

UNIVERSITÄT WÜRZBURG

Module Catalogue

for the Subject

Functional Materials

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

Examination regulations version: 2012 Responsible: Faculty of Chemistry and Pharmacy

JMU Würzburg • generated 26-Aug-2024 • exam. reg. data record 88|g81|-|-|H|2012



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The subject is divided into

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Content and Objectives of the Programme

The "Functional Materials" course programme (120 ECTS credits) with the Master of Science qualification prepares students for work of a scientific nature in the interdisciplinary area of materials science with a focus on functional materials. Students deepen their knowledge of specific topics and the methodical basics of the scientific work from their Bachelor studies. This course also prepares students for PhDstudies (Dr.rer.nat or Dr.-Ing.). The interdisciplinary character of this degree programme is reflected in cooperations with the Fachhochschule Würzburg-Schweinfurt, the Fraunhofer Institut für Silicatforschung, the Süddeutsches Kunststoffzentrum Würzburg, and the Bavarian Centre for Applied Energy Research (ZAE Bayern). These bring students into contact with the many topics of modern functional materials in the areas of chemistry, physics, materials science, and bio materials. The compulsory topics (45 ECTS credits) consist of lectures and practical training courses from the areas of Physics and Chemistry on mechanical/thermal and optical/electronic material properties, as well as Organic Chemistry and organic functional materials. These topics include a colloquium for the master thesis (5 ECTS credits) as well as two project assignments (each 10 ECTS credits) which can - as is the case for the master thesis - be undertaken at the universities and at the named research institutes participating in the course program or in industrial companies. The optional topics are divided into general topics (20 ECTS credits), where students may choose from Chemistry, Physics, Computer Science and Mathematics, and specific topics (30 ECTS credits). Here, students may choose between the Bio Materials and Technical Functional Materials subject areas. In their master thesis (25 ECTS credits) students show that they are able to deal predominantly independently with a thematically and temporally restricted experimental or theoretical topic from (engineering) sciences on the basis of their acquired methods and scientific skills. The results of the master thesis are presented and graded in a compulsory colloquium. The internationally comparable Master Degree qualifies students for scientifically oriented work in research and development in materials science with a focus on functional materials, as well as for attending a PhD study program.

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:

ASP02009

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

12-Jul-2012 (2012-139)

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



Compulsory Courses

(40 ECTS credits)

Module title				Abbreviation	
Mechanical and Thermal Material Properties				11-E5T-092-m01	
Module	e 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	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate	Admission prerequisite to assessment: successful completion of appr 50% of exercises. Certain prerequisites must be met to qualify for adm sion to assessment. The lecturer will inform students about the respec ve details at the beginning of the course. Registration for the course w be considered a declaration of will to seek admission to assessment. students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration assessment into effect. Students who meet all prerequisites will be ac mitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anow.		
Conten	ts				
Physica	al laws	of solids: Bonding and st	tructure, lattice dynar	nics, thermal and m	echanical properties.
Intende	ed learı	ning outcomes			
The stu	dents l	nave knowledge of mech	anical/thermal mater	ial characteristics.	
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)
Methoo module is	d of ass creditab	eessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
a) writte groups or d) pr	en exar (appro resenta	mination (approx. 90 min x. 30 minutes per candid tion/seminar presentatic	utes) or b) oral exam ate) or c) project rep on (approx. 30 minute	ination of one candi ort (approx. 10 pages es)	date each or oral examination in s, time to complete: 1 to 4 weeks)
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module appears in					
Master's degree (1 major) Technology of Functional Materials (2010) Master's degree (1 major) Technology of Functional Materials (2009) Master's degree (1 major) Functional Materials (2012)					

Module title				Abbreviation		
Opto-e	Opto-electronic Material Properties 11-MOE-092-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)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate	Admission prerequisite to assessment: successful completion of approx 50% of exercises. Certain prerequisites must be met to qualify for admiss sion to assessment. The lecturer will inform students about the respecti- ve details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration fo assessment into effect. Students who meet all prerequisites will be ad- mitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.			on of approx. fy for admis- the respecti- course will essment. If sessment gistration for will be ad- mester. For qualification
Conten	ts					
Physica	al princ	iples of optoelectronic	material properties and	d applications.		
Intende	ed lear	ning outcomes	· ·	•••		
The stu	dents l	know the principles of	optoelectronic material	characteristics.		
Course	S (type, r	umber of weekly contact hour	s, language — if other than Ger	rman)		
V + Ü (r	no infor	mation on SWS (week	v contact hours) and co	ourse language avail	able)	
Methoo module is	d of ass creditab	sessment (type, scope, lang le for bonus)	guage — if other than German,	examination offered — if no	t every semester, informati	on on whether
a) writt groups project prox. 30	en exaı (appro report o minu	mination (approx. 90 m x. 30 minutes per canc (approx. 10 pages, tim tes)	ninutes) or b) oral exam lidate, for modules with e to complete: 1 to 4 we	ination of one candi n less than 4 ECTS cr eeks) or d) presentat	date each or oral exa edits approx. 20 mir ion/seminar present	amination in 1utes) or c) tation (ap-
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teaching cycle						
Peferred to in IPO I (avamination regulations for teaching degree programmes)						
Module appears in						
Bachelor' degree (1 major) Physics (2010) Master's degree (1 major) Physics (2010) Master's degree (1 major) Technology of Functional Materials (2010) Master's degree (1 major) Technology of Functional Materials (2009) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010) Master's with 1 major Functional Materials (2012)						
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Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) Functional Materials (2012)

Module title					Abbreviation
Organic Chemistry 4 for Engineers 08-I0C4-122-mo1					08-10C4-122-m01
Module	e coord	inator		Module offered by	
lecture	r of lect	ture "Organische Chemie	4"	Institute of Organic	Chemistry
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 semester undergraduate Admission prerequisite to assess in the respective classes is in the respective classes is (usually 70% of exercises to be lar attendance of exercises (used absence)		site to assessment: s e classes as specifie rcises to be success ercises (usually a ma	ite to assessment: successful completion of exerci- classes as specified at the beginning of the course cises to be successfully completed) as well as regu- ercises (usually a maximum of 2 incidents of unexcu-		
Conten	ts				
This mo	odule d	iscusses biologically imp	oortant bonding class	ses, their reactions a	nd syntheses.
Intende	ed learı	ning outcomes			
Studen	ts have	e become familiar with bi	ologically important l	oonding classes, the	ir reactions and syntheses.
Course	S (type, n	number of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)
Methoo module is	d of ass creditab	sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
a) 1 to 3 or 90 m each (a Langua	3 writte ninutes pprox. ge of a	n examinations (1 writter each; 3 written examinat 20 minutes) or c) oral ex ssessment: German or Er	n examination: appro. tions: approx. 60 min amination in groups (nglish	x. 90 minutes; 2 writ nutes each) or b) oral (groups of 2, approx	ten examinations: approx. 60 l examination of one candidate . 30 minutes)
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Workload					
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module appears in					
Master's degree (1 major) Functional Materials (2012)					

Module title				Abbreviation		
Organic Functional Materials					08-0CM-FM-102-m01	
Module coordinator				Module offered by		
lecture	r of the	seminar "Organische Fur	nktionsmaterialien"	Institute of Organic	Chemistry	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	Contents					
The module deals with specific topics in organic functional materials. The focus is on fundamental (photo)phy- sical effects in organic molecular and polymeric semiconductors as well as their application in (opto)electronic components such as field effect transistors, organic light-emitting diodes, or organic solar cells as well as in non- linear optics.						
Intende	ed leari	ning outcomes				
The stu explain ents su near op	dents a the sy ch as f ptics.	are able to explain funda nthesis of these semicon ield effect transistors, org	mental (photo)physic ductor materials as v ganic light-emitting d	al processes in orga vell as their applicat iodes or in organic p	nic semiconductors. He/She can ion in (opto)electronic compon- hotovoltaics as well as in nonli-	
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
S (no in	Iformat	ion on SWS (weekly cont	act hours) and cours	e language available	2)	
Methoo module is	l of ass creditab	e essment (type, scope, langua; le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
a) 1 to 3 oral exa thods o the curr Langua	y writte aminati of asses rent se ge of a	n examinations (60 or 90 on in groups (groups of 2 ssment, the module coord mester at the beginning o ssessment: German or Er	o minutes) or b) oral e 2, 30 minutes). Shoul dinator will choose th of the course. nglish	examination of one c d there be the option are method to be use	andidate each (20 minutes) or c) n to choose between several me- d for the module component in	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teaching cycle						
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module appears in						
Master'	Master's degree (1 major) Chemistry (2013)					
Master'	s degr	ee (1 major) Chemistry (20	010)			
Master's degree (1 major) Functional Materials (2012)						



Module title					Abbreviation
Resear	ch proj	ect			08-PR-092-m01
Module	coord	inator		Module offered by	
holder thesis	of the (Chair of Chemical Techno	logy of Material Syn-	Chair of Chemical T	echnology of Material Synthesis
ECTS	Metho	od of grading	Only after succ. com	pl. 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 indeper	ndently on experime	nts on a topic in functional mate-
Intende	ed learı	ning outcomes			
Studen in writte	ts are a en form	able to independently wo n.	rk on a defined topic	in functional materi	als and to present their findings
Courses	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
R (no in	format	ion on SWS (weekly cont	act hours) and cours	e language available	e)
Methoo module is	l of ass creditab	e essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
report (Langua	approx ge of a	. 10 to 15 pages) ssessment: German or Ei	nglish		
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teaching cycle					
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	mmes)	
Module appears in					
Master'	s degr	ee (1 major) Technology o	of Functional Material	s (2010)	
Master'	s degre	ee (1 major) Technology (of Functional Material	s (2009)	
master's degree (1 major) Functional Materials (2012)					



Module title				Abbreviation	
Research project 2					08-PR2-122-m01
Module	e coord	inator		Module offered by	
holder thesis	of the (Chair of Chemical Techno	logy of Material Syn-	Chair of Chemical T	echnology of Material Synthesis
ECTS	Metho	od of grading	Only after succ. com	pl. 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 indeper	ndently on experimen	nts on a topic in functional mate-
Intende	ed learı	ning outcomes			
Studen in writte	ts are a en form	able to independently wo n.	rk on a defined topic	in functional materi	als and to present their findings
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
R (no in	format	ion on SWS (weekly cont	act hours) and cours	e language available	.)
Methoo module is	d of ass creditab	s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
report (Langua	approx ge of a	a. 10 to 15 pages) ssessment: German or Er	nglish		
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module appears in					
Master's degree (1 major) Functional Materials (2012)					



Compulsory Electives

(50 ECTS credits)



General Compulsory Electives

(ECTS credits)

Of the following modules, students may take up to two modules. The remaining ECTS credits in the subarea of mandatory electives must be achieved in the focuses A and/or B; modules already completed as part of the sub-area of focuses may not be used again in the sub-area of mandatory electives. If none of the following modules are chosen, the remaining ECTS credits must be achieved in the two focuses.

Module title			Abbreviation		
Chemical Nanotechnology: Analytics and Applications			08-FS5-101-m01		
Module	coord	inator		Module offered by	
holder thesis	of the (Chair of Chemical Techno	logy of Material Syn-	Chair of Chemical T	echnology of Material Synthesis
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				
The mo include ring. Th sectors	dule pı s pract e lectu	rovides an application-or ical exercises. It also dis re also offers insights int	iented introduction to cusses thermoanalys o the applications of	o the characterisatio is, rheological proce nanomaterials in the	n methods of nanochemistry and esses and dynamic light scatte- e industrial and technological
Intende	ed learr	ning outcomes			
Studen	ts have	e developed an advanced	knowledge of sol-ge	l chemistry and bion	nineralisation.
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
 This module comprises 2 module components. Information on courses will be listed separately for each module component. 08-FS5-1-101: V (no information on SWS (weekly contact hours) and course language available) 08-FS5-2-101: V (no information on SWS (weekly contact hours) and course language available) 					
Methoo module is	creditab	s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
Assess low. Un vidual a	ment ir less st assessi	this module comprises ated otherwise, successf nents.	the assessments in t ul completion of the	he individual module module will require s	e components as specified be- successful completion of all indi-
 Assessment in module component o8-FS5-1-101: Sol-Gel Chemistry 2 2 ECTS, Method of grading: numerical grade a) oral examination (approx. 15 minutes) or b) written examination (approx. 45 minutes) Assessment in module component o8-FS5-2-101: Application oriented Characterization of colloidal and polymeric systems 3 ECTS, Method of grading: numerical grade 					
Allocat	ion of p	olaces	i	· • •	
Number of places: 20. Should the number of applications exceed the number of available places, places will be allocated in a standardised procedure among all applicants irrespective of their subjects according to the following quotas: Quota 1 (50% of places): total number of ECTS credits already achieved in the respective degree subject; 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): allocation by lot. In this procedure, applicants who already have successfully completed at least one module component of the respective module will be given preferential consideration. A waiting list will be maintained and places re-allocated as they become available.					
Additional information					
The cou	urse is o	offered as a block course	at the end of the sen	nester.	
Worklo	ad				

Teaching cycle

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

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Module appears in

Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Nanostructure Technology (2012) Master's degree (1 major) Technology of Functional Materials (2010) Master's degree (1 major) Functional Materials (2012)

Module title				Abbreviation	
Chemically and bio-inspired Nanotechnology for Material Synthesis			08-NT-122-m01		
Module coordinator				Module offered by	
holder thesis	of the (Chair of Chemical Techno	logy of Material Syn-	Chair of Chemical T	echnology of Material Synthesis
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				
This mo of analy neralisa	odule p ysis us ation a	rovides an introduction t ed to characterise the gen nd uses examples to intro	o the synthesis meth nerated materials. It a oduce students to bio	ods of sol-gel chemi also discusses the fu p-inspired material s	stry and discusses the methods undamental principles of biomi- ynthesis.
Intende	ed learı	ning outcomes			
Studen	ts have	e developed an advanced	knowledge of sol-ge	l chemistry and bion	nineralisation.
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
This mo compor o o	odule c nent. 8-NT-1· 8-NT-2	omprises 2 module comp 122: V (no information of -122: V (no information o	oonents. Information n SWS (weekly contac n SWS (weekly conta	on courses will be lis ct hours) and course ct hours) and course	sted separately for each module language available) language available)
Method	d of ass	essment (type, scope, langua	ge — if other than German, e	examination offered — if no	t every semester, information on whether
module is	creditab	le for bonus)			
low. Un vidual a	iless st assessi	ated otherwise, successf ments.	ul completion of the	module will require s	successful completion of all indi-
 Assessment in module component o8-NT-1-122: Sol-Gel Chemistry 1: Fundamentals 2 ECTS, Method of grading: numerical grade a) written examination (approx. 45 minutes) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) Assessment in module component o8-NT-2-122: From Biomineralisation to biologically inspired Materials Synthesis 3 ECTS, Method of grading: numerical grade a) written examination (approx. 45 minutes) or b) oral examination of one candidate each (approx. 20 minutes) 					
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Workload					
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module	appea	in			
Bachelor' degree (1 major) Nanostructure Technology (2012)					

Master's with 1 major Functional Materials (2012)

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Bachelor' degree (1 major) Functional Materials (2012) Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Technology of Functional Materials (2010) Master's degree (1 major) Technology of Functional Materials (2009) Master's degree (1 major) Functional Materials (2012)

Module title				Abbreviation		
Electrochemical Energy Storage and Conversion					08-EEW-122-m01	
Module	e coord	inator		Module offered by		
holder thesis	of the (Chair of Chemical Techno	logy of Material Syn-	Chair of Chemical T	echnology of Material Synthesis	
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	Admission prerequis (a maximum of one	site to assessment: I incident of unexcuse	regular attendance of lab course ed absence).	
Conten	Its					
Chemis um and cal dou (Si, CIS	stry and d nickel uble lay 5, CIGS,	l application of: battery s metal hydride, sodium s er capacitors, redox-flow GaAs, organic and dye s	ystems (aqueous and ulphur, sodium nicke batteries, fuel cell sy olar cell), thermoelec	d non-aqueous syste el chloride, lithium ic vstems (AFC, PEMFC, tric devices.	ems such as lead, nickel cadmi- on accumulators), electrochemi- DMFC, PAFC, SOFC), solar cells	
Intend	ed learı	ning outcomes				
Studer that kn	nts have lowledg	e developed a knowledge ge to research problems.	of electrochemical e	nergy storage and co	onversion and are able to apply	
Course	S (type, n	number of weekly contact hours, l	anguage — if other than Ger	man)		
V + P +	E (no ir	nformation on SWS (weel	kly contact hours) and	d course language av	vailable)	
Metho module is	d of ass s creditab	sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
placement report / fieldwork report / report on practical training / report on practical course / project report / report on technical course (approx. 5 pages) and a) written examination (approx. 90 minutes) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes). Should a module component comprise more than one graded assessment, all assessments will be equally weighted, unless otherwise specified; should the lecturer want to make changes to the way in which assessments are weighted, he or she must do so by two weeks after the start of the course at the latest and must communicate this to students in an appropriate manner.						
Allocat	tion of p	olaces				
Additio	onal info	ormation				
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	Module appears in					
Bachel Master	Bachelor' degree (1 major) Nanostructure Technology (2012) Master's degree (1 major) Functional Materials (2012)					

