

Module Catalogue

for the Subject

Nanostructure Technology

as a Bachelor's with 1 major with the degree "Bachelor of Science" (180 ECTS credits)

Examination regulations version: 2010 Responsible: Faculty of Physics and Astronomy

JMU Würzburg • generated 26-Aug-2024 • exam. reg. data record 82|224|-|-|H|2010

Contents

(2010)

The subject is divided into		5
Content and Objectives of th	e Programme	6
Abbreviations used, Convent	ions, Notes, In accordance with	7
Compulsory Courses		8
Nanostructure Technology	1	9
Introduction to Nanoscience		10
Advanced Nano Sciences		11
Lab Course Physics		12
Basic Practical Course B (Nanos	tructure Technology)	13
Practical Course A		15
Mathematics for Engineer	s and Theoretical Physics	17
Mathematics 3 for students of P	hysics and Engineering	18
Statistical Mechanics, Thermody	namics and Electrodynamics	20
Ineoretical Mechanics and Quar	itum Mechanics for FOKUS Students	22
Theoretical Physics 1 and 2 Nano	s III Natiostructure Technology structure Technology (Mechanics, Quantum Mechanics, Electro	dynamics
Thermodynamics, Statistical Phy	structure rectinology (mechanics, Quantum mechanics, Electro	26
Chemistry		28
General Chemistry for Physics a	nd Engineers	20
Experimental Physics		29
Classical Physics (Mechanics Th	ermodynamics Wayes Oscillations Electricity Magnetism and	0n-
tics)	ernouynumes, waves, oscillatoris, Electrenty, magnetism and	32
Condensed Matter (Quanta, Ator	ns, Molecules, Solid State Physics)	34
Compulsory Electives		36
Electronics and Photonics		37
Current Topics in Nanostructure	Technology	38
Current Topics in Nanostructure	Technology	39
Current Topics in Nanostructure	Technology	40
Applied Superconduction		41
Semiconductor Lasers - Principle	es and Current Research	43
Applied Semiconductor Physics		45
Semiconductor Nanostructures	schoology and Theory of Quantum Transport	47
Nanoelectronics	childingy and meory of Quantum mansport	49 51
Semiconductor Physics and Dev	ices	53
Quantum Transport in Semicond	uctor Nanostructures	55
Spintronics		57
Principles of Electronics (with Pr	actical Course)	59
Life Science		60
Biochemistry		61
Current Topics in Nanostructure	Technology	62
Current Topics in Nanostructure	Technology	63
Current Topics in Nanostructure	Technology	64 67
Special Bioinformatics 1	lioscopy	05 67
Specific Biotechnology 2		69
Functional Biomaterials for Stud	ents of Nanostructure Technology and Science	71
Biotechnology 1 for Nanostructu	re Technology	73
Membrane Biology for advanced	students for Nanostructure Technology	75
Methods in Biotechnology for Na	anostructure Technology	76
molecular Biotechnology for Nar	iostructure lechnology	78
Bachelor's with 1 major Nanostructure Technology (2010)	JMU Würzburg • generated 26-Aug-2024 • exam. reg. da- ta record Bachelor (180 ECTS) Nanostrukturtechnik - 2010	page 2 / 182

Julius-Maximilians- UNIVERSITÄT WÜRZBURG	Module Catalogue fo Nanostructure Bachelor's with 1 major, 180	r the Subject Technology ECTS credits
Basics in Biotechnology		80
Biochemistry (teaching degree	for secondary schools)	82
Energy and Material Scie	ence Research	83
Chemically and biologically ins	pired Nanotechnology for Materials Synthesis	84
Materials Science 1 (Basic Intr	oduction)	86
Materials Science 2 (The Majo	r Material Groups)	87
Electrochemical Energy Storag	e and Conversion	88
Current Topics in Nanostructur	e lechnology	89
Current Topics in Nanostructur	e Technology	90
FOKUS Research Module Topo	logical Insulators	91
Nanoscale Materials		94
Applied Superconduction		95
Principles of Energy Technolog	ies	97
Thermodynamics and Econom	CS	99
Nanotechnology in Energy Res	earch	101
Molecular Materials (Lecture a	nd practical course)	103
Molecular Materials for Studer	ts of Nanostructure Technology	105
Coating Technologies based o	n Vanour Deposition	100
Thermodynamics and Econom	CS	109
Image and Signal Processing i	n Physics	111
Physics of Advanced Materials		113
Analytics and Metrology		114
Laboratory and Measurement	Fechnology	115
Chemical Nanotechnology: Ana	alytics and Applications	117
Current Topics in Nanostructur	e Technology	119
Current Topics in Nanostructur	e Technology	120
Current lopics in Nanostructur	e lechnology	121
Magnetism and Spin Transpor		122
Bionhysical Measurement Tech	nnology in Medical Science	124
Laboratory and Measurement	Fechnology in Biophysics	128
Methods for non-destructive C	naracterization of Materials and Components	130
Principles of two- and threeding	nensional Röntgen imaging	132
Introduction to Electron Micros	сору	134
Lab Course Engineering		136
Current Topics in Nanostructur	e Technology	137
Current Topics in Nanostructur	e Technology	138
Current Topics in Nanostructur	e Technology	139
Principles of Electronics (with	Practical Course)	140
Computer Aided Method		141
Mathematics / far Students of	S Develop and Engineering	143
Mathematics 4 for Students of	Physics and Engineering	144
Computational Mathematics	dvanced	145
Programming course for stude	its of Mathematics and other subjects, simple	147
Numerical Mathematics 1	······································	149
Numerical Mathematics 2		151
Programming course for stude	nts of Mathematics and other subjects	153
Computeroriented Mathematic	S	155
Modelling and Computational	Science	157
Introduction to Computer Scien	ice for Students of all Faculties	158
Current Topics in Nanostructur	e Technology	159
Current Topics in Nanostructur	e Technology	161
Rachelor's with a major Nanostructure Technology	IMILWürzburg e concreted of Aug apple exemution de	nago 2 / 492
(2010)	ta record Bachelor (180 ECTS) Nanostrukturtechnik - 2010	page 3 / 182

Julius-Maximilians- UNIVERSITÄT WÜRZBURG	Module Catalogue for the Subject Nanostructure Technology Bachelor's with 1 major, 180 ECTS credits

