

WÜRZBURG



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)

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### Module Group Focus Topic B

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Technologies to Support Regenerative Medicine

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# The subject is divided into

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### **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.

### 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)



# **Compulsory Courses**

(40 ECTS credits)

Module title			Abbreviation		
Mechanical and Thermal Material Properties			11-FU-MTE-161-m01		
Module coordinator				Module offered by	
Managi	ng Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
Physica	ıl laws	of solids: Bonding and st	ructure, lattice dynar	nics, thermal and m	echanical properties.
Intende	ed leari	ning outcomes			
The stu	dents l	nave knowledge of mecha	anical/thermal mater	ial characteristics.	
Courses	<b>5</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (3) + I Module		t in: Ü: German or English	1		
		s <b>essment</b> (type, scope, langua <sub>)</sub> le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
c) oral e d) proje e) prese If a writ stead ta of asse nation o	examin ect repo entatio ten exa ake the ssmen date at	form of an oral examinat	of 2, approx. 30 minut ) or es) method of assessme tion of one candidate must inform student	tes per candidate) o ent, this may be chan 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	nal inf	ormation			
Worklo	ad				
150 h					
Teaching cycle					
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)					
Module appears in					
	Master's degree (1 major) Functional Materials (2016)				
	-	ee (1 major) Functional M			
Master's degree (1 major) Functional Materials (2025)					

Module title			Abbreviation		
Opto-Electronic Material Properties				11-FU-MOE-161-m01	
Module coordinator				Module offered by	
Managi	ng Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate			
Conten	ts				
Physica	al princ	iples of optoelectronic m	aterial properties and	d applications	
Intende	ed learı	ning outcomes			
The stu	dents l	know the principles of op	toelectronic material	characteristics.	
Course	<b>S</b> (type, n	number of weekly contact hours, l	anguage — if other than Ger	man)	
V (3) + l Module		t in: Ü: German or Englisł	1		
		<b>sessment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
d) proje e) prese If a writ stead ta of asse nation o	ect repo entatio ten exa ake the ssmen date at	e form of an oral examina	s) or es) method of assessme tion of one candidate must inform student	ent, this may be char each or an oral exa	r nged and assessment may in- mination in groups. If the method weeks prior to the original exami-
Allocati	-				
Additio	nal inf	ormation			
Worklo	ad				
150 h					
Teaching cycle					
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)					
Module appears in					
Master's degree (1 major) Functional Materials (2016)					
	•	ee (1 major) Functional M			
Master's degree (1 major) Functional Materials (2025)					

Module title				Abbreviation				
Organi	Organic Chemistry 4 08-OC4-152-mo1							
Module coordinator Module offered b			Module offered by					
holder of the Chair of Organic Chemistry II Institute of Organic C			Chemistry					
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)				
5	nume	rical grade		-				
Duratio	on	Module level	Other prerequisites	Other prerequisites				
1 seme	ester	undergraduate						
Conten	nts							
	zardous	iscusses biologically in s substances, complica						
Intend	ed learı	ning outcomes						
able to	charac	able to name important terise and categorise d Idition, they are able to	yes. Students are able	to describe the strue	cture and selective s	ynthesis of		
Course	<b>S</b> (type, n	umber of weekly contact hours	, language — if other than Ger	man)				
V (2) +	Ü (2)							
		s <b>essment</b> (type, scope, langu le for bonus)	age — if other than German, o	examination offered — if no	t every semester, informati	on on whether		
c) oral d) log ( e) pres	examin (approx entatio	ation of one candidate ation in groups of up to . 20 pages) or n (approx. 30 minutes) ssessment: German an	3 candidates (approx		didate) or			
Allocat	tion of p	olaces	-					
Additio	onal inf	ormation						
Worklo	ad							
150 h								
Teachi	ng cycl	е						
Referre	ed to in	LPO I (examination regulation	ns for teaching-degree progra	mmes)				
§ 22    Nr. 1 h) § 22    Nr. 2 f) § 62   Nr. 2								
Module	Module appears in							
Module appears inBachelor'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)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)								
Master's w	rith 1 major	Functional Materials (2016)	-	generated 19-Apr-2025 • exa r (120 ECTS) Funktionswerkst	-	page 11 / 139		

Bachelor's degree (1 major) Biochemistry (2017)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) First state examination for the teaching degree Mittelschule Chemistry (2020 (Prüfungsordnungsversion 2015)) Bachelor'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 08-0CM-FM-161-m01				)1		
Module	e coord	inator		Module offered by		
lecture	r of the	seminar "Organische I	- unktionsmaterialien"	Institute of Organic	Chemistry	
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)		
5	nume	rical grade				
Duratio		Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts	5				
sical ef	fects ir nents s	organic molecular and	s in organic functional I polymeric semicondu sistors, organic light-er	ctors as well as their	application in (opto	)electronic
Intende	ed lear	ning outcomes				
explain	the sy ch as f	nthesis of these semic	lamental (photo)physic onductor materials as v organic light-emitting d	vell as their applicat	ion in (opto)electron	ic compon-
Course	<b>S</b> (type, r	umber of weekly contact hour	s, language — if other than Ger	man)		
S (3)						
Method		<b>eessment</b> (type, scope, lang le for bonus)	uage — if other than German, e	examination offered — if no	t every semester, informati	on on whether
b) oral c) oral ( d) log ( e) pres	examir examin approx entatio		each (20 to 30 minute 5 3 candidates (approx.	-	didate) or	
Allocat	. –					
Allocal		Jaces				
Additio	natinf	ormation				
	- 4					
Worklo	ad					
150 h						
Teachi	ng cycl	e				
<u></u>						
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) Experiment 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)						
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)						
		ee (1 major) Functional			/	
Master's wi	ith 1 majo	r Functional Materials (2016)	-	generated 19-Apr-2025 • exa r (120 ECTS) Funktionswerkst	-	page 13 / 139

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	Module title Abbreviation					
Resear	Research Project 1   08-FU-PR1-161-m01					
Module coordinator Module offered by					<u> </u>	
	degree programme coordinator Funktionswerkstoffe (Func- tional Matrierials)					
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
10	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
This mo rials.	odule g	ives students the opport	unity to work indepe	ndently on experime	nts on a topic in functional mate-	
Intende	ed lear	ning outcomes				
Studen in writt			rk on a defined topic	in functional materi	als and to present their findings	
Course	<b>S</b> (type, 1	number of weekly contact hours, l	anguage — if other than Gei	rman)		
R (10)						
		<b>sessment</b> (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
		د. 25 pages) ssessment: German and,	or English			
Allocat	ion of	places				
Additio	onal inf	ormation				
Worklo	ad					
300 h						
Teaching cycle						
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)						
Module appears in						
Master's degree (1 major) Functional Materials (2016)						
	Master's degree (1 major) Functional Materials (2022)					
Master	's degr	ee (1 major) Functional M	aterials (2025)			



Module	Module title Abbreviation					
Research Project 208-FU-PR2-161-m01					08-FU-PR2-161-m01	
Module coordinator Module offered by						
	degree programme coordinator Funktionswerkstoffe (Func- cional Matrierials)					
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
10	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
This mo rials.	odule g	ives students the opport	unity to work indepe	ndently on experime	nts on a topic in functional mate-	
Intende	ed lear	ning outcomes				
Studen in writte			rk on a defined topic	in functional materi	als and to present their findings	
Course	<b>S</b> (type, 1	number of weekly contact hours, l	anguage — if other than Gei	man)		
R (10)						
		<b>sessment</b> (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
		<. 25 pages) ssessment: German and/	or English			
Allocat	ion of	places				
Additio	nal inf	ormation				
Worklo	ad					
300 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)						
	-	ee (1 major) Functional M				
Master	's degr	ee (1 major) Functional M	aterials (2025)			



# **Compulsory Electives**

(50 ECTS credits)



# **Subfield Focus Topic**

(30 ECTS credits)

A focus topic (A or B) is to be selected, from which modules totaling 30 ECTS points are to be included.



#### Module Catalogue for the Subject Functional Materials Master's with 1 major, 120 ECTS credits

# Focus Topic A: Bio materials

(30 ECTS credits)

Module title			Abbreviation			
Biofabrication			03-BIOFAB-152-m01			
Module co	ordinator		Module offered by			
holder of tl Dentistry	holder of the Chair of Functional Materials in Medicine and Faculty of Medicine Dentistry					
ECTS Me	ethod of grading	Only after succ. com	pl. of module(s)			
5 nu	merical grade					
Duration	Module level	Other prerequisites				
1 semester	graduate					
Contents						
and praction photon pol sintering, r	ces, description of extracellu lymerisation, fused depositic	lar matrix, bioprintin on modelling, inorgan self-healing hydroge	g, continuous liquid nic powder printing, ls, polymers in 3D pı	of medical device regulations interface polymerisation, two- stereolithography, selective laser rinting, introduction to rheology, rol.		
Intended le	earning outcomes					
ble in the c printer wor ding of scie will acquire	context of biofabrication. This rks, with its strengths and we entific methodology for each	s includes how the pe eaknesses. A holistic stage and the differe	olymers are process view of biofabricatic ent regulations gover	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		
	pe, number of weekly contact hours, la	anguage — if other than Ger	man)			
V (2) + Ü (1 Module taı	.) ught in: V, Ü: English					
	<b>assessment</b> (type, scope, languag ditable for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
b) oral exa c) talk (30	examination (approx. 90 min mination of one candidate ea minutes) of assessment: English					
Allocation	of places					
Additional information						
Workload						
150 h						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master's degree (1 major) Biofabrication (2015)						
	Master's degree (1 major) Functional Materials (2016)					

Module	e title	· · · · · · · · · · · · · · · · · · ·			Abbreviation		
Tissue	Engine	ering - Alternatives to	Animal Testing		03-FU-TE-AT-161-m01		
Module	e coord	inator		Module offered by			
holder	of the (	Chair of Regenerative	Medicine	Faculty of Medicine	2		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
5	nume	rical grade					
Duratio	on	Module level	Other prerequisites	i			
1 seme	ster	undergraduate					
Conten	ts		· · · · ·				
			ration of complex 3D tiss according to GMP guideli		pment of pre- clinical test models.		
Intende	ed lear	ning outcomes					
			onstruct complex 3D tis s transplant in the clinic		the use therof as alternative test		
Course	<b>S</b> (type, r	umber of weekly contact hou	urs, language — if other than Ge	rman)			
V (2) +	Ü (2)						
		<b>essment</b> (type, scope, lar le for bonus)	nguage — if other than German,	examination offered — if no	ot every semester, information on whether		
(approx	x. 60 m			entation (approx. 30	o minutes) or written examination		
Allocat							
Additio	onal inf	ormation					
Worklo	ad						
150 h							
Teachi	ng cycl	e					
Referre	ed to in	LPO I (examination regula	tions for teaching-degree progra	ammes)			
Module	e appea	irs in					
Master	's degr	ee (1 major) Functiona	ll Materials (2016)				

Modul	e title				Abbreviation	
Fundar Functio		of Physiology and Appli	cation of Surgical Im	plants by Loss of	03-FU-IMP-161-m01	
Modul	e coord	inator		Module offered by		
holder Dentist		Chair of Functional Mater	ials in Medicine and	Faculty of Medicine	2	
ECTS Method of grading Only after succ. compl. of module(s)						
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ester	graduate				
Conter	nts					
structu	ire and		hat lead to functional		stem, of the jaw including tooth of function. Materials and use of	
Intend	ed lear	ning outcomes				
		receive advanced knowle In lead to the use of med			nowledge about pathological pro- t.	
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)		
V (3) +	P (1)					
			ge — if other than German, o	examination offered — if n	ot every semester, information on whether	
		le for bonus)				
(appro	x. 90 m	ractical course (approx. 1 inutes); weighted 1:1 ssessment: German and,		entation (approx. 30	o minutes) or written examination	
	tion of p					
Additio	onal inf	ormation				
Worklo	ad					
150 h						
-	ng cycl	e				
Referre	ed to in	LPO I (examination regulations	s for teaching-degree progra	mmes)		
		-	<b>.</b>			
Modul	e appea	irs in				
		ee (1 major) Functional M	aterials (2016)			

Module	title				Abbreviation	
Tissue	Engine	ering - Basics for Tissue	Regeneration		03-TE-REG-161-m01	
Module	coord	inator		Module offered by		
unknown				Faculty of Medicine		
ECTS	Metho	od of grading	Only after succ. compl. of module(s)			
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
sue trai	nsplant		cells for the genereat	ion of cartilage and I	nes. Basics of matrix -based tis- bone tissue. Strategies for vascu-	
Intende	ed learn	ning outcomes				
	ells for	the cartilage and bone re			ologuous cells, the selection of sed as diagnostics and for thera-	
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V (2) +	Ü (2)					
		<b>:essment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, information on whether	
(approx	. 60 m			entation (approx. 30	minutes) or written examination	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teachir	ng cycl	e				
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	mmes)		
Module	e appea	in				
Master	Master's degree (1 major) Functional Materials (2016)					

Module title Abbreviation					Abbreviation	
Carrier	Materi	als and Devices for Thera	apeutic Compounds		03-FU-TMW-161-m01	
Module	e coord	inator		Module offered by		
holder of the Chair of Regenerative Medicine		dicine	Faculty of Medicine			
ECTS	Metho	od of grading	Only after succ. compl. of module(s)			
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
tation of Further	of vario more, o	us loading mechanisms a	as well as the control is and their clinical us	led release of drugs se are presented. St	rticular nanoparticles; presen- from the drug delivery system. udents gain a deeper insight into	
Intende	ed learr	ning outcomes				
	what p	roduction options are ava			tems. In addition, they will be pected, so that they can deal	
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V (2) +	P (1)					
		e <b>essment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
(approx	x. 30 m			en examination (app	orox. 90 minutes) or presentation	
Allocat	ion of p	olaces				
Additio	nal info	ormation				
Worklo	ad					
150 h						
Teachi	ng cycl	9				
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)		
Module						
Master	Master's degree (1 major) Functional Materials (2016)					

Module	e title	_			Abbreviation	
Techno	logies	to Support Regenerative	e Medicine		03-FU-TRM-161-m01	
Module	e coord	inator		Module offered by	<u> </u>	
holder of the Chair of Regenerative Medicine			dicine	Faculty of Medicine		
ECTS						
5	nume	rical grade	-			
Duratio	on	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
		ects for the generation o surfaces. Cell material it		valents. Problems of	tissue/Implant interfaces. Nano-	
Intende	ed learı	ning outcomes				
		fundamental knowledge I the appropriate tissue of		/material interfaces,	with speciific tissue material in-	
Course	<b>S</b> (type, n	number of weekly contact hours,	language — if other than Ger	rman)		
V (2) +	Ü (2)					
		<b>sessment</b> (type, scope, langua le for bonus)	age — if other than German, o	examination offered — if no	ot every semester, information on whether	
(approx	<b>x.</b> 60 m			entation (approx. 30	minutes) or written examination	
Allocat			· · · · · · · · · · · · · · · · · · ·			
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teachi	ng cycl	e				
Referre	d to in	LPOI (examination regulation	ns for teaching-degree progra	mmes)		
Module	e appea	ars in				
Master	's degr	ee (1 major) Functional N	Naterials (2016)			



# Focus Field B: Technical Materials

(30 ECTS credits)

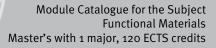
Master's with 1 major Functional Materials (2016)

	e title				Abbreviation
Structu	ure and	Properties of Modern M	Naterials: Experiments	s vs. Simulations	08-FU-MW-161-m01
Module	e coord	inator		Module offered by	,
degree	progra	mme coordinator Funkt	ionswerkstoffe (Func-		Technology of Material Synthesi
	Matrieri				
ECTS Method of grading Only after succ. compl. of module(s)					
5	1	rical grade		•	
<u></u> Duratio		Module level	Other prerequisites		
1 seme		graduate			
		glauuale	1		
Conten			1 1 1 1		
Materia simula		erties of metals and cera	amics: correlation of s	tructure/property re	lations through experiments and
Intend	ed lear	ning outcomes			
Studer	nts gain	an insight into the prop	perties of modern mate	erials: aerospace al	uminium alloys and high-perfor-
mance	cerami	cs. They are introduced	to measuring method	s and calculation m	ethods using numerical simulat
	•	ocus is on the relation l	petween the micro/na	noscopic structure o	of materials and the resulting pr
perties			_		
Course	<b>S</b> (type, r	number of weekly contact hours	, language — if other than Ge	rman)	
V (2) +	S (1)				
Metho	d of ass	<b>sessment</b> (type, scope, langu	age — if other than German,	examination offered — if r	ot every semester, information on whether
module i	s creditab	le for bonus)			
		k. 30 minutes) or			
		ation of one candidate		-	
		ation in groups (groups		tes total)	
-	-	ssessment: German and			
			-		
		ffered: Once a year, win	-		
	tion of p	ffered: Once a year, win	-		
Allocat 	tion of p	ffered: Once a year, win <b>blaces</b>	-		
Allocat 	tion of p	ffered: Once a year, win	-		
Allocat  Additic	tion of p	ffered: Once a year, win <b>blaces</b>	-		
Allocat  Additic 	tion of p	ffered: Once a year, win <b>blaces</b>	-		
Allocat 	tion of p	ffered: Once a year, win <b>blaces</b>	-		
Allocat  Additic  Worklo 150 h	tion of p	ffered: Once a year, win olaces ormation	-		
Allocat  Additic  Worklo 150 h	tion of p onal info oad	ffered: Once a year, win olaces ormation	-		
Allocat  Additio  Worklo 150 h Teachi	tion of p onal info oad ng cycl	ffered: Once a year, win olaces ormation	ter semester	ummes)	
Allocat  Additio  Worklo 150 h Teachi	tion of p onal info oad ng cycl	ffered: Once a year, win olaces ormation e	ter semester		
Allocat  Additic  Worklo 150 h Teachi  Referre	tion of p onal info oad ng cycl	ffered: Once a year, win olaces ormation e LPOI (examination regulatio	ter semester	ummes)	
Allocat  Additio  Worklo 150 h Teachi  Referre  Modulo	tion of p onal info oad ng cycl ed to in e appea	ffered: Once a year, win olaces ormation e LPOI (examination regulation ars in ee (1 major) Physics (20	ter semester		
Allocat  Additic  Worklo 150 h Teachi  Referre  Modulo Master Master	tion of p onal info oad ng cycl ed to in e appea	ffered: Once a year, win olaces ormation e LPOI (examination regulation ars in ee (1 major) Physics (20 ee (1 major) Nanostructo	ter semester ns for teaching-degree progra 16) ure Technology (2016)		
Allocat  Additic  Worklo 150 h Teachi  Referre Master Master Master Master	ng cycl ed to in e appea	ffered: Once a year, win places ormation e LPOI (examination regulation regulation e (1 major) Physics (20 e (1 major) Nanostruction e (1 major) Functional J	ter semester ns for teaching-degree progra 16) ure Technology (2016) Waterials (2016)		
Allocat  Additio  Worklo 150 h Teachi Teachi Referre  Modulo Master Master Master Master	tion of p onal info oad ng cycl ed to in e appea d's degro d's degro d's degro	ffered: Once a year, win places ormation e LPO I (examination regulation ars in ee (1 major) Physics (20) ee (1 major) Nanostructu ee (1 major) Functional I ee (1 major) Nanostructu	ter semester ns for teaching-degree progra 16) ure Technology (2016) Waterials (2016) ure Technology (2020)		
Allocat  Additio  Worklo 150 h Teachi  Referre Master Master Master Master Master Master Master	tion of p onal info oad ng cycl ed to in e appea d's degru d's degru d's degru d's degru	ffered: Once a year, win places ormation e LPO I (examination regulation regulation rs in ee (1 major) Physics (20 ee (1 major) Nanostruction ee (1 major) Nanostruction ee (1 major) Nanostruction ee (1 major) Physics (20) ee (1 major) Physics (20)	ter semester ns for teaching-degree progra 16) ure Technology (2016) Materials (2016) ure Technology (2020) 20)		
Allocat  Additic  Worklo 150 h Teachi  Referre Master Master Master Master Master Master Master Master	ed to in e appea 's degru 's degru 's degru 's degru 's degru 's degru	ffered: Once a year, win places ormation e LPO I (examination regulation ars in ee (1 major) Physics (20 ee (1 major) Nanostructor ee (1 major) Nanostructor ee (1 major) Physics (20 ee (1 major) Physics (20 ee (1 major) Physics (20 ee (1 major) Physics (20 ee (1 major) Physics (20	ter semester ns for teaching-degree progra 16) ure Technology (2016) Waterials (2016) ure Technology (2020) 20) ernational (2020)		
Allocat  Additic  Worklo 150 h Teachi  Referre Master Master Master Master Master Master Master Master Master Master Master	ed to in e appea 's degra 's degra 's degra 's degra 's degra 's degra	ffered: Once a year, win places ormation e LPO I (examination regulation regulation rs in ee (1 major) Physics (20 ee (1 major) Nanostruction ee (1 major) Nanostruction ee (1 major) Nanostruction ee (1 major) Physics (20) ee (1 major) Physics (20)	ter semester ns for teaching-degree progra 16) ure Technology (2016) Waterials (2016) ure Technology (2020) 20) ernational (2020) ngineering (2020)		