Module	e title		Abbreviation				
Coating Technologies based on Vapour Deposition					11-BVG-092-m01		
Module	e coord	inator		Module offered by			
Managing Director of the Institute of Ap			Applied Physics	plied Physics Faculty of Physics and Astronomy			
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
5	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 semester graduate		graduate	Certain prerequisite sessment. The lectur at the beginning of sidered a declaration dents have obtained the course of the se sessment into effect ted to assessment i sessment at a later admission to assess	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.			
Conten	ts						
Physica sation.	al techr Applic	nical principles of PVD ation of layer materials	and CVD installations a s on an industrial level.	nd processes. Coati	ng deposit and layer	characteri-	
Intende	ed lear	ning outcomes					
The stu to their	idents l r indust	have advanced knowle trial relevance and vari	dge of coating deposit ety.	processes in the gas	eous phase and gai	n insights in-	
Course	S (type, r	number of weekly contact hour	rs, language — if other than Ge	rman)			
V + R (r	no infor	mation on SWS (weekl	y contact hours) and co	ourse language avail	able)		
Metho module is	d of ass s creditab	s essment (type, scope, lang le for bonus)	guage — if other than German,	examination offered — if no	t every semester, informati	on on whether	
a) writt groups project (approx Assess and wil examin	en exa (appro report x. 30 m ment o Il be an nation r	mination (approx. 90 n ox. 30 minutes per cano (approx. 8 to 10 pages inutes) ffered: When and how nounced in due form u egulations) 2009.	ninutes) or b) oral exam didate, for modules with , time to complete: 1 to often assessment will l under observance of Sec	ination of one candi n less than 4 ECTS cr 4 weeks) or d) prese be offered depends o ction 32 Subsection	date each or oral exa edits approx. 20 mir entation/seminar pre on the method of ase 3 ASPO (general aca	amination in nutes) or c) esentation sessment demic and	
Allocat	ion of _l	places					
Additio	onal inf	ormation					
	-						
Workload							
Teaching cycle							
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module appears in							
Bachel Bachel	or' deg or' deg	ree (1 major) Nanostru ree (1 major) Nanostru	cture Technology (2010 cture Technology (2012)			
Master's w	Aaster's with 1 major Functional Materials (2012) JMU Würzburg • generated 26-Aug-2024 • exam. reg. da- ta record Master (120 ECTS) Funktionswerkstoffe - 2012						



Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Functional Materials (2012)

Module title					Abbreviation	
Semiconductor Physics and Devices					11-SPD-102-m01	
Module coordinator				Module offered by		
Managi	ing Dire	ector of the Institute of Ap	oplied Physics	Faculty of Physics and Astronomy		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
6	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 semester graduate		graduate	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anow.			
Conten	ts					
Princip as of el	les of S ectroni	emiconductor Physics. Ir cs and photonics.	ntroduction to key the	eories on semicondu	ctors. Components from the are-	
Intende	ed lear	ning outcomes				
perties equation on and basic u nents of and Gu ser). The ductors	and phononic band structures of important semiconductors and the resulting electronic, optical and thermal pro- perties. They know the principles of charge transport and are able to apply Poisson, Boltzmann and continuity equations to the solution of questions. They have gained insights into the methods of semiconductor producti- on and are familiar with the methods of planar technology and current developments in this sector, they have a basic understanding of component production. They understand the structure and function of the main compo- nents of electronics (diodes, transistor, FET, thyristor, diac, triac), microwave applications (tunnel, impatt, baritt and Gunn diode) and optoelectronics (photo diode, solar cell, light-emitting diode, semiconductor injection la- ser). They know the realisation possibilities of low-dimensional charge carrier systems on the basis of semicon- ductors and their technological importance. They are familiar with current developments in the field of compon-					
Course	E (tuno n	umber of weakly contact hours.	anguaga if other than Cor	man)		
V + R (n	o infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)	
Methoo module is	d of ass creditab	sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
written examination (approx. 90 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or pro- ject report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or presentation/seminar presentation (approx. 30 minutes) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009. Language of assessment: German, English						
Allocation of places						
Additio	nal inf	ormation				

Workload

Teaching cycle

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

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Module appears in

Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Nanostructure Technology (2012) Master's degree (1 major) Mathematics (2012) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) Computational Mathematics (2012) Master's degree (1 major) Functional Materials (2012)

Module title					Abbreviation	
Semiconductor Lasers - Principles and Current Research					11-HLF-092-m01	
Module coordinator				Module offered by		
Managi	ing Dire	ector of the Institute of Ap	oplied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semester graduate		Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.				
Conten	ts		1			
rent de model, hold co riers an des, las ductor cade la	velopm which onditior od phot ser reso lasers. sers, te	nents regarding compone will then be extended to n, characteristic curve an ons. Other topics of the l onators, mode selection, The lecture closes with c erahertz lasers or high-pe	nts. The principles of special aspects of se d laser efficiency are ecture are optical pro dynamic properties a urrent topics of laser efformance lasers.	lasers are described miconductor lasers. derived from couple ocesses in semicond as well as technology research such as qu	d on the basis of a general laser Basic concepts such as thres- d rate equations for charge car- uctors, layer and ridge wavegui- / for the generation of semicon- uantum dot lasers, quantum cas-	
Intende	ed learı	ning outcomes				
The stu knowle	dents l dge to	nave advanced knowledg modern questions and k	e of the principles of now the applications	semiconductor-lase in the current develo	er physics. They can apply their opment of components.	
Course	S (type, n	number of weekly contact hours, l	anguage — if other than Ger	man)		
R + V (n	o infor	mation on SWS (weekly o	contact hours) and co	ourse language availa	able)	
Methoo module is	d of ass creditab	sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009. Language of assessment: German, English						
Allocation of places						
Additional information						
Worklo	ad					

Teaching cycle

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

Referred to In LPO I (examination regulations for teaching-degree programmes)
Module appears in
Bachelor' degree (1 major) Physics (2010)
Bachelor' degree (1 major) Physics (2012)
Bachelor' degree (1 major) Nanostructure Technology (2010)
Bachelor' degree (1 major) Nanostructure Technology (2012)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Physics (2010)
Master's degree (1 major) Physics (2011)
Master's degree (1 major) Nanostructure Technology (2011)
Master's degree (1 major) Nanostructure Technology (2010)
Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010)
Master's degree (1 major) FOKUS Physics (2010)
Master's degree (1 major) FOKUS Physics (2011)
Master's degree (1 major) Computational Mathematics (2012)
Master's degree (1 major) Functional Materials (2012)

Module title					Abbreviation		
Quantum Transport in Semiconductor Nanostructures					11-QTH-102-m01		
Module	coord	inator		Module offered by			
Managing Director of the Institute of Ap			plied Physics Faculty of Physics and Astronomy				
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)			
6	numei	rical grade					
Duration	n	Module level	Other prerequisites				
1 semester graduate		Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment will for a subsequent the subsequent the subsequent for admission for as-					
Content	s						
The lectu topics of phenom transpor	ure ad f: balli iena b rt pher	dresses the fundamenta stic and diffuse transpor etween electrons, Coulor nomena, topological insu	l transport phenomer t, electron interferend nb blockade, thermo ılators, solid-state qu	na of electrons in na ce effects, quantisat electric properties, d antum computers.	nostructures. This includes the ion of conductivity, interaction lescription of spin-dependent		
Intended	d learr	ning outcomes					
The stud ons and	lents ł applio	nave mastered the basics cations of respective com	of electronics of nar ponents.	nostructures in theor	y and practice. They know functi-		
Courses	(type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)			
V + R (no	o infor	mation on SWS (weekly o	contact hours) and co	ourse language availa	able)		
Method module is a	of ass creditab	essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
a) writte groups (project r (approx. Assessm and will examina Languag	a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009.						
Allocatio	on of p	olaces					
Addition	nal info	ormation					
Workloa	Workload						
Teaching	Teaching cycle						
Referred	Referred to in LPO I (examination regulations for teaching-degree programmes)						

Module appears in

Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Nanostructure Technology (2012) Master's degree (1 major) Physics (2011) Master's degree (1 major) Technology of Functional Materials (2010) Master's degree (1 major) Nanostructure Technology (2011)

Master's degree (1 major) FOKUS Physics (2011)

Master's degree (1 major) Functional Materials (2012)

Module	title		Abbreviation			
Methods for non-destructive Characterization of Materials				and Components	11-ZMB-112-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	npl. of module(s)		
4	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semester undergraduate		Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.				
Conten	ts					
Methoo	ls of no	on-destructive material a	nd component charac	cterisation.		
Intende	ed learı	ning outcomes				
The stu	dents l	know methods of non-de	structive characterisa	ation of materials an	d components.	
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V + R (n	o infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)	
Methoo module is	of ass creditab	s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
a) writte groups or d) pr Assess and wil examin	en exar (appro esenta ment o l be an ation r	mination (approx. 90 min x. 30 minutes per candid tion/seminar presentatic ffered: When and how of nounced in due form unc egulations) 2009.	utes) or b) oral exam late) or c) project repo on (approx. 30 minute ten assessment will b ler observance of Sec	ination of one candi ort (approx. 10 pages es) pe offered depends of ction 32 Subsection 5	date each or oral examination in s, time to complete: 1 to 4 weeks) on the method of assessment 3 ASPO (general academic and	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Bachelor' degree (1 major) Nanostructure Technology (2012)						
Master'	s degri	ee (1 major) Nanostructur	aterials (2012)			

Module title					Abbreviation		
Labora	Laboratory and Measurement Technology 11-A3-072-m01						
Module	e coord	inator		Module offered by			
Managing Director of the Institute of Ap			Applied Physics	plied Physics Faculty of Physics 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 semester un		undergraduate	Admission prerequi 50% of exercises. C sion to assessment ve details at the beg be considered a dec students have obtai over the course of th assessment into eff mitted to assessme assessment at a late for admission to assess	Admission prerequisite to assessment: successful completion of approx. 50% of exercises. Certain prerequisites must be met to qualify for admis- sion to assessment. The lecturer will inform students about the respecti- ve details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be ad- mitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew			
Conten	ts						
Introdu nics, cr	ction to yogeni	o electronic and optica cs, light sources, spect	l measuring methods o troscopic methods and	f physical metrology measured value acq	, vacuum technology uisition.	y and cryoge-	
Intende	ed leari	ning outcomes					
The stu cal met red vali	idents l trology, ue acqu	have acquired the follo cryogenics and vacuu uisition.	wing transferable skills m technology, cryogeni	s: Electronic and opti cs, light sources, sp	cal measuring methe ectroscopic methods	ods in physi- s and measu-	
Course	S (type, n	number of weekly contact hour	rs, language — if other than Ge	rman)			
V + Ü (r	no infor	mation on SWS (week	y contact hours) and co	ourse language avail	able)		
Method module is	d of ass s creditab	sessment (type, scope, lang le for bonus)	guage — if other than German,	examination offered — if no	t every semester, informati	ion on whether	
written	examiı	nation (approx. 120 mi	nutes)				
Allocat	ion of p	olaces					
Only as	s part o	f pool of general key s	kills (ASQ): 15 places. P	laces will be allocate	ed by lot.		
Additio	nal inf	ormation					
Worklo	ad						
Teachi	ng cycl	е					
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module appears in							
Bachelor' degree (1 major) Physics (2007) Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2009) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Physics (2008) Bachelor' degree (1 major) Nanostructure Technology (2010)							
master's W	Master's with 1 major Functional Materials (2012) JMU Wurzburg • generated 26-AUg-2024 • exam. reg. da- ta record Master (120 ECTS) Funktionswerkstoffe - 2012					page 31 / 111	

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

Bachelor' degree (1 major) Nanostructure Technology (2012) Bachelor' degree (1 major) Nanostructure Technology (2008) Bachelor' degree (1 major) Nanostructure Technology (2007) Master's degree (1 major) Technology of Functional Materials (2010) Master's degree (1 major) Technology of Functional Materials (2009) Master's degree (1 major) Functional Materials (2012) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)

Module title					Abbreviation	
Laboratory and Measurement Technology in Biophysics					11-LMB-092-m01	
Module	e coord	inator		Module offered by		
Managing Director of the Institute of Ap			plied Physics Faculty of Physics and Astronomy			
ECTS	Metho	od of grading	Only after succ. compl. of module(s)			
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semester graduate		Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for				
Conten	ts		L			
The lec physica measu methoc	ture co al proce ring tec ls of st	vers relevant principles or edures for the examination hniques and sensors, mo ructure elucidation of bio	of molecular and cellu on and manipulation ethods of single-parti omolecules.	ular biology as well a of biological systems cle detection, specia	s the physical principles of bio- s. The main topics are optical al microscoping techniques and	
Intende	ed learı	ning outcomes				
The stu sical pr measu biomol	dents l ocedur ring tec ecules.	know the principles of mo res for the examination a hniques and their applic	blecular and cellular l nd manipulation of b ations and are able to	biology as well as the iological systems. Th o apply techniques c	e physical principles of biophy- ney have knowledge of optical of structure elucidation to simple	
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	rman)		
R + V (n	no infor	mation on SWS (weekly o	contact hours) and co	ourse language availa	able)	
Methoo module is	d of ass creditab	e essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009.						
Allocation of places						
Additional information						
Workload						
Teaching cycle						

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

Module appears in

Bachelor' degree (1 major) Physics (2010)
Bachelor' degree (1 major) Physics (2012)
Bachelor' degree (1 major) Nanostructure Technology (2010)
Bachelor' degree (1 major) Nanostructure Technology (2012)
Master's degree (1 major) Physics (2010)
Master's degree (1 major) Physics (2011)
Master's degree (1 major) Nanostructure Technology (2011)
Master's degree (1 major) Nanostructure Technology (2010)
Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010)
Master's degree (1 major) FOKUS Physics (2010)
Master's degree (1 major) FOKUS Physics (2011)
Master's degree (1 major) Functional Materials (2012)

Module title					Abbreviation		
Semiconductor Physics					11-HLP-092-m01		
Module	coord	inator		Module offered by			
Managing Director of the Institute of Ap			plied Physics	ed Physics Faculty of Physics and Astronomy			
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)			
6	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 semester graduate		Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anow.					
Conten	ts						
Advanc ons and sation e	ed exa d their o effects	mination of crystal bondi coupling effects. Electron of semiconductors with r	ng and the electronic pphonon coupling. Te educed dimensions.	: band structure of se emperature-depende (Semi-)magnetic ser	emiconductors. Optical excitati- ent transport properties. Quanti- niconductors.		
Intende	ed learr	ning outcomes					
The stu cal prin materia	dents l ciples Ils.	nave specific and advanc of semiconductors and h	ed knowledge in the ave gained an overvi	field of Semiconduc ew of the important	tor Physics. They know the physi- characteristics of semiconductor		
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)			
R + V (n	o infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)		
Methoo module is	l of ass creditab	essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
a) writte groups project (approx Assessi and wil examin Langua	a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009.						
Allocat	ion of p	olaces					
Additional information							
Workload							
leaching cycle							
Poferred to in LPO L (maninghing angleting for the language)							
CECETE COLORING CONTRACTOR CONTRAC							