Introduction to LabVIEW	162
Statistics, Data Analysis and Computer Physics	164
Computational Physics	166
Statistics, Data Analysis and Computer Physics	168
Thesis	169
Bachelor Thesis Nanostructure Technology	170
Subject-specific Key Skills	171
Industrial Work Placement	172
Industrial Practical Course Nanostructure Technology	173
Compulsory Electives	174
Key Qualifications for Students of Nanostructure Technology	175
Key Qualifications for Students of Nanostructure Technology	176
Nanoanalytics	177
Biophysical Measurement Technology in Medical Science	179
Laboratory and Measurement Technology in Biophysics	181



The subject is divided into

section / sub-section	FCTS credits	starting
		page
Compulsory Courses	105	8
Nanostructure Technology	12	9
Lab Course Physics	11	12
Mathematics for Engineers and Theoretical Physics	40	17
Chemistry	10	28
Experimental Physics	32	31
Compulsory Electives	45	36
Electronics and Photonics		37
Life Science		60
Energy and Material Science Research		83
Analytics and Metrology		114
Lab Course Engineering		136
Computer Aided Methods		143
Thesis	10	169
Subject-specific Key Skills	16	171
Industrial Work Placement	10	172
Compulsory Electives	6	174



Content and Objectives of the Programme

The goal of the studies is it to mediate knowledge on the most important subsections of the Nanostructure Technology and to make the students familiar with the methods of engineering scientific and physical thinking and working. By training of analytic thinking abilities the students acquire the ability to deal later with the various fields of applications and to compile the basic knowledge in particular necessary for a consecutive Bachelor and Master course of studies. Therefore the main emphasis is put on the understanding of the fundamental physical and chemical terms and laws as well as on basic engineeringscientific knowledge and the development of the typical scientific thinking and working structures. During the Bachelor thesis the student should work on an thematic and temporally limited experimental or theoretical engineering-scientific task in the field of Nanostructure Technology using well-known procedures and scientific criteria under guidance to a large extent independently.

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)):

20-Jan-2011 (2011-9)

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

(105 ECTS credits)



Nanostructure Technology

(12 ECTS credits)

Module title			Abbreviation		
Introduction to Nanoscience				11-EIN-092-m01	
Module	Module coordinator			Module offered by	
Managi	ng Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
6	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
2 seme	ster	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 ove 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 is admission to assessment apow		
Conten	ts				
Introdu	ction to	o the principles of produc	cing, characterising a	nd applying nanostr	uctures.
Intende	ed learı	ning outcomes			
The stu ons of i	dents l nanosti	have knowledge of the fu ructures.	ndamental propertie	s, technologies, cha	racterising methods and functi-
Course	S (type, n	number of weekly contact hours, l	anguage — if other than Ger	man)	
V + S (r	o infor	mation on SWS (weekly o	contact hours) and co	urse 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
written otherwi	examiı ise spe	nation (approx. 120 minu cified)	tes, for modules with	less than 4 ECTS cre	edits approx. 90 minutes; unless
Allocat	ion of p	olaces			
Only as	part o	f pool of general key skill	s (ASQ): 15 places. P	aces will be allocate	ed by lot.
Additio	nal inf	ormation			
Worklo	ad				
Teachi	ıg 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) Bachelor' degree (1 major) Functional Materials (2012) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010) No final examination Special study offering (2010)					

Module title			Abbreviation		
Advanced Nano Sciences				11-FON-092-m01	
Module coordinator				Module offered by	
Managi	Managing Director of the Institute of Applied Physics		Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
6	nume	rical grade	11-EIN		
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective det at the beginning of the course. Registration for the course will be co- sidered a declaration of will to seek admission to assessment. If stu dents have obtained the qualification for admission to assessment the course of the semester, the lecturer will put their registration for sessment into effect. Students who meet all prerequisites will be ad ted to assessment in the current or in the subsequent semester. For sessment at a later date, students will have to obtain the qualificati		
Conten	ts				
Advanc	ed top	ics of producing, charact	erising and applying	nanostructures.	
Intende	ed lear	ning outcomes			
The stu thods a	dents l Ind fun	nave advanced knowledg ctions of nanostructures.	e of the specific prop	perties, production te	echnologies, characterising me-
Course	S (type, r	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V + S (r	io infor	mation on SWS (weekly o	contact hours) and co	urse language avail	able)
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
written or oral	examiı examin	nation (approx. 90 to 120 ation in groups (groups (minutes) or oral exa of 2, approx. 30 minu	mination of one can tes)	didate each (approx. 20 minutes)
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					
Bachel	Bachelor' degree (1 major) Nanostructure Technology (2010)				
Bachelor's degree (1 major, 1 minor) Physics (winor, 2010)					



Lab Course Physics

(11 ECTS credits)

Modules from the area Physikalisches Praktikum (Physics Practical Course) will not factor into the overall grade of the Bachelor's degree. Students must complete module 11-P-PA prior to completing module 11-P-PB-N.

Module title			Abbreviation		
Basic Practical Course B (Nanostructure Technology)			11-P-PB-N-092-m01		
Module	coord	inator		Module offered by	
Managi	ng Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	nd Astronomy
ECTS Method of grading Only after succ. compl. of module(s)					
6 (not) successfully completed 11-P-PA					
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Contents					
Physica Nuclea	al laws r Physic	of mechanics, thermodyr cs, wave optics. Basic me	namics, optics, scienc easuring methods usi	ce of electricity, vibrand structure of electricity of a structure of the	ation and waves, Atomic and torage oscilloscopes.
Intende	ed learr	ning outcomes			
The stu le to ind measur princip	dents k depend ing pro les of s	know and have mastered lently plan and conduct e stocol. They are able to ev tatistics and to draw, pre	physical measuring i experiments, to coope valuate the measuring sent and discuss the	methods and experinerate with others, an gresults on the basi conclusions.	menting techniques. They are ab- d to document the results in a s of error propagation and of the
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
Klassis Elektriz Wellend Atom- u Compu	che Phy itätsleh optik (F und Ker ter und I of ass	ysik (Classical Physics, K nre und Schaltungen (Ele Physical Optics, WOP): P nphysik (Atomic and Nuc Messtechnik (Computer ressment (type, scope, langua	LP): P (2 weekly conta ctricity and Circuits, I (2 weekly contact hou clear Physics, AKP): P s and Measurement 1 ge — if other than German, e	act hours) ELS): P (2 weekly cor Irs) (2 weekly contact ho Fechnology, CMT): P examination offered — if no	ntact hours) ours) (2 weekly contact hours) ¹ t every semester, information on whether
module is	creditab	le for bonus)			
This mo 1. Lab o ly con phys 2. Lab o ly con phys	odule h course i mplete ics-rela course i mplete ics-rela	as the following assessm in part 1: a) Preparing, pe d if a Testat (exam) is par ited contents of the cours in part 2: a) Preparing, pe d if a Testat (exam) is par ited contents of the cours	nent components orforming and evaluat ssed. b) Talk (with dis se (approx. 30 minute erforming and evaluat ssed. b) Talk (with dis se (approx. 30 minute	ing the experiments scussion) to test the es). ting the experiments scussion) to test the es).	will be considered successful- students' understanding of the will be considered successful- students' understanding of the
Students must register for assessment components 1 and 2 online (registration deadline to be announced). Students will be offered one opportunity to retake element a) and/or element b). To pass an assessment compo- nent, they must pass both elements a) and b). To pass this module, students must successfully complete two out of the five courses. Students must take exactly one course each in the areas KLP and ELS as well as one course in the areas WOP, AKP and CMT. Students must attend KLP or ELS courses prior to attending WOP, AKP or CMT courses. To pass this module, students must pass both assessment component 1 and assessment component 2.					
Allocat	ion of p	olaces			
Additio	nal info	ormation			
Workload					
Teachir	ng cycl	e			