Modul	e title				Abbreviation
Sensor	r and A	ctor Materials - Function	onal Ceramics and Mag	netic Particles	08-FU-SAM-161-m01
Modul	e coord	inator		Module offered b	y
	progra Matrieri		ktionswerkstoffe (Func-	Chair of Chemica	l Technology of Material Synthesis
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
5	1	rical grade			
<u> </u>		Module level	Other prerequisites		
		-			
1 seme		graduate			
Conten	its				
					as piezoelectrics, shape memory ological fluids, magnetofluids.
Intend	ed lear	ning outcomes			
Studer	nts have	e developed fundamer	ntal knowledge in the ar	ea of sensory and	actuatory materials.
Course	<b>S</b> (type, r	number of weekly contact hou	ırs, language — if other than Ger	rman)	
V (2) +	P (2)				
		sessment (type, scope, lan	guage — if other than German	examination offered — if	not every semester, information on whether
		le for bonus)	o de la strer tran cennun, i		,,,
Assess	ment o	ssessment: German a ffered: Once a year, su or bonus			
	tion of J				
Additic	nal inf	ormation			
Auditit					
 We elde					
<b>Worklo</b> 150 h					
-	ng cycl	e			
Referre	ed to in	LPO I (examination regulat	tions for teaching-degree progra	immes)	
Module	e appea	ars in			
		ee (1 major) Physics (2	2016)		
	-		cture Technology (2016)		
	-	ee (1 major) Functiona			
	-		cture Technology (2020)		
	-	ee (1 major) Physics (2			
Master	's degr	ee (1 major) Physics In	Iternational (2020)		
Master	's degr	ee (1 major) Quantum	Engineering (2020)		
	'c doar	$( \cdot \cdot ) \circ \cdot $			
Master	5 uegi	ee (1 major) Quantum	Technology (2021)		
Master	's degr	ee (1 major) Quantum ee (1 major) Quantum ee (1 major) Physics In	Engineering (2024)		

Module	Module title Abbreviation							
Polyme	rs II				03-FU-PM2-161-mo:	1		
Module	coord	inator		Module offered by				
holder o Dentisti		Chair of Functional Mate	rials in Medicine and	Faculty of Medicine				
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)				
5	nume	rical grade	-					
Duratio		Module level	Other prerequisites	Other prerequisites				
1 semes	ster	graduate						
Content		3.44440						
plex po lication their be	lymer a of the havior	mer synthesis methods architectures), biodegra respective polymers: e. on surfaces.	dable polymers, polyp	eptoides, natural po	lymers. We will disc	uss the app-		
Intende	d learr	ning outcomes						
differen als. Stu gain ins quence	t synth dents o sight in s / disa	equire advanced knowle netic routes with which t can estimate if and how to the field of technical advantages that synthe concerns.	the different molecules fast a polymer degrac ly used polymers from	s can be prepared fro les under given circu nature. Each sectior	om different starting mstances. Furtherm a also points to poss	materi- ore, they ible conse-		
Courses	<b>5</b> (type, n	umber of weekly contact hours	, language — if other than Ger	rman)				
S (2) + Ü	Ü (1)							
Method	ofass	s <b>essment</b> (type, scope, langu le for bonus)	uage — if other than German, o	examination offered — if no	t every semester, informati	on on whether		
b) oral e c) talk (	examin approx	nination (approx. 90 m ation of one candidate 30 minutes) ssessment: German and	each (approx. 20 minu	utes) or				
Allocati	on of p	olaces						
Additio	nal info	ormation						
Workloa	ad							
150 h								
Teachin	ig cycl	2						
reaction	Scyce	•						
Referre	d to in	LPO I (examination regulatio	ns for teaching-degree progra	mmes)				
Module								
Master' Master' Suppler Master' Master'	s degre s teach mentar s degre s teach	ee (1 major) Chemistry ( ee (1 major) Functional I ning degree Gymnasium y course MINT Teacher ee (1 major) Chemistry ( ning degree Gymnasium y course MINT Teacher	Materials (2016) 1 MINT Teacher Educat Education PLUS, Elite I 2018) 1 MINT Teacher Educat	Network Bavaria (EN ion PLUS, Elite Netwo	B) (2016) ork Bavaria (ENB) (20			
<u> </u>		Functional Materials (2016)	JMU Würzburg •	generated 19-Apr-2025 • exa	ım. reg. da-	page 29 / 139		
			ta record Maste	r (120 ECTS) Funktionswerkst	offe - 2016			

Module title Abbreviation							
Nanoso	ale Ma	terials			08-PCM3-161-m01		
Module	e coord	inator		Module offered by			
lecture	r of the	seminar "Nanoskalige	Materialien"	Institute of Physical	l and Theoretical Ch	emistry	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
5		nerical grade					
Duratio		Module level	Other prerequisites	i			
1 seme		graduate					
Conten		Sidduite					
This mo	odule d	liscusses advanced top naracterisation method				es, fabricati-	
		ning outcomes					
Studen	ts are a	able to characterise nar moscale materials.	noscale materials. The	y are able to name ar	nalytical methods an	d applicati-	
Course	<b>S</b> (type, r	number of weekly contact hours	s, language — if other than Ge	rman)			
S (2) + Module		t in: German or English					
		<b>Sessment</b> (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	ion on whether	
b) oral c) talk	examir (approx Ige of a	mination (approx. 90 m nation of one candidate <. 30 minutes) ssessment: German an bonus	each (approx. 20 min	utes) or			
Allocat	ion of <sub>l</sub>	olaces					
Additio	nal inf	ormation					
Worklo	ad						
150 h							
Teachi	ng cycl	e					
Referre	d to in	LPO I (examination regulation	ons for teaching-degree progra	ammes)			
	-						
Module							
	-	ee (1 major) Chemistry					
	-	ee (1 major) Mathemati					
	-	ee (1 major) Computatio		.6)			
	-	ee (1 major) Functional hing degree Gymnasiun		ion PLUS Elito Notw	ork Rovaria (ENR) (a	016)	
Supple	menta	ry course MINT Teacher ee (1 major) Chemistry (	Education PLUS, Elite			010)	
	-	ee (1 major) Computatio		.9)			
	-	ee (1 major) Mathemati					
		hing degree Gymnasiun ry course MINT Teacher				020)	
Master's wi	ith 1 majo	r Functional Materials (2016)		• generated 19-Apr-2025 • exa er (120 ECTS) Funktionswerkst	-	page 30 / 139	



Bachelor'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) Master's degree (1 major) Chemistry (2024) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) 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
Supran	nolecul	ar Chemistry (Basics)			08-SCM1-161-m01
Module	e coord	inator		Module offered by	
		seminar "Supramolecula	r Chemistry (Ba-	Institute of Organic	Chemistry
sics)"		·	-		·
ECTS		Method of grading Only after succ. compl. of module(s)			
5		rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme		graduate			
actions nation dern ap	s betwe polyme oplicati	en molecules, molecular ers and networks, liquid c ons of supramolecular ch	recognition by recep rystals, self-assembl	tors, complexes, su	lar chemistry. It focuses on inter- oramolecular polymers, coordi- , synthetic ion channels and mo-
Studen field as describ ion cha	its are a s well a be the s annels.	s to describe the formatic elf-assembly of polymers They can name modern a	on, structure and poly in aqueous media a pplications of supra	ymers of coordinatio s well as to identify molecular chemistry	igh degree of expertise in the n compounds. They are able to the characteristics of synthetic
	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)	
S (3) Module	a taugh	t in: German or English			
module is a) writt b) oral	s creditab en exai examir	<sup>le for bonus)</sup> mination (approx. 90 min lation of one candidate e	utes) or ach (approx. 20 minu		ot every semester, information on whether
-	-	ssessment: German and,	or English		
Allocat	ion of p	Diaces			
 Additic	nalinf	ormation			
Worklo	ad				
150 h					
-	ng cycl	e			
Referre	ed to in	LPOI (examination regulations	s for teaching-degree progra	mmes)	
Module	e appea	nrs in			
Master Master Master Supple Master	's degro 's degro 's teach ementai	ee (1 major) Functional M ee (1 major) Functional M ee (1 major) Chemistry (2 ning degree Gymnasium I ry course MINT Teacher Ec ee (1 major) Biofabricatio ee (1 major) Functional M	aterials (2022) 024) MINT Teacher Educat ducation PLUS, Elite n (2025)		

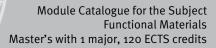
	Module title				Abbreviation	
Physical Chemistry of Supramolecular Assemblies			ar Assemblies		08-PCM5-161-m01	
Module	e coord	inator		Module offered by		
lecture kularer		seminar "Physikalisch uren"	e Chemie Supramole-		l and Theoretical Ch	emistry
ECTS		od of grading	Only after succ. con	npl. of module(s)		
5		rical grade				
Duratio		Module level	Other prerequisites	i		
1 seme	ctor	graduate				
Conten		Sidduite				
This mo cal proj	odule e perties	of aggregates as well a	ractions between mole as key applications of s			ysical-chemi
		ning outcomes				
in the fi dern ap	ield. Th pplicati	ney can describe the fo ons of supramolecular		hemical properties o		
		iumber of weekly contact hour	s, language — if other than Ger	iiiidil)		
S (2) + Module		t in: German or English				
Method	d of ass	-	guage — if other than German,	examination offered — if no	t every semester, informat	ion on whether
	ge of a	k. 30 minutes) Issessment: German ar <b>places</b>	nd/or English			
Additio	nal inf	ormation				
147 11	ad					
Worklo						
Worklo 150 h						
	ng cycl	e				
150 h	ng cycl	e				
150 h <b>Teachir</b> 			ons for teaching-degree progra	ammes)		
150 h <b>Teachir</b> 			ons for teaching-degree progra	ammes)		
150 h Teachir  Referre 	ed to in	LPOI (examination regulati	ons for teaching-degree progra	ammes)		
150 h Teachir  Referre  Module	ed to in e appea	LPO I (examination regulati		ammes)		
150 h Teachir  Referre  Module Master	ed to in e appea	LPOI (examination regulati	(2016)	ammes)		
150 h Teachir  Referre  Module Master Master	ed to in e appea 's degr	<b>LPO I</b> (examination regulati ars in ee (1 major) Chemistry ee (1 major) Mathemat	(2016)			
150 h Teachin  Referre  Module Master Master Master Master	e appea 's degr 's degr 's degr 's degr 's degr	LPOI (examination regulati ars in ee (1 major) Chemistry ee (1 major) Mathemati ee (1 major) Computati ee (1 major) Functional	(2016) ics (2016) onal Mathematics (201 Materials (2016)	6)		
150 h Teachir  Referre  Master' Master' Master' Master' Master'	<b>d to in</b> <b>e appea</b> 's degr 's degr 's degr 's degr 's teac	LPO I (examination regulati ars in ee (1 major) Chemistry ee (1 major) Mathemati ee (1 major) Computati ee (1 major) Functional hing degree Gymnasiur	(2016) ics (2016) onal Mathematics (201 Materials (2016) n MINT Teacher Educat	6) ion PLUS, Elite Netwo		016)
150 h Teachin  Referre  Master Master Master Master Supple	ed to in e appea 's degr 's degr 's degr 's degr 's teac menta	LPOI (examination regulati ars in ee (1 major) Chemistry ee (1 major) Mathemati ee (1 major) Computati ee (1 major) Functional hing degree Gymnasiur ry course MINT Teacher	(2016) ics (2016) onal Mathematics (201 Materials (2016) n MINT Teacher Educat <sup>·</sup> Education PLUS, Elite	6) ion PLUS, Elite Netwo		016)
150 h Teachin  Referre  Module Master' Master' Master' Master' Supple Master'	ed to in e appea 's degr 's degr 's degr 's degr 's teacl menta 's degr	LPO I (examination regulati ars in ee (1 major) Chemistry ee (1 major) Mathemati ee (1 major) Computati ee (1 major) Functional hing degree Gymnasiur ry course MINT Teacher ee (1 major) Chemistry	(2016) ics (2016) onal Mathematics (201 Materials (2016) n MINT Teacher Educat Education PLUS, Elite ( (2018)	6) ion PLUS, Elite Netwo Network Bavaria (EN		016)
150 h Teachin  Referre  Master' Master' Master' Master' Supple Master' Master'	ed to in e appea 's degr 's degr 's degr 's teacl menta 's degr 's degr 's degr	LPO I (examination regulati ars in ee (1 major) Chemistry ee (1 major) Mathemati ee (1 major) Computati ee (1 major) Functional hing degree Gymnasiur ry course MINT Teacher ee (1 major) Chemistry ee (1 major) Computati	(2016) ics (2016) onal Mathematics (201 Materials (2016) n MINT Teacher Educat Education PLUS, Elite (2018) onal Mathematics (201	6) ion PLUS, Elite Netwo Network Bavaria (EN		016)
150 h Teachir  Referre  Master' Master' Master' Master' Supple Master' Master' Master' Master' Master' Master'	ed to in e appea e's degr e's degr e's degr e's teac menta e's degr e's degr e's degr e's degr e's degr	LPO I (examination regulati ars in ee (1 major) Chemistry ee (1 major) Mathemati ee (1 major) Functional hing degree Gymnasiur ry course MINT Teacher ee (1 major) Chemistry ee (1 major) Computati ee (1 major) Mathemati	(2016) ics (2016) onal Mathematics (201 Materials (2016) n MINT Teacher Educat Education PLUS, Elite (2018) onal Mathematics (201	6) ion PLUS, Elite Netwo Network Bavaria (EN 9)	B) (2016)	

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (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) Chemistry (2024) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) 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)

Modul	e title				Abbreviation
Polym	er Mate	rials 1: Technology of Po	olymer Modification		08-FU-PW1-161-m01
Modul	e coord	inator		Module offered by	l
	progra Matrieri	mme coordinator Funktio als)	onswerkstoffe (Func-	Chair of Chemical T	echnology of Material Synthesis
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
5	1	rical grade			
<u>Duratio</u>		Module level	Other prerequisites		
		graduate			
1 seme		giauuale	]		
logies	for the i				; properties of polymers; techno es for the characterisation of po
Intend	ed learı	ning outcomes			
portan such a nufacti cessin	t produ s inject ured pro g machi	ction technologies (poly ion moulding) and under oducts. They have becon nes and tools.	mer synthesis method rstand the different w ne familiar with ways	ds, compounding tec ays of influencing th to calculate complex	r with the characteristics of im- chnologies, processing methods e properties of materials and ma c flow conditions in polymer pro-
Course	<b>S</b> (type, n	umber of weekly contact hours,	language — if other than Ger	rman)	
V (2) +	P (2)				
		e <b>essment</b> (type, scope, langua le for bonus)	age — if other than German,	examination offered — if no	t every semester, information on whether
b) oral c) oral Langua Assess	examin examin age of a sment o	nination (approx. 90 min ation of one candidate e ation in groups (groups ssessment: German and ffered: Once a year, wint or bonus	each (approx. 20 minu of 2, approx. 30 minu /or English		
Allocat	tion of p	olaces			
Additio	onal inf	ormation			
Worklo	ad				
150 h					
-	ng cycl	e			
Referre	ed to in	LPOI (examination regulation	s for teaching-degree progra	ummes)	
		<u> </u>		· · · · ·	
	e appea	urs in			
		ee (1 major) Functional N	Aaterials (2016)		
master	-				
Master	S Gegn	ee (1 major) Functional N	Aaterials (2022)		
	-	ee (1 major) Functional N ee (1 major) Biofabricatio			

Module title					Abbreviation	
Polymer Materials 2: Technology of Filler Modification for Polymer Materials 08-FU-PW2-161-m01						
Module coordinator				Module offered by		
degree programme coordinator Funktionswerkstoffe (Func- tional Matrierials)				Chair of Chemical Technology of Material Synthesis		
ECTS	Method of grading		Only after succ. compl. of module(s)			
5	nume	rical grade				
Duration Module level		Module level	Other prerequisites			
1 semester graduate		graduate				
Contents						
ons bei (e.g. el	tween f ectrica	iller materials and polym	ers, determination o behaviour) and influe	f the special propert	er to modify polymers, interacti- ies of functionalised polymers ition on other properties (e.g.	
Intende	ed lear	ning outcomes				
Students have become familiar with technologies for the functionalisation of filler materials. They have develo- ped an awareness of the possibilities and problems associated with the modification of polymers as well as the interactions between filler materials and polymers. They know how to determine the special properties of func- tionalised polymers (e.g. electrical behaviour, bactericidal behaviour) and understand how other properties are influenced by functionalisation (e.g. rheology, mechanical behaviour, colour, surface).						
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Gei	rman)		
V (2) + P (2)						
		<b>sessment</b> (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
b) oral c) oral Langua Assess	examir examin Ige of a ment o	mination (approx. 90 min ation of one candidate e ation in groups (groups c ssessment: German and, ffered: Once a year, sum or bonus	ach (approx. 20 minu of 2, approx. 30 minu ⁄or English			
Allocat	ion of <b>j</b>	olaces				
Additio	onal inf	ormation				
Worklo	ad					
150 h						
Teaching cycle						
	_ /					
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)						
Module	e appea	ırs in				
Master Master	Master's degree (1 major) Functional Materials (2016) Master's degree (1 major) Functional Materials (2022) Master's degree (1 major) Functional Materials (2025)					
master	5 uegi		ateriais (2025)			

Module title					Abbreviation	
Nanoar	nalytics	5			11-NAN-152-m01	
Module	e coord	inator		Module offered by		
Managi	ing Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites	;		
1 seme	ster	graduate				
Conten	ts					
level up of X-ray py. Sca croscop ray abs	o to an metho nning t oe Se orptior	nalytic procedures in tl atomic level, examinat ods Physics and mate cunneling microscopy condary ions - mass sp ning outcomes	ion of chemical compo rial systems on the na Electron probes: Scan	sition, spectroscopy noscale Scanning p ning electron micros	of electronic proper probes: Atomic force cope. Transmission	ties, usage microsco- electron mi-
vel. The	ey knov thods f	have basic knowledge of v microscoping procedu or the determination of ds.	ires that are used in p	ractice in labs and th	e industry as well as	s spectrosco-
Course	<b>S</b> (type, r	number of weekly contact hours	s, language — if other than Ge	rman)		
V (3) + Module		t in: German or English				
Method	d of ass	sessment (type, scope, lang	uage — if other than German,	examination offered — if no	t every semester, informati	ion on whether
module is	creditab	le for bonus)				
<ul> <li>b) oral</li> <li>c) oral of</li> <li>d) projection</li> <li>e) pressed</li> <li>lf a write</li> <li>stead ta</li> <li>of assed</li> <li>nation</li> <li>Langua</li> </ul>	examir examin ect repo entatio tten exa ake the ssmen date at ge of a	mination (approx. 90 to bation of one candidate ation in groups (groups ort (approx. 8 to 10 pag n/talk (approx. 30 minuta amination was chosen a form of an oral examinat is changed, the lectur the latest. ssessment: German an ffered: Once a year, win	each (approx. 30 minu s of 2, approx. 30 minu es) or utes). as method of assessm ation of one candidate er must inform student d/or English	ites per candidate) o ent, this may be char e each or an oral exa	nged and assessmer mination in groups.	If the method
Allocat	ion of p	olaces				
Additional information Workload 180 h Teaching cycle						
reaciili	ig tyti	6				
Referre	d to in	LPO I (examination regulation	ons for teaching-degree nrogr	ammes)		
Module	e appea	ars in				
				. , .		J
Master's wi	ith 1 majo	r Functional Materials (2016)	-	• generated 19-Apr-2025 • exa er (120 ECTS) Funktionswerkst	-	page 37 / 139



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) exchange program Physics (2023)