Module appears in

Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Nanostructure Technology (2012) Master's degree (1 major) Mathematics (2012) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2012)
Module	e title				Abbreviation	
Introduction to Electron Microscopy				11-IEM-111-m01		
Module	e coord	inator		Module offered by		
Manag	ing Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
4	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 semester graduate		Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for				
Conten	ts					
(selecte on tech formati image f 7. Chen spectro	ed-area inique) on, ima formati nical ar oscopy)	ED, convergent beam EL . 4. Transmission electro aging of microstructure). on, image simulation). 6. nalysis with the electron . 8. Sample preparation.), basics of electron on n microscopy (the ins 5. Can we see atoms Scanning electron m microscope (energy-o Electron microscopy	rystallography, com trument, contrast m High-resolution ele icroscopy (the instru lispersive X-ray micr and complementary	parison with the X-ray diffracti- echanisms, principles of image ctron microscopy (principle of ument, contrast mechanisms). oanalysis, electron energy loss techniques.	
Intende	ed learı	ning outcomes				
The stu They kr copic n	idents l now mic nethod:	nave basic knowledge of croscoping procedures th s for chemical analysis. T	modern research me hat are used in praction hey are able to evalu	thods of electron mi ce in labs and the ind ate the efficiency of	croscopy up to an atomic level. dustry as well as electron-micros- different research methods.	
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V + R (r	no infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)	
Method module is	d of ass s creditab	s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
a) writt groups project (approz Assess and wil examin Langua	a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009. Language of assessment: German, English					
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)
Module appears in
Bachelor' degree (1 major) Physics (2010)
Bachelor' degree (1 major) Physics (2012)
Bachelor' degree (1 major) Nanostructure Technology (2010)
Bachelor' degree (1 major) Nanostructure Technology (2012)
Master's degree (1 major) Physics (2010)
Master's degree (1 major) Physics (2011)
Master's degree (1 major) Nanostructure Technology (2011)
Master's degree (1 major) Nanostructure Technology (2010)
Master's degree (1 major) FOKUS Physics (2010)
Master's degree (1 major) FOKUS Physics (2011)
Master's degree (1 major) Functional Materials (2012)
Master's degree (1 maior) FOKUS Physics (2006)

Module title				Abbreviation		
Principles of t	wo- and threedimension	al Röntgen imaging		11-ZDR-111-m01		
Module coord	inator		Module offered by			
Managing Dire	ector of the Institute of Ap	oplied Physics	plied Physics Faculty of Physics and Astronomy			
ECTS Metho	od of grading	Only after succ. com	pl. of module(s)			
6 nume	rical grade					
Duration	Module level	Other prerequisites				
1 semester graduate		Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anow.				
Contents		L				
Physics of X-ra ton absorption projection, For traction, visua characterisatio	ay generation (X-ray tube n, scattering), physics of urier reconstruction, itera ilisation,). Application on, metrology, biology,	s, synchrotron). Physi X-ray detection. Math ative methods). Image s of X-ray imaging in t .). Radiation protectio	ics of the interaction ematics of reconstru- e processing (image the industrial sector on and biological rac	between X-rays and matter (pho- uction algorithms (filtered rear data pre-processing, feature ex- (component testing, material liation effect (dose,).		
			<u></u>	··· · · ·		
techniques us	ing X-rays and methods	nerating X-rays and o of image processing a	as well as application	n areas of these methods.		
Courses (type, n	number of weekly contact hours, l	anguage — if other than Ger	man)			
V + R (no infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)		
Method of ass module is creditab	sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
a) written exar groups (appro project report (approx. 30 m Assessment o and will be an examination r	a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and					
Allocation of p	olaces					
Additional info	ormation					
Workload						
Teaching cycl	е					
Referred to in	LPO I (examination regulation	s for teaching-degree progra	mmes)			

Module appears in

Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Nanostructure Technology (2012) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2012) Master's degree (1 major) FOKUS Physics (2006)

Module title					Abbreviation		
Biophysical Measurement Technology in Medical			gy in Medical Science		11-BMT-092-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 semester g		graduate	Certain prerequisite sessment. The lectu at the beginning of sidered a declaratio dents have obtained the course of the se sessment into effec ted to assessment i sessment at a later admission to assess	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.			
Conten	ts						
The lect topics a sound a image p	ture co are con and MR process	vers the physical princ ventional X-ray technic R-tomography. The lect sing.	iples of imaging techni que, computer tomogra ure additionally addres	ques and their appli phy, imaging technic ses systems theory o	cation in Biomedicin ques of nuclear medi of imaging systems a	e. The main icine, ultra- ind digital	
Intende	ed leari	ning outcomes					
The stu derstar images	dents 1d the p	know the physical prino principles of image gen	ciples of imaging techn eration and are able to	iques and their appl explain different tec	ication in Biomedicii hniques and interpr	ne. They un- et simple	
Course	S (type, n	umber of weekly contact hour	s, language — if other than Ge	rman)			
R + V (n	o infor	mation on SWS (weekl	y contact hours) and co	ourse language avail	able)		
Methoo module is	d of ass creditab	s essment (type, scope, lang le for bonus)	guage — if other than German,	examination offered — if no	t every semester, informati	on on whether	
a) writte groups project (approx Assess and wil examin Langua	en exar (appro report (. 30 m ment o l be an ation r ge of a	nination (approx. 90 n x. 30 minutes per cand (approx. 8 to 10 pages inutes) ffered: When and how nounced in due form u egulations) 2009. ssessment: German, E	ninutes) or b) oral exam lidate, for modules with , time to complete: 1 to often assessment will l nder observance of See nglish	ination of one candi n less than 4 ECTS cr 4 weeks) or d) prese be offered depends o ction 32 Subsection 3	date each or oral exa edits approx. 20 min entation/seminar pre on the method of ass 3 ASPO (general aca	amination in nutes) or c) esentation sessment demic and	
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	ad						
Teachir	ng cycl	e					
Referre	d to in	LPO I (examination regulation	ons for teaching-degree progra	ammes)			
Master's wi	th 1 majoı	r Functional Materials (2012)	JMU Würzburg • ta record Maste	generated 26-Aug-2024 • exer er (120 ECTS) Funktionswerkst	am. reg. da- coffe - 2012	page 41 / 111	



Module appears in

Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Nanostructure Technology (2012) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2012)

Module title Abbreviatio			Abbreviation		
Materials for high voltage insulation and high voltage syst			nd high voltage syste	ems	99-HIS-122-m01
Module	e coord	inator		Module offered by	
Dean o ty of Ap	f the Fa	culty of Electrical Engine Sciences Würzburg-Schwe	ering at the Universi- einfurt	University of Applie furt (FHWS)	d Sciences Würzburg- Schwein-
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	unknown			
Conten	ts				
No info	rmatio	n on contents available.			
Intende	ed learr	ning outcomes			
No info	rmatio	n on intended learning ou	utcomes available.		
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü +	P (no i	nformation on SWS (weel	kly contact hours) an	d course language a	vailable)
Method module is	d of ass creditab	e ssment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
a) writt or c) or	en exar al exan	nination (approx. 90 min nination in groups (group	utes) or b) oral exam s of 2, approx. 30 mi	ination of one candi nutes total)	date each (approx. 20 minutes)
Allocat	ion of p	olaces			
Additio	onal info	ormation			
Worklo	ad				
Teachi	ng cycl	9			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module	e appea	irs in			
Master	's degre	ee (1 major) Functional M	aterials (2012)		

Module title A					Abbreviation
Modell	Modelling and simulation for technology systems				99-MSTS-092-m01
Module	coord	inator		Module offered by	
Dean of versity	f the Fa of Appl	culty of Mechanical Engi ied Sciences Würzburg-S	neering at the Uni- schweinfurt	University of Applie furt (FHWS)	d Sciences Würzburg- Schwein-
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	unknown			
Conten	ts				
No info	rmatio	n on contents available.			
Intende	ed leari	ning outcomes			
No info	rmatio	n on intended learning ou	utcomes available.		
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)
Methoo module is	l of ass creditab	eessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
written for moc	examiı Ielling	nation (approx. 90 minut assignment to be specifie	es) or modelling assi ed at the beginning o	gnment in the form c f the course)	f a project (expenditure of time
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachir	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) Technology c	of Functional Material	s (2010)	
Master	s degr	ee (1 major) Technology c	of Functional Material	s (2009)	
Master	s degr	ee (1 major) Functional M	aterials (2012)		

Module	e title				Abbreviation
Applied Spectroscopy 3 08-PS3-092-m01			08-PS3-092-m01		
Module coordinator Module offered by					
lecture	r of lect	ure "Praktische Spektros	kopie 3"	Institute of Physica	l and Theoretical Chemistry
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
This mo practice tra and	odule g e and to discus	ives students the opport o interpret readings or gra s modern mass spectrom	unity to apply their th aphs. We will record a netry methods.	eoretical knowledge and analyse UV-VIS,	of spectroscopic methods in fluorescence and vibration spec-
Intende	ed learı	ning outcomes			
Studen conduc	ts are a t error	able to work with differen discussions.	t spectrometers and	to interpret the resul	ting spectra. They are able to
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (no ir	nformat	ion on SWS (weekly cont	act hours) and cours	e language available	2)
Methoo module is	d of ass creditab	s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
1 writte ten exa oral exa	n exam minatio aminati	ination (approx. 90 minu ons (approx. 60 minutes ion in groups (groups of 2	utes) or 2 written exar each) or oral examina 2, approx. 30 minutes	minations (approx. 6 ation of one candida 5)	o or 90 minutes each) or 3 writ- te each (approx. 20 minutes) or
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachi	ng cycl	e			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module	e appea	irs in			
Bachel	or' deg	ree (1 major) Chemistry (2	2010)		
Bachel	or' deg	ree (1 major) Chemistry (2	2009)	<i>.</i>	
Master	's degr	ee (1 major) Technology c	of Functional Material	s (2010)	
Master	's degre	ee (1 major) lechnology c	of Functional Material	s (2009)	
master	s uegr	ee (1 major) runctional M	atenais (2012)		

Module	e title				Abbreviation	
Aspects of molecular Biotechnology07-4S1MZ5-102-m01				07-4S1MZ5-102-m01		
Module	e coord	inator		Module offered by		
holder	of the (Chair of Biotechnology		Faculty of Biology		
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					
Fundar mes, p sor des electro	nental roducti sign, dru manipu	orinciples of "white" biot on of biomolecules, mole ug design, drug targeting ılation of cells.	echnology, bioreacto ecular biology, recom , molecular diagnosti	rs, biocatalysis, imm binant DNA technolo cs, recombinant ant	nobilisation of cells and enzy- ogy, protein engineering, biosen- ibodies, hybridoma technology,	
Intende	ed learı	ning outcomes				
Studen ges and Studen dently to inde	ts will g d disad ts will a review pender	gain an overview of tradit vantages. They will learn acquire a knowledge of fu relevant literature. In adc ntly acquaint themselves	ional and modern me to decide what meth undamental methods lition, they will becon with - relevant mecha	ethods in biotechnol od is most suitable f in biotechnology the ne acquainted with - anisms.	ogy and their respective advanta- for addressing a particular issue. at will enable them to indepen- or, where necessary, will be able	
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
This mo compo • c • c	odule c nent. 97-4S1N 97-4S1N	omprises 2 module comp 1Z5-1-102: V (no informat 1Z5-2-102: S (no informat	oonents. Information ion on SWS (weekly c ion on SWS (weekly c	on courses will be li ontact hours) and co contact hours) and c	sted separately for each module ourse language available) ourse language available)	
Metho module is	d of ass s creditab	essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
Assess low. Ur vidual	ment ir Iless st assessi	n this module comprises ated otherwise, successf ments.	the assessments in th ul completion of the r	ne individual module module will require s	e components as specified be- successful completion of all indi-	
Assess a 3 b w Assess a 2 b p Allocat	 Assessment in module component o7-4S1MZ5-1-102: Aspects of molecular Biotechnology 3 ECTS, Method of grading: numerical grade written examination (approx. 30 minutes) Assessment in module component o7-4S1MZ5-2-102: Molecular Biotechnology - Seminar 2 ECTS, Method of grading: (not) successfully completed presentation (approx. 15 to 20 minutes) 					
Numbe	r of nla	ces: XX1. Should the num	ber of applications e	exceed the number of	f available places, places will be	
allocati logy) w ces wil 5% of p ject Bic themati ject Bic ble in c the oth places, courses dure, a	Allocation of places Number of places: XX1. Should the number of applications exceed the number of available places, places will be allocated as follows: Places will primarily be allocated to students of the Bachelor's degree subject Biologie (Bio- logy) with 180 ECTS credits. Should the module be used in other subjects, there will be two quotas: 95% of pla- ces will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits and 5% of places (a minimum of one participant in total) will be allocated to students of the Bachelor's degree sub- ject Biologie (Biology) with 60 ECTS credits and to students of the Bachelor's degree subject S computational Ma- thematics and Mathematik (Mathematics), each with 180 ECTS credits, as part of the application-oriented sub- ject Biology (as well as potentially to students of other 'importing' subjects). Should the number of places availa- ble 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 uniform regulation for the courses of one module component. In this case, places on all courses of a module component that are concerned will be allocated in a standardised procedure. In this proce-					

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tive module will be given preferential 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 academic achievements. For this purpose, applicants will be ranked according to the number of ECTS credits they have 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. This will be done as follows: First, applicants will be ranked, firstly, according to their average grade weighted according to the number of ECTS credits (qualitative ranking) and, secondly, according to their total number of ECTS credits achieved (quantitative ranking). The applicants' position in a third ranking will be calculated as the sum of these two rankings, and places will be allocated according to this third ranking. 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): allocation by lot. 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. XX2: XX3 places. Places will be allocated by lot.

Additional information

Workload

Teaching cycle

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

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Module appears in

Bachelor' degree (1 major) Biology (2011) Bachelor' degree (1 major) Biology (2010) Master's degree (1 major) Functional Materials (2012)

Module	e title				Abbreviation		
Introdu	iction t	o Functional Analysis			10-M-FAN-072-m01		
Module	e coord	inator		Module offered by			
Dean o	f Studi	es Mathematik (Mathe	matics)	Institute of Mathem	atics		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
5	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 semester undergradu		undergraduate	Certain prerequisite sessment. The lectu at the beginning of sidered a declaratio dents have obtained the course of the se sessment into effec ted to assessment i sessment at a later admission to assess	sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.			
Conten	ts						
Banach	n space	s and Hilbert spaces, I	oounded operators, prin	nciples of functional	analysis.		
Intende	ed lear	ning outcomes					
The stu method broad a Course V + Ü (r Method module is	ident ki ds, is al applica s (type, r no infor d of ass	nows the fundamental ble to apply methods f bility of the theory to o number of weekly contact hour rmation on SWS (week sessment (type, scope, lang ble for bonus)	concepts and methods rom linear algebra and ther branches of mather s, language — if other than Ger ly contact hours) and co guage — if other than German,	o of functional analys analysis to functiona ematics. man) ourse language avail examination offered — if no	is as well as the per al analysis, and reali able) t every semester, informat	tinent proof ses the ion on whether	
written by an o 2, appr Langua	examin oral exa ox. 30 oge of a	nation (approx. 90 min mination of one candio minutes) ssessment: German, E	utes); if announced by date each (approx. 20 n nglish if agreed upon w	the lecturer, the writ ninutes) or an oral ex vith the examiner	ten examination car xamination in groups	n be replaced s (groups of	
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	ad						
Teachi	ng cycl	e					
Referre	d to in	LPO I (examination regulation	ons for teaching-degree progra	ammes)			
§ 73 (1)	1. Mat	hematik Analysis					
Module	e appea	ars in					
Bachel Bachel Bachel Bachel	Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Technology of Functional Materials (2009) Bachelor' degree (1 major) Technology of Functional Materials (2010) Bachelor' degree (1 major) Economathematics (2009)						
Master's WI	iui i majoi	r i unctional materials (2012)	ta record Maste	er (120 ECTS) Funktionswerkst	ann. 19g. ua- coffe - 2012	page 48 / 111	

Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2009) Master's degree (1 major) Technology of Functional Materials (2010) Master's degree (1 major) Technology of Functional Materials (2009) Master's degree (1 major) Functional Materials (2012) Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008) First state examination for the teaching degree Gymnasium Mathematics (2009) Bachelor' degree (1 major) Technology of Functional Materials (2009)