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

§ 53 (1) 1. a) Physik Mechanik, Wärmelehre, Elektrizitätslehre, Optik, der speziellen Relativitätstheorie

§ 53 (1) 1. b) Physik Aufbau der Materie

- § 53 (1) 1. c) Physik physikalische Grundpraktika
- § 77 (1) 1. b) Physik "Fortgeschrittene Experimentalphysik"

§ 77 (1) 1. d) Physik "physikalische Praktika"

Module appears in

Bachelor' degree (1 major) Nanostructure Technology (2010)

Bachelor's with 1 major Nanostructure Technology (2010)

Module title			Abbreviation		
Practical Course A			11-P-PA-092-m01		
Module	coord	inator		Module offered by	
Managi	ng Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	(not) s	successfully completed			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
Physica pagatio tests, w	al laws on, grap vriting o	of mechanics, thermodyr ohs, linear regression, av of lab reports and publica	namics, science of ele erage values and star ations.	ectricity, types of erronder of erronde Erronder of erronder of erro	or, error approximation and pro- tribution functions, significance
Intende	ed learr	ning outcomes			
The stu le to ind measur principl	dents depenc ring pro les of s	know and have mastered lently plan and conduct e stocol. They are able to ev tatistics and to draw, pre	physical measuring experiments, to coope valuate the measuring esent and discuss the	methods and experinerate with others, an gresults on the basi conclusions.	menting techniques. They are ab- d to document the results in a s of error propagation and of the
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
Auswer Ü (1 we Beispie BAM): F	tung vo ekly co ele aus P (2 we	on Messungen und Fehle ntact hour), once a year (Mechanik, Wärmelehre u ekly contact hours)	rrechnung (Measurer (winter semester) Ind Elektrik (Example	nents and Data Anal s from Mechanics, T	ysis): V (1 weekly contact hour) + hermodynamics and Electricity,
Method	l of ass	s 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)			
This mo 1. Topic 2. Lab c ted if lated	odule h cs cove course: a Test conter	as the following assessm red in lectures and exerc a) Preparing, performing at (exam) is passed. b) Ta nts of the course (approx	nent components ises: written examina and evaluating the e alk (with discussion) . 30 minutes).	ition (approx. 120 mi xperiments will be c to test the students'	inutes) onsidered successfully comple- understanding of the physics-re-
Successful completion of approx. 50% of practice work is a prerequisite for admission to assessment component 1. To pass assessment component 2, students must pass both elements a) and b). Students will be offered one opportunity to retake element a) and/or element b). Students must register for assessment components 1 and 2 online (details to be announced). Students must attend Auswertung von Messungen und Fehlerrechnung (Measurements and Data Analysis) before attending Beispiele aus Mechanik, Wärmelehre und Elektrik (Examples from Mechanics, Thermodynamics and Electricity).					
Allocat	ion of p	olaces			
Additional information					
Worklo	ad				
Teachir	Teaching cycle				
-					

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

§ 53 (1) 1. a) Physik Mechanik, Wärmelehre, Elektrizitätslehre, Optik, der speziellen Relativitätstheorie

§ 53 (1) 1. c) Physik physikalische Grundpraktika

§ 77 (1) 1. d) Physik "physikalische Praktika"

Module appears in

Bachelor' degree (1 major) Mathematics (2014) Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2014) Bachelor' degree (1 major) Aerospace Computer Science (2009) Bachelor' degree (1 major) Aerospace Computer Science (2014) Bachelor' degree (1 major) Aerospace Computer Science (2014) Bachelor' degree (1 major) Aerospace Computer Science (2014) Bachelor' degree (1 major, 1 minor) Physics (Minor, 2010) No final examination Special study offering (2010)



Mathematics for Engineers and Theoretical Physics

(40 ECTS credits)

For students interested in participating in the FOKUS programme, modules 11-TQM-F and 11-STE will replace module 11-TPN. Module component 11-TQM-F-2, which will prepare students for studying in the Master's programme FOKUS, will be offered in the form of a block course between the lecture periods of the winter and summer semesters (for students who took up studies in winter semester, block course will be offered between third and fourth subject semester).

Module title			Abbreviation			
Mathematics 3 for students of Physics and Engineering			11-MPI3-062-m01			
Module	coord	inator		Module offered by		
Managi and Ast	ng Dire trophys	ector of the Institute of T sics	heoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS Method of grading Only after succ. compl. of module(s)			npl. of module(s)			
8 numerical grade						
Duration Module level Other prerequisites						
1 seme	ster	undergraduate	Admission prerequisite to assessment: successful completion of appre 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. I 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. Fo assessment at a later date, students will have to obtain the qualificati for admission to assessment anew			on of approx. fy for admis- the respecti- e course will essment. If issessment gistration for will be ad- mester. For qualification
Conten	ts					
Ordinar	y and _I	partial differential equat	ions in Physics.			
Intende	ed learı	ning outcomes				
The stu partial	dents l differer	nave basic mathematica ntial equations.	l knowledge of dynan	nic equations and so	lution methods for c	ommon and
Course	S (type, n	umber of weekly contact hours,	language — if other than Ge	rman)		
V + Ü (r	no infor	mation on SWS (weekly	contact hours) and co	ourse language avail	able)	
Methoo module is	l of ass creditab	s essment (type, scope, langu le for bonus)	age — if other than German,	examination offered — if no	t every semester, informati	on on whether
written	examiı	nation (approx. 120 minu	 utes)			
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	appea	irs in				
Bachelor' degree (1 major) Physics (2007)						
Bachelor' degree (1 major) Physics (2009)						
Bachelor' degree (1 major) Physics (2008)						
Bachelor' degree (1 major) Technology of Functional Materials (2009)						
Bachelor' degree (1 major) Technology of Functional Materials (2010)						
Bachel	or' degi	ree (1 major) Nanostruct	ure Technology (2010)		
Bachelor's	with 1 maj	or Nanostructure Technology	JMU Würzburg •	, generated 26-Aug-2024 • exa	am. reg. da-	page 18 / 182
(2010)			ta record Bachel	or (180 FCTS) Nanostrukturte	chnik - 2010	