Module title Abbreviation						
Organic Semiconductors 11-OHL-161-mo1						
Module	e coord	inator		Module offered by		
Managing Director of the Institute of Applied Physics			Applied Physics	Faculty of Physics a	nd Astronomy	
ECTS Method of grading Only after succ. compl. of module(s)						
6	6 numerical grade					
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts		-			
Fundan ons.	nentals	of organic semiconduc	tors, molecular and po	olymer electronics an	d sensor technology	y, applicati-
Intende	ed lear	ning outcomes				
		have advanced knowled	lge of organic semicor	ductors.		
		number of weekly contact hours				
V (3) +		,,,,,				
		t in: German or English				
		<b>sessment</b> (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	ion on whether
b) oral c) oral d d) proje e) pres If a writ stead t of asse nation Langua Assess Allocat 	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 <b>Allocation of places</b>  <b>Additional information</b>  <b>Workload</b>					
Teachi		•				
reatin	ig tytt	C				
Referre	d to in	LPO I (examination regulation	ons for teaching-degree progra	mmes)		
Module appears in						
Master's degree (1 major) Physics (2016) Master's degree (1 major) Nanostructure Technology (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) Nanostructure Technology (2020) Master's degree (1 major) Physics (2020)						
Master's wi	ith 1 majoi	r Functional Materials (2016)	-	generated 19-Apr-2025 • exa r (120 ECTS) Funktionswerkst	-	page 39 / 139



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) 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	
Optica	l Prope	rties of Semiconducto	Nanostructures		11-HNS-161-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	mpl. of module(s)		
6	nume	rical grade				
Duration Module level Other prerequisites						
1 seme	1 semester graduate					
Conten	ts					
or mac ging th tures o with a f of nove for qua	roscop eir size f varyin focus o el optoe ntum c ed lear	ic crystals, their electro . The lecture addresses g dimensions (2D, 1D, n optical properties an electronic and quantum ommunication and quantum	requently referred to as onic, optical and magne s technological challen oD). It provides the ba d light-matter coupling n photonic devices bas antum computing arch	etic properties can be ages in the preparation sic theoretical conce g. Moreover, it discus sed on such nanostru itectures.	e systematically tailo on of semiconductor pts to describe their ses the challenges a ctures, including bui	ored by chan- nanostruc- properties, and concepts ilding blocks
knowle	dge of	the technological meth	inciples and character nods to fabricate such knowledge to problem	structures, and of the	eir applications to no	
Course	<b>S</b> (type, r	number of weekly contact hour	s, language — if other than Ge	erman)		
V (3) + Module		t in: German or English				
Metho	d of ass	sessment (type, scope, lang	guage — if other than German,	examination offered — if no	ot every semester, informat	ion on whether
b) oral c) oral d) proje e) pres If a writ stead t of asse nation Langua Assess	examir examin ect repo entatio tten exa ake the essmen date at age of a ment o	ation in groups (group ort (approx. 8 to 10 pag n/talk (approx. 30 min amination was chosen e form of an oral exami t is changed, the lectur the latest. ssessment: German ar ffered: In the semester	e each (approx. 30 min s of 2, approx. 30 minu ges) or utes). as method of assessm nation of one candidat rer must inform studen	utes per candidate) o eent, this may be cha e each or an oral exa ts about this by four	nged and assessmer mination in groups. weeks prior to the or	If the method riginal exami-
Allocat	ion of <sub>l</sub>	olaces				
 Additional information  Workload 180 h Teaching cycle  Referred to in LPO I (examination regulations for teaching-degree programmes) 						
Master's w	ith 1 majo	r Functional Materials (2016)	-	• generated 19-Apr-2025 • example (120 ECTS) Funktionswerks	-	page 41 / 139

## UNIVERSITÄT WÜRZBURG

Master's degree (1 major) Mathematics (2016) 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)

Module title				Abbreviation		
Princip	les of E	Energy Technologies			11-ENT-152-m01	
Module	e coord	inator		Module offered by		
Manag	ing Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. cor	npl. of module(s)		
6	nume	rical grade				
Duratio	on	Module level	Other prerequisites	5		
1 seme	ster	graduate				
Conten	ts					
as rene ting ma studen verters Electric	ewable aterials ts. Ene . Nucle city. Bic	resources of energy. W , selective layers, high rgy conservation via th ar power plants. Hydro	vation and energy conv /e also discuss aspects ly activated carbons). T ermal insulation. Therr electricity. Wind turbin ergy. Energy storage. Er	of optimising materi he course is especia nodynamic energy ef es. Photovoltaics. Sc	als (e.g. nanostructu lly suitable for teach ficiency. Fossil fired	ured insula- ing degree energy con-
			different methods of e	nergy technology, esi	pecially energy conv	ersion, trans-
			ne structures of corresp			
Course	<b>S</b> (type, r	number of weekly contact hou	rs, language — if other than Ge	erman)		
V (3) +						
		t in: German or Englisł				
		<b>Sessment</b> (type, scope, lan Ile for bonus)	guage — if other than German,	examination offered — if no	t every semester, informat	ion on whether
		mination (approx. 90 t	 0.120 minutes) or			
b) oral c) oral d) proje e) pres If a writ stead t of asse nation Langua Assess	examin examin ect repo entatio tten exa ake the essmen date at age of a ment o	nation of one candidate ation in groups (group ort (approx. 8 to 10 pag n/talk (approx. 30 mir amination was chosen e form of an oral exami t is changed, the lectu the latest. ssessment: German a ffered: Once a year, wi	e each (approx. 30 min s of 2, approx. 30 minu ges) or utes) as method of assessm nation of one candidat rer must inform studen nd/or English	ites per candidate) o ent, this may be chai e each or an oral exa	nged and assessmer mination in groups.	If the method
Allocat	ion of <sub>l</sub>	olaces				
Additio	onal inf	ormation				
Worklo	ad					
180 h						
Teaching cycle						
Referre	ed to in	LPO I (examination regulat	ions for teaching-degree progr	ammes)		
§ 22    § 22    § 22	Nr. 2 f)					
Module	e appea	ars in				
Master's w	ith 1 majo	r Functional Materials (2016)	-	• generated 19-Apr-2025 • exa er (120 ECTS) Funktionswerkst	-	page 43 / 139

## UNIVERSITÄT WÜRZBURG

Bachelor's degree (1 major) Physics (2015) 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	
Coating Technologies based on Vapour Deposition			r Deposition		11-BVG-152-m01
Module	coord	inator		Module offered by	
Managi	ng Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	1	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes		graduate			
Conten					
		ical principles of PVD an ation of layer materials o		nd processes. Coatir	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-
Courses	<b>5</b> (type, n	umber of weekly contact hours, la	anguage — if other than Ger	man)	
V (3) + I Module		t in: German or English			
Method module is a) writte b) oral o c) oral e d) proje e) prese lf a writ stead ta of asses nation o Langua Assess Allocati	Module taught in: German or English Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) a) written examination (approx. 90 to 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: Once a year, summer semester Allocation of places Additional information				
Worklo	ad				
150 h					
Teachir	ng cycl	9			
 Referre	d to in	LPOI (examination regulations	s for teaching-degree progra	mmes)	
Module	appea	rs in			
Bachelo	or's deg	gree (1 major) Nanostruct ee (1 major) Functional M	•, •	5)	



## **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 "Sub-field Focus Topic".



# Module Group Engineering Sciences

(ECTS credits)

Module title Abbreviation					Abbreviation
Materia	als for I	High Voltage insulation a	tems	99-HIS-161-m01	
Module coordinator				Module offered by	,
Dean of the Faculty of Electrical Engineering at the Univer ty of Applied Sciences Würzburg-Schweinfurt			-	University of Appli furt (FHWS)	ed Sciences Würzburg- Schwein-
ECTS Method of grading Only after succ. compl. of module(s)					
5 numerical grade					
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
		ss, electrical strength, di ems, diagnostics, measu			nd application of insulating mate- ng systems.
Intende	ed leari	ning outcomes			
terials.	They c		ing systems by their o	own and approve th	tems with layering of different ma- e existing design. They have basic
Course	<b>5</b> (type, n	umber of weekly contact hours,	language — if other than Ger	rman)	
V (2) +	Ü (1) +	P (1)			
		s <b>essment</b> (type, scope, langua le for bonus)	age — if other than German, o	examination offered — if n	ot every semester, information on whether
b) oral ( c) oral ( Langua	examin examin ge of a	mination (approx. 90 mir ation of one candidate e ation in groups (groups o ssessment: German and or bonus	each (approx. 20 minu of 2, approx. 30 minu		
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
150 h					
Teaching cycle					
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	mmes)	
Module	appea	irs in			
Master'	s degr	ee (1 major) Functional N	laterials (2016)		

Module title Abbreviation					Abbreviation
Modeling and Simulation for Technological Systems99-MST-161-m01					99-MST-161-m01
Module coordinator Module o					1
, , , , , , , , , , , , , , , , , , , ,				University of Applie furt (FHWS)	ed Sciences Würzburg- Schwein-
ECTS Method of grading Only after succ. compl. of module(s)					
5 numerical grade					
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts	• •			
		undations and practical a ring and beyond.	application of the the	ory of linear and nor	n-linear dynamic systems in elec-
Intend	ed lear	ning outcomes			
		as basic knowledge of dy nalyse their behaviour by		r systems and can de	escribe them with the help of mo-
Course	<b>S</b> (type, 1	number of weekly contact hours, l	anguage — if other than Gei	rman)	
V (2) +	Ü (2)				
		<b>Sessment</b> (type, scope, langua ole for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether
Langua Assess	age of a ment c	nation (approx. 90 minut assessment: German and, offered: Once a year, winto for bonus	or English	mination (modelling	assignment, approx. 40 hours)
Allocat	ion of	places			
Additio	onal inf	ormation			
Worklo	ad				
150 h					
Teaching cycle					
Referre	ed to in	LPO I (examination regulations	s for teaching-degree progra	ummes)	
Module	e appea	ars in			
		ee (1 major) Functional M	aterials (2016)		



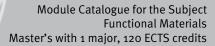
## Module Group Material Sciences

(ECTS credits)

Module title					Abbreviation
Chemio	cal Nan	otechnology: Analyti	cs and Applications		08-FU-NT-AA-152-m01
Module	e coord	inator		Module offered by	<u> </u>
			ktionswerkstoffe (Func-		echnology of Material Synthesis
tional Matrierials)					
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
5 numerical grade					
Duration Module level Other prerequisites					
1 seme	ester	graduate			
Conten	nts				
					echnology. Thermoanalysis, industry and technology.
Intend	ed lear	ning outcomes			
Studen	nts have	e developed an advan	ced knowledge of the ch	aracterisation and a	application of nanomaterials.
Course	<b>S</b> (type, 1	number of weekly contact ho	urs, language — if other than Ge	rman)	
V (4)					
a) writt b) oral c) oral d) log ( e) pres Langua	en exa examir examir (approx entatio age of a	nation in groups of up x. 20 pages) or on (approx. 30 minute rssessment: German a	te each (20 to 30 minute to 3 candidates (approx s)	-	didate) or
Allocat		places			
Additio	nal inf	ormation			
		ormation			
Worklo	ad				
150 h					
Teachi	ng cvcl	e			
	0.99				
Referre	ed to in	LPO I (examination regula	tions for teaching-degree progra	mmes)	
Module appears in					
Bachelor's degree (1 major) Nanostructure Technology (2015) Master's degree (1 major) Functional 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) Master's degree (1 major) Functional Materials (2025)					

Flectro	Module title				Abbreviation
Electrochemical Energy Storage and Conversion			Conversion		08-FU-EEW-152-m01
Module	e coord	inator		Module offered by	
			nology of Material Syn-	· · · · · · · · · · · · · · · · · · ·	echnology of Material Synthesis
ECTS Method of grading Only after succ. compl. of module(s)					
5					
Duration Module level Other prerequisites					
1 seme	ster	undergraduate			
Conten					
um and cal dou (Si, CIS	d nicke uble lay 5, CIGS,	l metal hydride, sodiur er capacitors, redox-fle GaAs, organic and dye	n sulphur, sodium nick	el chloride, lithium io /stems (AFC, PEMFC,	ms such as lead, nickel cadmi- n accumulators), electrochemi- DMFC, PAFC, SOFC), solar cells
		ning outcomes	an of alastrashamiast	normy storage and	inversion and are able to angle
		e developed a knowled ge to research problem	-	nergy storage and co	nversion and are able to apply
		2	rs, language — if other than Ge	rman)	
V (2) +					
			guage — if other than German.	examination offered — if not	t every semester, information on whether
		le for bonus)			····,···,····, ·····
weighte Langua	ed 7:3 age of a ment o	ssessment: German ai ffered: Once a year, su	nd/or English		(2 to 4 random examinations),
Allocal		JIdles			
Additio	nal inf				
	onal inf	ormation			
 Worklo					
 <b>Worklo</b> 150 h	ad	ormation			
 Worklo	ad	ormation			
 Worklo 150 h Teachin	oad ng cycl	ormation e	ions for teaching-degree progra	mmes)	
 Worklo 150 h Teachin	oad ng cycl	ormation e	ions for teaching-degree progra	mmes)	
 Worklo 150 h Teachin  Referre	ng cycl ed to in	ormation e LPOI (examination regulat	ions for teaching-degree progra	mmes)	
 Worklo 150 h Teachin  Referre  Module	oad ng cycl ed to in e appea	e LPOI (examination regulat			
 Worklo 150 h Teachin  Referre  Bachel	ng cycl ed to in e appea or's de	e LPOI (examination regulat ars in gree (1 major) Nanostr	ucture Technology (201		
 Worklo 150 h Teachin  Referre  Module Bachel Master	ng cycl ed to in e appea or's de ''s degr	e LPO I (examination regulat ars in gree (1 major) Nanostri ee (1 major) Physics (2	ucture Technology (201		
 <b>Worklo</b> 150 h <b>Teachin</b>  <b>Referre</b>  <b>Module</b> Master Master	ng cycl ed to in e appea or's de 's degr 's degr	e LPO I (examination regulat ars in gree (1 major) Nanostri ee (1 major) Physics (2	ucture Technology (201 016) ture Technology (2016)		
 150 h Teachin  Referre  Module Bachel Master Master Master Master	ed to in ed to in e appea or's de d's degr d's degr d's degr	e LPO I (examination regulat ars in gree (1 major) Nanostruc ee (1 major) Nanostruc ee (1 major) Functional ee (1 major) Nanostruc	ucture Technology (201 016) ture Technology (2016) l Materials (2016) ture Technology (2020)		
 <b>Worklo</b> 150 h <b>Teachin</b>  <b>Referre</b>  <b>Module</b> Master Master Master Master Master	ed to in e appea or's de d's degr d's degr d's degr d's degr d's degr	e LPOI (examination regulat ars in gree (1 major) Nanostruc ee (1 major) Nanostruc ee (1 major) Nanostruc ee (1 major) Functional ee (1 major) Nanostruc ee (1 major) Physics (2	ucture Technology (201 016) ture Technology (2016) l Materials (2016) ture Technology (2020) 020)		
 <b>Worklo</b> 150 h <b>Teachin</b>  <b>Referre</b>  <b>Module</b> Master Master Master Master Master Master	ed to in e appea or's degr 's degr 's degr 's degr 's degr 's degr	e EPOI (examination regulat ars in gree (1 major) Nanostruc ee (1 major) Nanostruc ee (1 major) Nanostruc ee (1 major) Functional ee (1 major) Nanostruc ee (1 major) Physics (2 ee (1 major) Physics (2 ee (1 major) Physics In	ucture Technology (201 016) ture Technology (2016) l Materials (2016) ture Technology (2020) 020) ternational (2020)		
 Worklo 150 h Teachin  Referre  Module Master Master Master Master Master Master Master Master Master	ed to in e appea or's degr 's degr 's degr 's degr 's degr 's degr 's degr	e EPOI (examination regulat ars in gree (1 major) Nanostruc ee (1 major) Physics (2 ee (1 major) Nanostruc ee (1 major) Functional ee (1 major) Nanostruc ee (1 major) Physics (2 ee (1 major) Physics (2 ee (1 major) Physics In ee (1 major) Quantum	ucture Technology (201) 016) ture Technology (2016) l Materials (2016) ture Technology (2020) 020) ternational (2020) Engineering (2020)	5)	
 <b>Worklo</b> 150 h <b>Teachin</b>  <b>Referre</b>  <b>Module</b> Master Master Master Master Master Master Master Master Master Master	ed to in ed to in ed to in e appea or's degr 's degr 's degr 's degr 's degr 's degr 's degr 's degr 's degr	e EPOI (examination regulat ars in gree (1 major) Nanostruc ee (1 major) Physics (2 ee (1 major) Nanostruc ee (1 major) Functional ee (1 major) Nanostruc ee (1 major) Physics (2 ee (1 major) Physics (2 ee (1 major) Physics In ee (1 major) Quantum	ucture Technology (201 016) ture Technology (2016) l Materials (2016) ture Technology (2020) 020) ternational (2020) Engineering (2020) ucture Technology (202	5)	



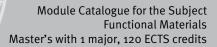


Bachelor's degree (1 major) Quantum Technology (2021) Master's degree (1 major) Quantum Technology (2021)

Module	e title				Abbreviation	
Analyti	ical Me	thods - Examples from P	ractical Failure Analy	sis	08-FU-ANA-161-m01	
Module	Module coordinator			Module offered by		
Dean of Studies Funktionswerkstoffe (Functional Materia			Functional Materials)	Chair of Chemical T	echnology of Material Synthesis	
ECTS	Metho	od of grading	Only after succ. con	only after succ. compl. of module(s)		
5 numerical grade						
Duration Module level Other prerequisites						
1 seme	1 semester graduate					
Conten	Its					
and po	lymers		quainted to different	methods for the cha	amics, semiconductors, metals aracterization of the different ma	
Intend	ed lear	ning outcomes				
The stu	dents	gain fundamental knowle	edge in measuring me	ethods in the physica	al / chemical laborratory.	
Course	<b>S</b> (type, r	number of weekly contact hours,	language — if other than Ger	rman)		
V (2) +	P (2)					
		<b>sessment</b> (type, scope, langua le for bonus)	age — if other than German, o	examination offered — if no	ot every semester, information on whether	
c) oral d) log ( e) pres Langua Assess	examin (approx entatio age of a sment o	nation of one candidate e ation in groups of up to . 20 pages) or n (approx. 30 minutes) ssessment: German and ffered: Once a year, sum or bonus	3 candidates (approx. /or English	-	didate) or	
Allocat	ion of <sub>l</sub>	olaces				
Additio	onal inf	ormation				
Worklo	ad					
150 h	_					
Teachi	ng cycl	e				
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)		
Module	e appea	ars in				
	-	ee (1 major) Functional N				
	-	ee (1 major) Functional N				
Master	's degr	ee (1 major) Functional N	laterials (2025)			

Module title					Abbreviation
Chemical Technology of Inorganic Nano and Micro Particles 08-FU-PART-16					08-FU-PART-161-m01
Module	e coord	inator		Module offered by	/
degree programme coordinator Funktionswerkstoffe (Func- tional Matrierials)			ktionswerkstoffe (Func-	Chair of Chemical	Technology of Material Synthesis
ECTS         Method of grading         Only after succ. compl. of module(s)					
5 numerical grade					
Duratio	on	Module level	Other prerequisites	;	
1 seme	ster	graduate			
Conten	Its				
synthe	sis. Ch		l particles and structure		ndamental methods of particle ips. Introduction of important par
Intend	ed lear	ning outcomes			
Studer	nts gain	advanced knowledge	e in nano- and micropart	icles.	
Course	<b>S</b> (type, r	number of weekly contact ho	urs, language — if other than Ge	rman)	
V (2) +	P (2)				
a) writt b) oral c) oral d) log ( e) pres Langua Assess	en exa examir examin (approx entatio age of a ment o		te each (20 to 30 minute to 3 candidates (approx s) and/or English	-	ndidate) or
Allocat	ion of <sub>l</sub>	places			
 Additic	onal inf	ormation			
 Worklo	ad				
150 h					
Teachi	ng cvcl	e			
	0.95				
Referre	ed to in	LPO I (examination regula	tions for teaching-degree progra	ammes)	
		(	0 403.00 prosite		
Module	e appea	ars in			
		ee (1 major) Functiona			





## **Module Group Physics**

(ECTS credits)