Module	title				Abbreviation	
Ordinar	y Diffe	rential Equations			10-M-ODE-082-mo1	
Module	coord	inator		Module offered by		
Dean of	fStudie	es Mathematik (Mathe	matics)	tics) Institute of Mathematics		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semester undergraduate		Certain prerequisite sessment. The lectu at the beginning of t sidered a declaratio dents have obtained the course of the se sessment into effect ted to assessment i sessment at a later admission to assess	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.			
Conten	ts					
Existen ferentia	ce and Il equa	uniqueness theorem; tions; matrix exponent	continuous dependenc ial series; linear differe	e of solutions on init ntial equations of hi	tial values; systems gher order.	of linear dif-
Intende	ed learı	ning outcomes				
The stu equatio	dent is ons. He	acquainted with the for /she is able to apply the second second	undamental concepts a nese methods to practio	nd methods of the th cal problems.	neory of ordinary dif	ferential
Courses	5 (type, n	umber of weekly contact hour	s, language — if other than Gei	rman)		
V + Ü (n	io infor	mation on SWS (week	y contact hours) and co	ourse language avail	able)	
Method module is	l of ass creditab	s essment (type, scope, lang le for bonus)	guage — if other than German,	examination offered — if no	t every semester, informat	ion on whether
written by an o 2, appro Langua	examiı ral exa ox. 30 ge of a	nation (approx. 90 min mination of one candio minutes) ssessment: German, E	utes); if announced by date each (approx. 20 n nglish if agreed upon w	the lecturer, the writ ninutes) or an oral ex rith the examiner	ten examination car kamination in groups	be replaced s (groups of
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
 Worklo						
WUIKIU	au					
Teachir	ng cycl	A				
	is cycl					
Referre	d to in	LPOI (examination regulation	ons for teaching-degree progra	mmes)		
Module	appea	irs in				
Bacheld Bacheld Bacheld Bacheld Bacheld Master's wi	Bachelor' degree (1 major) Computer Science (2007) Bachelor' degree (1 major) Computer Science (2010) Bachelor' degree (1 major) Physics (2008) Bachelor' degree (1 major) Technology of Functional Materials (2009) Bachelor' degree (1 major) Technology of Functional Materials (2010)					
			ta record Maste	er (120 ECTS) Funktionswerkst	toffe - 2012	2030 / 111

Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Aerospace Computer Science (2009) Bachelor' degree (1 major) Aerospace Computer Science (2011) Master's degree (1 major) Technology of Functional Materials (2010) Master's degree (1 major) Technology of Functional Materials (2009) Master's degree (1 major) Functional Materials (2012) Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008) Bachelor' degree (1 major) Technology of Functional Materials (2006)

Module	title				Abbreviation		
Numerical Mathematics 1					10-M-NM1-082-mo		
Module	coord	inator		Module offered by			
Dean of	fStudie	es Mathematik (Mathe	matics)	Institute of Mathem	atics		
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)			
8	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 semester u		undergraduate	Certain prerequisite sessment. The lectu at the beginning of t sidered a declaratio dents have obtained the course of the se sessment into effect ted to assessment in sessment at a later admission to assess	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification fo admission to assessment anew.			
Conten	ts						
Solution ons, int	n of sy: erpola	stems of linear equatic tion with polynomials,	ons and curve fitting pro splines and trigonome	blems, nonlinear eq tric functions, nume	uations and system rical integration.	s of equati-	
Intende	ed learı	ning outcomes					
The stu to pract	dent is tical pr	acquainted with the fu oblems and knows abo	undamental concepts a out their typical fields o	nd methods in nume f application.	erical mathematics, a	applies them	
Courses	S (type, n	umber of weekly contact hour	s, language — if other than Ger	rman)			
V + Ü (n	no infor	mation on SWS (week	y contact hours) and co	ourse language avail	able)		
Method module is	of ass creditab	e essment (type, scope, lang le for bonus)	guage — if other than German, o	examination offered — if no	t every semester, informat	on on whether	
written by an o 2, appro Langua	examin ral exa ox. 30 ge of a	nation (approx. 90 min mination of one candio minutes) ssessment: German, E	utes); if announced by date each (approx. 20 n nglish if agreed upon w	the lecturer, the writ ninutes) or an oral ex ith the examiner	ten examination car camination in groups	be replaced s (groups of	
Allocati	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	ad						
Teachir	ng cycl	e					
Referre	d to in	LPO I (examination regulati	ons for teaching-degree progra	mmes)			
§ 73 (1)	5. Mat	hematik Angewandte I	Mathematik				
Module	appea	in sin					
Bachelo	or' deg	ree (1 major) Computer	Science (2010)				
Bachelo	or' deg	ree (1 major) Mathema	tics (2008)				
Bachelo	or' deg	ree (1 major) Physics (2	2010)				
Bachel	or' degi or' degi	ree (1 major) Physics (2 roo (1 major) Physics (2	2009)				
Master's with	th 1 maio	Eunctional Materials (2012)	IMILWürzburg	generated 26-Aug-2024 . ov	am reg da-	nage 52 / 111	
	1	2012)	ta record Maste	r (120 ECTS) Funktionswerkst	offe - 2012	P~3c J2 / III	

UNIVERSITÄT WÜRZBURG

Bachelor' degree (1 major) Physics (2008) Bachelor' degree (1 major) Technology of Functional Materials (2009) Bachelor' degree (1 major) Technology of Functional Materials (2010) Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2009) Bachelor' degree (1 major) Aerospace Computer Science (2009) Bachelor' degree (1 major) Aerospace Computer Science (2011) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Technology of Functional Materials (2010) Master's degree (1 major) Technology of Functional Materials (2009) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) Functional Materials (2012) Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008) First state examination for the teaching degree Gymnasium Mathematics (2009)

Module	title				Abbreviation	
Numerical Mathematics 2				10-M-NM2-082-mo	1	
Module	coord	inator		Module offered by		
Dean of	f Studie	es Mathematik (Mather	matics)	tics) Institute of Mathematics		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
5	nume	rical grade		-		
Duratio	n	Module level	Other prerequisites			
1 semester undergraduate		Certain prerequisite sessment. The lectu at the beginning of t sidered a declaratio dents have obtained the course of the set sessment into effect ted to assessment in sessment at a later admission to assess	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.			
Conten	ts					
Solution nary dif	n meth ferenti	ods and applications f al equations, boundary	or eigenvalue problems / value problems.	s, linear programmin	g, initial value probl	ems for ordi-
Intende	ed learr	ning outcomes				
The stu about tl and eng	dent is heir ad gineeri	able to draw a distinct vantages and limitatio ng sciences and econo	ion between the different is concerning the poss mics.	ent concepts of nume ibilities of application	erical mathematics a on in different fields	and knows of natural
Courses	5 (type, n	umber of weekly contact hour	s, language — if other than Ger	man)		
V + Ü (n	io infor	mation on SWS (weekl	y contact hours) and co	ourse language avail	able)	
Method module is	l of ass creditab	essment (type, scope, lang le for bonus)	uage — if other than German, e	examination offered — if no	t every semester, informati	on on whether
written by an o 2, appro Langua	examir ral exa ox. 30 I ge of a	nation (approx. 90 min mination of one candic minutes) ssessment: German, E	utes); if announced by late each (approx. 20 m nglish if agreed upon w	the lecturer, the writ ninutes) or an oral ex ith the examiner	ten examination can kamination in groups	be replaced s (groups of
Allocati	ion of p	olaces				
Additio	nal info	ormation				
Worklo	ad					
Teachin	ng cycl	e				
Referre	d to in	LPO I (examination regulation	ons for teaching-degree progra	mmes)		
§ 73 (1)	5. Mat	hematik Angewandte N	Nathematik			
Module	appea	irs in				
Bachelo Bachelo Bachelo Bachelo	Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2009) Bachelor' degree (1 major) Physics (2012)					
Master's wit	th 1 major	Functional Materials (2012)	JMU Würzburg • ta record Maste	generated 26-Aug-2024 • exa r (120 ECTS) Funktionswerkst	am. reg. da- coffe - 2012	page 54 / 111

UNIVERSITÄT WÜRZBURG

Bachelor' degree (1 major) Physics (2008) Bachelor' degree (1 major) Technology of Functional Materials (2009) Bachelor' degree (1 major) Technology of Functional Materials (2010) Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2009) Bachelor' degree (1 major) Aerospace Computer Science (2009) Bachelor' degree (1 major) Aerospace Computer Science (2011) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Technology of Functional Materials (2010) Master's degree (1 major) Technology of Functional Materials (2009) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) Functional Materials (2012) Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008) First state examination for the teaching degree Gymnasium Mathematics (2009)

Module title				Abbreviation		
Computeroriented Mathematics 10-M-COM-082-m01					1	
Module	e coord	inator		Module offered by		
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics	
ECTS	Metho	od of grading	Only after succ. com	mpl. of module(s)		
3	(not)	successfully completed				
Duratio	on	Module level	Other prerequisites			
1 semester undergraduate Admission prerequisite to assessment: regular attendance of ex (attendance monitored, a maximum of one incident of unexcuse sence).			f exercises cused ab-			
Conten	ts					
Introdu merica 10-M-A lar diffe	iction to l comp NL) and erential	o modern mathematical s utation (e. g. Matlab) to s d 10-M-LNA). Computer-b l and integral calculus; vi	software for symbolic supplement the basic ased solution of prob sualisation of functio	computation (e.g. M modules in analysis Ilems in linear algeb ns.	Mathematica or Map and linear algebra (ra, geometry, analys	le) and nu- ((10-M-ANA or is, in particu-
Intend	ed lear	ning outcomes				
The stu fields c	ident le of appli	earns the use of advanced cation to solve mathema	d modern mathematio tical problems.	cal software package	es, and is able to ass	sess their
Course	S (type, r	number of weekly contact hours, I	language — if other than Ger	man)		
V + Ü (I	no infoi	rmation on SWS (weekly	contact hours) and co	ourse language avail	able)	
Metho module is	d of ass s creditab	sessment (type, scope, langua le for bonus)	age — if other than German, e	examination offered — if no	t every semester, informat	on on whether
project	in the	form of programming exe	ercises (as specified a	it the beginning of th	ne course)	
Langua	age of a	ssessment: German, Eng	lish if agreed upon w	ith the examiner		
Allocat	ion of p	olaces				
			,			
Additio	onal inf	ormation	-			
Workla	ad					
Teachi	ng cycl	e				
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)		
§ 73 (1)) 5. Mat	hematik Angewandte Ma	athematik			
Module appears in						
Bachelor' degree (1 major) Computer Science (2010)						
Bachelor' degree (1 major) Mathematics (2008)						
Bachelor' degree (1 major) Physics (2010)						
Bachelor' degree (1 major) Physics (2009)						
Bachel	or deg or deg	ree (1 major) Physics (20 ree (1 major) Physics (20	12) 08)			
Bachel	or' deg	ree (1 major) Technology	of Functional Materia	lls (2009)		
Bachel	or' deg	ree (1 major) Technology	of Functional Materia	ils (2010)		
Bachel	or' deg	ree (1 major) Nanostructu	ure Technology (2010))		
Bachel	or' deg	ree (1 major) Economath	ematics (2009)			
Master's w	ith 1 majo	r Functional Materials (2012)	JMU Würzburg ●	generated 26-Aug-2024 • ex	am. reg. da-	page 56 / 111

Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2009) Master's degree (1 major) Physics (2010) Master's degree (1 major) Technology of Functional Materials (2010) Master's degree (1 major) Technology of Functional Materials (2009) Master's degree (1 major) Functional Materials (2012) Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008) First state examination for the teaching degree Gymnasium Mathematics (2009)

Module title				Abbreviation		
Programming course for students of Mathematics and other subjects10-M-PRG-082-m01						
Module	e coord	inator		Module offered by		
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics	
ECTS	Meth	od of grading	Only after succ. com	pl. of module(s)		
3	(not)	successfully completed				
Duratio	on 2	Module level	Other prerequisites			
1 semester undergraduate Admission prerequisite to assessment: regular attendance (attendance), a maximum of one incident of unexcused absence).			attendance :e).			
Conten	its					
Basics matics.	of a mo	odern programming lang	uage (e. g. C or Fortrai	n) taking into accour	nt the particular need	ls in mathe-
Intende	ed lear	ning outcomes				
The stu in math	ident is nematio	able to work independe	ntly on small program	nming exercises and	standard programm	ing problems
Course	S (type, r	number of weekly contact hours,	language — if other than Ger	man)		
P (no ir	nformat	tion on SWS (weekly cont	tact hours) and cours	e language available	2)	
Metho module is	d of ass s creditab	sessment (type, scope, langua	age — if other than German, e	examination offered — if no	t every semester, informati	on on whether
project	in the	form of programming exe	ercises (as specified a	it the beginning of th	ne course)	
Allocat	ion of a	issessment: German, Eng	glish if agreed upon w	ith the examiner		
Allocal						
Additio	nal inf	ormation	-			
Worklo	ad					
Teachi	ng cvcl	e				
Poforro	d to in					
		chomotile Annound to Ma	s for teaching-degree progra	mmes)		
<u>8 /3 (1)</u>	15. Mai		atriematik			
Module	e appea	ars in				
Bachel	or' deg	ree (1 major) Mathematic	(2008)			
Bachel	or deg	ree (1 major) Physics (20	10)			
Dachel	or deg	ree (1 major) Physics (20	12)			
Dachel	or deg	ree (1 major) Physics (20	12) o ²)			
Bachel	or' deg	ree (1 major) Friysics (20	of Functional Materia	16 (2000)		
Bachelor' degree (1 major) Technology of Functional Materials (2009)						
Bachelor' degree (1 major) recimology of runctional Materials (2010) Bachelor' degree (1 major) Nanostructure Technology (2010)						
Bachelor' degree (1 major) Fronomathematics (2000)						
Bachel	or' deg	ree (1 major) Economath	ematics (2009) ematics (2008)			
Bachel	or' deg	ree (1 major) Mathematic	al Physics (2000)			
Bachel	or' deg	ree (1 major) Computatio	nal Mathematics (200	9)		
Master	's degr	ee (1 major) Physics (201	0)	- 11		
Master	's degr	ee (1 major) Technology (of Functional Material	s (2010)		
Master's w	ith 1 majo	r Functional Materials (2012)	JMU Würzburg ● ta record Maste	generated 26-Aug-2024 • ex r (120 ECTS) Funktionswerksi	am. reg. da- toffe - 2012	page 58 / 111

Master's degree (1 major) Technology of Functional Materials (2009) Master's degree (1 major) Functional Materials (2012) Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008) First state examination for the teaching degree Gymnasium Mathematics (2009)

Module title				Abbreviation	
E-Learning					10-l=EL-102-m01
Module	coord	inator		Module offered by	
holder	of the (Chair of Computer Scienc	e VI	Institute of Comput	er Science
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	Where applicable, prerequisites as specified by the lecturer at the begin ning of the course (e. g. completion of exercises).		
Conten	ts				
Learnin intellige stems,	g para ent tuto adaptiv	digms, learning system ty pring systems, student m ve tutoring systems, com	ypes, author systems odels, didactics, prol puter-supported coo	, learning platforms, blem-oriented learni berative learning, ev	standards for learning systems, ng and case-based training sy- aluation of learning systems.
Intende	ed leari	ning outcomes			
The stu plicatio	dents µ ns.	possess a theoretical and	l practical knowledge	about eLearning an	d are able to assess possible ap-
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)
Methoo module is	l of ass creditab	s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
written tion dat aminat Langua	examin te, the ion in g ge of a	nation (approx. 50 to 60 i written examination can groups (one candidate ea ssessment: German, Eng	minutes); if announce be replaced by an ora ch: 15 minutes, group (lish if agreed upon w	ed by the lecturer by al examination of on os of 2: 20 minutes, ith the examiner	four weeks prior to the examina- e candidate each or an oral ex- groups of 3: 25 minutes)
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachir	ng cycl	e			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module appears in					
Master	Master's degree (1 major) Computer Science (2010)				
Master Master	s degri	ee (1 major) Mathematics	(2012)		
Master	s degr	ee (1 major) Business Info	ormation Systems (20	011)	
Master	s degr	ee (1 major) Business Info	ormation Systems (20	013)	
Master	s degr	ee (1 major) Computation	al Mathematics (201	2)	
Master	s degr	ee (1 major) Functional M	aterials (2012)	Commuter Col (
First state examination for the teaching degree Gymnasium Computer Science (2009)					