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

Bachelor' degree (1 major) Nanostructure Technology (2008) Bachelor' degree (1 major) Nanostructure Technology (2007) Bachelor' degree (1 major) Functional Materials (2012) Bachelor' degree (1 major) Technology of Functional Materials (2006)

Module title			Abbreviation			
Statistical Mechanics, Thermodynamics and Electrodynamics			11-STE-092-m01			
Module	coord	inator		Module offered by		
Managi and Ast	ng Dire rophys	ector of the Institute of T ics	heoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
16	numei	rical grade				
Duratio	n	Module level	Other prerequisites			
2 seme	ster	undergraduate	10-M1-PHY and 10-N	2-PHY or 10-M1-NST	and 10-M2-NST	
Conten	ts					
Principl ticles, c namics	es of S ritical of elec	tatistical Physics: Ideal phenomena, Maxwell e tromagnetic fields. Spe	systems. Thermodyna quations, electrostatic cial relativity.	mics: Quantum stati s, magnetostatics, N	istics, systems of int Naxwell equations in	eracting par- matter, dy-
Intende	ed learr	ning outcomes				
The stu trodyna method	dents h mics, t Is and a	nave advanced knowled hermodynamics and sta are able to independent	lge of the methods of ∃ atistical mechanics. Th tly apply them to the d	Theoretical Physics. Theoretical Physics. The provide the section of the section and solution an	They know the princi the corresponding c ion of problems in th	ples of elec- alculation his area.
Courses	5 (type, n	umber of weekly contact hours	, language — if other than Ger	man)		
Statistis hours) - Theoret hours),	sche M + Ü (2 v ische E once a	echanik und Thermody veekly contact hours), c Elektrodynamik (Theore year (summer semeste	namik (Statistical Mec once a year (winter sen tical Electrodynamics): r)	hanics and Thermod nester) : V (4 weekly contact	ynamics): V (4 week hours) + Ü (2 weekl	ly contact y contact
Method	l of ass	essment (type, scope, langu	lage — if other than German, e	examination offered — if no	t every semester, informati	on on whether
module is	creditab	le for bonus)				
 This module has the following assessment components 1. Topics covered in lectures and exercises in part 1 (Statistische Mechanik und Thermodynamik (Statistical Mechanics and Thermodynamics)): written examination (approx. 120 minutes). 2. Topics covered in lectures and exercises in part 2 (Theoretische Elektrodynamik (Theoretical Electrodynamics)): written examination (approx. 120 minutes). 3. Topics covered in lectures and exercises in parts 1 and 2: oral examination of one candidate each (approx. 30 minutes, usually chosen) or written examination (approx. 120 minutes). 						
Assessment component 3 will be offered in German; English if agreed upon with examiner(s). Successful completion of approx. 50% of practice work each is a prerequisite for admission to assessment com- ponents 1 and 2. Students are highly recommended to attend both courses Statistische Mechanik und Thermodynamik (Statisti- cal Mechanics and Thermodynamics) and Theoretische Elektrodynamik (Theoretical Electrodynamics). The topics discussed in these two courses will be covered in assessment component 3. Students must register for assessment components 1 through 3 online (details to be announced). To pass this module, students must first pass assessment component 1 or 2 and must then pass assessment component 3. The grade achieved in assessment component 1 or 2 (whichever is better) and the grade achieved in assessment component 3 will each count 50% towards the overall grade awarded for the module.						
Allocation of places						
Additional information						
Worklo	ad					
Bachelor's v (2010)	with 1 maj	or Nanostructure Technology	JMU Würzburg • ta record Bachelo	generated 26-Aug-2024 • exa or (180 ECTS) Nanostrukturted	am. reg. da- chnik - 2010	page 20 / 182

Teaching cycle

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

Module appears in

Bachelor' degree (1 major) Mathematics (2012)

Bachelor' degree (1 major) Mathematics (2013)

Bachelor' degree (1 major) Physics (2010)

Bachelor' degree (1 major) Physics (2012)

Bachelor' degree (1 major) Nanostructure Technology (2010)

Bachelor' degree (1 major) Mathematical Physics (2009)

Bachelor' degree (1 major) Mathematical Physics (2012)

Bachelor' degree (1 major) Computational Mathematics (2012)

Bachelor' degree (1 major) Computational Mathematics (2013)

Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)