Module title				Abbreviation	
Coating Technologies based on Vapour Deposition			r Deposition		11-BVG-152-m01
Module	coord	inator		Module offered by	
Managi	ng Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	1	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes		graduate			
Conten					
		ical principles of PVD an ation of layer materials o		nd processes. Coatir	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-
Courses	<b>5</b> (type, n	umber of weekly contact hours, la	anguage — if other than Ger	man)	
V (3) + I Module		t in: German or English			
Method module is a) writte b) oral o c) oral e d) proje e) prese lf a writ stead ta of asses nation o Langua Assess Allocati	Module taught in: German or English Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) a) written examination (approx. 90 to 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: Once a year, summer semester Allocation of places Additional information				
Worklo	ad				
150 h					
Teachir	ng cycl	9			
 Referre	d to in	LPOI (examination regulations	s for teaching-degree progra	mmes)	
Module	appea	rs in			
Bachelo	or's deg	gree (1 major) Nanostruct ee (1 major) Functional M	•, •	5)	

Module					Abbreviation
Physics	s of Sei	miconductor Devices			11-SPD-152-m01
Module	e coord	inator		Module offered by	
Managi	ing Dire	ector of the Institute of Ap	oplied Physics	Faculty of Physics a	and Astronomy
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
6	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
technol amples levant s effects into the technol ponent diodes, JFET, Th nal cha sector. Intende The stu phonor ties. Th the solu miliar w ding of electrol patt, Ba	logies a s. The b semico based e metho logy. It s, inter , IMPAT hyristor arge car ed learn dents h band ey kno ution o vith the compo nics (d aritt or	and discusses the main of asic part introduces the of nductors. The following p on the charge carrier den ods of production of sem discusses the way of fun face components and ap T, Baritt- and Gunn diode , Diac, Triac, Schottky dio rier systems for technolo <b>hing outcomes</b> know the characteristics structures of important s w the principles of charge f questions. They have ga e theories of planar techn onent production. They ur iode, transistor, field-effe Gunn diode) and of optoo	components in the field crystal structures and part discusses the pri- insity of the thermal ed- iconductor materials actioning of the follow oplication fields: Rect es, photodiode, solar ode, MOSFET, MESFET gy and basic researc of semiconductors, the emiconductors and the e transport as well as ained insights into the pology and recent devenderstand the structure et transistor, thyristor electronics (photo dia	Ids of electronics ar I band and phonon of nciples of charge tra quilibrium. The part and presents the may ing components, so ifier diodes, Zener d cell, LED, semicond T, HFET. It highlights h and shows recent her year and shows recent the Poisson, Boltzn e methods of semico relopments in this for the and way of function of the coll, triac), of mico bode, solar cell, light-	insight into semiconductor key ad photonics on the basis of ex- dispersions of technologically re- ansport involving non-equilibrium on technology gives an insight ost important methods of planar orted according to volume com- iodes, varistor, varactor, tunnel luctor injection laser, transistor, the importance of low-dimensio- developments in the components overview of the electronic and hic, 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 crowave applications (tunnel, Im- emitting diode, semiconductor
		-			ge carrier systems on the basis ent developments in the field of
compo					
<b>Course</b> V (3) +		number of weekly contact hours, l	anguage — if other than Gei	man)	
		t in: German or English			
<b>Method of assessment</b> (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)					
b) oral c) oral d d) proje e) prese If a writ stead ta of asse	examir examin ect repo entatio tten exa ake the ssmen	e form of an oral examina	ach (approx. 30 minu of 2, approx. 30 minu 6) or es). 5 method of assessme tion of one candidate	tes per candidate) o ent, this may be cha e each or an oral exa	r nged and assessment may in- mination in groups. If the method weeks prior to the original exami-

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

### Allocation of places

### Additional information

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## Workload

180 h

### Teaching cycle

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

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### Module appears in

Bachelor'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)

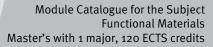
Module title					Abbreviation			
Semico	onducto	or Lasers and Photonic	5		11-HLF-152-m01			
Module	e coord	inator		Module offered by				
Managi	ng Dire	ector of the Institute of	Applied Physics	ed Physics Faculty of Physics and Astronomy				
ECTS	Metho	od of grading	Only after succ. con	Only after succ. compl. of module(s)				
6	nume	rical grade						
Duratio	n	Module level	Other prerequisites					
1 seme	ster	graduate						
Conten	ts							
This lecture discusses the principles of laser physics, based on the example of semiconductor lasers, and cur- rent developments regarding components. The principles of lasers are described on the basis of a general laser model, which will then be extended to special aspects of semiconductor lasers. Basic concepts such as thres- hold condition, characteristic curve and laser efficiency are derived from coupled rate equations for charge car- riers and photons. Other topics of the lecture are optical processes in semiconductors, layer and ridge wavegui- des, laser resonators, mode selection, dynamic properties as well as technology for the generation of semicon- ductor lasers. The lecture closes with current topics of laser research such as quantum dot lasers, quantum cas- cade lasers, terahertz lasers or high-performance lasers.								
		ning outcomes	·					
			dge of the principles of know the applications					
Course	<b>S</b> (type, n	umber of weekly contact hour	s, language — if other than Gei	rman)				
V (3) + I Module		t in: German or English						
			uage — if other than German,	examination offered — if no	t every semester, informati	ion on whether		
b) oral of c) oral of d) proje e) prese If a writ stead ta of asse nation of Langua	<ul> <li>module is creditable for bonus)</li> <li>a) written examination (approx. 90 to 120 minutes) or</li> <li>b) oral examination of one candidate each (approx. 30 minutes) or</li> <li>c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or</li> <li>d) project report (approx. 8 to 10 pages) or</li> <li>e) presentation/talk (approx. 30 minutes).</li> <li>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.</li> <li>Language of assessment: German and/or English</li> <li>Assessment offered: Once a year, summer semester</li> </ul>							
Allocat	ion of p	olaces						
 Additional information  Workload								
180 h								
Teachir	ıg cycl	e						
Referre	d to in	LPO I (examination regulati	ons for teaching-degree progra	mmes)				
Module	e appea	in and a second s						
Master's wi	th 1 majoı	Functional Materials (2016)		generated 19-Apr-2025 • exa r (120 ECTS) Funktionswerkst	_	page 60 / 139		

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)

Module title					Abbreviation	
Quantu	ım Tran	sport			11-QTH-161-m01	
Module	e coordi	nator		Module offered by		
Manag	Managing Director of the Institute of Applied Physics			Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
6	numer	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
The lecture addresses the fundamental transport phenomena of electrons in nanostructures. This includes the topics of: ballistic and diffuse transport, electron interference effects, quantisation of conductivity, interaction phenomena between electrons, Coulomb blockade, thermoelectric properties, description of spin-dependent transport phenomena, topological insulators, solid-state quantum computers.						
		ning outcomes				
		nave mastered the basi cations of respective co		nostructures in theor	y and practice. They	know functi-
Course	<b>S</b> (type, n	umber of weekly contact hours	, language — if other than Ger	rman)		
V (3) + Module		t in: German or English				
		<b>essment</b> (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	on on whether
<ul> <li>a) written examination (approx. 90 to 120 minutes) or</li> <li>b) oral examination of one candidate each (approx. 30 minutes) or</li> <li>c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or</li> <li>d) project report (approx. 8 to 10 pages) or</li> <li>e) presentation/talk (approx. 30 minutes).</li> <li>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.</li> <li>Language of assessment: German and/or English</li> <li>Assessment offered: In the semester in which the course is offered and in the subsequent semester</li> </ul>						
Allocat	ion of p	laces				
Additio	nal info	ormation				
Worklo	ad					
180 h						
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) Nanostructure Technology (2016) Master's degree (1 major) Computational Mathematics (2016)						
Master's w	ith 1 major	Functional Materials (2016)		generated 19-Apr-2025 • exa r (120 ECTS) Funktionswerkst		page 62 / 139
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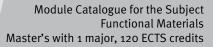
Master's degree (1 major) Functional Materials (2016) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Master's degree (1 major) Computational Mathematics (2019) Master's degree (1 major) Mathematics (2019) Master's degree (1 major) Functional Materials (2022) Master's degree (1 major) Functional Materials (2025)

Module title					Abbreviation				
Methoo	ds of No	on-Destructive Materia	l Testing		11-ZMB-152-m01				
Module	e coord	inator		Module offered by					
Managi	ing Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	nd Astronomy				
ECTS	Metho	od of grading	Only after succ. con	Only after succ. compl. of module(s)					
4	nume	rical grade							
Duratio	n	Module level	Other prerequisites						
1 seme	ster	undergraduate							
Conten	ts								
		on-destructive materia ptical testing, laser. Im	l and component testir age processing.	ng. Thermography. N	eutron radiography.	X-ray testing.			
Intende	ed learr	ning outcomes							
on (hea thods f	at, X-ray or the c	, terahertz), particles (	of the generation and in neutrons) or ultrasoun ypes, particles and ultr racterisation.	d waves with materia	lls. They know the ap	oplied me-			
Course	<b>S</b> (type, n	umber of weekly contact hour	s, language — if other than Gei	rman)					
V (2) + Module	• •	t in: German or English							
		<b>essment</b> (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	on on whether			
<ul> <li>c) oral of</li> <li>d) projection</li> <li>e) present of</li> <li>f a write stead to</li> <li>of asseent of</li> <li>Langua</li> </ul>	<ul> <li>a) written examination (approx. 90 to 120 minutes) or</li> <li>b) oral examination of one candidate each (approx. 30 minutes) or</li> <li>c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or</li> <li>d) project report (approx. 8 to 10 pages) or</li> <li>e) presentation/talk (approx. 30 minutes).</li> <li>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.</li> <li>Language of assessment: German and/or English</li> <li>Assessment offered: Once a year, winter semester</li> </ul>								
Allocat	ion of p	olaces							
Additio	nal info	ormation							
Worklo	ad								
120 h									
Teachi	ng cycl	9							
Referred to in LPO I (examination regulations for teaching-degree programmes)									
Module	annea	rs in							
Module appears inBachelor'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 wi	ith 1 major	Functional Materials (2016)		generated 19-Apr-2025 • exa r (120 ECTS) Funktionswerkst	-	page 64 / 139			



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 Technology					11-LMT-152-m01		
Module	e coord	inator		Module offered by			
Managi	ng Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	nd Astronomy		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
6	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 seme	ster	undergraduate					
Conten	ts						
Introduction to electronic and optical measuring methods of physical metrology, vacuum technology and cryoge- nics, cryogenics, light sources, spectroscopic methods and measured value acquisition.							
Intende	ed learn	ning outcomes					
	n techn	nave competencies in t ology and cryogenics, o					
Course	<b>S</b> (type, n	umber of weekly contact hour	s, language — if other than Ge	rman)			
V (3) + Module		t in: German or English					
		essment (type, scope, lang	uage — if other than German,	examination offered — if no	t every semester, informati	on on whether	
		<sup>le for bonus)</sup> nination (approx. 90 to	·				
<ul> <li>b) oral examination of one candidate each (approx. 30 minutes) or</li> <li>c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or</li> <li>d) project report (approx. 8 to 10 pages) or</li> <li>e) presentation/talk (approx. 30 minutes).</li> <li>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.</li> <li>Language of assessment: German and/or English</li> <li>Assessment offered: Once a year, winter semester</li> </ul>							
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	ad						
180 h							
Teachir	ng cycl	9					
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module appears in							
Bachelo Bachelo Master Bachelo	Bachelor's degree (1 major) Physics (2015) Bachelor's degree (1 major) Nanostructure Technology (2015) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2015) Master's degree (1 major) Functional Materials (2016) Bachelor's degree (1 major) Physics (2020)						
Master's wi	th 1 majoi	Functional Materials (2016)	-	generated 19-Apr-2025 • exa r (120 ECTS) Funktionswerkst	-	page 66 / 139	



Bachelor's degree (1 major) Nanostructure Technology (2020) 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 title Abbreviation						
Biophy	sical M	leasurement Technolog	y in Medical Science		11-BMT-161-m01	
Module	e coord	inator		Module offered by		
Managi	ng Dire	ector of the Institute of A	Applied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
The lecture covers the physical principles of imaging techniques and their application in Biomedicine. The main topics are conventional X-ray technique, computer tomography, imaging techniques of nuclear medicine, ultrasound and MR-tomography. The lecture additionally addresses the systems theory of imaging systems and digital image processing.						
Intende	ed leari	ning outcomes				
	nd the p	know the physical princ principles of image gene				
Course	<b>S</b> (type, n	umber of weekly contact hours	, language — if other than Ger	man)		
V (3) + Module		t in: German or English				
		<b>essment</b> (type, scope, langule for bonus)	uage — if other than German, o	examination offered — if no	t every semester, informati	on on whether
<ul> <li>b) oral e</li> <li>c) oral e</li> <li>d) proje</li> <li>e) prese</li> <li>lf a writ</li> <li>stead ta</li> <li>of asse</li> <li>nation e</li> <li>Langua</li> </ul>	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				
Additio	nal inf	ormation				
Worklo	ad					
180 h						
Teachir	ng cycl	e				
Referre	d to in	LPO I (examination regulation	ns for teaching-degree progra	mmes)		
Module appears in						
		ee (1 major) Physics (20	16)			
	-	ee (1 major) Functional				
Master	's teach	ning degree Gymnasium	MINT Teacher Educat	ion PLUS, Elite Netwo	ork Bavaria (ENB) (20	016)
Master's wi	th 1 major	r Functional Materials (2016)	-	generated 19-Apr-2025 • exa r (120 ECTS) Funktionswerkst	-	page 68 / 139

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) 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)

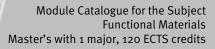
exchange program Physics (2023)

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	Module title				Abbreviation		
Semiconductor Physics 11-HLPH-161-m01							
Module	e coord	inator		Module offered by			
Managing Director of the Institute of Applied Physics			oplied Physics	Faculty of Physics a	nd Astronomy		
ECTS	Metho	od of grading	Only after succ. con	ompl. of module(s)			
6	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	ts						
<ol> <li>Symmetry properties</li> <li>Crystal formation and electronic band structure</li> <li>Optical excitations and their coupling effects</li> <li>Electron-phonon coupling</li> <li>Temperature-dependent transport properties</li> <li>Magnetic semiconductors</li> </ol>							
Intende	ed lear	ning outcomes					
		are familiar with the princ ad know their physical pr				re of semi-	
Course	<b>S</b> (type, r	number of weekly contact hours, I	anguage — if other than Gei	man)			
V (3) + Module		t in: German or English					
Metho	d of ass	<b>Sessment</b> (type, scope, langua	ge — if other than German,	examination offered — if no	t every semester, informati	ion on whether	
module is	s creditab	le for bonus)					
<ul> <li>b) oral</li> <li>c) oral</li> <li>d) projetion</li> <li>e) pression</li> <li>lf a write stead to a st</li></ul>	<ul> <li>a) written examination (approx. 90 to 120 minutes) or</li> <li>b) oral examination of one candidate each (approx. 30 minutes) or</li> <li>c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or</li> <li>d) project report (approx. 8 to 10 pages) or</li> <li>e) presentation/talk (approx. 30 minutes).</li> <li>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.</li> <li>Language of assessment: German and/or English</li> <li>Assessment offered: In the semester in which the course is offered and in the subsequent semester</li> </ul>						
Allocat	ion of <sub>l</sub>	olaces					
Additio	nal inf	ormation					
Worklo	ad						
180 h	180 h						
Teachi	Teaching cycle						
Referre	d to in	LPOI (examination regulation	s for teaching-degree progra	mmes)			
Module	Module appears in						
	-	ee (1 major) Mathematics ee (1 major) Physics (201					
Master's w	ith 1 majo	r Functional Materials (2016)		generated 19-Apr-2025 • exa r (120 ECTS) Funktionswerkst		page 70 / 139	

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			
Princip	les of T	wo- and Three-Dimens	ional Röntgen Imaging	g	11-ZDR-152-m01			
Module	coord	inator		Module offered by				
Managi	ng Dire	ector of the Institute of A	Applied Physics	Faculty of Physics a	nd Astronomy			
ECTS	Metho	od of grading	Only after succ. cor	Only after succ. compl. of module(s)				
6	nume	rical grade						
Duratio	n	Module level	Other prerequisites	5				
1 seme	ster	graduate						
Conten	ts							
ton abs projecti traction charact	orption ion, For n, visua erisatio	ay generation (X-ray tub n, scattering), physics o urier reconstruction, ite lisation,). Applicatio on, metrology, biology, hing outcomes	f X-ray detection. Mat rative methods). Imag ns of X-ray imaging in	nematics of reconstru e processing (image the industrial sector	uction algorithms (fil data pre-processing (component testing,	ltered rear , feature ex- , material		
		-	operating X-rays and	of their interactions y	with matter. They kno	wimaging		
		know the principles of g ing X-rays and methods						
Courses	<b>S</b> (type, n	umber of weekly contact hours	, language — if other than Ge	rman)				
V (3) + I Module		t in: German or English						
Method	l of ass	<b>eessment</b> (type, scope, langule for bonus)	uage — if other than German,	examination offered — if no	t every semester, informat	ion on whether		
<ul> <li>c) oral e</li> <li>d) proje</li> <li>e) prese</li> <li>lf a writ</li> <li>stead ta</li> <li>of asse</li> <li>nation e</li> <li>Langua</li> </ul>	<ul> <li>a) written examination (approx. 90 to 120 minutes) or</li> <li>b) oral examination of one candidate each (approx. 30 minutes) or</li> <li>c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or</li> <li>d) project report (approx. 8 to 10 pages) or</li> <li>e) presentation/talk (approx. 30 minutes).</li> <li>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.</li> <li>Language of assessment: German and/or English</li> </ul>							
Allocat		ffered: Once a year, sur blaces						
Additio	nal inf	ormation						
Worklo	ad							
180 h								
	Teaching cycle							
	<u> </u>							
Referred to in LPO I (examination regulations for teaching-degree programmes)								
Module								
Bachelo	Bachelor's degree (1 major) Physics (2015) Bachelor's degree (1 major) Nanostructure Technology (2015) Master's degree (1 major) Functional Materials (2016)							
Master's wi	th 1 majoı	Functional Materials (2016)	-	• generated 19-Apr-2025 • exa er (120 ECTS) Funktionswerkst	-	page 72 / 139		



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)

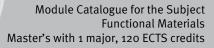
Module	e title				Abbreviation	
Physic	s of Ad	vanced Materials			11-PMM-161-m01	
Module	e coord	inator		Module offered by		
Manag	ing Dire	ector of the Institute of <i>i</i>	Applied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
6	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	its					
and su	percon	rties of various materia ductors; thin films, hete imensional layer mater	erostructures and supe			
Intend	ed lear	ning outcomes				
The stu	idents l	know the properties and	d characterization met	hods of some moder	n materials.	
Course	<b>S</b> (type, r	number of weekly contact hours	s, language — if other than Ger	man)		
V (3) + Module		t in: German or English				
		<b>sessment</b> (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	on on whether
e) pres If a writ stead t of asse nation Langua	entatio tten exa ake the essmen date at age of a	ort (approx. 8 to 10 pagen/ n/talk (approx. 30 minu amination was chosen a form of an oral examinut is changed, the lecture the latest. ssessment: German an ffered: In the semester	utes). as method of assessmo aation of one candidate er must inform student d/or English	e each or an oral exames about this by four	mination in groups. I weeks prior to the or	If the method riginal exami-
Allocat	ion of p	olaces				
Additio	onal inf	ormation				
Worklo	ad					
180 h						
Teachi	ng cycl	e				
Referre	ed to in	LPO I (examination regulation	ons for teaching-degree progra	mmes)		
Module	e appea	ars in				
Master Master Master Master Master Master	's degru 's degru 's degru 's degru 's degru 's teach	ee (1 major) Mathemati ee (1 major) Physics (20 ee (1 major) Nanostruct ee (1 major) Computatio ee (1 major) Functional ning degree Gymnasiun r Functional Materials (2016)	o16) ure Technology (2016) onal Mathematics (201 Materials (2016) n MINT Teacher Educat			016) page 74 / 139
	.,.			r (120 ECTS) Funktionswerkst	*	

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)