Module title					Abbreviation
Information Retrieval					10-I=IR-102-m01
Module	e coord	inator		Module offered by	
Dean of	f Studie	es Informatik (Computer S	Science)	Institute of Comput	er Science
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 Where applicable, prerequisites as specified by the lecturer at the h ning of the course (e. g. completion of exercises).			ified by the lecturer at the begin- kercises).	
Conten	ts				
IR mode data str ges and thods t	els (e. § ructure d parad o supp	g. Boolean and vector spa s (e.g. inverted index), q ligms, structured queries ort IR (e.g. recommendat	ace model, evaluation uery elements (e.g. c), search engine (e.g tion systems, text clu	n), processing of tex query operations, rel . architecture, crawli stering and classific	t (tokenising, text properties), evance feedback, query langua- ng, interfaces, link analysis), me- ation, information extraction).
Intende	ed leari	ning outcomes			
The stu the tecl	dents hnical	possess theoretical and p know-how to create a sea	practical knowledge in Irch engine.	n the area of informa	ation retrieval and have acquired
Course	S (type, n	number of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)
Methoc module is	l of ass creditab	sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
written tion dat aminat Langua	examin te, the ion in g ge of a	nation (approx. 50 to 60 r written examination can groups (one candidate ea ssessment: German, Eng	minutes); if announce be replaced by an ora ch: 15 minutes, group lish if agreed upon w	ed by the lecturer by al examination of on os of 2: 20 minutes, ith the examiner	four weeks prior to the examina- e candidate each or an oral ex- groups of 3: 25 minutes)
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachir	ıg cycl	е			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module	Module appears in				
Master Master Master Master Master First sta	Master's degree (1 major) Computer Science (2010) Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Business Information Systems (2011) Master's degree (1 major) Business Information Systems (2013) Master's degree (1 major) Functional Materials (2012) First state examination for the teaching degree Gymnasium Computer Science (2009)				

Detebases		Module title			
Databases II				10-I=DB2-102-m01	
Module coor	dinator		Module offered by		
Dean of Stuc	ies Informatik (Computer	Science)	Institute of Comput	er Science	
ECTS Met	nod of grading	Only after succ. com	pl. of module(s)		
5 num	erical grade				
Duration	Module level	Other prerequisites			
1 semester	graduate	Where applicable, p ning of the course (e	rerequisites as spec . g. completion of ex	ified by the lecturer at the begin- vercises).	
Contents					
Data wareho	uses and data mining; XM	L databases; web dat	abases;introductior	n to Datalog.	
Intended lea	rning outcomes				
The students	have advanced knowledg	e about relational da	tabases, XML and da	ata mining.	
Courses (type	number of weekly contact hours, l	anguage — if other than Ger	nan)	<u> </u>	
V + Ü (no infe	ormation on SWS (weekly o	contact hours) and co	urse language availa	able)	
Method of as module is credita	ssessment (type, scope, langua	ge — if other than German, e	xamination offered — if no	t every semester, information on whether	
written exam tion date, the amination in Language of	ination (approx. 50 to 60 i e written examination can groups (one candidate ea assessment: German, Eng	ninutes); if announce be replaced by an ora ch: 15 minutes, group lish if agreed upon w	ed by the lecturer by al examination of on os of 2: 20 minutes, with the examiner	four weeks prior to the examina- e candidate each or an oral ex- groups of 3: 25 minutes)	
Allocation of	places				
Additional in	formation				
Workload					
Teaching cy	le				
		,			
Referred to i	n LPO I (examination regulation)	s for teaching-degree progra	nmes)		
			,		
Module appe	ears in				
Master's degree (1 major) Computer Science (2010) Master's degree (1 major) Mathematics (2012) Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Physics (2010) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) Business Information Systems (2011) Master's degree (1 major) Business Information Systems (2013) Master's degree (1 major) Computational Mathematics (2012) Master's degree (1 major) Functional Materials (2012) First state examination for the teaching degree Gymnasium Computer Science (2009)					

Module title Abbreviation						
Organi	Organic Semiconductor				11-0HL-092-m01	
Module	e coord	inator		Module offered by		
Managi	ing Dire	ector of the Institute of	Applied Physics	plied Physics Faculty of Physics and Astronomy		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semestergraduateAdmission prerequisite to assessment 50% of exercises. Certain prerequisite sion to assessment. The lecturer will in ve details at the beginning of the cours be considered a declaration of will to s students have obtained the qualificati over the course of the semester, the le assessment into effect. Students who mitted to assessment at a later date, students w for admission to assessment anew			site to assessment: ertain prerequisites . The lecturer will info ginning of the course claration of will to se ned the qualification ne semester, the lect ect. Students who m nt in the current or ir er date, students wil sessment anew.	successful completion must be met to quali- orm students about f . Registration for the ek admission to ass n for admission to ass urer will put their reg eet all prerequisites n the subsequent set l have to obtain the	on of approx. ify for admis- the respecti- e course will essment. If ssessment gistration for will be ad- mester. For qualification	
Conten	ts					
Physica cations	al princ	iples of organic semico	onductors, molecular a	nd polymer electroni	cs and sensor techn	ology, appli-
Intende	ed learı	ning outcomes				
The stu	dents l	have advanced knowle	dge of organic semicor	iductors.		
Course	S (type, n	number of weekly contact hour	s, language — if other than Ge	rman)		
V + Ü (r	no infor	mation on SWS (weekl	y contact hours) and co	ourse language avail	able)	
Methoo module is	d of ass creditab	eessment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informat	ion on whether
a) writte groups project prox. 30	en exaı (appro report o minu	mination (approx. 90 m x. 30 minutes per canc (approx. 10 pages, tim tes)	iinutes) or b) oral exam lidate, for modules witl e to complete: 1 to 4 we	ination of one candi n less than 4 ECTS cr eeks) or d) presentat	date each or oral exa edits approx. 20 mir ion/seminar presen	amination in nutes) or c) tation (ap-
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teachir	ng cycl	e				
KETEFIFED TO IN LPUT (examination regulations for teaching-degree programmes)						
 Modulo appears in						
Bachel	or' deg	ree (1 maior) Physics (2	2010)			
Bachel	or' deg	ree (1 major) Physics (2	2012)			
Master	Master's degree (1 major) Physics (2010)					
Master	's degro	ee (1 major) Physics (20	011) Vof Eurotional Mataria	(2010)		
Master's wi	5 uego	r Functional Materials (2012)	y of Functional Materia	senerated 26-Aug-2024	am, reg. da-	nage 62 / 111
	ta record Master (120 ECTS) Funktionswerkstoffe - 2012					page 0) / 111



Master's degree (1 major) Technology of Functional Materials (2009) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2012)

Module title					Abbreviation
Basic principles of cell biology and tissue regeneration					03-SP1A1-101-m01
Module	coord	inator		Module offered by	
holder of Rege	of the (nerativ	Chair of Orthopaedics and ve Medicine	d holder of the Chair	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	graduate			
Conten	ts				
Cell bio geomet	logy, n ry, me	netabolism, differentiatio chanobiology (bioreactor	on, cell behaviour, ce s with mechanics).	l/cell interactions, c	ell adhesion, 2D/3D and surface
Intende	ed lear	ning outcomes			
Studen [.] nobiolo	ts have gy.	e developed a knowledge	of cell biology, meta	bolism, differentiatio	on, adhesion to surfaces, mecha-
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü +	P (no i	nformation on SWS (wee	kly contact hours) an	d course language a	vailable)
Methoo module is	of ass creditab	sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
placem port on (approx	ent rep techni (. 30 m	oort / fieldwork report / re cal course (approx. 10 pa inutes)	eport on practical trai ages) and a) written e	ning / report on prac xamination (approx.	ctical course / project report / re- 90 minutes) or b) presentation
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teaching cycle					
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	mmes)	
Module	e appea	ars in			
Master'	s degr	ee (1 major) Technology o	of Functional Material	s (2010)	
Master's degree (1 major) Functional Materials (2012)					

Module title					Abbreviation
Fundamentals of Tissue Engineering and Quality Management				ent	03-SP1A2-101-m01
Module	e coord	inator		Module offered by	
holder	of the (Chair of Regenerative Me	dicine and holder of	Faculty of Medicine	
the Cha	air of Fu	Inctional Materials in Me	dicine and Dentistry		
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				
Tissue ves and cording	engine 1 blood 5 to DIN	ering of complex constru- vessels. Risk analysis ac EN ISO 10993.	cts: supply, hypoxia, ccording to ISO 17025	nutrient diffusion, e: 2005, biological ex	xtracellular matrix, supply of ner- /aluation of medical devices ac-
Intende	ed learn	ning outcomes			
Studen	ts are f	amiliar with the fundame	ental principles of tiss	sue engineering and	quality management.
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü +	P (no i	nformation on SWS (wee	kly contact hours) an	d course language a	vailable)
Methoo module is	d of ass creditab	e essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
placem port on (appro>	ent rep techni <. 30 m	ort / fieldwork report / re cal course (approx. 10 pa inutes)	eport on practical trai ages) and a) written e	ning / report on prac xamination (approx.	tical course / project report / re- 90 minutes) or b) presentation
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachir	ıg cycl	e	,		
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	mmes)	
Module	e appea	in in			
Master	's degr	ee (1 major) Technology o	of Functional Material	s (2010)	
Master's degree (1 major) Functional Materials (2012)					

Module title Abb				Abbreviation	
Materials used for surgical implants					03-SP2A1-101-m01
Module	e coord	inator		Module offered by	
holder	of the (Chair of Orthopaedics (Jal	kob/Ebert)	Faculty of Medicine	
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)	
5	nume	rical grade			
Duration Module level Other prerequisites					
1 seme	ster	graduate			
Conten	ts				
Functio ception	n and a , bone	application of different m s, teeth).	edical implants (carc	liovascular system, o	catheter systems, organs of per-
Intende	ed learr	ning outcomes			
Studen compat	ts have tibility a	e developed a knowledge and interaction with the c	of the application of organism.	implants in differen	t organs and tissues and their
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü +	P (no i	nformation on SWS (wee	kly contact hours) an	d course language a	vailable)
Methoo module is	d of ass creditab	essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
placem port on (appro>	ent rep techni k. 30 m	oort / fieldwork report / re cal course (approx. 10 pa inutes)	eport on practical trai ges) and a) written e	ning / report on prac xamination (approx.	ctical course / project report / re- 90 minutes) or b) presentation
Allocat	ion of p	olaces			
Additio	nal info	ormation			
Worklo	ad				
Teachi	ng cycl	e			
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module	Module appears in				
Master	's degre	ee (1 major) Technology c	of Functional Material	s (2010)	
Master's degree (1 major) Functional Materials (2012)					

Module title					Abbreviation
Materia	als for I	piosensors, tissue engin	eering and tissue reg	reneration	03-SP2A2-101-m01
Module	coord	inator		Module offered by	
holder of Rege	of the (nerativ	Chair of Orthopaedics and e Medicine	d holder of the Chair	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 semes	ster	graduate			
Conten	ts				
Interact as an ir	tion of Iformat	biosystems with materia tion broker for sensors, b	ls, biodegradation ve iological materials, s	rsus inert materials, tructure-function int	protein adsorption on surfaces eraction (nano-microstructures).
Intende	ed leari	ning outcomes			
Studen	ts have	e developed a knowledge	of the interaction of	the biosystem with ı	materials.
Courses	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü +	P (no i	nformation on SWS (wee	kly contact hours) an	d course language a	vailable)
Method module is	l of ass creditab	s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
placem port on (approx	ent rep techni k. 30 m	oort / fieldwork report / re cal course (approx. 10 pa inutes)	eport on practical trai ages) and a) written e	ning / report on prac xamination (approx.	ctical course / project report / re- 90 minutes) or b) presentation
Allocati	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachir	ng cycl	е			
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	mmes)	
Module	appea	in in			
Master'	s degr	ee (1 major) Technology o	of Functional Material	s (2010)	
Master's degree (1 major) Functional Materials (2012)					

Module title Abbr					Abbreviation
Carrier materials and devices for therapeutic compounds 03-SP3A1-101-m01					03-SP3A1-101-m01
Module	coord	inator		Module offered by	
holder	of the (Chair of Functional Mater	ials in Medicine and	Faculty of Medicine	
Dentist	ry		-		
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				
Integrat process	tion an ses, tar	d binding of active agent geting and release of the	s in particles, functio active agents.	nalisation of particle	es for (intracellular) transport
Intende	ed leari	ning outcomes			
Studen ctionali	ts have sation	e developed a knowledge of particles for (intracelli	of the integration an ular) transport proces	d binding of active a ses, targeting and re	gents in particles and of the fun- elease of active agents.
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	_
V + Ü +	P (no i	nformation on SWS (wee	kly contact hours) an	d course language a	vailable)
Methoo module is	l of ass creditab	essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
placem port on (appro>	ent rep techni 4. 30 m	ort / fieldwork report / re cal course (approx. 10 pa inutes)	eport on practical trai ages) and a) written e	ning / report on prac xamination (approx.	ctical course / project report / re- 90 minutes) or b) presentation
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module	appea	in			
Master	s degr	ee (1 major) Technology o	of Functional Material	s (2010)	
Master	Master's degree (1 major) Functional Materials (2012)				

Module title					Abbreviation	
Microsystems for biological and medicinal Applications					03-SP3A2-101-m01	
Module	coord	inator		Module offered by		
holder Dentist	of the (ry and	Chair of Functional Mater holder of the Chair of Reg	ials in Medicine and generative Medicine	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	graduate				
Conten	ts					
Implant noparti	table d cles fo	rug delivery systems, lab r regenerative medicine a	-on-a-chip systems fo and protein biochemi	or bioanalysis, biore stry.	actor technology, lab course: na-	
Intende	ed leari	ning outcomes				
Studen analysi	ts have s, biore	e developed a knowledge eactor technology, nanop	of implantable drug articles for regenerat	delivery systems and provide the system of t	d lab-on-a-chip systems for bio- otein biochemistry.	
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V + Ü +	P (no i	nformation on SWS (wee	kly contact hours) an	d course language a	vailable)	
Methoo module is	l of ass creditab	s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
placem port on (approx	ent rep techni 4. 30 m	ort / fieldwork report / re cal course (approx. 10 pa inutes)	eport on practical trai ages) and a) written e	ning / report on prac xamination (approx.	ctical course / project report / re- 90 minutes) or b) presentation	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teachir	Teaching cycle					
Referre	d to in	LPOI (examination regulation	s for teaching-degree progra	mmes)		
Module	appea	irs in				
Master'	s degr	ee (1 major) Technology o	of Functional Material	s (2010)		
Master	Master's degree (1 major) Functional Materials (2012)					

Module	title		Abbreviation						
Supran	nolecul	ar Chemistry (Basics)		08-SCM1-102-m01					
Module	coord	inator		Module offered by					
lecture	r of lect	ure "Organischen Chemi	e"	Faculty of Chemistry and Pharmacy					
ECTS	Metho	od of grading	Only after succ. compl. of module(s)						
5	nume	rical grade							
Duration M		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)									
S (no information on SWS (weekly contact hours) and course language available)									
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)									
written examination (approx. 90 minutes) or oral examination of one candidate each (approx. 20 minutes) Language of assessment: German or English									
Allocation of places									
Additio	nal info	ormation							
Workload									
Teaching cycle									
Referred to in LPO I (examination regulations for teaching-degree programmes)									
Module appears in									
Master's degree (1 major) Chemistry (2013)									
Master's degree (1 major) Chemistry (2010)									
Master's degree (1 major) Chemistry (2014) Master's degree (1 major) Eulertianal Materials (2012)									
Master's degree (1 major) Functional Materials (2012)									