Module title			Abbreviation	
Theoretical Mechanics and Quantum Mechanics for FOKUS Students			11-TQM-F-092-m01	
Module	coordinator		Module offered by	
Managi and Ast	ng Director of the Institute of trophysics	Theoretical Physics	Faculty of Physics a	and Astronomy
ECTS	Method of grading	Only after succ. con	npl. of module(s)	
16	numerical grade	10-M-PHY1 and 10-N 11-KP	A-PHY2 or 10-M-NST1	and 10-M-NST2 and 11-TQM-1,
Duratio	n Module level	Other prerequisites	i	
2 seme	ster undergraduate			
Conten	ts	·		
Newton Probler Limits c cillator. ny-part	ian mechanics. Lagrangian an ns of central forces, minor vib of classical physics. Schröding . Angular momentum and spir icle systems	nd Hamiltonian formali rations, rigid body, mo ger equation, mathema n. Hydrogen atom. Metl	sm. Symmetries and tion in electromagne tical principles of qu nods of approximatio	l conservation laws. Applications: etic fields. Relativistic dynamics. Jantum mechanics, harmonic os- on. Motion in electric fields. Ma-
Intende	ed learning outcomes			
The stu miliar w of quar of Theo cal con	dents have gained first exper with the principles of theoretic ntum theory. They are able to a retical Physics and to interpre cepts.	iences concerning the al mechanics and thei apply the acquired calc et the results. They hav	working methods of r different formulatio rulation methods and e especially acquired	Theoretical Physics. They are fa- ns and understand the principles d techniques to simple problems d knowledge of basic mathemati-
Course	S (type, number of weekly contact hour	s, language — if other than Ge	rman)	
Theoret year (w Quante + Ü (2 v ween st	tische Mechanik (Theoretical i inter semester) nmechanik für FOKUS-Studie veekly contact hours) + T (1 we ummer and winter semester)	Mechanics): V (4 weekl rende (Quantum Mecha eekly contact hour), on	y contact hours) + Ü anics for FOKUS Stud ce a year (block taug	(2 weekly contact hours), once a lents): V (4 weekly contact hours) th during semester break bet-
Method	d of assessment (type, scope, lang	uage — if other than German,	examination offered — if no	ot every semester, information on whether
module is	creditable for bonus)			
 This module has the following assessment components Topics covered in lectures and exercises in part 1 (Theoretische Mechanik (Theoretical Mechanics)): written examination (approx. 120 minutes). Topics covered in lectures and exercises in part 2 (Quantenmechanik für FOKUS-Studierende (Quantum Mechanics for FOKUS Students)): written examination (approx. 120 minutes). Topics covered in lectures and exercises in part 1 and 2: oral examination of one candidate each (approx. 30 minutes, usually chosen) or written examination (approx. 120 minutes). 				
Successful completion of approx. 50% of practice work each is a prerequisite for admission to assessment components 1 and 2. To qualify for admission to assessment component 3, students must pass assessment component 1 and/or 2. Students are highly recommended to attend both courses Theoretische Mechanik (Theoretical Mechanics) and Quantenmechanik für FOKUS-Studierende (Quantum Mechanics for FOKUS Students). The topics discussed in these two courses will be covered in assessment component 3. Students must register for assessment components 1 through 3 online (details to be announced). To pass this module, students must first pass assessment component 1 or 2 and must then pass assessment component 3. The grade achieved in assessment component 1 or 2 (whichever is better) and the grade achieved in assessment component 3 will each count 50% towards the overall grade awarded for the module.				
Bachelor's (2010)	with 1 major Nanostructure Technology	JMU Würzburg • ta record Bachel	generated 26-Aug-2024 • ex. or (180 ECTS) Nanostrukturte	am. reg. da- chnik - 2010 page 22 / 182

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

Additional information

Students who intend to study the FOKUS Master's degree programme must take Quantenmechanik für FO-KUS-Studierende (Quantum Mechanics for FOKUS Students) instead of Quantenmechanik (Quantum Mechanics).

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) Mathematical Physics (2009) Bachelor' degree (1 major) Mathematical Physics (2012)

Module title					Abbreviation
Mathematics 1 and 2 for students in Nanostructure Techno				logy	10-M-NST12-092-m01
Module coordinator				Module offered by	
Dean of Studies Mathematik (Mathema			atics)	Institute of Mathematics	
ECTS	ECTS Method of grading		Only after succ. compl. of module(s)		
16	5 numerical grade				
Duration Module level		Other prerequisites			
2 semester undergraduate		By way of exception, additional prerequisites are listed in the section or assessments.			

Contents

Basics on numbers and functions, sequences and series, elementary functions, differential and integral calculus in one variable, vector calculus, linear maps and systems of linear equations, matrix calculus, eigenvalue theory, differential and integral calculus in several variables, differential equations, Fourier analysis, integral theorems.

Intended learning outcomes

The student gets acquainted with important concepts of mathematics. He/She learns to apply these methods to simple problems in natural and engineering sciences, in particular in the field of nanostructure technology, and is able to interpret the results.

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

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

- 10-M-NST12-1-092: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 10-M-NST12-2-092: V + Ü (no information on SWS (weekly contact hours) and course language available)

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

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

Assessment in module component 10-M-NST12-1-092: Mathematics 1 for students of Nanostructure Technology Mathematics 1 for students of Nanostructure Technology

- 8 ECTS, Method of grading: (not) successfully completed
- written examination (approx. 90 to 120 minutes, usually chosen) or oral examination of one candidate each (approx. 20 minutes) or oral examination in groups (groups of 2, approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner
- Other prerequisites: Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective 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 admitted 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.

Assessment in module component 10-M-NST12-2-092: Mathematics 2 for students of Nanostructure Technology Mathematics 2 for students of Nanostructure Technology

- 8 ECTS, Method of grading: numerical grade
- written examination (approx. 90 to 120 minutes, usually chosen) or oral examination of one candidate each (approx. 20 minutes) or oral examination in groups (groups of 2, approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner
- Other prerequisites: Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective 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

Bachelor's with 1 major Nanostructure Technology	JMU Würzburg • generated 26-Aug-2024 • exam. reg. da-	page 24 / 182
(2010)	ta record Bachelor (180 ECTS) Nanostrukturtechnik - 2010	

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

put their registration for assessment into effect. Students who meet all prerequisites will be admitted 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.

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) Nanostructure Technology (2010) Bachelor' degree (1 major) Nanostructure Technology (2012)

Bachelor's with 1 major Nanostructure Technology	
(2010)	