UNIVERSITÄT

WÜRZBURG

Module	e title			-	Abbreviation	
Labora	tory an	d Measurement Techno	logy in Biophysics		11-LMB-152-m01	
Module	e coord	inator		Module offered by		
Manag	ing Dire	ector of the Institute of A	pplied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
6	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
physica measu	al proce ring tec	vers relevant principles edures for the examinati hniques and sensors, n ructure elucidation of bi	on and manipulation nethods of single-part	of biological system:	s. The main topics ar	re optical
Intende	ed lear	ning outcomes				
sical pr	ocedu ring teo	know the principles of m res for the examination hniques and their appli	and manipulation of b	iological systems. Th	ney have knowledge	of optical
Course	<b>S</b> (type, r	number of weekly contact hours	, language — if other than Ger	rman)		
V (3) + Module		t in: German or English				
		<b>eessment</b> (type, scope, langu le for bonus)	age — if other than German,	examination offered — if no	t every semester, informati	ion on whether
<ul> <li>b) oral</li> <li>c) oral of</li> <li>d) projection</li> <li>e) pression</li> <li>If a write stead to of asseen to asseen to asseen to a strain</li> <li>Languare</li> </ul>	examir examin ect repo entatio tten exa ake the ssmen date at ge of a	mination (approx. 90 to nation of one candidate ation in groups (groups ort (approx. 8 to 10 page n/talk (approx. 30 minu amination was chosen a torm of an oral examin t is changed, the lecture the latest. ssessment: German and ffered: Once a year, sun	each (approx. 30 minu of 2, approx. 30 minu es) or ites). s method of assessme ation of one candidate er must inform student d/or English	tes per candidate) o ent, this may be chan e each or an oral exa	nged and assessmer mination in groups.	If the method
Allocat	ion of <sub>l</sub>	olaces				
Additio	nal inf	ormation				
 Worklo	ad					
180 h						
Teachi	ng cycl	e				
	,					
Referre	d to in	LPO I (examination regulatio	ns for teaching-degree progra	immes)		
Module	e appea	urs in				
Bachel	or's de	gree (1 major) Physics (2 gree (1 major) Nanostru	-	5)		
		r Functional Materials (2016)	JMU Würzburg •	generated 19-Apr-2025 • exa r (120 ECTS) Funktionswerkst	-	page 76 / 139



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)

JMU Würzburg • generated 19-Apr-2025 • exam. reg. data record Master (120 ECTS) Funktionswerkstoffe - 2016

Module	e title				Abbreviation
Compu	Itationa	l Materials Science (DFT	)		11-CMS-161-m01
Module	e coord	inator		Module offered by	
		ector of the Institute of Th	eoretical Physics	Faculty of Physics a	and Astronomy
	trophys				
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
8	nume	rical grade			
Duratio	on	Module level	Other prerequisites	;	
1 seme	ester	graduate			
Conten	-	tional theory (DFT)	_		
5. Man 6. And 7. Dyna 8. DFT 9. Strop Intende Aside f pool. T constru the sof serve b me qua	y-body erson ir amical r + DMFT ngly con ed learn from the he part uction c tware w border c antum N	icipants are introduced to f maximally localised Wa vannier90. Furthermore, t ases such as the Kondo Aonte Carlo are utilised t	ohysics Kondo physics odeling of solids of these topics, the st o the use of DFT softw annier functions throu the students learn ho regime. Impurity solw o solve the self consi	ware packages such ugh the projection of ow to construct many vers such as exact dia istency equations of	nds-on exercises from the CIP as VASP or Wien2k and to the f DFT results on atom orbitals with r-particle solutions of AIM and ob- agonalisation or continuous-ti- dynamic molecular field theory calculation of a strongly correla-
-		metal oxide such as SrV( umber of weekly contact hours, I	-	rman)	
V (4) + Module		t in: German or English			
		e <b>essment</b> (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether
<ul> <li>b) oral</li> <li>c) oral</li> <li>d) proje</li> <li>e) press</li> <li>lf a write</li> <li>stead t</li> <li>of asset</li> <li>nation</li> <li>Langua</li> </ul>	examin examin ect repo entatio tten exa ake the essmen date at age of a	form of an oral examina	ach (approx. 30 minu of 2, approx. 30 minu s) or es). 5 method of assessm tion of one candidate 7 must inform student /or English	ites per candidate) o ent, this may be cha e each or an oral exa ts about this by four	nged and assessment may in- mination in groups. If the method weeks prior to the original exami-
Allocat	tion of p	olaces			
Additio	onal inf	ormation			

### Workload

240 h

Teaching cycle

R

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

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### 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)

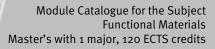
Module	title				Abbreviation
Solid St	tate Ph	ysics 2			11-FK2-161-m01
Module	coord	inator		Module offered by	
Managi	ng Dire	ector of the Institute of Ap	oplied Physics	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
8	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate			
Content					
and exc gation o gnetic a	citation of mag and ele ations	s such as phonons and r netic, orbital and charge ctronic properties of thin	nagnetic waves; reso order; X-ray and neut films and superlattic	nant elastic X-ray sc ron reflectometry; in es; resonant inelast	atomic and magnetic structure attering and absorption; investi- ivestigation of the structural, ma- ic X-ray scattering; investigation icroscopy"); further topics upon
		ning outcomes			
tering, r	moderr		and neutron reflector	netry and resonant i	ring, resonant elastic X-ray scat- inelastic X-ray scattering. They
Courses	<b>5</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (4) + F Module		t in: German or English			
		<b>eessment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
b) oral e c) oral e d) proje e) prese If a writ stead ta of asses nation o Langua	examin examin ect repo entatio ten exa ake the ssmen date at ge of a ment o	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 minut of or es). method of assessme tion of one candidate must inform student for English	es per candidate) of ent, this may be char each or an oral exam s about this by four	nged and assessment may in- mination in groups. If the method weeks prior to the original exami-
Allocati	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
240 h					
Teachin	ng cycl	e			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module	appea	irs in			
Master'	s degr	ee (1 major) Mathematics	(2016)		

Master's with 1 major Functional Materials (2016)

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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)

Module	title				Abbreviation	
Imagin	g Meth	ods at the Synchroton		-	11-BMS-152-m01	
Module	e coord	inator		Module offered by		
Managi	ng Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. cor	npl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites	i		
1 seme	ster	undergraduate				
Conten	ts		*			
and ima the con energet transfo	age pro volutio tic aspe rm.	periodic signals. Fund cessing. Discretisation on product. Tapering fu ects. Statistical signals	of signals / sampling nctions and interpolati	theorem (Shannon). on of images. The Pa	Homogeneous and I rsival theorem, corre	linear filter, elation and
Intende	ed leari	ning outcomes				
		know the principles of f different image proce				tioning and
Course	<b>S</b> (type, n	umber of weekly contact hour	s, language — if other than Ge	rman)		
V (3) + Module		t in: German or English				
Method	d of ass	essment (type, scope, lang	uage — if other than German,	examination offered — if no	t every semester, informati	on on whether
		le for bonus)				
<ul> <li>b) oral e</li> <li>c) oral e</li> <li>d) proje</li> <li>e) prese</li> <li>If a writ</li> <li>stead ta</li> <li>of asse</li> <li>nation</li> <li>Langua</li> </ul>	examin examin ect repo entatio ten exa ake the ssmen date at ge of a	nination (approx. 90 to ation of one candidate ation in groups (group) ort (approx. 8 to 10 pag n/talk (approx. 30 min amination was chosen form of an oral examin t is changed, the lectur the latest. ssessment: German ar ffered: Once a year, su	e each (approx. 30 minu s of 2, approx. 30 minu es) or utes). as method of assessm nation of one candidate er must inform student d/or English	ites per candidate) o ent, this may be char e each or an oral exa	nged and assessmer mination in groups.	If the method
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
180 h						
Teachir	ng cycl	e				
Referre	d to in	LPO I (examination regulati	ons for teaching-degree progra	ammes)		
Module	e appea	irs in				
Bachel	or's de	gree (1 major) Physics ( gree (1 major) Nanostru ee (1 major) Functional	icture Technology (201	5)		
Master's wi	th 1 majoi	Functional Materials (2016)	_	• generated 19-Apr-2025 • exa er (120 ECTS) Funktionswerkst	-	page 82 / 139



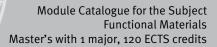
Bachelor's degree (1 major) Physics (2020) Bachelor's degree (1 major) Nanostructure Technology (2020) Bachelor's degree (1 major) Quantum Technology (2021) Master's degree (1 major) Functional Materials (2022) exchange program Physics (2023) Master's degree (1 major) Functional Materials (2025)

Module	title				Abbreviation	
Image a	and Sig	gnal Processing in Physi	cs		11-BSV-161-m01	
Module	e coord	inator		Module offered by		
Managi	ng Dire	ector of the Institute of A	pplied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
and ima convolu getic ob transfo	age pro ution p oservat rmatio		of signals/sampling the signals of signals of the second sec	heorem (Shannon); ł f images; the Parsiva	nomogeneous and li al theorem, correlation	near filters, on and ener-
Intende	ed lear	ning outcomes				
les of ir	nage p	have advanced knowled rocessing and are famili Is and to implement ther	ar with different meth	ods of signal proces		
Course	<b>S</b> (type, r	number of weekly contact hours,	language — if other than Ge	rman)		
V (2) + I Module		t in: German or English				
		<b>sessment</b> (type, scope, langualle for bonus)	age — if other than German,	examination offered — if no	t every semester, informati	ion on whether
<ul> <li>b) oral e</li> <li>c) oral e</li> <li>d) proje</li> <li>e) prese</li> <li>lf a writ</li> <li>stead ta</li> <li>of asse</li> <li>nation e</li> <li>Langua</li> </ul>	examir examin ect repo entatio ten exa ake the ssmen date at ge of a	mination (approx. 90 to nation of one candidate e lation in groups (groups ort (approx. 8 to 10 page n/talk (approx. 30 minut amination was chosen as form of an oral examina t is changed, the lecture the latest. ssessment: German and ffered: In the semester i	each (approx. 30 minu of 2, approx. 30 minu s) or tes). s method of assessm ation of one candidate r must inform student //or English	tes per candidate) o 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	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
180 h						
Teachir	ıg cycl	е				
Referre	d to in	LPO I (examination regulation	ns for teaching-degree progra	immes)		
Module	appea	ars in				
	-	ee (1 major) Mathematic ee (1 major) Physics (201				
Master's wi	th 1 majo	r Functional Materials (2016)	-	generated 19-Apr-2025 • exa r (120 ECTS) Funktionswerkst	-	page 84 / 139

## UNIVERSITÄT WÜRZBURG

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)





# Module Group Chemistry

(ECTS credits)

Bioorganic Chemistry  Module cordinator  Module cordinator  Module cordinator  Module cordinator  Module offered by  Institute of Organic Chemistry  Bettor of lecture "Bioorganische Chemie" (Bioorganic  Diration  Module offered by  Conty after succ. conpl. of module(s)  Teaming of argaing  Only after succ. conpl. of module(s)  Teaming of a grading  Only after succ. conpl. of module(s)  Teaming of a grading  Only after succ. conpl. of module(s)  Module offered by	Module	title				Abbreviation	
lecturer of lecture "Bioorganische Chemie" (Bioorganic       Institute of Organic Chemistry         Chemistry       Institute of Organic Chemistry         S       num=rical grade          Duration       Module level       Other prerequisites         1 semester       graduate          Contents          Bioorganic chemistry unites the central questions of organic chemistry, biochemistry is the synthesis and purposeful          analyudition of biomolecules, such as nucleic acids, peptides, crobenk, crabbydrates 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 dignostics and therapeutics.         Key concepts covered in the course are nucleic acid chemistry, peptide chemistry, carbohydrate chemistry, bior-thegonal reactions, signal transduction)         Intended learning outcomes         The students will have a molecular understanding of the structure and reactivity of biomolecules. The students obtain knowledge of modern synthetic methods in bioorganic chemistry and can explain principles of molecular interactions and trecognition mechanisms. They can describe modern aspects of nucleic acids, proteins, carbohydrates and lipids.         Course (type, number of weekly contact hours, language – if other than German, examination of one candidate each (20 to 30 minutes) or	Bioorga	nic Ch	emistry			08-SCM3-152-m01	
Chemistry)  ECTS Method of grading Only after succ. compl. of module(s)  5 numerical grade   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 Faramework 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, bioor- tingonal reactions, molecular diversity, solid-phase synthesis, molecular recognition and interactions (ligand-re- ceptor interactions, signal transduction) Intended learning outcomes The students will have a molecular understanding of the structure and reactivity of biomolecules. The students obtain knowledge of moderm synthetic methods in bioorganic chemistry and can explain principles of molecular interactions and recognition mechanisms. They can describe modern aspects of nucleic acids, proteins, carbohydrates and lipids. Courses (type, number of weekly contact hours, language – if other than German) S (3) Method of assessment (type, scope, language – if other than German, examination offered – if not every senester, information on whether module is crediable for bound a) written examination (approx, 45 to 9 or minutes) or b) oral examination of places	Module	coordi	nator		Module offered by		
5     numerical 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, petides, proteins, carbohydrates and lipids. This includes the framework of structure-function relationships and the fundamental understanding of biological mechanisms, to enable applications towards biomaterials, biosensing, bioimaging, clinical diagnostics and therapeutics.       Key concepts covered in the course are nucleic acid chemistry, peptide chemistry, carbohydrate chemistry, bioorthogonal reactions, molecular diversity, solid-phase synthesis, molecular recognition and interactions (ligand-receptor interactions, signal transduction)       Intended learning outcomes			ure "Bioorganische Che	emie" (Bioorganic	Institute of Organic	Chemistry	
Duration         Module level         Other prerequisites           1 semester         graduate            Contents            Bioogranic 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, signal transduction)           Intended learning outcomes           The students will have a molecular understanding of the structure and reactivity of biomolecules. The students obtain knowledge of modern synthetic methods in bioorganic chemistry and can explain principles of nolecular interactions and recognition mechanisms. They can describe modern aspects of nucleic acids, proteins, carbohydrate s and lipids.           Courses (type, number of weekly contact hours, language – if other than German, examination offerd – if not every semester, information on whether module is rollabain knowledge to modern           S (3)         Method of assessment (spe, scope, language – if other than German, examination offerd – if not every semester, information on school and any office semantal on of one candidate each (20 to 30 minutes) or             O ral examination of one candidate each (	ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
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 hipois. 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, signal transduction)           Intended learning outcomes           The students will have a molecular understanding of the structure and reactivity of biomolecules. The students on bioorganic chemistry and can explain principles of molecular interactions and recognition mechanisms. They can describe modern aspects of nucleic acids, proteins, carbohydrate s and lipids.           Courses (type, number of weekly contact hours, language – if other than German)         O           S (s)	5	numer	rical grade				
Contents         Bioorganic chemistry unities 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 biogical 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, signal transduction)         Intended learning outcomes         The students will have a molecular understanding of the structure and reactivity of biomolecules. The students will have a molecular understanding of the structure and reaction and interactions (ligand-receptor interactions and learning outcomes         Courses (type, number of weekly contact hours, language – if other than German)       5 (3)         Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)       a) written examination (approx. 45 to 90 minutes) or         b) oral examination in groups of up to 3 candidates (15 to 30 minutes per candidate)       Language of assessment: German and/or English         Alditional information	· · · · ·	n	Module level	Other prerequisites			
Bioorganic chemistry unites the central questions of organic chemistry, biochemistry, medicinal chemistry and spectroscopy with a focus on biomolecules, such as nucleica caids, 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 acids chemistry, peptide chemistry, carbohydrate chemistry, bioorthogonal reactions, molecular diversity, solid-phase synthesis, molecular recognition and interactions (ligand-receptor interactions, signal transduction) Intended learning outcomes The students will have a molecular understanding of the structure and reactivity of biomolecules. The students obtain knowledge of moderm synthetic methods in bioorganic chemistry and can explain principles of molecular interactions and recognition mechanisms. They can describe modern aspects of nucleic acids, proteins, carbohydrates and lipids. Courses (type, number of weekly contact hours, language – if other than Geman) S (3) Method of assessment (type, scope, language – if other than Geman) S (3) Method of assessment (type, scope, language – if other than Geman) S (3) Method of assessment (type, scope, language – if other than Geman) S (3) Method of assessment (type, scope, language – if other than Geman) S (3) Method of assessment (type, scope, language – if other than Geman) S (3) Method of assessment (type, scope, language – if other than Geman) S (3) Method of assessment (type, scope, language – if other than Geman) S (3) Method of assessment (type, scope, language – if other than Geman) S (3) Method of assessment (type, scope, language – if other than Geman) S (3) Method of assessment (type, scope, language – if other than Geman) S (3) Method of assessment (type, scope, language – if other than Geman) S (3) Method of assessment (type, scope, language – if other than G	1 semes	ster	graduate				
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, bioor- thogonal reactions, signal transduction) Intended learning outcomes The students will have a molecular understanding of the structure and reactivity of biomolecules. The students obtain knowledge of modern synthetic methods in bioorganic chemistry and can explain principles of molecular interactions and recognition mechanisms. They can describe modern aspects of nucleic acids, proteins, carbohy- drates and lipids. Courses (type, number of weekly contact hours, language – if other than German) S (3) Method of assessment (type, scope, language – if other than German) S (3) Authen examination (approx. 45 to 90 minutes) or b) oral examination (approx. 45 to 90 minutes) or c) oral examination (approx. 45 to 90 minutes) or c) oral examination in groups of up to 3 candidates (15 to 30 minutes per candidate) Language of assessment: German and/or English Allocation of places 	Content	ts					
a) written examination (approx. 45 to 90 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (15 to 30 minutes per candidate) Language of assessment: German and/or English Allocation of places  Additional information  Workload 150 h Teaching cycle  Referred to in LPO I (examination regulations for teaching-degree programmes)  Module appears in Master's degree (1 major) Biochemistry (2015) Master's degree (1 major) Functional Materials (2016) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)	spectro manipu the fran to enab Key con thogona ceptor i Intende The stur obtain l interact drates a S (3) Method	scopy v lation o nework le appl accepts o al react nteract dents v knowle ions ar and lipi s (type, n	with a focus on biomole of biomolecules, such a of structure-function re- ications towards bioma covered in the course a ions, molecular diversi- ions, signal transduction ing outcomes vill have a molecular ur dge of modern synthetion d recognition mechani- ds. umber of weekly contact hours essment (type, scope, lange	ecules. At the core of b is nucleic acids, pepti- elationships and the fu- aterials, biosensing, bi- re nucleic acid chemis ty, solid-phase synthe on) iderstanding of the str c methods in bioorgar sms. They can describ	ioorganic chemistry des, proteins, carboh indamental understa ioimaging, clinical di try, peptide chemistr sis, molecular recogn ucture and reactivity nic chemistry and car e modern aspects of	is the synthesis and hydrates and lipids. anding of biological n agnostics and thera ry, carbohydrate che nition and interactio of biomolecules. Th n explain principles of nucleic acids, prote	purposeful This includes mechanisms, peutics. mistry, bioor- ns (ligand-re- le students of molecular eins, carbohy-
b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (15 to 30 minutes per candidate) Language of assessment: German and/or English Allocation of places 							
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Workload 150 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in Master's degree (1 major) Biochemistry (2015) 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) Master's with 1 major Functional Materials (2016) Master's with 1 major Functional Materials (2016) Master's with 1 major Functional Materials (2016)	Allocati	ion of p	laces				
Workload 150 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in Master's degree (1 major) Biochemistry (2015) 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) Master's with 1 major Functional Materials (2016) Master's with 1 major Functional Materials (2016) Master's with 1 major Functional Materials (2016)							
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Teaching cycle            Referred to in LPO I (examination regulations for teaching-degree programmes)            Module appears in         Master's degree (1 major) Biochemistry (2015)         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)         Waster's with 1 major Functional Materials (2016)         Master's with 1 major Functional Materials (2016)	Worklo	ad					
Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in Master's degree (1 major) Biochemistry (2015) 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) Master's with 1 major Functional Materials (2016)	150 h						
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Module appears in Master's degree (1 major) Biochemistry (2015) 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) Master's with 1 major Functional Materials (2016)							
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Master's degree (1 major) Biochemistry (2015) 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) Master's with 1 major Functional Materials (2016) Master's with 1 major Functional Materials (2016) Master's with 1 major Functional Materials (2016)							
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) Master's with 1 major Functional Materials (2016) JMU Würzburg • generated 19-Apr-2025 • exam. reg. da- page 87 / 139	Module	appea	rs in				
	Master' Master'	s degre s degre	ee (1 major) Chemistry ( ee (1 major) Functional	2016) Materials (2016)	ion PLUS, Elite Netwo	ork Bavaria (ENB) (20	016)
	Master's wit	th 1 major	Functional Materials (2016)	-		-	page 87 / 139

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)