Module	title		Abbreviation						
Nanosc	ale Ma	terials			08-PCM3-102-m01				
Module coordinator				Module offered by					
lecturer of the seminar "Nanoskalige Materialien"				Institute of Physical and Theoretical Chemistry					
ECTS	Metho	od of grading	Only after succ. compl. of module(s)						
5	nume	rical grade							
Duration		Module level	Other prerequisites						
1 semester		graduate							
Contents									
This module discusses advanced topics in nanoscale materials. It focuses on the structure, properties, fabricati- on, modern characterisation methods and application areas of nanoscale materials.									
Intended learning outcomes									
Students are able to characterise nanoscale materials. They are able to name analytical methods and application areas of nanoscale materials.									
Courses (type, number of weekly contact hours, language — if other than German)									
S + Ü (n	io infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)									
written examination (90 minutes) or oral examination of one candidate each (20 minutes) or talk (30 minutes) Language of assessment: German or English									
Allocati	ion of p	olaces							
Additional information									
Workload									
Teachir	ng cycl	e							
Referred to in LPO I (examination regulations for teaching-degree programmes)									
Module appears in									
Bachelor' degree (1 major) Nanostructure Technology (2010)									
Bachelor' degree (1 major) Nanostructure Technology (2012)									
Master's degree (1 major) Chemistry (2013)									
Master's degree (1 major) Chemistry (2010)									
master's degree (1 major) Chemistry (2014) Master's degree (1 major) Mathematics (2012)									
Master's degree (1 major) Mathematics (2012) Master's degree (1 major) Computational Mathematics (2012)									
Master'	Master's degree (1 major) Functional Materials (2012)								
Physical chemistry of supramolecular assemblies 08-PCM5-102-m01 Module coordinator Module offered by Iccture row the seminar "Physikalische Chemie Supramole- kularer Strukturen" Institute of Physical and Theoretical Chemistry ECTS Method of grading Only after succ. com l. of module(s) 5 numerical grade Duration Module level Other prerequisites 1 semester graduate Contents This module examines the basic interactions between molecules. It discusses the formation and physical-che cal properties of aggregates as well as key applications of supramolecular chemistry. Intended learning outcomes Students are able to explain the basic interactions between molecules demonstrating a high degree of experting the field. They can describe the formation and physical-chemical properties of aggregates. They can name re dern applications of supramolecular chemistry. Courses (type, number of weekly contact hours, language — if other than German)									
---	--	--	--	--	--	--			
Module coordinator Module offered by lecturer of the seminar "Physikalische Chemie Supramole- kularer Strukturen" Institute of Physical and Theoretical Chemistry ECTS Method of grading Only after succ. compl. of module(s) 5 numerical grade Duration Module level Other prerequisites 1 semester graduate Contents This module examines the basic interactions between molecules. It discusses the formation and physical-che cal properties of aggregates as well as key applications of supramolecular chemistry. Intended learning outcomes Students are able to explain the basic interactions between molecules demonstrating a high degree of experting in the field. They can describe the formation and physical-chemical properties of aggregates. They can name r dern applications of supramolecular chemistry. Courses (type, number of weekly contact hours, language — if other than German)									
lecturer of the seminar "Physikalische Chemie Supramole- kularer Strukturen" Institute of Physical and Theoretical Chemistry ECTS Method of grading Only after succ. compl. of module(s) 5 numerical grade Durational real gradue Institute of Physical and Theoretical Chemistry 1 semester graduate Contents graduate This module examines the basic interactions between molecules. It discusses the formation and physical-che cal properties of aggregates as well as key applications of supramolecular chemistry. Intended learning outcomes Students are able to explain the basic interactions between molecules demonstrating a high degree of expertion in the field. They can describe the formation and physical-chemical properties of aggregates. They can name redern applications of supramolecular chemistry. Courses (type, number of weekly contact hours, language – if other than German)									
ECTS Method of grading Only after succ. compl. of module(s) 5 numerical grade Duration Module level Other prerequisites 1 semester graduate Contents This module examines the basic interactions between molecules. It discusses the formation and physical-che cal properties of aggregates as well as key applications of supramolecular chemistry. Intended learning outcomes Students are able to explain the basic interactions between molecules demonstrating a high degree of expertion in the field. They can describe the formation and physical-chemical properties of aggregates. They can name redern applications of supramolecular chemistry. Courses (type, number of weekly contact hours, language — if other than German)									
5 numerical grade Duration Module level Other prerequisites 1 semester graduate Contents Image: Second and and and and and and and and and a									
Duration Module level Other prerequisites 1 semester graduate Contents This module examines the basic interactions between molecules. It discusses the formation and physical-che cal properties of aggregates as well as key applications of supramolecular chemistry. Intended lear-ing outcomes Students are able to explain the basic interactions between molecules demonstrating a high degree of expertion in the field. They can describe the formation and physical-chemical properties of aggregates. They can name redern applications of supramolecular chemistry. Courses (type, number of weekly contact hours, language — if other than German)									
1 semester graduate Contents									
Contents This module examines the basic interactions between molecules. It discusses the formation and physical-che cal properties of aggregates as well as key applications of supramolecular chemistry. Intended learning outcomes Students are able to explain the basic interactions between molecules demonstrating a high degree of expertion in the field. They can describe the formation and physical-chemical properties of aggregates. They can name r dern applications of supramolecular chemistry. Courses (type, number of weekly contact hours, language — if other than German)									
This module examines the basic interactions between molecules. It discusses the formation and physical-che cal properties of aggregates as well as key applications of supramolecular chemistry. Intended learning outcomes Students are able to explain the basic interactions between molecules demonstrating a high degree of experti in the field. They can describe the formation and physical-chemical properties of aggregates. They can name r dern applications of supramolecular chemistry. Courses (type, number of weekly contact hours, language — if other than German)									
Intended learning outcomes Students are able to explain the basic interactions between molecules demonstrating a high degree of expert in the field. They can describe the formation and physical-chemical properties of aggregates. They can name r dern applications of supramolecular chemistry. Courses (type, number of weekly contact hours, language — if other than German)									
Students are able to explain the basic interactions between molecules demonstrating a high degree of expert in the field. They can describe the formation and physical-chemical properties of aggregates. They can name r dern applications of supramolecular chemistry. Courses (type, number of weekly contact hours, language — if other than German)									
Courses (type, number of weekly contact hours, language — if other than German)									
S + Ü (no information on SWS (weekly contact hours) and course language available)									
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whethe module is creditable for bonus) written examination (90 minutes) and/or oral examination of one candidate each (20 minutes) and/or talk (30 minutes)									
Language of assessment: German or English									
Allocation of places									
Additional information									
Workload									
Teaching cycle									
Referred to in LPO I (examination regulations for teaching-degree programmes)									
Module appears in									
Master's degree (1 major) Chemistry (2013)									
Master's degree (1 major) Chemistry (2010)									
Master's degree (1 major) Mathematics (2012)									
Master's degree (1 major) Technology of Functional Materials (2010)									
Master's degree (1 major) Technology of Functional Materials (2009) Master's degree (1 major) Computational Mathematics (2012)									
Master's degree (1 major) Functional Materials (2012)									

Module	title			Abbreviation			
Principles of Energy Technologies					11-ENT-092-m01		
Module coordinator				Module offered by			
Managing Director of the Institute of Ap			plied Physics Faculty of Physics and Astronomy				
ECTS	Metho	od of grading	Only after succ. com	ıly after succ. compl. of module(s)			
6	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 semester graduate		Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for					
Conten	ts			sment anew.			
as rene ting ma studen verters. Electric	wable iterials, ts. Ener Nuclea ity. Bio	resources of energy. We a , selective layers, highly a rgy conservation via ther ar power plants. Hydroeld mass. Geothermal energ	also discuss aspects activated carbons). The mal insulation. Therm ectricity. Wind turbing y. Energy storage. En	of optimising materi ne course is especia odynamic energy ef es. Photovoltaics. So ergy transport	als (e.g. nanostructured insula- lly suitable for teaching degree ficiency. Fossil fired energy con- lar thermal: Heat. Solar thermal:		
Intende	ed learr	ning outcomes					
The stu port an	dents l d stora	know the principles of dif ge. They understand the	ferent methods of en structures of corresp	ergy technology, esp onding installations	pecially energy conversion, trans- and are able to compare them.		
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)			
R + V (n	o infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)		
Methoo module is	d of ass creditab	e ssment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009.							
Allocation of places							
Additio	Additional information						
Worklo	Workload						
Teachin	Teaching cycle						

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

Module appears in

Bachelor' degree (1 major) Physics (2010)
Bachelor' degree (1 major) Physics (2012)
Bachelor' degree (1 major) Nanostructure Technology (2010)
Bachelor' degree (1 major) Nanostructure Technology (2012)
Master's degree (1 major) Physics (2010)
Master's degree (1 major) Physics (2011)
Master's degree (1 major) Nanostructure Technology (2011)
Master's degree (1 major) Nanostructure Technology (2010)
Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010)
Master's degree (1 major) FOKUS Physics (2010)
Master's degree (1 major) FOKUS Physics (2011)
Master's degree (1 major) Functional Materials (2012)

Module	e title			Abbreviation			
Semiconductor Nanostructures					11-HNS-092-m01		
Module coordinator				Module offered by			
Managing Director of the Institute of App			lied Physics Faculty of Physics and Astronomy				
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)			
6	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 semester graduate			Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anow.				
Conten	ts		-				
or maci ging the tures of with a f of nove for qua	roscopi eir size f varyin focus o el optoe ntum c	c crystals, their electroni . The lecture addresses to g dimensions (2D, 1D, of n optical properties and electronic and quantum p ommunication and quan	c, optical and magne echnological challeng)). It provides the bas light-matter coupling hotonic devices base tum computing archi	tic properties can be ges in the preparatic sic theoretical conce Moreover, it discus ed on such nanostru tectures.	e systematically tailored by chan- on of semiconductor nanostruc- pts to describe their properties, ses the challenges and concepts ctures, including building blocks		
Intended learning outcomes							
The stu knowle devices	dents dge of 5. They	know the theoretical prin the technological metho are able to apply their kn	ciples and characteri ds to fabricate such s owledge to problems	stics of semiconduc tructures, and of the s in this field of resea	tor nanostructures. They have eir applications to novel photonic arch.		
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)			
R + V (n	infor	mation on SWS (weekly o	contact hours) and co	urse language avail	able)		
Methoo module is	d of ass creditab	s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009. Language of assessment: German, English							
Allocat	Allocation of places						
Additio	nal inf	ormation					
Worklo	ad						

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

Referred to In LPO I (examination regulations for teaching-degree programmes)
Module appears in
Bachelor' degree (1 major) Physics (2010)
Bachelor' degree (1 major) Physics (2012)
Bachelor' degree (1 major) Nanostructure Technology (2010)
Bachelor' degree (1 major) Nanostructure Technology (2012)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Physics (2010)
Master's degree (1 major) Physics (2011)
Master's degree (1 major) Technology of Functional Materials (2010)
Master's degree (1 major) Nanostructure Technology (2011)
Master's degree (1 major) Nanostructure Technology (2010)
Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010)
Master's degree (1 major) FOKUS Physics (2010)
Master's degree (1 major) FOKUS Physics (2011)
Master's degree (1 major) Computational Mathematics (2012)
Master's degree (1 major) Functional Materials (2012)

Module title					Abbreviation		
Nanoar	nalytics	;			11-NAN-092-m01		
Module	e coord	inator		Module offered by			
Managing Director of the Institute of Applied Physics			oplied Physics	Faculty of Physics and Astronomy			
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)			
6	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 semester graduate		graduate	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anow.				
Conten	ts						
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 Intended learning outcomes The students have basic knowledge of modern research methods for different nanostructures up to an atomic le- vel. They know microscoping procedures that are used in practice in labs and the industry as well as spectrosco- pic methods for the determination of electronic properties. They are able to evaluate the efficiency of different re- search methods. Courses (type, number of weekly contact hours, language – if other than German) R + V (no information on SWS (weekly contact hours) and course language available)							
groups (approx. 30 minutes) er candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009. Language of assessment: German, English Allocation of places Additional information							
Worklo	ad						
	au						
L							

Referred to in LPO I (examination regulations for teaching-degree programmes)
Module appears in
Bachelor' degree (1 major) Physics (2010)
Bachelor' degree (1 major) Physics (2012)
Bachelor' degree (1 major) Nanostructure Technology (2010)
Bachelor' degree (1 major) Nanostructure Technology (2012)
Master's degree (1 major) Physics (2010)
Master's degree (1 major) Physics (2011)
Master's degree (1 major) Nanostructure Technology (2011)
Master's degree (1 major) Nanostructure Technology (2010)
Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010)
Master's degree (1 major) FOKUS Physics (2010)
Master's degree (1 major) FOKUS Physics (2011)
Master's degree (1 major) Functional Materials (2012)

Module	title	Abbreviation					
Structure and Properties of Modern Materials: Experiments and Simulations 08-MW-122-mo1							
Module	Module coordinator Module offered by						
holder thesis	of the (Chair of Chemical Techno	logy of Material Syn-	Chair of Chemical T	echnology of Material Synthesis		
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						
Materia simulat	l prope ions.	erties of metals and cerar	nics: correlation of st	ructure/property rel	ations through experiments and		
Intende	ed learr	ning outcomes					
Studen mance on. A sp perties.	ts gain cerami pecial f	an insight into the prope cs. They are introduced t ocus is on the relation be	erties of modern mate o measuring method: etween the micro/nar	erials: aerospace alu s and calculation me noscopic structure of	minium alloys and high-perfor- ethods using numerical simulati- f materials and the resulting pro-		
Courses	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)			
V + S (n	io infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)		
Method module is	l of ass creditab	s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
a) talk (nation i	(approx in grou	x. 30 minutes) or b) oral e ps (groups of 2, approx. ;	examination of one ca 30 minutes)	andidate each (appro	ox. 20 minutes) or c) oral exami-		
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	ad						
Teaching cycle							
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module	e appea	irs in					
Master's degree (1 major) Functional Materials (2012)							

Module	Module title Abbreviation					
Techno	Technology of Sensor and Actor Materials including Smart Fluids08-SAM-122-m01					
Module	coord	inator		Module offered by		
holder o thesis	of the (Chair of Chemical Techno	logy of Material Syn-	Chair of Chemical T	echnology of Material Synthesis	
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	Admission prerequis course.	site to assessment: s	successful completion of lab	
Conten	ts					
Fabrica [.] materia	tion, ef Ils and	fects and applications of magnetostrictive materia	sensory and actuato als. Electrorheologica	ory materials such as l and magnetorheolo	piezoelectrics, shape memory ogical fluids, magnetofluids.	
Intende	ed learr	ning outcomes				
Studen	ts have	e developed fundamental	knowledge in the are	ea of sensory and ac	tuatory materials.	
Courses	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V + P (n	o infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)	
Method module is	l of ass creditab	e ssment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
a) writte or c) ora	en exar al exan	nination (approx. 90 min nination in groups (group	utes) or b) oral exam s of 2, approx. 30 mi	ination of one candi nutes total)	date each (approx. 20 minutes)	
Allocati	ion of p	olaces				
Additio	nal info	ormation				
Worklo	ad					
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	e appea	irs in				
Master's degree (1 major) Functional Materials (2012)						

Module	Module title Abbreviation						
Polyme	ers II				03-PM2-122-m01		
Module	e coord	inator		Module offered by			
holder Dentist	of the (ry	Chair of Functional Mater	ials in Medicine and	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	graduate					
Conten	ts						
In-dept tions - o group a graphie	h know control analysis es, poly	vledge and practical appl led radical polymerisatio s, mass spectrometry) - c ymer functionalisation).	ication of: - free radic n - polymer character urrent aspects of poly	al polymerisation, p isation (e. g. gel per ymer research (e. g.	olyaddition - ionic polymerisa- meation chromatography, end- block-copolymers, polymer topo-		
Intende	ed learn	ning outcomes					
Studen	ts acqu	uire an advanced knowled	dge of polymer synth	esis, modification ar	nd characterisation.		
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)			
S + Ü (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)		
Method module is	d of ass creditab	essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
a) writt (30 mir Langua	en exar nutes) ge of a	nination (approx. 90 min ssessment: German or Ei	utes) or b) oral exam nglish	ination of one candi	date each (20 minutes) or c) talk		
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	ad						
Teachi	ng cycl	e					
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module appears in							
Master	's degr	ee (1 major) Chemistry (2	013)				
Master	's degr	ee (1 major) Chemistry (2	014)				
Master	's degr	ee (1 major) Technology o	of Functional Material	s (2010)			
Master's degree (1 major) Functional Materials (2012)							

Module title Abbreviation							
Polyme	er Mate	rials 1: Technology of Po	lymer Modification		08-PW1-122-m01		
Module	coord	inator		Module offered by			
holder thesis	of the (Chair of Chemical Techno	logy of Material Syn-	Chair of Chemical T	echnology of Material Synthesis		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)			
5	nume	rical grade					
Duratio	n	Module level	Other prerequisites	es			
1 seme	ster	graduate					
Conten	ts						
Polyme logies f lymer c	r synth or the 1 ompou	esis methods; the structor manufacturing of polyme nds and components.	ure of polymers and p r compounds and cor	oolymer compounds; mponents, procedure	; properties of polymers; techno- es for the characterisation of po-		
Intende	ed learn	ning outcomes					
and ter portant such as nufactu cessing	Students have developed a knowledge of the special properties of polymers and polymer compounds (e.g. time and temperature-dependent viscoelastic behaviour). They have become familiar with the characteristics of im- portant production technologies (polymer synthesis methods, compounding technologies, processing methods such as injection moulding) and understand the different ways of influencing the properties of materials and ma- nufactured products. They have become familiar with ways to calculate complex flow conditions in polymer pro-						
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)			
V + P (n	o infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)		
Methoo module is	l of ass creditab	s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
a) written examination (approx. 90 minutes) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes total) Assessment offered: once a year, winter semester							
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Workload							
Teaching cycle							
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module	appea	irs in					
Master's degree (1 major) Functional Materials (2012)							

Module title		Abbreviation					
Polymer Mat	erials 2: Technology of Fi	08-PW2-122-m01					
Module coor	dinator		Module offered by				
holder of the thesis	Chair of Chemical Techno	logy of Material Syn-	Chair of Chemical T	echnology of Material Synthesis			
ECTS Meth	od of grading	Only after succ. com	pl. of module(s)				
5 num	erical grade						
Duration	Module level	Other prerequisites	Other prerequisites				
1 semester	graduate						
Contents							
Principles of ons between (e.g. electrica rheology, me	and technologies for the f filler materials and polym Il behaviour, bactericidal chanical behaviour, colou	unctionalisation of finers, determination of behaviour) and influe of surface).	ller materials in orde the special properti nce of functionalisa	r to modify polymers, interacti- les of functionalised polymers tion on other properties (e.g.			
Intended lea	rning 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).							
Courses (type,	number of weekly contact hours,	anguage — if other than Ger	man)				
V + P (no info	rmation on SWS (weekly	contact hours) and co	urse language availa	able)			
Method of as module is credita	sessment (type, scope, langua ble for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether			
a) written exa or c) oral exa Assessment	amination (approx. 90 mir mination in groups (group offered: once a year, sumi	nutes) or b) oral exam os of 2, approx. 30 mi mer semester	ination of one candi nutes total)	date each (approx. 20 minutes)			
Allocation of	places						
Additional in	formation						
Workload	Workload						
Teaching cycle							
Referred to in	LPOI (examination regulation	s for teaching-degree progra	mmes)				
Module appe	ars in						
Master's deg	Master's degree (1 major) Functional Materials (2012)						



Focus (ECTS credits)

Students must select a focus (A or B) and, within this focus, must take modules worth no less than 30 ECTS credits.