Module title			Abbreviation				
Theoretical Physics 1 and 2 Nanostructure Technology (Mechanics, Quantum			11-TPN-092-m01				
Mechanics, Electrodynamics, Thermodynamics, Statistical Physics)							
Module coordinator Module offered					<u> </u>		
Managi and Ast	Managing Director of the Institute of Theoretical Physics Faculty of Physics and Astronomy and Astrophysics						
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)			
16	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
2 seme	ster	undergraduate					
Conten	ts						
Physica conserv applica chanics equatio mics: H sitions.	Il laws vation l tions, l s, abstr ons, ele eat, en	and elementary method aws, systems of mass p Hamiltonian dynamics. (act quantum mechanics ctrostatics, magnetosta tropy, thermal equilibri	s of Theoretical Physic oints, reference syste Quantum mechanics: s (operator formalism) tics, dynamics of elec um, measurands, leve	cs. Mechanics: Newt ms, one-dimensiona Schrödinger equatio , angular momentum tromagnetic fields, s l of efficiency, therm	on's laws, physical v l motion, Lagrange e n, one-dimensional n, spin. Electrodynan special relativity. The odynamic potentials	values and equations, quantum me- nics: Maxwell ermodyna- s, phase tran-	
Intende	ed learn	ning outcomes					
The stu chanics	dents l 5, quan	know the basic principle tum mechanics, thermo	es, contexts and eleme dynamics, electrodyna	entary methods of Th amics and Statistica	eoretical Physics, th l Physics.	eoretical me-	
Courses	S (type, n	umber of weekly contact hours,	language — if other than Ger	man)			
Theoretische Physik 1 (Lehramt, Nanostrukturtechnik) (Theoretical Physics 1 (Teaching Degree, Nanostructure Technology)): V (4 weekly contact hours) + Ü (2 weekly contact hours), once a year (summer semester) Theoretische Physik 2 (Lehramt, Nanostrukturtechnik) (Theoretical Physics 2 (Teaching Degree, Nanostructure Technology)): V (4 weekly contact hours) + Ü (2 weekly contact hours), once a year (winter semester)							
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 assessment components							
 Topics covered in lectures and exercises in part 1 (Theoretische Physik 1 (Theoretical Physics 1)): written examination (approx. 120 minutes, usually chosen) or oral examination of one candidate each (approx. 30 minutes). Topics covered in lectures and exercises in part 2 (Theoretische Physik 2 (Theoretical Physics 2)): written examination (approx. 120 minutes, usually chosen) or oral examination of one candidate each (approx. 30 minutes). Topics covered in lectures and exercises in parts 1 and 2: oral examination of one candidate each (approx. 30 minutes). 							
Successful completion of approx. 50% of practice work each is a prerequisite for admission to assessment components 1 and 2. To qualify for admission to assessment component 3, students must pass assessment component 1 and/or 2. Students are highly recommended to attend both courses Theoretische Physik 1 (Theoretical Physics 1) and Theoretische Physik 2 (Theoretical Physics 2). The topics discussed in these two courses will be covered in assessment component 3. Students must register for assessment components 1 through 3 online (details to be announced). To pass this module, students must first pass assessment component 1 or 2 and must then pass assessment component 3. The grade achieved in assessment component 1 or 2 (whichever is better) and the grade achieved in assessment component 3 will each count 50% towards the overall grade awarded for the module.							
/////////////////////							
Bachelor's v (2010)	with 1 maj	or Nanostructure Technology	JMU Würzburg • ta record Bachel	generated 26-Aug-2024 • exa or (180 ECTS) Nanostrukturtee	am. reg. da- chnik - 2010	page 26 / 182	

Additional information

Workload

--

Teaching cycle

--

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

§ 77 (1) 1. c) Physik "Theoretische Physik"

Module appears in

Bachelor' degree (1 major) Nanostructure Technology (2010)



Chemistry (10 ECTS credits)

Module title Abbreviation						
General Chemistry for Physics and Engineers			08-CP1-102-m01			
Module coordinator			Module offered by			
lecturer of the course			Institute of Inorgani	ic Chemistry		
ECTS	Metho	od of grading	Only after succ. con	ıpl. of module(s)		
10	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
This mo studen	odule d ts the c	iscusses the fundamer opportunity to learn ess	tal principles of both i ential methods and pe	norganic and organic rform simple experir	c chemistry. The lab ments.	course gives
Intende	ed lear	ning outcomes				
Studen to expla cal form le to ide	ts are a ain bas nulas to entify f	able to explain the prind ic models of the structu o describe chemical rea undamental problems i	tiples of the periodic ta tre of matter. They hav ctions and to interpret n chemistry and perfor	ble and to extract in e developed the abil them by identifying m experiments to so	formation from it. Th ity to use the langua the type of reaction. lve them.	ney are able age of chemi- . They are ab-
Course	S (type, r	umber of weekly contact hours	, language — if other than Ger	man)		
Ihis mo comport • o • o • o Method	 This module comprises 3 module components. Information on courses will be listed separately for each module component. o8-IOC-1-072: V (no information on SWS (weekly contact hours) and course language available) o8-CP1-3-072: P (no information on SWS (weekly contact hours) and course language available) o8-CP1-1-102: V (no information on SWS (weekly contact hours) and course language available) O8-CP1-1-102: V (no information on SWS (weekly contact hours) and course language available) 					
module is creditable for bonus)						
Assess low. Un vidual a Assess tal med • 3 • w Assess • 2 • fo ti • A	ment in less st assessi ment in licine, o ECTS, vritten o ment in ECTS, or each cal per ssessn	ated otherwise, succes ments. n module component of engineering and natura Method of grading: nur examination (approx. 6 n module component of Method of grading: (no experiment: Vortestate formance (log, 2 to 5 pa nent offered: once a veg	B-IOC-1-072: Organic C science nerical grade o minutes) B-CP1-3-072: General a t) successfully comple e (pre-experiment exan ages), Nachtestate (po ar, summer semester	nd Analytical Chemi ted ns, approx. 10 minut	successful completions successful completions stry (lab) es each), assessme s, approx. 10 minutes	nt of prac- s each)
 Only after successful completion of module components: Successful completion of module component o8-CP1-1 is a prerequisite for participation in module component o8-CP1-3. Assessment in module component o8-CP1-1-102: Principles of Inorganic Chemistry for Physics and Engineering Majors 5 ECTS, Method of grading: numerical grade written examination (approx_oo_minutes) 						
Allocation of places						
Additional information						
Workload						
Bachelor's (2010)	with 1 ma	or Nanostructure Technology	JMU Würzburg ● ta record Bachel	generated 26-Aug-2024 • exa or (180 ECTS) Nanostrukturtee	am. reg. da- chnik - 2010	page 29 / 182

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)



Experimental Physics

(32 ECTS credits)