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	e title				Abbreviation
Molecu	ılar Bio	logy for Advanced Stude	nts		08-BC-MOLMC-161-m01
Module	e coord	inator		Module offered by	
holder	of the (	Chair of Biochemistry		Chair of Biochemist	try
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten					
Compri tional b			his module discusse	s advanced topics in	n molecular physiology and func-
Intende	ed learr	ning outcomes			
Studen	ts have	e developed a sound know	wledge of molecular l	biology.	
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (2) +	Ü (1)				
		<b>essment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
d) log ( e) pres	approx entatio	ation in groups of up to 3 . 20 pages) or n (approx. 30 minutes) ssessment: German and/		15 minutes per cano	didate) or
Allocat	ion of p	olaces			
Additio	nal info	ormation			
Worklo	ad				
150 h					
Teachi	ng cycl	e			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module					
Master Master Supple Master Master Supple Master	's degre 's teach mentar 's degre 's teach mentar 's degre	ee (1 major) Chemistry (20 ee (1 major) Functional M ning degree Gymnasium I y course MINT Teacher Ec ee (1 major) Chemistry (20 ning degree Gymnasium I y course MINT Teacher Ec ee (1 major) Functional M ee (1 major) Functional M	aterials (2016) WINT Teacher Educati ducation PLUS, Elite N 018) WINT Teacher Educati ducation PLUS, Elite N aterials (2022)	Network Bavaria (EN on PLUS, Elite Netwo	B) (2016) ork Bavaria (ENB) (2020)

Module	e title				Abbreviation	
Moder	n Synth	etic Methods			08-0CM-SYNT-161-1	m01
Module	e coord	inator		Module offered by	<u> </u>	
lecture	r of the	seminar		Institute of Organic	Chemistry	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	Its					
		iscusses modern stere emistry and catalysis.	oselective synthesis m	ethods. It focuses o	n selected total syntl	heses, orga-
Intend	ed lear	ning outcomes				
They ca			y plan complex chemic ey can describe aspect			
Course	<b>S</b> (type, r	number of weekly contact hour	s, language — if other than Ge	rman)		
S (2) + Module		t in: German or English				
		<b>sessment</b> (type, scope, lang le for bonus)	guage — if other than German,	examination offered — if no	ot every semester, informati	ion on whether
c) oral d) log ( e) pres Langua	examin (approx entatio	ation in groups of up t . 20 pages) or n (approx. 30 minutes) ssessment: German ar			didate) or	
Additio	onal inf	ormation				
Worklo	ad					
150 h						
Teachi	ng cycl	e				
Referre	ed to in	LPO I (examination regulati	ons for teaching-degree progra	ummes)		
Module	e appea	urs in				
Master	's degr	ee (1 major) Chemistry	(2016)			
Master Supple Master Master Supple Master	's teacl ementai 's degr 's teacl ementai	y course MINT Teacher ee (1 major) Chemistry ning degree Gymnasiur	n MINT Teacher Educat Education PLUS, Elite (2018) n MINT Teacher Educat Education PLUS, Elite Materials (2022)	Network Bavaria (EN ion PLUS, Elite Netw	B) (2016) ork Bavaria (ENB) (24	
Master's w	ith 1 majo	r Functional Materials (2016)		e generated 19-Apr-2025 • exa er (120 ECTS) Funktionswerks		page 90 / 139

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 t	itle			Abbreviation	
Laser Spe	ectroscopy			08-PCM1a-161-m01	_
Module c	oordinator		Module offered by		
		troskopie" (Laser Spectros-	Institute of Physical	and Theoretical Ch	emistry
	Aethod of grading	Only after succ. cor	npl. of module(s)		
5 n	umerical grade				
Duration	Module level	Other prerequisites	5		
1 semeste					
Contents	1-				
This mod		nts to the fundamental princi	ples of laser spectros	copy. It discusses a	bsorption
Intended	learning outcomes				
		ne components and operating ble to describe the principle			
Courses (	type, number of weekly cont	act hours, language — if other than Ge	erman)		
S (2) + Ü Module ta	(1) aught in: German or E	nglish			
	<b>of assessment</b> (type, sco reditable for bonus)	ope, language — if other than German,	examination offered — if no	t every semester, informat	ion on whether
b) oral ex	examination (approx amination of one car of assessment: Gerr	didate each (approx. 20 min	utes)		
Allocatio	n of places				
	•				
Additiona	al information				
Workload	4				
150 h					
Teaching	cycle				
Referred	to in LPO I (examination	regulations for teaching-degree progr	ammes)		
	oppears in				
Module a	appears in				
	degree (1 major) Che	mistry (2016)			
Master's					
Master's Master's Master's	degree (1 major) Che degree (1 major) Mat degree (1 major) Com	hematics (2016) putational Mathematics (201	16)		
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Master's Master's Master's Master's Master's	degree (1 major) Che degree (1 major) Mat degree (1 major) Com degree (1 major) Fund teaching degree Gym	hematics (2016) putational Mathematics (201 ctional Materials (2016) nasium MINT Teacher Educat	tion PLUS, Elite Netwo		016)
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Master's Master's Master's Master's Supplem Master's	degree (1 major) Che degree (1 major) Mat degree (1 major) Com degree (1 major) Fund teaching degree Gym entary course MINT To degree (1 major) Che	hematics (2016) putational Mathematics (201 ctional Materials (2016) nasium MINT Teacher Educat eacher Education PLUS, Elite mistry (2018)	tion PLUS, Elite Netwo Network Bavaria (ENE		016)
Master's Master's Master's Master's Suppleme Master's Master's	degree (1 major) Che degree (1 major) Mat degree (1 major) Com degree (1 major) Fund teaching degree Gym entary course MINT To degree (1 major) Che degree (1 major) Com	hematics (2016) putational Mathematics (201 ctional Materials (2016) nasium MINT Teacher Educat eacher Education PLUS, Elite mistry (2018) putational Mathematics (201	tion PLUS, Elite Netwo Network Bavaria (ENE		016)
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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) Functional Materials (2025)

	e title				Abbreviation	
Statisti	ical Me	chanics and Reaction I	Dynamics		08-PCM2-161-m01	
Module	e coord	inator		Module offered by		
		ninar "Chemische Dyna	amik" (Chemical Dyna-		l and Theoretical Ch	emistry
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
5		rical grade		•		
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten		51444410				
clude tl	he fund		cs in statistical mechar statistical thermodynar gy transfer.			
Intende	ed lear	ning outcomes				
			selected topics in stati idamental principles of			. They have
Course	<b>S</b> (type, r	number of weekly contact hour	s, language — if other than Ge	rman)		
S (2) +						
• •		t in: German or English				
		<b>sessment</b> (type, scope, lang le for bonus)	guage — if other than German,	examination offered — if no	t every semester, informati	ion on whether
	ge of a	k. 30 minutes) ssessment: German ar <b>blaces</b>	nd/or English			
Additio	nal inf	ormation				
		ormation				
Additio  Worklo		ormation				
		ormation				
 <b>Worklo</b> 150 h	ad					
 Worklo	ad					
 Worklo 150 h Teachir 	ad ng cycl	e	ons for teaching-degree progra	nmmes)		
 Worklo 150 h Teachir 	ad ng cycl	e	ons for teaching-degree progra	ımmes)		
 Worklo 150 h Teachir  Referre	ad ng cycl ed to in	e LPO I (examination regulati	ons for teaching-degree progra	ımmes)		
 Worklo 150 h Teachir  Referre  Module	ad ng cycl ed to in e appea	e LPOI (examination regulati ars in		ummes)		
 Worklo 150 h Teachir  Referre  Module Master	ad ng cycl ed to in e appea 's degr	e LPO I (examination regulati	(2016)	ımmes)		
 Worklo 150 h Teachir  Referre  Module Master Master	ad ng cycl ed to in e appea 's degr 's degr	e LPOI (examination regulati ars in ee (1 major) Chemistry ee (1 major) Mathemati	(2016)			
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 <b>Worklo</b> 150 h <b>Teachir</b>  <b>Referre</b>  <b>Module</b> Master' Master' Master' Master' Supple Master'	ad ng cycl d to in d to in s degr s degr s degr s degr s degr s teac menta	e LPO I (examination regulati ars in ee (1 major) Chemistry ee (1 major) Mathemati ee (1 major) Computati ee (1 major) Functional hing degree Gymnasiur ry course MINT Teacher ee (1 major) Chemistry	(2016) ics (2016) onal Mathematics (201 Materials (2016) n MINT Teacher Educat Education PLUS, Elite (2018)	6) ion PLUS, Elite Netwo Network Bavaria (EN		016)
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Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (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) Chemistry (2024) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) 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)

	e title				Abbreviation
Applied	d Spect	troscopy 3			08-PS3-152-m01
Module	e coord	linator		Module offered by	
lecture	r of lec	ture "Praktische Spektro	oskopie 3"	Institute of Physica	l and Theoretical Chemistry
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten			_!		
practic	e and t		graphs. We will record		e of spectroscopic methods in fluorescence and vibration spec
Intend	ed lear	ning outcomes			
		able to work with differe discussions.	ent spectrometers and	to interpret the resu	lting spectra. They are able to
Course	<b>S</b> (type, 1	number of weekly contact hours	, language — if other than Ge	rman)	
V (3)					
b) oral c) oral d) log ( e) pres	examir examir approx entatio ige of a	mination (approx. 90 to nation of one candidate nation in groups of up to x. 20 pages) or on (approx. 30 minutes) assessment: German an <b>places</b>	each (20 to 30 minute 3 candidates (approx	-	didate) or
		ormation			
 Worklo		ormation			
 <b>Worklo</b> 150 h	ad				
 Worklo	ad				
 Worklo 150 h Teachin	ad ng cycl		ons for teaching-degree progra	ımmes)	
 Worklo 150 h Teachin  Referre	ad ng cycl ed to in	e LPO I (examination regulation	ons for teaching-degree progra	ummes)	
 Worklo 150 h Teachin  Referre  Module	ng cycl ed to in e appea	e LPO I (examination regulation		ımmes)	
 Worklo 150 h Teachin  Referre  Bachel	ad ng cycl ed to in e appea or's de	e LPOI (examination regulation ars in gree (1 major) Chemistr	y (2015)	ummes)	
 Worklo 150 h Teachin  Referre  Module Bachel Bachel	ad ng cycl ed to in e appea or's de or's de	e LPO I (examination regulation ars in gree (1 major) Chemistr gree (1 major) Functiona	y (2015) al Materials (2015)	ımmes)	
 Worklo 150 h Teachin  Referre  Bachel Bachel Master	ad ng cycl ed to in e appea or's de or's de 's degr	e LPO I (examination regulation ars in gree (1 major) Chemistr gree (1 major) Functional	y (2015) al Materials (2015) Materials (2016)	ımmes)	
 Worklo 150 h Teachin  Referre  Bachel Bachel Bachel Master Bachel	ad ng cycl ed to in e appea or's de or's de 's degr or's de	e LPO I (examination regulation ars in gree (1 major) Chemistr gree (1 major) Functiona	y (2015) al Materials (2015) Materials (2016) y (2017)	ummes)	



## Module Group Theory of Chemistry / Numerics (Mathematics / Computer Science)

(ECTS credits)

Module	e title				Abbreviation	
Basics	and Ap	plications of Quantum C	Chemistry		08-TCM2-161-m01	
Module coordinator				Module offered by		
lecture	r of lect	ture "Computational Che	emistry"	Institute of Physica	l and Theoretical Ch	emistry
ECTS		od of grading	Only after succ. con	•		,
5 numerical grade Duration Module level Other prerequis			Other prerequisites	5		
1 semester graduate						
Conten		3.44440				
		ntroduces students to th	 e fundamental princi	ples of computations	al chemistry	
					at chemistry.	
		ning outcomes				
Studen putatio		able to explain the theore emistry.	etical principles of co	mputational chemis	try and to apply metl	nods in com-
Course	<b>S</b> (type, r	number of weekly contact hours,	language — if other than Ge	rman)		
S (2) +	Ü (2)					
		<b>Sessment</b> (type, scope, langua le for bonus)	age — if other than German,	examination offered — if no	ot every semester, informati	ion on whether
		mination (approx. 90 to :	180 minutes) or			
		ation of one candidate e		es) or		
		ation in groups of up to			didate) or	
		. 20 pages) or				
		n (approx. 30 minutes)				
	-	ssessment: German and	l/or English			
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teachi	ng cvcl	e				
	0 . )	-				
Poforro	d to in	LPOI (examination regulation	oc for toaching dogroe progra	mmac)		
Module	e appea	urs in				
Master	's degr	ee (1 major) Chemistry (2	2016)			
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 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 (2		-)		
	-	ee (1 major) Computation		.9)		
	-	ee (1 major) Mathematic	-	ion DILIC Elito Noter	ork Powaria (END) (a	220)
		ning degree Gymnasium Y course MINT Teacher E				020)
		•			ע (2020)	
MACTOR		PP (1	nal Mathematics (202	2)		
		r Functional Materials (2016)	nal Mathematics (202			

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) Functional Materials (2025)

	e title				Abbreviation	
Numeri	ical Me	thods and Programmin	g		08-TCM3-161-m01	
Module coordinator				Module offered by	<u> </u>	
		ture "Programmieren in	Theoretischer Che-	-	l and Theoretical Ch	emistry
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)		
5		rical grade				
Duratio		Module level	Other prerequisites	5		
1 seme		graduate		-		
Conten		graduate				
This mo ses its	odule p applica	provides an introduction ation areas.	to the fundamentals	of programming in th	eoretical chemistry	and discus-
Intende	ed lear	ning outcomes				
		able to explain and use name its application are	, .	ng languages typical	ly used in theoretica	l chemistry
Course	<b>S</b> (type, r	number of weekly contact hours	, language — if other than Ge	erman)		
S (2) +	Ü (2)					
		<b>Sessment</b> (type, scope, langu le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informat	ion on whether
		n (approx. 30 minutes)	.,			
e) pres Langua	age of a	ssessment: German and	d/or English			
e) pres Langua <b>Allocat</b> 	age of a t <b>ion of</b>	ssessment: German and	d/or English			
e) pres Langua Allocat  Additio	age of a tion of p	ssessment: German an <b>blaces</b>	d/or English			
e) pres Langua Allocat  Additio  Worklo	age of a tion of p	ssessment: German an <b>blaces</b>	d/or English			
e) pres Langua Allocat  Additio  Worklo 150 h	age of a ion of ponal inf	ssessment: German and olaces ormation	d/or English			
e) pres Langua Allocat  Additio  Worklo 150 h	age of a ion of ponal inf	ssessment: German and olaces ormation	d/or English			
e) pres Langua Allocat  Additio  Worklo 150 h Teachin 	age of a ion of p onal inf pad	ssessment: German and olaces ormation e				
e) pres Langua Allocat  Additio  Worklo 150 h Teachin 	age of a ion of p onal inf pad	ssessment: German and olaces ormation		ammes)		
e) pres Langua Allocat  Additio  Worklo 150 h Teachin 	age of a ion of p onal inf pad	ssessment: German and olaces ormation e		ammes)		
e) pres Langua Allocat  Additio  Worklo 150 h Teachin  Referre	age of a ion of p onal inf pad	ssessment: German and places ormation e LPOI (examination regulatio		ammes)		
e) pres Langua Allocat  Additio  Worklo 150 h Teachin  Referre  Module	age of a ion of p onal inf oad ng cycl ed to in	ssessment: German and places ormation e LPOI (examination regulatio	ons for teaching-degree progr	ammes)		
e) pres Langua Allocat  Additio  Worklo 150 h Teachin  Referre  Module	age of a ion of p onal inf oad ng cycl ed to in e appea	ssessment: German and olaces ormation e LPOI (examination regulation ars in	ons for teaching-degree progr	ammes)		
e) pres Langua Allocat  Additio  Teachin  Referre  Module Master Master Master	age of a ion of p onal inf onal info onal info info onal info onal info info onal info info info info info info info info	ssessment: German and places ormation e POI (examination regulation ars in ee (1 major) Chemistry ( ee (1 major) Computation ee (1 major) Computation	2016) cs (2016) onal Mathematics (201			
e) pres Langua Allocat  Additio  Worklo 150 h Teachin  Referre  Module Master Master Master Master	age of a ion of p onal inf oad ng cycl ed to in e appea 's degr 's degr 's degr	ssessment: German and olaces ormation e POI (examination regulation ars in ee (1 major) Chemistry ( ee (1 major) Mathematic ee (1 major) Functional	2016) cs (2016) cs (2016) mal Mathematics (2016)	16)		
e) pres Langua Allocat  Additio  Worklo 150 h Teachin  Referre Master Master Master Master Master Master	age of a ion of p onal inf onal i	ssessment: German and places ormation e e LPO I (examination regulation ars in ee (1 major) Chemistry ( ee (1 major) Mathemation ee (1 major) Functional hing degree Gymnasium	2016) cs (2016) mal Mathematics (2017) Materials (2016) m MINT Teacher Educat	16) tion PLUS, Elite Netw		016)
e) pres Langua Allocat  Additio  Teachin  Referre Master Master Master Master Supple	age of a ion of p onal inf bad ad ad ad ad ad ad ad ad ad	ssessment: German and places ormation e LPOI (examination regulation ars in ee (1 major) Chemistry ( ee (1 major) Mathematic ee (1 major) Functional in hing degree Gymnasium ry course MINT Teacher	2016) cs (2016) cs (2016) mal Mathematics (202 Materials (2016) n MINT Teacher Educat Education PLUS, Elite	16) tion PLUS, Elite Netw		016)
e) pres Langua Allocat  Additio  Worklo 150 h Teachin  Referre  Master Master Master Master Master Supple Master	age of a ion of p onal inf onal i	ssessment: German and olaces ormation e P POI (examination regulation ars in ee (1 major) Chemistry ( ee (1 major) Mathemation ee (1 major) Functional hing degree Gymnasium ry course MINT Teacher ee (1 major) Chemistry (	2016) cs (2016) cs (2016) mal Mathematics (2016) materials (2016) m MINT Teacher Educat Education PLUS, Elite (2018)	16) tion PLUS, Elite Netw Network Bavaria (EN		016)
e) pres Langua Allocat  Additio  Worklo 150 h Teachin  Referre Master Master Master Master Master Supple Master Master Master	age of a ion of p onal inf onal i	ssessment: German and olaces ormation e e LPO I (examination regulation ars in ee (1 major) Chemistry ( ee (1 major) Computation ee (1 major) Functional hing degree Gymnasium ry course MINT Teacher ee (1 major) Chemistry ( ee (1 major) Computation ee (1 major) Chemistry ( ee (1 major) Computation	2016) cs (2016) cs (2016) mal Mathematics (2017) Materials (2016) m MINT Teacher Educat Education PLUS, Elite 2018) mal Mathematics (2017)	16) tion PLUS, Elite Netw Network Bavaria (EN		016)
e) pres Langua Allocat  Additio  Worklo 150 h Teachin  Referre Master Master Master Master Master Master Supple Master Master Master Master	age of a ion of p onal inf onal i	ssessment: German and olaces ormation e P POI (examination regulation ars in ee (1 major) Chemistry ( ee (1 major) Mathemation ee (1 major) Functional hing degree Gymnasium ry course MINT Teacher ee (1 major) Chemistry (	2016) cs (2016) cs (2016) mal Mathematics (2016) m MINT Teacher Educat Education PLUS, Elite (2018) mal Mathematics (2017) cs (2019)	16) tion PLUS, Elite Netw Network Bavaria (EN 19)	B) (2016)	

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (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) Chemistry (2024) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) 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		
Quantu	Quantum Dynamics 08-TCM4-161-m01						
Module coordinator				Module offered by			
lecturer of lecture "Quantendynamik"			I	Institute of Physical	l and Theoretical Ch	emistry	
ECTS	Metho	od of grading	Only after succ. con	· · · ·			
5	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	ts						
		ent Schrödinger equatio adiabatic states, non-ad				theorem,	
Intende	ed lear	ning outcomes					
in mole	ecules.	possess knowledge ab Their insight into the m theoretical chemistry.					
Course	<b>S</b> (type, r	number of weekly contact hour	s, language — if other than Ge	rman)			
S (2) +	Ü (2)						
		<b>Sessment</b> (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	ion on whether	
d) log ( e) pres Langua	approx entatio ge of a	ation in groups of up to . 20 pages) or n (approx. 30 minutes) ssessment: German ar		. 15 minutes per cano	didate) or		
Allocation of places							
Additio	nal inf	ormation					
Auditio	ilat illi						
Worklo							
	150 h Teaching cycle						
reaciiii	is cyci						
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module appears in							
Master	Master's degree (1 major) Chemistry (2016)						
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 teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)						
		•		Network Bavaria (EN	B) (2016)		
	-	ee (1 major) Chemistry		-)			
	Master's degree (1 major) Computational Mathematics (2019)						
	-	ee (1 major) Mathemati hing degree Gymnasiur		ion DILIS Elito Notur	ork Bayaria (END) (a.	020)	
master	SIEdu	inig degree dynnasiur	in miner reacher Euucal	ION FLOD, EIILE NELWO	JIN DAVAHA (EIND) (20	020)	
Master's wi	ith 1 majo	r Functional Materials (2016)		9 generated 19-Apr-2025 • exa er (120 ECTS) Funktionswerkst		page 102 / 139	