Focus Subject A: Biocompatible materials

(30 ECTS credits)

Module title					Abbreviation		
Basic principles of cell biology and tissue regeneration03-SP1A1					03-SP1A1-101-m01		
Module	coord	inator		Module offered by			
holder of Rege	of the (nerativ	Chair of Orthopaedics and ve Medicine	d holder of the Chair	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	graduate					
Conten	ts						
Cell bio geomet	logy, n ry, me	netabolism, differentiatio chanobiology (bioreactor	on, cell behaviour, ce s with mechanics).	l/cell interactions, c	ell adhesion, 2D/3D and surface		
Intende	ed lear	ning outcomes					
Studen [.] nobiolo	ts have gy.	e developed a knowledge	of cell biology, meta	bolism, differentiatio	on, adhesion to surfaces, mecha-		
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)			
V + Ü +	P (no i	nformation on SWS (wee	kly contact hours) an	d course language a	vailable)		
Methoo module is	of ass creditab	sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
placem port on (approx	ent rep techni 4. 30 m	oort / fieldwork report / re cal course (approx. 10 pa inutes)	eport on practical trai ages) and a) written e	ning / report on prac xamination (approx.	ctical course / project report / re- 90 minutes) or b) presentation		
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	ad						
Teachir	ıg cycl	e					
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module	Module appears in						
Master'	s degr	ee (1 major) Technology o	of Functional Material	s (2010)			
Master's degree (1 major) Functional Materials (2012)							

Module title					Abbreviation		
Fundan	nentals	of Tissue Engineering a	nd Quality Managem	ent	03-SP1A2-101-m01		
Module	e coord	inator		Module offered by			
holder the Cha	of the C air of Fu	Chair of Regenerative Meen Inctional Materials in Me	dicine and holder of dicine and Dentistry	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	graduate					
Conten	ts						
Tissue ves and cording	engine d blood g to DIN	ering of complex constru- vessels. Risk analysis ac EN ISO 10993.	cts: supply, hypoxia, ccording to ISO 17025	nutrient diffusion, e : 2005, biological ev	xtracellular matrix, supply of ner- valuation of medical devices ac-		
Intende	ed learr	ning outcomes					
Studen	ts are f	amiliar with the fundame	ental principles of tiss	sue engineering and	quality management.		
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)			
V + Ü +	P (no i	nformation on SWS (wee	kly contact hours) an	d course language a	vailable)		
Methoo module is	d of ass creditab	e essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
placem port on (appro>	ent rep techni k. 30 m	ort / fieldwork report / re cal course (approx. 10 pa inutes)	eport on practical trai ages) and a) written e	ning / report on prac xamination (approx.	ctical course / project report / re- 90 minutes) or b) presentation		
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	ad						
Teachir	ng cycl	9					
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	e appea	irs in					
Master	s degre	ee (1 major) Technology c	of Functional Material	s (2010)			
Master's degree (1 major) Functional Materials (2012)							

Module title Abbreviation							
Materia	als use	d for surgical implants		03-SP2A1-101-m01			
Module	e coord	inator		Module offered by			
holder	of the (Chair of Orthopaedics (Jal	kob/Ebert)	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 seme	ster	graduate					
Conten	ts						
Functio ception	n and a , bone	application of different m s, teeth).	edical implants (carc	liovascular system, o	catheter systems, organs of per-		
Intende	ed leari	ning outcomes					
Studen compat	ts have tibility a	e developed a knowledge and interaction with the o	of the application of organism.	implants in differen	t organs and tissues and their		
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)			
V + Ü +	P (no i	nformation on SWS (wee	kly contact hours) an	d course language a	vailable)		
Methoo module is	d of ass creditab	essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
placem port on (appro>	ent rep techni <. 30 m	oort / fieldwork report / re cal course (approx. 10 pa inutes)	eport on practical trai ges) and a) written e	ning / report on prac xamination (approx.	tical course / project report / re- 90 minutes) or b) presentation		
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	ad						
Teachir	ng cycl	e					
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module appears in							
Master	's degr	ee (1 major) Technology c	of Functional Material	s (2010)			
Master	Master's degree (1 major) Functional Materials (2012)						

Module title					Abbreviation		
Materials for biosensors, tissue engineering and tissue regeneration03-SP2A2-101-m01							
Module	coord	inator		Module offered by			
holder of Rege	of the (nerativ	Chair of Orthopaedics and re Medicine	d holder of the Chair	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 semes	ster	graduate					
Conten	ts						
Interact as an ir	tion of Iformat	biosystems with materia tion broker for sensors, b	ls, biodegradation ve iological materials, s	rsus inert materials, tructure-function int	protein adsorption on surfaces eraction (nano-microstructures).		
Intende	ed learr	ning outcomes					
Studen	ts have	e developed a knowledge	of the interaction of	the biosystem with r	materials.		
Courses	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)			
V + Ü +	P (no i	nformation on SWS (wee	kly contact hours) an	d course language a	vailable)		
Method module is	l of ass creditab	s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
placem port on (approx	ent rep techni (. 30 m	ort / fieldwork report / re cal course (approx. 10 pa inutes)	eport on practical trai ages) and a) written e	ning / report on prac xamination (approx.	ctical course / project report / re- 90 minutes) or b) presentation		
Allocati	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	ad						
Teachir	ng cycl	9					
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module appears in							
Master'	s degre	ee (1 major) Technology o	of Functional Material	s (2010)			
Master's degree (1 major) Functional Materials (2012)							

Module title Abbreviation							
Carrier materials and devices for therapeutic compounds 03-SP3A1-101-m01							
Module	coord	inator		Module offered by			
holder	of the (Chair of Functional Mater	ials in Medicine and	Faculty of Medicine			
Dentist	ry		-				
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						
Integrat process	tion an ses, tar	d binding of active agent geting and release of the	s in particles, functio active agents.	nalisation of particle	es for (intracellular) transport		
Intende	ed leari	ning outcomes					
Studen ctionali	ts have sation	e developed a knowledge of particles for (intracelli	of the integration an ular) transport proces	d binding of active a ses, targeting and re	gents in particles and of the fun- elease of active agents.		
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	_		
V + Ü +	P (no i	nformation on SWS (wee	kly contact hours) an	d course language a	vailable)		
Methoo module is	l of ass creditab	essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
placem port on (appro>	ent rep techni 4. 30 m	ort / fieldwork report / re cal course (approx. 10 pa inutes)	eport on practical trai ages) and a) written e	ning / report on prac xamination (approx.	ctical course / project report / re- 90 minutes) or b) presentation		
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	ad						
Teaching cycle							
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module appears in							
Master	s degr	ee (1 major) Technology o	of Functional Material	s (2010)			
Master	Master's degree (1 major) Functional Materials (2012)						

Module	title			Abbreviation			
Microsy	ystems	for biological and medic	inal Applications		03-SP3A2-101-m01		
Module	coord	inator		Module offered by			
holder	of the (Chair of Functional Mater	ials in Medicine and	Faculty of Medicine			
Dentist	ry and	holder of the Chair of Reg	generative Medicine				
ECTS	Metho	od of grading	Only after succ. com	ipl. of module(s)			
5	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	ts						
Implan noparti	table d cles fo	rug delivery systems, lab r regenerative medicine a	-on-a-chip systems fo and protein biochemi	or bioanalysis, biorea stry.	actor technology, lab course: na-		
Intende	ed leari	ning outcomes					
Studen analysi	ts have s, biore	e developed a knowledge eactor technology, nanop	of implantable drug articles for regenerat	delivery systems and ive medicine and pro	d lab-on-a-chip systems for bio- otein biochemistry.		
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	,		
V + Ü +	P (no i	nformation on SWS (wee	kly contact hours) an	d course language a	vailable)		
Methoo module is	l of ass	essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
placem port on (appro>	ent rep techni (. 30 m	oort / fieldwork report / re cal course (approx. 10 pa inutes)	eport on practical trai ges) and a) written e	ning / report on prac xamination (approx.	ctical course / project report / re- 90 minutes) or b) presentation		
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	ad						
Teaching cycle							
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module	Module appears in						
Master	s degr	ee (1 major) Technology c	of Functional Material	s (2010)			
Master's degree (1 major) Functional Materials (2012)							



Focus Subject B: Technical functional materials

(ECTS credits)

Module	e title			Abbreviation		
Semiconductor Nanostructures					11-HNS-092-m01	
Module	e coord	inator		Module offered by		
Managi	ing Dire	ector of the Institute of Ap	oplied Physics	Faculty of Physics a	ind Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
6	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 semester graduate		Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.				
Conten	ts		-			
or maci ging the tures of with a f of nove for qua	roscopi eir size f varyin focus o el optoe ntum c	c crystals, their electroni . The lecture addresses to g dimensions (2D, 1D, of n optical properties and electronic and quantum p ommunication and quan	c, optical and magne echnological challeng)). It provides the bas light-matter coupling hotonic devices base tum computing archi	tic properties can be ges in the preparatic sic theoretical conce Moreover, it discus ed on such nanostru tectures.	e systematically tailored by chan- on of semiconductor nanostruc- pts to describe their properties, ses the challenges and concepts ctures, including building blocks	
Intende	ed learr	ning outcomes				
The stu knowle devices	dents dge of 5. They	know the theoretical prin the technological metho are able to apply their kn	ciples and characteri ds to fabricate such s owledge to problems	stics of semiconduc tructures, and of the s in this field of resea	tor nanostructures. They have eir applications to novel photonic arch.	
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
R + V (n	infor	mation on SWS (weekly o	contact hours) and co	urse language avail	able)	
Methoo module is	d of ass creditab	s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009. Language of assessment: German, English						
Allocat	Allocation of places					
Additio	nal inf	ormation				
Worklo	ad					

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

Referred to In LPO I (examination regulations for teaching-degree programmes)
Module appears in
Bachelor' degree (1 major) Physics (2010)
Bachelor' degree (1 major) Physics (2012)
Bachelor' degree (1 major) Nanostructure Technology (2010)
Bachelor' degree (1 major) Nanostructure Technology (2012)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Physics (2010)
Master's degree (1 major) Physics (2011)
Master's degree (1 major) Technology of Functional Materials (2010)
Master's degree (1 major) Nanostructure Technology (2011)
Master's degree (1 major) Nanostructure Technology (2010)
Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010)
Master's degree (1 major) FOKUS Physics (2010)
Master's degree (1 major) FOKUS Physics (2011)
Master's degree (1 major) Computational Mathematics (2012)
Master's degree (1 major) Functional Materials (2012)

Module title					Abbreviation		
Structu	Structure and Properties of Modern Materials: Experiments and Simulations 08-MW-122-mo1						
Module	coord	inator		Module offered by			
holder thesis	of the (Chair of Chemical Techno	logy of Material Syn-	Chair of Chemical T	echnology of Material Synthesis		
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						
Materia simulat	l prope ions.	erties of metals and cerar	nics: correlation of st	ructure/property rel	ations through experiments and		
Intende	ed learr	ning outcomes					
Studen mance on. A sp perties.	ts gain cerami pecial f	an insight into the prope cs. They are introduced t ocus is on the relation be	erties of modern mate o measuring method etween the micro/nar	erials: aerospace alu s and calculation me noscopic structure of	minium alloys and high-perfor- ethods using numerical simulati- f materials and the resulting pro-		
Courses	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)			
V + S (n	io infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)		
Method module is	l of ass creditab	s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
a) talk (nation i	(approx in grou	x. 30 minutes) or b) oral e ps (groups of 2, approx. ;	examination of one ca 30 minutes)	andidate each (appro	ox. 20 minutes) or c) oral exami-		
Allocat	ion of p	olaces					
Additio	nal info	ormation					
Worklo	ad						
Teaching cycle							
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module	e appea	irs in					
Master'	Master's degree (1 major) Functional Materials (2012)						

Module title Abbreviation						
Organic Semiconductor					11-0HL-092-m01	
Module	e coord	inator		Module offered by	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)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semester graduate		Admission prerequi 50% of exercises. C sion to assessment ve details at the beg be considered a dec students have obtai over the course of th assessment into eff mitted to assessme assessment at a late for admission to assess	Admission prerequisite to assessment: successful completion of approx. 50% of exercises. Certain prerequisites must be met to qualify for admis- sion to assessment. The lecturer will inform students about the respecti- ve details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be ad- mitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.			
Conten	ts					
Physica cations	al princ	iples of organic semico	onductors, molecular a	nd polymer electroni	cs and sensor techn	ology, appli-
Intende	ed learı	ning outcomes				
The stu	dents l	nave advanced knowle	dge of organic semicor	iductors.		
Course	S (type, n	umber of weekly contact hour	s, language — if other than Ge	rman)		
V + Ü (r	no infor	mation on SWS (weekl	y contact hours) and co	ourse language avail	able)	
Methoo module is	d of ass creditab	s essment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informat	ion on whether
a) writte groups project prox. 30	en exaı (appro report o minu	nination (approx. 90 m x. 30 minutes per canc (approx. 10 pages, tim tes)	iinutes) or b) oral exam lidate, for modules witl e to complete: 1 to 4 we	ination of one candi n less than 4 ECTS cr eeks) or d) presentat	date each or oral exa edits approx. 20 mir ion/seminar presen	amination in nutes) or c) tation (ap-
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teaching cycle						
Reference to III LFOT (examination regulations for teaching-degree programmes)						
 Module appears in						
Module appears in Bachelor' degree (1 major) Physics (2010)						
Bachel	or' deg	ree (1 major) Physics (2	2012)			
Master's degree (1 major) Physics (2010)						
Master	Master's degree (1 major) Physics (2011)					
Mastoriaut	s degre	ee (1 major) reconnolog	y of runctional Materia	reperted of Aug cook 5 ar	am reg da	nago 07 / 444
Musici's WI	an i majul	anetional Materials (2012)	ta record Maste	er (120 ECTS) Funktionswerkst	toffe - 2012	μαδε 3/ / 111

Julius-Maximilians-UNIVERSITÄT WÜRZBURG



Master's degree (1 major) Technology of Functional Materials (2009) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2012)

Module	Module title Abbreviation					
Techno	Technology of Sensor and Actor Materials including Smart Fluidso8-SAM-122-mo1					
Module	coord	inator		Module offered by		
holder o thesis	of the (Chair of Chemical Techno	logy of Material Syn-	Chair of Chemical T	echnology of Material Synthesis	
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	Admission prerequis course.	site to assessment: s	successful completion of lab	
Conten	ts					
Fabrica [.] materia	tion, ef Ils and	fects and applications of magnetostrictive materia	sensory and actuato als. Electrorheologica	ory materials such as l and magnetorheolo	piezoelectrics, shape memory ogical fluids, magnetofluids.	
Intende	ed learr	ning outcomes				
Studen	ts have	e developed fundamental	knowledge in the are	ea of sensory and ac	tuatory materials.	
Courses	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V + P (n	o infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)	
Method module is	l of ass creditab	e ssment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
a) writte or c) ora	en exar al exan	nination (approx. 90 min nination in groups (group	utes) or b) oral exam s of 2, approx. 30 mi	ination of one candi nutes total)	date each (approx. 20 minutes)	
Allocati	ion of p	olaces				
Additio	nal info	ormation				
Worklo	ad					
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	e appea	irs in				
Master's degree (1 major) Functional Materials (2012)						