Module title			Abbreviation			
Classical Physics (Mechanics, Thermodynamics, Waves, Oscillations, Electrici- 11-KP-092-mo1						
ty, Magnetism and Optics)						
Module coordinator			Module offered by			
Managing Director of the Institute of Applied Physics			oplied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
16	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
2 seme	ster	undergraduate	Bridge course Mathe cal Methods of Phys	ematische Rechenme ics) for first-semeste	ethoden der Physik (er students.	(Mathemati-
Conten	ts					
Physica gnetic v tion. Int Non-lin rent. M ternatir	al laws vibratio teractio earity a echani ng curre	of mechanics, thermodyn ons and waves, radiation ons and central forces. Ge and chaos. Mechanics of sms of conduction. Magr ent. Electromagnetic wav	namics, vibrations, w and wave optics. Tim eneral relativity. Mecl non-rigid bodies. Ga netostatics. Electroma es. Geometric optics.	aves, science of elected re, room and motion. hanics of rigid bodie sses. Thermodynami agnetic induction. Ma Wave optics.	tricity, magnetism, e . Physical values. Fo s. Friction. Vibration ics. Electrostatics. El axwell equations. So	electroma- rce and mo- and waves. lectric cur- cience of al-
Intende	ed leari	ning outcomes				
The stu ves, sci are able knowle	dents (ience o e to ap dge to	understand the basic prir f electricity, magnetism, ply mathematical methoo the solution of mathema	nciples and connection electromagnetic vibra ds to the formulation tical-physical tasks.	ons of mechanics, th ations and waves, ra of physical contexts	ermodynamics, vibr diation and wave op and autonomously	ations, wa- otics. They apply their
Courses (type, number of weekly contact hours, language — if other than German)						
Klassische Physik 1 (Mechanik, Wellen, Wärme) (Classical Physics 1 (Mechanics, Waves, Heat)): V (4 weekly con- tact hours) + Ü (2 weekly contact hours), once a year (winter semester) Klassische Physik 2 (Elektromagnetismus, Optik) (Classical Physics 2 (Electromagnetism, Optics)): V (4 weekly contact hours) + Ü (2 weekly contact hours), once a year (summer semester)						
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)						ion on whether
 This module has the following assessment components 1. Topics covered in lectures and exercises in part 1 (Klassische Physik 1 (Classical Physics 1)): written examination (approx. 120 minutes). 2. Topics covered in lectures and exercises in part 2 (Klassische Physik 2 (Classical Physics 2)): written examination (approx. 120 minutes). 3. Topics covered in lectures and exercises in parts 1 and 2: oral examination of one candidate each (approx. 30 minutes, usually chosen) or written examination (approx. 120 minutes). 						
Assessment component 3 will be offered in German; English if agreed upon with examiner(s). Successful completion of approx. 50% of practice work each is a prerequisite for admission to assessment com- ponents 1 and 2. To qualify for admission to assessment component 3, students must pass assessment component 1 and/or 2. Students are highly recommended to attend both courses Klassische Physik 1 (Classical Physics 1) and Klassi- sche Physik 2 (Classical Physics 2). The topics discussed in these two courses will be covered in assessment component 3. Students must register for assessment components 1 through 3 online (details to be announced). To pass this module, students must first pass assessment component 1 or 2 and must then pass assessment component 3. The grade achieved in assessment component 1 or 2 (whichever is better) and the grade achieved in assessment component 3 will each count 50% towards the overall grade awarded for the module.						
Allocation of places						
Bachelor's (2010)	with 1 maj	or Nanostructure Technology	JMU Würzburg • ta record Bachele	generated 26-Aug-2024 • exa or (180 ECTS) Nanostrukturted	am. reg. da- chnik - 2010	page 32 / 182

Additional information
Workload
Teaching cycle
Referred to in LPO I (examination regulations for teaching-degree programmes)
Module appears in
Bachelor' degree (1 major) Mathematics (2012)
Bachelor' degree (1 major) Mathematics (2013)
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)
Bachelor' degree (1 major) Mathematical Physics (2009)
Bachelor' degree (1 major) Mathematical Physics (2012)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)
No final examination Special study offering (2010)

Module title Abbreviation				Abbreviation		
Condensed Matter (Quanta, Atoms, Molecules, Solid State Physics) 11-KM-092-m01					11-KM-092-m01	
Module coordinator				Module offered by		
Managing Director 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)		
16	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
2 seme	ster	undergraduate				
Conten	ts		-			
Quantu Quantu Atoms i mical b (FEG). C propert	m phei m Phys in exter onding Crystal s ies of i	nomena, introduction to sics. Mathematical formu 'nal fields. Many-electror y. Molecule rotations and structure. The reciprocal nsulators. Electrons in a	Atomic Physics and p lation of quantum mo atoms. Optical trans vibrations. Bonding lattice. Structure dete periodic potential.	hysical laws of solic echanics. Quantum i sitions and spectroso in crystals. Mechani ermination. Lattice v	ls. Experimental principles of mechanics of hydrogen atoms. copy. Laser. Molecules and che- cal properties. Free electron gas ibrations (phonons). Thermal	
Intende	ed learr	ning outcomes	· ·			
The stu ding an They ar apply tl	dents l d struc e able heir kno	know the basic contexts a ture, lattice dynamics, th to apply mathematical m owledge to the solution c	and principles of qua nermal properties, pri ethods to the formula of mathematical-phys	ntum phenomena, A nciples of electronic ation of modern phy ical tasks.	tomic Physics and solids (bon- properties (free electron gas)). sical contexts and autonomously	
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
Kondensierte Materie 1 (Quanten, Atome, Moleküle) (Condensed Matter 1 (Quanta, Atoms, Molecules)): V (4 wee- kly contact hours) + Ü (2 weekly contact hours), once a year (winter semester) Kondensierte Materie 2 (Festkörperphysik 1) (Condensed Matter 2 (Solid State Physics)): V (4 weekly contact hours) + Ü (2 weekly contact hours), once a year (summer semester) 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 assessment components 1. Topics covered in lectures and exercises in part 1 (Kondensierte Materie 1 (Condensed Matter 1)): written examination (approx. 120 minutes). 2. Topics covered in lectures and exercises in part 2 (Kondensierte Materie 2 (Condensed Matter 2)): written examination (approx. 120 minutes). 3. Topics covered in lectures and exercises in parts 1 and 2: oral examination of one candidate each (approx. 30 minutes, usually chosen) or written examination (approx. 120 minutes). 						
Assessment component 3 will be offered in German; English if agreed upon with examiner(s). Successful completion of approx. 50% of practice work each is a prerequisite for admission to assessment com- ponents 1 and 2. To qualify for admission to assessment component 3, students must pass assessment component 1 and/or 2. Students are highly recommended to attend both courses Kondensierte Materie 1 (Condensed Matter 1) and Kondensierte Materie 2 (Condensed Matter 2). The topics discussed in these two courses will be covered in as- sessment component 3. Students must register for assessment components 1 through 3 online (details to be announced). To pass this module, students must first pass assessment component 1 or 2 and must then pass assessment component 3. The grade achieved in assessment component 1 or 2 (whichever is better) and the grade achieved in assessment component 3 will each count 50% towards the overall grade awarded for the module.						
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) Mathematics (2012)			
Bachelor' degree (1 major) Mathematics (2013)			
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)			
Bachelor' degree (1 major) Mathematical Physics (2009)			
Bachelor' degree (1 major) Mathematical Physics (2012)			
Bachelor' degree (1 major) Computational Mathematics (2012)			
Bachelor' degree (1 major) Computational Mathematics (2013)			
Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)			