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (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) Chemistry (2024) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) 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)

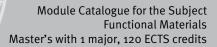
Module title					Abbreviation			
Selected Topics in Theoretical Chemistry					08-TCM1-161-m01			
Module coordinator				Module offered by				
lecturer of lecture "Theoretische Chemi			mie"	Institute of Physica	l and Theoretical Ch	emistry		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)				
5	nume	rical grade						
Duratio	n	Module level	Other prerequisites					
1 seme	ster	graduate						
Conten	ts							
This mo	dule in	ntroduces students to t	he fundamental princi	oles of theoretical ch	emistry.			
		ning outcomes			,			
			thematical and physica	al principles underly	ing the quantum che	emical and		
		amical approaches of t						
Course	<b>S</b> (type, r	number of weekly contact hour	s, language — if other than Gei	man)				
S (2) +	Ü (2)							
Method	d of ass	<b>sessment</b> (type, scope, lang	uage — if other than German,	examination offered — if no	t every semester, informati	on on whether		
module is	creditab	le for bonus)						
		mination (approx. 90 to		、 、				
			e each (20 to 30 minute o 3 candidates (approx		didate) or			
		. 20 pages) or	5 5 candidates (approx	15 minutes per can				
e) prese	entatio	n (approx. 30 minutes)						
Langua	ge of a	ssessment: German ar	id/or English					
Allocation of places								
Additio	nal inf	ormation						
Worklo	ad							
150 h								
Teachir	ng cycl	e						
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)								
Module appears in								
Master's degree (1 major) Chemistry (2016)								
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 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) Computational Mathematics (2019) Master's degree (1 major) Mathematics (2019)							
	-		n MINT Teacher Educat	ion PLUS, Elite Netwo	ork Bavaria (ENB) (20	020)		
			Education PLUS, Elite					
Master'	Master's degree (1 major) Computational Mathematics (2022)							
Master's wi	Master's with 1 major Functional Materials (2016) JMU Würzburg • generated 19-Apr-2025 • exam. reg. da- ta record Master (120 ECTS) Funktionswerkstoffe - 2016							

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) Functional Materials (2025)

Module	title			Abbreviation			
Practical Course in Programming					10-l-PP-152-m01		
Module coordinator				Module offered by			
Dean of	fStudie	es Informatik (Computer S	Science)	Institute of Comput	er Science		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)			
10	(not) s	successfully completed					
Duratio	n	Module level	Other prerequisites				
1-2 sem	nester	undergraduate					
Conten	ts						
The pro	gramm	ing language Java. Indep	endent creation of sr	nall to middle-sized,	, high-quality Java programs.		
	-	ning outcomes					
		are able to independently	v develop small to mi	ddle-sized, high-qua	ality lava programs.		
		umber of weekly contact hours, l	· · · · · · · · · · · · · · · · · · ·				
P (6)	(t)pe,						
Method		e <b>ssment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
lf annoi examin	written examination (approx. 60 to 120 minutes). If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate).						
Allocation of places							
Additio	nal info	ormation					
Worklo	ad						
300 h							
Teachir	ng cycl	9					
Teaching cycle: every semester							
	Referred to in LPO I (examination regulations for teaching-degree programmes)						
§ 49   Nr. 1 c) § 69   Nr. 1 d)							
Module appears in							
Bachelor's degree (1 major) Computer Science (2015)							
Bachelor's degree (1 major) Mathematics (2015)							
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)						
	First state examination for the teaching degree Realschule Computer Science (2015)						
		mination for the teaching		Computer Science (2	2015)		
	-	ee (1 major) Functional M					
		gree (1 major) Computer S					
	-	ee (1 major) Functional M					
Master'	Master's degree (1 major) Functional Materials (2025)						

Module title					Abbreviation				
Modeli	ng and	Computational Science			10-M-MWR-152-m01				
Module coordinator				Module offered by					
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathen	natics				
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)					
8	nume	rical grade		· · · · · · · · · · · · · · · · · · ·					
Duratio		Module level	Other prerequisites						
1 semester undergraduate									
Conten			<u>.</u>						
scaling	the mo ndame	odelling, asymptotic serie ntal methods for numeric	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 n ng sciences on a comput		ds and techniques to	o simulate processes from natura				
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)					
V (4) +									
Module	e taugh	t in: German and/or Engl	ish						
		<b>sessment</b> (type, scope, langua vle for bonus)	ge — if other than German, e	examination offered — if n	ot every semester, information on whether				
b) oral c) oral	examir examin age of a	mination (approx. 90 to 1 nation of one candidate e nation in groups (groups o ssessment: German and bonus	ach (15 to 30 minutes of 2, 10 to 15 minutes	s) or					
Allocat	ion of <sub>l</sub>	places							
Additio	onal inf	ormation							
Worklo	ad								
240 h	-								
Teachi	ng cycl	e							
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)					
Module	e appea	ars in							
		gree (1 major) Physics (20							
	Bachelor's degree (1 major) Mathematical Physics (2015)								
Bachel				Bachelor's degree (1 major) Computational Mathematics (2015)					
Bachel Bachel	or's de	gree (1 major) Computati	onal Mathematics (20	015)					
Bachel Bachel Bachel	or's de or's de	gree (1 major) Computati gree (1 major) Mathemati	onal Mathematics (20 cal Physics (2016)	015)					
Bachel Bachel Bachel Master	or's de or's de 's degr	gree (1 major) Computati gree (1 major) Mathemati ee (1 major) Functional M	onal Mathematics (20 cal Physics (2016) aterials (2016)	D15)					
Bachel Bachel Bachel Master Bachel	or's de or's de 's degr or's de	gree (1 major) Computati gree (1 major) Mathemati	onal Mathematics (20 cal Physics (2016) aterials (2016) 520)	015)					





# Module Group Biology

(ECTS credits)

Module title				Abbreviation			
Aspect	s of Mo	olecular Biotechnology			07-4S1MOLB-152-m	101	
Module coordinator				Module offered by			
holder	ofthe	Chair of Biotechnology	and Biophysics	Faculty of Biology			
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)			
5	nume	rical grade					
Duratio	on	Module level	Other prerequisites	i			
1 seme	ster	undergraduate					
Conten	nts		*				
mes, p sor des electro	Fundamental principles of "white" biotechnology, bioreactors, biocatalysis, immobilisation of cells and enzy- mes, production of biomolecules, molecular biology, recombinant DNA technology, protein engineering, biosen- sor design, drug design, drug targeting, molecular diagnostics, recombinant antibodies, hybridoma technology, electromanipulation of cells.						
		ning outcomes			1.1.		
ges an Studer dently	d disac nts will review	gain an overview of trac lvantages. They will lea acquire a knowledge of relevant literature. In a ntly acquaint themselve	rn to decide what meth fundamental methods ddition, they will becor	nod is most suitable t in biotechnology th me acquainted with -	for addressing a par at will enable them t	ticular issue. to indepen-	
Course	S (type, 1	number of weekly contact hours	s, language — if other than Ge	rman)			
V (2) +	S (2)						
		<b>sessment</b> (type, scope, lang ble for bonus)	uage — if other than German,	examination offered — if no	t every semester, informat	ion on whether	
	exami ble for	nation (approx. 30 to 60 bonus	o minutes)				
Allocat	tion of	places					
Should Studen siderat ted to s nimum 60 ECT tik (Ma tentiall the num there b form re ponent ve succ tial cor A waiti Selecti mic ach ve ach in the s at the t averag to their	25 places. Should the number of applications exceed the number of available places, places will be allocated as follows: Students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits will be given preferential con- sideration. Should the module be used in other subjects, there will be two quotas: 95% of places will be alloca- ted to students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits and 5% of places (a mi- nimum of one place in total) will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 60 ECTS credits and to students of the Bachelor's degree subjects Computational Mathematics and Mathema- tik (Mathematics), each with 180 ECTS credits, as part of the application-oriented subject Biology (as well as po- tentially to students of other 'importing' subjects). Should the number of places available in one quota exceed the number of applications, the remaining places will be allocated to applicants from the other quota. Should there be, within one module component, several courses with a restricted number of places, there will be a uni- form regulation for the courses of one module component. In this case, places on all courses of a module com- ponent that are concerned will be allocated in the same procedure. In this procedure, applicants who already ha- ve successfully completed at least one other module component of the respective module will be given preferen- tial consideration. A waiting list will be maintained and places re-allocated as they become available. Selection process group 1 (95%): Places will primarily be allocated according to the applicants' previous acade- mic achievements. For this purpose, applicants will be ranked according to the number of ECTS credits they ha- ve achieved and their average grade of all assessments taken during their studies or of all module components in the subject of Biologie (Biology) (excluding Chemie (Chemistry), Physik (Physics), Mathematik (Mathematics)) at the time of application. T						
Master's w	ith 1 majo	r Functional Materials (2016)		e generated 19-Apr-2025 • exa er (120 ECTS) Funktionswerkst		page 109 / 139	

# UNIVERSITÄT WÜRZBURG

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** 

Workload

150 h

**Teaching cycle** 

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

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### 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 Group Focus Topic A

(ECTS credits)

Module title			Abbreviation			
Biofabrication				03-BIOFAB-152-m01		
Module	e coord	inator		Module offered by		
holder Dentist		Chair of Functional Materi	als in Medicine and	Faculty of Medicine		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
and pra photon sinterir	actices, 1 polym 1g, mel <sup>1</sup>	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 pr	of medical device regulations interface polymerisation, two- stereolithography, selective laser rinting, introduction to rheology, rol.	
Intend	ed learı	ning outcomes				
ble in t printer ding of will acc	he cont works, scienti quire 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 biofabrication ent regulations gover	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	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V (2) + Module		t in: V, Ü: English				
		e <b>essment</b> (type, scope, langua; le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
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	onal inf	ormation				
Worklo	ad					
150 h	150 h					
Teachi	ng cycl	9				
Referre	ed to in	LPO I (examination regulations	for teaching-degree progra	mmes)		
	e appea					
	-	ee (1 major) Biofabricatio ee (1 major) Functional M				
master	Jucgi		(2010)			

Module	e title				Abbreviation		
Tissue Engineering - Alternatives to Animal Testing       03-FU-TE-AT-161-m01							
Module	e coord	inator		Module offered by			
holder	of the (	Chair of Regenerative	Medicine	Faculty of Medicine	2		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
5	nume	rical grade					
Duratio	on	Module level	Other prerequisites	i			
1 seme	ster	undergraduate					
Conten	ts		· · · · ·				
			ration of complex 3D tiss according to GMP guideli		pment of pre- clinical test models.		
Intende	ed lear	ning outcomes					
			onstruct complex 3D tis s transplant in the clinic		the use therof as alternative test		
Course	<b>S</b> (type, r	umber of weekly contact hou	urs, language — if other than Ge	rman)			
V (2) +	Ü (2)						
		<b>essment</b> (type, scope, lar le for bonus)	nguage — if other than German,	examination offered — if no	ot every semester, information on whether		
(approx	x. 60 m			entation (approx. 30	o minutes) or written examination		
Allocat							
Additio	onal inf	ormation					
Worklo	ad						
150 h							
Teachi	ng cycl	e					
Referre	ed to in	LPO I (examination regula	tions for teaching-degree progra	ammes)			
Module	e appea	irs in					
Master	's degr	ee (1 major) Functiona	ll Materials (2016)				

Modul	e title				Abbreviation		
Fundar	mentals	s of Physiology and Appli	03-FU-IMP-161-m01				
Functio	on						
Modul	e coord	inator		Module offered by			
holder Dentis		Chair of Functional Mater	ials in Medicine and	Faculty of Medicine			
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)			
5	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 seme	ester	graduate					
Conter	nts						
structu	ire and		hat lead to functiona		stem, of the jaw including tooth of function. Materials and use of		
Intend	ed lear	ning outcomes					
		receive advanced knowle an lead to the use of med			nowledge about pathological pro- t.		
Course	<b>es</b> (type, r	number of weekly contact hours, l	anguage — if other than Gei	rman)			
V (3) +	P (1)						
		<b>Sessment</b> (type, scope, langua ole for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether		
(appro	x. 90 m	ractical course (approx. 1 inutes); weighted 1:1 ssessment: German and		entation (approx. 3c	minutes) or written examination		
Allocat	tion of <sub>l</sub>	places					
Additio	onal inf	ormation					
Worklo	bad						
150 h							
Teachi	ng cycl	e					
-							
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	immes)			
Modul	Module appears in						
Master	r's degr	ee (1 major) Functional M	aterials (2016)				

Module title					Abbreviation	
Tissue Engineering - Basics for Tissue Regeneration					03-TE-REG-161-m01	
Module	e coord	inator		Module offered by		
unknov	vn			Faculty of Medicine		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
sue tra	nsplant		cells for the genereat	ion of cartilage and l	nes. Basics of matrix -based tis- bone tissue. Strategies for vascu-	
Intende	ed learı	ning outcomes				
	ells for	the cartilage and bone re			ologuous cells, the selection of sed as diagnostics and for thera-	
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V (2) +	Ü (2)					
		s <b>essment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, information on whether	
(approx	k. 60 m			entation (approx. 30	minutes) or written examination	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teaching cycle						
Referre	d to in	LPOI (examination regulations	s for teaching-degree progra	mmes)		
Module	e appea	in and the second se				
Master	Master's degree (1 major) Functional Materials (2016)					

Module title Abbrev					Abbreviation	
Carrier Materials and Devices for Therapeutic Compounds					03-FU-TMW-161-m01	
Module	e coord	inator		Module offered by		
holder	of the (	Chair of Regenerative Mee	dicine	Faculty of Medicine		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
tation of Further	of vario more, o	us loading mechanisms a	as well as the control is and their clinical us	led release of drugs se are presented. Sti	rticular nanoparticles; presen- from the drug delivery system. udents gain a deeper insight into	
Intende	ed leari	ning outcomes				
taught		roduction options are ava			tems. In addition, they will be pected, so that they can deal	
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V (2) +	P (1)					
		<b>essment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
(approx	x. 30 m			en examination (app	orox. 90 minutes) or presentation	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
150 h	150 h					
Teaching cycle						
Referre	ed to in	LPO I (examination regulations	s for teaching-degree progra	mmes)		
Module	e appea	irs in				
Master	Master's degree (1 major) Functional Materials (2016)					

Module title Abbreviation							
Techno	Technologies to Support Regenerative Medicine         o3-FU-TRM-161-mo1						
Module	e coord	inator		Module offered by			
holder	of the (	Chair of Regenerative Me	dicine	Faculty of Medicine			
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)			
5	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 seme	ster	undergraduate					
Conten	ts						
		ects for the generation of surfaces. Cell material iu		valents. Problems of	tissue/Implant interfaces. Nano-		
Intende	ed learı	ning outcomes					
		fundamental knowledge I the appropriate tissue c		/material interfaces,	with speciific tissue material in-		
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)			
V (2) +	Ü (2)						
		<b>essment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
(approx	k. 60 m			entation (approx. 30	minutes) or written examination		
Allocat							
			-				
Additio	nal inf	ormation					
Worklo	ad						
150 h							
Teachi	ng cycl	е					
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	mmes)			
Module	Module appears in						
Master	's degr	ee (1 major) Functional M	aterials (2016)				



# Module Group Focus Topic B

(ECTS credits)

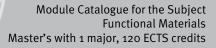
Modul	e title				Abbreviation
Structu	ure and	Properties of Modern Ma	aterials: Experiments	vs. Simulations	08-FU-MW-161-m01
Modul	e coord	inator		Module offered by	<u>,</u>
degree	progra	mme coordinator Funktio	onswerkstoffe (Func-		Technology of Material Synthesis
	Matrier				
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade		· · · · · ·	
<u> </u>		Module level	Other prerequisites		
1 seme		graduate			
		gladdale			
Conten					
Materia simula		erties of metals and cera	mics: correlation of si	tructure/property re	lations through experiments and
Intend	ed lear	ning outcomes			
Studer	nts gain	an insight into the prope	erties of modern mate	erials: aerospace al	uminium alloys and high-perfor-
					ethods using numerical simulat
	•	focus is on the relation b	etween the micro/na	noscopic structure o	of materials and the resulting pro
perties -					
	_	number of weekly contact hours,	anguage — if other than Ger	man)	
V (2) +	S (1)				
		<b>Sessment</b> (type, scope, langua Ile for bonus)	ge — if other than German, o	examination offered — if n	ot every semester, information on whether
		x. 30 minutes) or nation of one candidate e	ach (annrox 20 mini	ites) or	
		ation in groups (groups (			
		ssessment: German and		,	
Assess	sment o	ffered: Once a year, wint	er semester		
Allocat	tion of <sub>l</sub>	olaces			
			-		
Additic	onal inf	ormation			
Worklo			-		
	Jau				_
150 h	-				
Teachi	ng cycl	e			
	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)	
 Moduli	e appea	are in			
		ee (1 major) Physics (201	6)		
	-	-			
Master's degree (1 major) Nanostructure Technology (2016) Master's degree (1 major) Functional Materials (2016)					
	-	ee (1 major) Nanostructu			
	-	ee (1 major) Physics (202			
	-	ee (1 major) Physics (202			
	-	ee (1 major) Quantum En			
	-	ee (1 major) Quantum Te			

Modul	e title				Abbreviation	
Sensor	r and Ad	tor Materials - Functio	nal Ceramics and Mag	netic Particles	08-FU-SAM-161-m01	
Module	e coord	inator		Module offered b	y	
	progra Matrieri	mme coordinator Funk als)	tionswerkstoffe (Func-	Chair of Chemica	l Technology of Material Synthesis	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	1	rical grade		, ,,		
<u>)</u> Duratio		Module level	Other prerequisites			
1 seme		graduate				
Conten	nts					
					as piezoelectrics, shape memory ological fluids, magnetofluids.	
Intend	ed lear	ning outcomes				
Studer	nts have	e developed fundament	tal knowledge in the ar	ea of sensory and	actuatory materials.	
Course	<b>S</b> (type, r	umber of weekly contact hour	s, language — if other than Gei	rman)		
V (2) +	P (2)					
		essment (type scope lang	uage — if other than German	examination offered — if	not every semester, information on whether	
		le for bonus)			not every semester, mornation on whether	
Assess P: cred	ment o itable f	ssessment: German an ffered: Once a year, su or bonus				
Allocat	tion of <sub>l</sub>	olaces				
Additio	onal inf	ormation				
Worklo	bad					
150 h						
-	ng cycl	e				
Referre	ed to in	LPO I (examination regulation	ons for teaching-degree progra	mmes)		
Modul	e appea	ors in				
		ee (1 major) Physics (20	016)			
	-		ture Technology (2016)			
	-	· · ·	•, · ·			
	Master's degree (1 major) Functional Materials (2016) Master's degree (1 major) Nanostructure Technology (2020)					
	Master's degree (1 major) Physics (2020)					
	-	ee (1 major) Physics Int				
	-	ee (1 major) Quantum E				
Master			.ngineening (2020)			
	's degr	ee (1 major) Quantum T				
Master	-	-	echnology (2021)			

Module title				Abbreviation		
Polyme	Polymers II 03-FU-PM2-161-m01					1
Module coordinator Module offered by						
holder o Dentisti		Chair of Functional Mate	rials in Medicine and	Faculty of Medicine		
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate				
Conten	ts	5	1			
plex po lication	lymer a of the	mer synthesis methods, architectures), biodegrad respective polymers: e. on surfaces.	dable polymers, polyp	eptoides, natural po	lymers. We will disc	uss the app-
Intende	d learr	ning outcomes				
differen als. Stu gain ins quence	it synth dents o sight in s / disa	equire advanced knowle netic routes with which t can estimate if and how to the field of technicall advantages that synthes concerns.	he different molecules fast a polymer degrac y used polymers from	s can be prepared fro les under given circu nature. Each sectior	om different starting mstances. Furtherm a also points to poss	materi- ore, they ible conse-
Courses	<b>5</b> (type, n	umber of weekly contact hours,	 language — if other than Ger	rman)		
S (2) + ĺ	Ü (1)					
		e <b>essment</b> (type, scope, langu le for bonus)	age — if other than German, e	examination offered — if no	t every semester, informati	ion on whether
b) oral e c) talk (	examin approx	nination (approx. 90 mi ation of one candidate a. 30 minutes) ssessment: German and	each (approx. 20 minu	utes) or		
Allocati	ion of p	olaces				
Additio	nal info	ormation				
Worklo	ad					
150 h						
Teachin		9				
	- <u>5</u> - <b>J</b> - <b>I</b>	-				
Referre	d to in	LPO I (examination regulation	ns for teaching-degree progra	mmes)		
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Module						
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)						
<u> </u>		y course MINT Teacher E				
Master's wi	tn 1 major	Functional Materials (2016)		generated 19-Apr-2025 • exa r (120 ECTS) Funktionswerkst		page 121 / 139