Module title Abbreviation						
Principles of Energy Technologies 11-ENT-092-m01						
Module coord	linator		Module offered by			
Managing Dir	ector of the Institute of A	oplied Physics	Faculty of Physics a	nd Astronomy		
ECTS Meth	od of grading	Only after succ. com	pl. of module(s)			
6 nume	erical grade					
Duration	Module level	Other prerequisites				
1 semester	graduate	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for				
Contents	1		inent unew.			
 Physical principles of energy conservation and energy conversion, energy transport and energy storage as well as renewable resources of energy. We also discuss aspects of optimising materials (e.g. nanostructured insulating materials, selective layers, highly activated carbons). The course is especially suitable for teaching degree students. Energy conservation via thermal insulation. Thermodynamic energy efficiency. Fossil fired energy converters. Nuclear power plants. Hydroelectricity. Wind turbines. Photovoltaics. Solar thermal: Heat. Solar thermal: Electricity. Biomass. Geothermal energy. Energy storage. Energy transport Intended learning outcomes The students know the principles of different methods of energy technology, especially energy conversion, transport and storage. They understand the structures of corresponding installations and are able to compare them. Courses (type, number of weekly contact hours, language – if other than German) P. W (no information on SWS (weakly contact hours) and course language available). 						
module is credital	SeSSMent (type, scope, langua ole for bonus)	ige — if other than German, e	examination offered — if no	t every semester, information on whether		
a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009. Language of assessment: German, English						
Allocation of places						
Additional information						
Workload	Workload					
Teaching cyc	e					

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

Module appears in

Bachelor' degree (1 major) Physics (2010)
Bachelor' degree (1 major) Physics (2012)
Bachelor' degree (1 major) Nanostructure Technology (2010)
Bachelor' degree (1 major) Nanostructure Technology (2012)
Master's degree (1 major) Physics (2010)
Master's degree (1 major) Physics (2011)
Master's degree (1 major) Nanostructure Technology (2011)
Master's degree (1 major) Nanostructure Technology (2010)
Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010)
Master's degree (1 major) FOKUS Physics (2010)
Master's degree (1 major) FOKUS Physics (2011)
Master's degree (1 major) Functional Materials (2012)

Module	e title				Abbreviation
Nanoar	nalytics	5			11-NAN-092-m01
Module	e coord	inator		Module offered by	
Managi	ing 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)	
6	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate	Certain prerequisite sessment. The lectu at the beginning of t sidered a declaratio dents have obtained the course of the se sessment into effect ted to assessment in sessment at a later admission to assess	s must be met to qua rer will inform stude the course. Registrat n of will to seek adm the qualification fo mester, the lecturer t. Students who mee n the current or in th date, students will h sment anew.	alify for admission to as- nts about the respective details ion for the course will be con- hission to assessment. If stu- r admission to assessment over will put their registration for as- t all prerequisites will be admit- e subsequent semester. For as- ave to obtain the qualification for
Conten	ts				
level up of X-ray py. Sca croscop ray abs Intende The stu vel. The pic met search Course R + V (m Method module is a) writt	to to an metho nning to ce Se orption dents l ey knov chods fi metho s (type, r to infor d of ass creditab	atomic level, examinatio ods Physics and materia cunneling microscopy E condary ions - mass spect ning outcomes have basic knowledge of v microscoping procedure or the determination of e ds. number of weekly contact hours, I mation on SWS (weekly of sessment (type, scope, langua le for bonus) mination (approx. 90 min	n of chemical compo al systems on the nar lectron probes: Scan ctrometry - X-ray meth modern research me es that are used in pr lectronic properties. anguage — if other than Ger contact hours) and co ge — if other than German, o	thods for different na actice in labs and th They are able to eval	of electronic properties, usage probes: Atomic force microsco- cope. Transmission electron mi- bectroscopy. Photoemission. X- anostructures up to an atomic le- e industry as well as spectrosco- uate the efficiency of different re- able) t every semester, information on whether date each or oral examination in
a) writt groups project (appro) Assess and wil examin Langua Allocat Additio	en exal (appro report x. 30 m ment o l be an ation r ge of a ion of p nal infa	mination (approx. 90 min x. 30 minutes per candid (approx. 8 to 10 pages, ti inutes) ffered: When and how of nounced in due form unc egulations) 2009. ssessment: German, Eng blaces	lates) or b) oral exam late, for modules with ime to complete: 1 to ten assessment will b der observance of Sec (lish	nation of one candi n less than 4 ECTS cr 4 weeks) or d) prese be offered depends o ction 32 Subsection ;	date each or oral examination in edits approx. 20 minutes) or c) entation/seminar presentation on the method of assessment 3 ASPO (general academic and

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Referred to in LPO I (examination regulations for teaching-degree programmes)
Module appears in
Bachelor' degree (1 major) Physics (2010)
Bachelor' degree (1 major) Physics (2012)
Bachelor' degree (1 major) Nanostructure Technology (2010)
Bachelor' degree (1 major) Nanostructure Technology (2012)
Master's degree (1 major) Physics (2010)
Master's degree (1 major) Physics (2011)
Master's degree (1 major) Nanostructure Technology (2011)
Master's degree (1 major) Nanostructure Technology (2010)
Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010)
Master's degree (1 major) FOKUS Physics (2010)
Master's degree (1 major) FOKUS Physics (2011)
Master's degree (1 major) Functional Materials (2012)

Module	e title				Abbreviation
Polyme	ers II				03-PM2-122-m01
Module	e coord	inator		Module offered by	
holder Dentist	of the (ry	Chair of Functional Mater	ials in Medicine and	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	graduate			
Conten	ts				
In-dept tions - o group a graphie	h know control analysis es, poly	vledge and practical appl led radical polymerisatio s, mass spectrometry) - c mer functionalisation).	ication of: - free radic n - polymer character urrent aspects of poly	al polymerisation, p isation (e. g. gel per ymer research (e. g.	olyaddition - ionic polymerisa- meation chromatography, end- block-copolymers, polymer topo-
Intende	ed learn	ning outcomes			
Studen	ts acqu	uire an advanced knowled	dge of polymer synth	esis, modification ar	nd characterisation.
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
S + Ü (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)
Methoo module is	d of ass creditab	s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
a) writt (30 mir Langua	en exar nutes) ge of a	nination (approx. 90 min ssessment: German or Ei	utes) or b) oral exam nglish	ination of one candi	date each (20 minutes) or c) talk
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachi	ng cycl	e			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module	e appea	ars in			
Master	's degr	ee (1 major) Chemistry (2	013)		
Master	's degr	ee (1 major) Chemistry (2	014)		
Master	's degr	ee (1 major) Technology o	of Functional Material	s (2010)	
Master	's degre	ee (1 major) Functional M	aterials (2012)		

Module	title				Abbreviation
Polyme	er Mate	rials 1: Technology of Po	lymer Modification		08-PW1-122-m01
Module	e coord	inator		Module offered by	
holder thesis	of the (Chair of Chemical Techno	logy of Material Syn-	Chair of Chemical T	echnology of Material Synthesis
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				
Polyme logies f lymer c	r synth or the i ompou	esis methods; the structor manufacturing of polyme nds and components.	ure of polymers and p r compounds and cor	oolymer compounds; mponents, procedure	; properties of polymers; techno- es for the characterisation of po-
Intende	ed leari	ning outcomes			
and ter portant such as nufactu cessing	ts have nperatu produ inject ired pro g machi	e developed a knowledge ure-dependent viscoelast ction technologies (polyr ion moulding) and under oducts. They have becom ines and tools.	of the special proper ic behaviour). They h ner synthesis method stand the different w e familiar with ways t	ave become familiar ave become familiar ls, compounding tec ays of influencing the to calculate complex	a polymer compounds (e.g. time r with the characteristics of im- chnologies, processing methods e properties of materials and ma- c flow conditions in polymer pro-
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V + P (n	io infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)
Methoo module is	d of ass creditab	s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
a) writt or c) or Assess	en exaı al exan ment o	nination (approx. 90 min nination in groups (group ffered: once a year, winte	utes) or b) oral exam s of 2, approx. 30 mi er semester	ination of one candi nutes total)	date each (approx. 20 minutes)
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachi	ıg 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) Functional M	aterials (2012)		

Module	title				Abbreviation
Nanosc	ale Ma	terials			08-PCM3-102-m01
Module	coord	inator		Module offered by	
lecturer	r of the	seminar "Nanoskalige M	aterialien"	Institute of Physica	l and Theoretical Chemistry
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate			
Conten	ts				
This mo on, mo	odule d dern ch	iscusses advanced topic aracterisation methods a	s in nanoscale mater and application areas	ials. It focuses on th s of nanoscale mater	e structure, properties, fabricati- ials.
Intende	ed leari	ning outcomes			
Studen on area	ts are a s of na	ble to characterise nano noscale materials.	scale materials. They	are able to name ar	alytical methods and applicati-
Courses	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
S + Ü (n	io infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)
Method module is	l of ass creditab	s essment (type, scope, langua ₎ le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
written Langua	examiı ge of a	nation (90 minutes) or ora ssessment: German or Er	al examination of one	e candidate each (2c	minutes) or talk (30 minutes)
Allocati	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachir	ng cycl	9			
Referre	d to in	LPOI (examination regulations	s for teaching-degree progra	mmes)	
Module	appea	irs in			
Bachelo	or' deg	ree (1 major) Nanostructu	re Technology (2010))	
Bachelo	or' deg	ree (1 major) Nanostructu	re Technology (2012)		
Master'	s degre	ee (1 major) Chemistry (2)	013)		
Master	s degr	e (1 major) Chemistry (2)	010)		
Master'	s degr	ee (1 major) Mathematics	(2012)		
Master'	s degr	ee (1 major) Computation	al Mathematics (201)	2)	
Master'	s degr	ee (1 major) Functional M	aterials (2012)	,	

Module title			Abbreviation
Polymer Materials 2: Technology	of Filler Modification for F	Polymer Materials	08-PW2-122-m01
Module coordinator		Module offered by	
holder of the Chair of Chemical Te thesis	chnology of Material Syn-	Chair of Chemical T	echnology of Material Synthesis
ECTS Method of grading	Only after succ. con	npl. of module(s)	
5 numerical grade			
Duration Module level	Other prerequisites		
1 semester graduate			
Contents			
Principles of and technologies for ons between filler materials and p (e.g. electrical behaviour, bacteric rheology, mechanical behaviour, o	the functionalisation of fi oolymers, determination o idal behaviour) and influe colour, surface).	ller materials in orde f the special properti ence of functionalisa	r to modify polymers, interacti- les of functionalised polymers tion on other properties (e.g.
Intended learning outcomes			
Students have become familiar wi ped an awareness of the possibili interactions between filler materia tionalised polymers (e.g. electrica influenced by functionalisation (e	ith technologies for the fu ties and problems associa als and polymers. They kn l behaviour, bactericidal b .g. rheology, mechanical b	nctionalisation of fill ated with the modific ow how to determine oehaviour) and unde oehaviour, colour, su	er materials. They have develo- cation of polymers as well as the the special properties of func- rstand how other properties are rface).
Courses (type, number of weekly contact h	ours, language — if other than Gei	rman)	
V + P (no information on SWS (we	ekly contact hours) and co	ourse language availa	able)
Method of assessment (type, scope, module is creditable for bonus)	language — if other than German,	examination offered — if no	t every semester, information on whether
a) written examination (approx. 90 or c) oral examination in groups (§ Assessment offered: once a year,	o minutes) or b) oral exam groups of 2, approx. 30 mi summer semester	ination of one candi nutes total)	date each (approx. 20 minutes)
Allocation of places			
Additional information			
Workload			
Teaching cycle			
Referred to in LPO I (examination regu	lations for teaching-degree progra	mmes)	
Module appears in			
Master's degree (1 major) Function	nal Materials (2012)		

Supramolecular Chemistry (Basics) 08-SCM1-102-m01 Module cordinator Module offered by lecture of lecture "Organischen Chemie" Faculty of Chemistry and Pharmacy ECTS Method of grading Only after succ. compl. of module(s) 5 numerical grade Duration Module level Other prerequisites 1 semester graduate Contents Contentsry. 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) S (no information on SWS (weekly contact hours) and course language available)
Module coordinator Module offered by lecture rolecture "Organischen Chemie" Faculty of Chemistry and Pharmacy ECTS Method of grading Only after succ. compl. of module(s) 5 numerical grade Duration Module level Other prerequisites 1 semester graduate Contents This module introduces students to the fundamental principles of supramolecular chemistry. It focuses on 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) S (no information on SWS (weekly contact hours) and course language available)
lecturer of lecture "Organischen Chemie" Faculty of Chemistry and Pharmacy ECTS Method of grading Only after succ. compl. of module(s) 5 numerical grade Duration Module level Other prerequisites 1 semester graduate Contents This module introduces students to the fundamental principles of supramolecular chemistry. It focuses on interactions between molecules, molecular recognition by receptors, complexes, supramolecular polymers, coordination polymers and networks, liquid crystals, self-assembly in aqueous media, synthetic ion channels and modern applications of supramolecular chemistry. Intended learning outcomes Students are able to explain interactions between molecules demonstrating a high degree of expertise in the field as well as to describe the formation, structure and polymers of coordination compounds. They are able to describe the self-assembly of polymers in aqueous media as well as to identify the characteristics of synthetic ion channels. They can name modern applications of supramolecular chemistry. Courses (type, number of weekly contact hours, language – if other than German) S (no information on SWS (weekly contact hours) and course language available)
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) S (no information on SWS (weekly contact hours) and course language available)
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) S (no information on SWS (weekly contact hours) and course language available)
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Allocation of places
Additional information
Workload
Teaching cycle
Referred to in LPO I (examination regulations for teaching-degree programmes)
Module appears in
Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014) Master's degree (1 major) Functional Materials (2012)
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Master's degree (1 major) Functional Materials (2012)





Thesis (30 ECTS credits)

Module	title		Abbreviation							
Master	Thesis	Functional Materials			08-MT-TF-122-m01					
Module	coord	inator		Module offered by						
Dean of Studies Funktionswerkstoffe (Functional Materials) Chair of Chemical Technology of Material Synthesis										
ECTS	Metho	od of grading	Only after succ. con	mpl. of module(s)						
30	nume	rical grade								
Duratio	n	Module level	Other prerequisites							
1 semes	ster	graduate								
Conten	ts									
Students will be expected to research and write on a defined topic in the technology of functional materials, ad- hering to the principles of good scientific practice.										
Intended learning outcomes										
Students are able to conduct research on a defined topic, adhering to the principles of good scientific practice, and to present the results of their work in written form.										
Courses (type, number of weekly contact hours, language — if other than German)										
 This module has 2 components; information on courses listed separately for each component. o8-MT-TF-2-122: K (no information on language and number of weekly contact hours available) o8-MT-TF-1-122: A (no information on language and number of weekly contact hours available) 										
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether										
module is creditable for bonus)										
This module has the following 2 assessment components. Unless stated otherwise, students must pass all of these assessment components to pass the module as a whole										
 Assessment component to module component o8-MT-TF-2-122: Kolloquium zur Master-Arbeit 5 ECTS credits, method of grading: numerical grade Abschlusskolloquium (approx. 60 minutes) bestehend aus talk (approx. 30 minutes) and anschließender Diskussion (approx. 30 minutes) Language of assessment: German, English Only after succ. compl. of module component(s): Successful completion of module component o8-MT-TF-1 is a prerequisite for partizipation in module component o8-MT-TF-2. Assessment component to module component o8-MT-TF-1+122: Master-Arbeit 25 ECTS credits, method of grading: numerical grade Master thesis (approx. 50-70 pages) 										
Allocation of places										
Additio	nal inf	ormation								
 Additional information listed separately for each module component. o8-MT-TF-1-122: Additional information on module duration: 6 months. o8-MT-TF-2-122: 										
Workload										
Teaching cycle										
Referre	d to in	LPOI (examination regulation	ons for teaching-degree progra	mmes)						
Module	appea	in								
Master'	s degre	ee (1 major) Functional	Materials (2012)							
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