Module title					Abbreviation	
Nanoscale Materials 08-PCM3-161-m01						
Module	e coord	inator		Module offered by		
lecture	r of the	seminar "Nanoskalige	Materialien"	Institute of Physical	l and Theoretical Ch	emistry
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5		rical grade		· · · · · ·		
Duratio		Module level	Other prerequisites	i		
1 seme		graduate				
Conten		Sidduite				
This mo	odule d	liscusses advanced top naracterisation method				es, fabricati-
		ning outcomes				
Studen	ts are a	able to characterise nar moscale materials.	noscale materials. The	y are able to name ar	alytical methods an	d applicati-
Course	<b>S</b> (type, r	number of weekly contact hours	s, language — if other than Ge	rman)		
S (2) + Module		t in: German or English				
		<b>sessment</b> (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	ion on whether
b) oral c) talk	examir (approx Ige of a	mination (approx. 90 m nation of one candidate <. 30 minutes) ssessment: German an bonus	each (approx. 20 min	utes) or		
Allocat	ion of <sub>l</sub>	olaces				
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teachi	ng cycl	e				
Referre	d to in	LPO I (examination regulation	ons for teaching-degree progra	ammes)		
Module						
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	-	ee (1 major) Mathemati				
	-	ee (1 major) Computatio		.6)		
	-	ee (1 major) Functional		ion PLUS Elito Notw	ork Boyoria (ENB) (a	016)
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)						
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Master	's teacl	hing degree Gymnasiun ry course MINT Teacher	n MINT Teacher Educat			020)
Master's wi	ith 1 majo	r Functional Materials (2016)	-	• generated 19-Apr-2025 • exa er (120 ECTS) Funktionswerkst	-	page 122 / 139

#### Julius-Maximilians-UNIVERSITÄT WÜRZBURG



Bachelor'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) Master's degree (1 major) Chemistry (2024) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) 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)

ECTS       Method of grading       Only after succ. compl. of module(s)         5       numerical grade          Duration       Module level       Other prerequisites         1 semester       graduate          Contents          This module introduces students to the fundamental principles of supramolecular chemistry. It focuses on inter- actions between molecules, molecular recognition by receptors, complexes, supramolecular polymers, coordi- nation polymers and networks, liquid crystals, self-assembly in aqueous media, synthetic ion channels and mo- dern applications of supramolecular chemistry.         Intended learning outcomes       Students are able to explain interactions between molecules demonstrating a high degree of expertise in the field as well as to describe the formation, structure and polymers of coordination compounds. They are able to describe the self-assembly of polymers in aqueous media as well as to identify the characteristics of synthetic ion channels. They can name modern applications of supramolecular chemistry.         Courses (type, number of weekly contact hours, language — if other than German)	Module	Module title Abbreviation					
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			-		Network Bavaria (EN	B) (2025)	
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Physica	e title				Abbreviation	
	al Cher	nistry of Supramolecul	ar Assemblies		08-PCM5-161-m01	
Module coordinator				Module offered by	<u> </u>	
lecture kularer		seminar "Physikalisch uren"	e Chemie Supramole-	-	l and Theoretical Ch	emistry
ECTS	1	od of grading	Only after succ. con	npl. of module(s)		
5	1	rical grade		• • • • •		
Duratio		Module level	Other prerequisites	i		
1 seme	ster	graduate				
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 Additio  150 h Teachin  Referre Master Master Master Master Master Supple Master Master Master Master	ed to in ed to in ed to in e appea e's degr e's degr e's teacl ementa e's degr e's degr e's degr	e LPO I (examination regulati ars in ee (1 major) Chemistry ee (1 major) Mathemati ee (1 major) Computati ee (1 major) Functional hing degree Gymnasiur ry course MINT Teacher ee (1 major) Chemistry	(2016) ics (2016) onal Mathematics (201 Materials (2016) n MINT Teacher Educat Education PLUS, Elite (2018) onal Mathematics (201 ics (2019)	6) ion PLUS, Elite Netw Network Bavaria (EN 9)	B) (2016)	

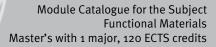
#### Julius-Maximilians-UNIVERSITÄT WÜRZBURG

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (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) Chemistry (2024) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) 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)

	e title				Abbreviation
Polym	er Mate	rials 1: Technology of Po	lymer Modification		08-FU-PW1-161-m01
Module coordinator Module offered by					<u> </u>
	e progra Matrieri	mme coordinator Funktic als)	onswerkstoffe (Func-	Chair of Chemical T	echnology of Material Synthesis
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)	
5	1	rical grade		•	
Duratio		Module level	Other prerequisites		
1 seme		graduate			
Conter		Sidduite	<u> </u>		
logies	for the				; properties of polymers; techno- es for the characterisation of po-
Intend	ed lear	ning outcomes			
portan such a nufact cessin	t produ s inject ured pro g mach	ction technologies (polyr ion moulding) and under oducts. They have becom ines and tools.	ner synthesis method stand the different w le familiar with ways	ds, compounding tec ays of influencing th to calculate complex	r with the characteristics of im- chnologies, processing methods e properties of materials and ma- < flow conditions in polymer pro-
Course	<b>es</b> (type, r	umber of weekly contact hours, l	anguage — if other than Gei	man)	
V (2) +	P (2)				
		s <b>essment</b> (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether
b) oral c) oral Langua Assess	examir examin age of a sment o	nination (approx. 90 mir ation of one candidate e ation in groups (groups o ssessment: German and, ffered: Once a year, winto or bonus	ach (approx. 20 minu of 2, approx. 30 minu /or English		
Allocat	tion of p	olaces			
Additio	onal inf	ormation			
Worklo	oad				
150 h					
-	ng cycl	e			
Teachi	0.,				
Teachi					
	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)	
	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)	
 Referre			s for teaching-degree progra	mmes)	
 Referre  Modul	e appea	irs in		mmes)	
 Referre  Module Master	<b>e appea</b> r's degr	n <b>rs in</b> ee (1 major) Functional M	aterials (2016)	mmes)	
 Referre  Module Master Master	<b>e appea</b> r's degra	irs in	aterials (2016) aterials (2022)	mmes)	

Module title Abbreviation					Abbreviation
Polymer Materials 2: Technology of Filler Modification for Polymer Materials 08-FU-PW2-161-m01					
Modul	e coord	inator		Module offered by	l
	e progra Matrieri	mme coordinator Funktic als)	onswerkstoffe (Func-	Chair of Chemical 1	Fechnology of Material Synthesis
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ester	graduate			
Conter	nts				
ons be (e.g. el	tween f lectrica	iller materials and polym	ners, determination of behaviour) and influe	f the special propert	er to modify polymers, interacti- ies of functionalised polymers ation on other properties (e.g.
Intend	ed lear	ning outcomes			
ped an interac tionali:	i awarei tions b sed pol	ness of the possibilities a etween filler materials ar	and problems associand polymers. They known naviour, bactericidal b	ated with the modifion ow how to determin behaviour) and unde	ler materials. They have develo- cation of polymers as well as the e the special properties of func- erstand how other properties are urface).
Course	<b>es</b> (type, r	number of weekly contact hours,	language — if other than Ger	rman)	
V (2) +	P (2)		-		
		<b>sessment</b> (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	ot every semester, information on whether
b) oral c) oral Langua Assess	examir examin age of a sment o	mination (approx. 90 mir nation of one candidate e ation in groups (groups o ssessment: German and ffered: Once a year, sum or bonus	each (approx. 20 minu of 2, approx. 30 minu /or English		
Allocat	tion of p	olaces			
			<b>.</b>		
Additio	onal inf	ormation			
Worklo	bad				
150 h					
-	ng cycl	e			
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)	
			0 - 3 F. 38.0		
Modul	e appea	urs in			
		ee (1 major) Functional N	laterials (2016)		
	-	ee (1 major) Functional N			
musici	0 0 0 0	ee (I majoi) i unctionat iv	laterials (2022)		

Module title					Abbreviation		
Nanoar	Nanoanalytics 11-NAN-152-mo1						
Module	e coord	inator		Module offered by			
Manag	ing Dire	ector of the Institute of A	Applied Physics	Faculty of Physics a	nd Astronomy		
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)			
6	nume	rical grade					
Duratio	on	Module level	Other prerequisites	;			
1 seme	ster	graduate					
Conten	ts	<u>.</u>	·				
level up of X-ray py. Sca croscop	Principles of analytic procedures in the field of nanostructure physics, imaging techniques from a microscopic level up to an atomic level, examination of chemical composition, spectroscopy of electronic properties, usage of X-ray methods Physics and material systems on the nanoscale Scanning probes: Atomic force microsco- py. Scanning tunneling microscopy Electron probes: Scanning electron microscope. Transmission electron mi- croscope Secondary ions - mass spectrometry - X-ray methods: Synchrotron spectroscopy. Photoemission. X- ray absorption						
The stu vel. The	idents ey knov thods f	have basic knowledge c v microscoping procedu or the determination of	res that are used in p	ractice in labs and th	e industry as well as	spectrosco-	
Course	<b>S</b> (type, r	number of weekly contact hours	, language — if other than Ge	rman)			
V (3) + Module		t in: German or English					
Method	d of ass	sessment (type, scope, langi	lage — if other than German,	examination offered — if no	t every semester, informati	ion on whether	
module is	s creditab	le for bonus)					
<ul> <li>b) oral</li> <li>c) oral of</li> <li>d) projection</li> <li>e) pression</li> <li>lf a write stead to</li> <li>of assemination</li> <li>Langua</li> </ul>	examir examin ect repo entatio tten exa ake the ssmen date at age of a	mination (approx. 90 to nation of one candidate nation in groups (groups ort (approx. 8 to 10 page n/talk (approx. 30 minu amination was chosen a form of an oral examin t is changed, the lecture the latest. ssessment: German an ffered: Once a year, wir	each (approx. 30 minu of 2, approx. 30 minu es) or ites). is method of assessm ation of one candidate er must inform student d/or English	tes per candidate) o ent, this may be char e each or an oral exa	nged and assessmer mination in groups.	If the method	
Allocat	ion of <sub>l</sub>	places					
Additional information							
	Workload						
180 h			_				
Teachi	ig cycl	e					
Referre	a to in	LPO I (examination regulation	ns for teaching-degree progra	ammes)			
		•					
Module	e appea	ars in					
Master's wi	ith 1 majo	r Functional Materials (2016)		• generated 19-Apr-2025 • exa er (120 ECTS) Funktionswerkst		page 129 / 139	



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) exchange program Physics (2023)

Module title Abbreviation						
Organi	Organic Semiconductors 11-OHL-161-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. con	npl. of module(s)		
6	nume	rical grade				
Duratio		Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
Fundar ons.	nentals	of organic semiconduc	tors, molecular and po	olymer electronics an	id sensor technology	y, applicati-
Intende	ed lear	ning outcomes				
		have advanced knowled	lge of organic semicon	iductors.		
		number of weekly contact hours				
V (3) +		····· , ···· ,	,			
	• •	t in: German or English				
		<b>sessment</b> (type, scope, langule for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	ion on whether
a) writt	en exai	mination (approx. 90 to	120 minutes) or			
		ation of one candidate		utes) or		
		ation in groups (groups		tes per candidate) or	r	
		ort (approx. 8 to 10 page				
		n/talk (approx. 30 minu amination was chosen a		ent this may be char	nged and assessmer	nt may in-
		e form of an oral examin				
		t is changed, the lecture			- ,	
		the latest.				
		ssessment: German an ffered: In the semester		offered and in the su	ibcoquant comostor	
Allocat				onered and in the st	ibsequent semester	
AllUCal		Jaces				
 • • • • • • •	1. 6					
Additio	onal Inf	ormation				
Worklo	ad					
180 h	-					
Teachi	ng cycl	e				
Referre	d to in	LPO I (examination regulation	ons for teaching-degree progra	immes)		
Module appears in						
	-	ee (1 major) Physics (20				
	-	ee (1 major) Nanostruct				
	-	ee (1 major) Functional				
		ning degree Gymnasium				016)
		y course MINT Teacher			B) (2016)	
	-	ee (1 major) Nanostruct ee (1 major) Physics (20				
	-	r Functional Materials (2016)		generated 19-Apr-2025 • exa	ım. reg. da-	page 131 / 139
		(2010)	-	er (120 ECTS) Funktionswerkst	-	,



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) 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						
Optica	Optical Properties of Semiconductor Nanostructures 11-HNS-161-m01					
Module	e coord	inator		Module offered by	1	
Managing Director 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)		
6	nume	rical grade				
Duratio	on	Module level	Other prerequisites	5		
1 seme	ster	graduate				
Conten	ts					
or mac ging th tures o with a f of nove for qua	roscopi eir size f varyin focus o el optoe ntum c	ic crystals, their electro . The lecture addresse g dimensions (2D, 1D, n optical properties an electronic and quantum	requently referred to as onic, optical and magne s technological challen oD). It provides the ba d light-matter coupling n photonic devices bas antum computing arch	etic properties can be ges in the preparatic sic theoretical conce g. Moreover, it discus ed on such nanostru	e systematically tailo on of semiconductor pts to describe their ses the challenges a	ored by chan- nanostruc- properties, and concepts
knowle	dge of	the technological metl	inciples and character nods to fabricate such knowledge to problem	structures, and of the	eir applications to no	
Course	<b>S</b> (type, r	number of weekly contact hour	s, language — if other than Ge	rman)		
V (3) + Module		t in: German or English				
		<b>eessment</b> (type, scope, lang le for bonus)	guage — if other than German,	examination offered — if no	ot every semester, informat	ion on whether
<ul> <li>b) oral</li> <li>c) oral</li> <li>d) projetion</li> <li>e) pression</li> <li>lf a write stead t</li> <li>of asset nation</li> <li>Languation</li> </ul>	examir examin ect repo entatio tten exa ake the essmen date at ige of a	ation in groups (group ort (approx. 8 to 10 pag n/talk (approx. 30 min amination was chosen form of an oral exami t is changed, the lectu the latest. ssessment: German ar	e each (approx. 30 min s of 2, approx. 30 minu ges) or utes). as method of assessm nation of one candidat rer must inform studen	utes per candidate) o ent, this may be cha e each or an oral exa ts about this by four	nged and assessme mination in groups. weeks prior to the o	If the method riginal exami-
Allocat	ion of <sub>l</sub>	olaces				
Additional information Workload 180 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes)						
		(examination regulat				
Module	e appea	nrs in				
Master's w	ith 1 majo	r Functional Materials (2016)	-	• generated 19-Apr-2025 • exa er (120 ECTS) Funktionswerks	-	page 133 / 139

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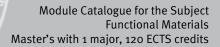
Master's degree (1 major) Mathematics (2016) Master's degree (1 major) Physics (2016) Master's degree (1 major) Nanostructure Technology (2016) Master's degree (1 major) Computational Mathematics (2016) Master's degree (1 major) Functional Materials (2016) Master's teaching degree Gymnasium MINT Teacher 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)

Module title					Abbreviation	
Princip	Principles of Energy Technologies 11-ENT-152-mo1					
Module	e coord	inator		Module offered by		
Manag	ing Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. cor	npl. of module(s)		
6	nume	rical grade				
Duratio	on	Module level	Other prerequisites	;		
1 seme	ster	graduate				
Conten	Its	~				
as rene ting ma studen verters Electric	ewable aterials ts. Ene . Nucle city. Bic	resources of energy. W , selective layers, high rgy conservation via th ar power plants. Hydro	vation and energy conv /e also discuss aspects ly activated carbons). T ermal insulation. Therr pelectricity. Wind turbin ergy. Energy storage. Er	of optimising materi he course is especia nodynamic energy ef es. Photovoltaics. Sc	als (e.g. nanostructu lly suitable for teach ficiency. Fossil fired	ured insula- ing degree energy con-
			different methods of er	nergy technology es	necially energy conv	ersion trans-
			he structures of corresp			
Course	<b>S</b> (type, r	number of weekly contact hou	rs, language — if other than Ge	rman)		
V (3) +	R (1)					
Module	e taugh	t in: German or English	1			
			guage — if other than German,	examination offered — if no	t every semester, informati	ion on whether
		nination (approx. 90 t	a 120 minutos) or			
<ul> <li>b) oral</li> <li>c) oral</li> <li>d) projection</li> <li>e) pression</li> <li>lf a write stead t</li> <li>of assession</li> <li>Languat</li> <li>Assession</li> </ul>	examir examin ect repo entatio tten exa ake the essmen date at age of a ment o	nation of one candidate lation in groups (group ort (approx. 8 to 10 pag on/talk (approx. 30 mir amination was chosen e form of an oral exami t is changed, the lectu the latest. ssessment: German au ffered: Once a year, wi	e each (approx. 30 minu s of 2, approx. 30 minu ges) or uutes) as method of assessm nation of one candidate rer must inform studen nd/or English	ites per candidate) o ent, this may be char e each or an oral exa	nged and assessmer mination in groups.	If the method
Allocat	ion of <sub>l</sub>	places				
Additio	onal inf	ormation				
Worklo	ad					
180 h						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
§ 22						
§ 22    § 22						
Module	_	ars in				
	- apper					
Master's w	ith 1 majo	r Functional Materials (2016)		• generated 19-Apr-2025 • exa er (120 ECTS) Funktionswerkst	-	page 135 / 139

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





# **Thesis** (30 ECTS credits)

Module	Module title Abbreviation					
Master	Master Thesis Functional Materials   08-FU-MT-161-m01					
Module	Module coordinator Module offered by					
degree tional <i>N</i>		mme coordinator Funktic	onswerkstoffe (Func-	Chair of Chemical 1	Fechnology of Material Synthesis	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
25	nume	rical grade				
Duratio	n	Module level	Other prerequisites	i		
1 seme	ster	graduate				
Conten	ts					
		be expected to research a principles of good scienti		d topic in the techno	blogy of functional materials, ad-	
Intende	ed lear	ning outcomes				
		able to conduct research t the results of their work		dhering to the princ	iples of good scientific practice,	
Course	<b>S</b> (type, r	number of weekly contact hours, I	anguage — if other than Ge	rman)		
No cou	rses as	signed to module				
		<b>sessment</b> (type, scope, langua ole for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
		is (approx. 70 pages) ssessment: German and	/or English			
Allocat	ion of p	places				
Additio	nal inf	ormation				
Time to	comp	lete: 6 months.				
Worklo	ad					
750 h						
Teachi	ng cycl	e				
Referre	d to in	LPOI (examination regulation	s for teaching-degree progra	ammes)		
Module	e appea	ars in				
Master	's degr	ee (1 major) Functional M ee (1 major) Functional M	laterials (2022)			
waster	s aegr	ee (1 major) Functional M	iateriais (2025)			

Module	Module title Abbreviation					
Master	Master Thesis Defense     08-FU-Koll-161-mo1					
Module	Module coordinator Module offered by					
chairperson of examination committee Funktionswerkstof- fe						
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	ster	graduate				
Conten	ts	·				
Prasen	tation	and defense of the result	s of the Master-Thesi	S		
Intende	ed lear	ning outcomes				
The stu	dents	learn how to present and	defend a scientif pie	ce of work.		
Course	<b>S</b> (type, I	number of weekly contact hours, l	anguage — if other than Gei	rman)		
K (o)						
module is	creditat	ole for bonus)			ot every semester, information on whether	
tes)	•	um (approx. 60 minutes): ussessment: German and,		utes) with subseque	nt discussion (approx. 30 minu-	
Allocat						
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teachi	ng cycl	e				
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)		
			• •			
Module	e appea	ars in				
		ee (1 major) Functional M	aterials (2016)			
	-	ee (1 major) Functional M				
Master	's degr	ee (1 major) Functional M	aterials (2025)			