Compulsory Electives

(45 ECTS credits)

The area of mandatory electives comprises the following module areas: "Vertiefungszweig Elektronik und Photonik" ("Specialisation Electronics and Photonics"; VEP), "Vertiefungszweig Life Science" ("Specialisation Life Science"; VLS), "Vertiefungszweig Energie- und Materialforschung" ("Specialisation Energy and Materials Research"; VEM), "Vertiefungsbereich Analytik und Messtechnik" ("Specialisation Analytics and Measurement Technology"; VA), "Ingenieurwissenschaftliches Praktikum" ("Engineering Practical Course"; IWP) and "Computergestütztes Arbeiten" ("Computer-based Skills"; CA). Students must successfully complete: no less than two modules worth a total of no less than 10 ECTS credits in one of the specialisations (Vertiefungszweige), no less than one module worth no less than 5 ECTS credits in another specialisation, no less than one module worth no less than 5 ECTS credits in area CA or area IWP as well as no less than two additional modules in the area of mandatory electives.


Electronics and Photonics

(ECTS credits)

Module title					Abbreviation		
Current Topics in Nanostructure Technology					11-BXN5-112-m01		
Module	e coord	inator		Module offered by			
chairpe	erson o	f examination committee	_	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	undergraduate	Approval by examination	ation committee req	uired.		
Conten	ts						
Current or stud	topics y abroa	of Experimental Physics. ad.	Accredited academi	c achievements, e.g.	in case of change of university		
Intende	ed leari	ning outcomes					
The stu Techno nology ledge.	dents I logy of or nand They ar	nave advanced competer the Bachelor's programn o sciences and understar e able to classify the sub	ncies corresponding t ne. They have knowle nd the measuring and ject-specific contexts	o the requirements or edge of a current sub l evaluation method s and know the appli	of a module of Nanostructure discipline of nanostructure tech- s necessary to acquire this know- cation areas.		
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	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) writte in grou weeks) Langua	en exaı ps (app or d) p ge of a	mination (approx. 120 mi prox. 30 minutes per cand resentation/seminar pre ssessment: German, Eng	nutes) or b) oral exan lidate) or c) project re sentation (approx. 3c lish	nination of one cand eport (approx. 8 to 10 o minutes)	lidate each or oral examination o pages, time to complete: 1 to 4		
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	Module appears in						
Bachel	or' deg	ree (1 major) Nanostructu	re Technology (2010)				
Bachelor' degree (1 major) Nanostructure Technology (2012)							

Module title					Abbreviation	
Current Topics in Nanostructure Technology					11-BXN6-112-m01	
Module	e coord	inator		Module offered by		
chairpe	erson o	f examination committee	_	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	undergraduate	Approval by examination	ation committee req	uired.	
Conten	ts					
Current or stud	topics y abroa	of Experimental Physics. ad.	Accredited academi	c achievements, e.g.	in case of change of university	
Intende	ed leari	ning outcomes				
The stu Techno nology ledge.	dents I logy of or nane They ar	nave advanced competer the Bachelor's programn o sciences and understar e able to classify the sub	ncies corresponding t ne. They have knowle nd the measuring and ject-specific contexts	o the requirements of edge of a current sub l evaluation method s and know the appli	of a module of Nanostructure discipline of nanostructure tech- s necessary to acquire this know- cation areas.	
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	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) writte in grou weeks) Langua	en exaı ps (app or d) p ge of a	mination (approx. 120 mi prox. 30 minutes per cand resentation/seminar pre ssessment: German, Eng	nutes) or b) oral exan didate) or c) project re sentation (approx. 3c lish	nination of one cand eport (approx. 8 to 10 o minutes)	lidate each or oral examination o pages, time to complete: 1 to 4	
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	ars in				
Bachel	or' deg	ree (1 major) Nanostructu	ire Technology (2010)			
Bachelor' degree (1 major) Nanostructure Technology (2012)						

Module title					Abbreviation		
Current	Current Topics in Nanostructure Technology				11-BXN8-112-m01		
Module	e coord	inator		Module offered by			
chairpe	erson o	f examination committee		Faculty of Physics a	nd Astronomy		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)			
8	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 seme	ster	undergraduate	Approval by examination	ation committee req	uired.		
Conten	ts						
Current or stud	topics y abroa	of Experimental Physics. ad.	Accredited academi	c achievements, e.g.	in case of change of university		
Intende	ed lear	ning outcomes					
The stu Techno nology ledge.	dents l logy of or nan They ar	have advanced competer the Bachelor's programn o sciences and understar e able to classify the sub	ncies corresponding t ne. They have knowle nd the measuring and ject-specific contexts	o the requirements or edge of a current sub l evaluation method s and know the appli	of a module of Nanostructure discipline of nanostructure tech- s necessary to acquire this know- cation areas.		
Course	S (type, r	number 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	urse language avail	able)		
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		
a) writt in grou weeks) Langua	en exaı ps (apı or d) p ge of a	mination (approx. 120 mi prox. 30 minutes per cano resentation/seminar pre ssessment: German, Eng	nutes) or b) oral exan didate) or c) project re sentation (approx. 3c lish	nination of one cand eport (approx. 8 to 10 o minutes)	lidate each or oral examination o pages, time to complete: 1 to 4		
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	Module appears in						
Bachel	or' deg	ree (1 major) Nanostructu	re Technology (2010)				
Bachelor' degree (1 major) Nanostructure Technology (2012)							

Module title Abbreviation							
Applied Superconduction					11-ASL-092-m01		
Module	e coord	inator		Module offered by			
Manag	ing Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	nd Astronomy		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
6	nume	rical grade					
Duratio	on	Module level	Other prerequisites	;			
1 semester		graduate	Certain prerequisite sessment. The lectu 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 thods o	al princ of mate	iples of superconducti rials sciences for the c	vity. Application in ene alculation of temperatu	rgy engineering. Inst Ire profiles in superc	rumental developme onductors.	ents. Me-	
Intende	ed lear	ning outcomes					
are abl able to energy Course	e to eva discus techno s (type, r	aluate the contribution s questions on superc logy. Furthermore, the	s of materials sciences onductivity in a scientif y can deal with practica s, language — if other than Ge	fic manner and to crit al mathematical ques	of superconductivity tically question deve stions.	/. They are lopments of	
R + V (r	no infor	mation on SWS (week	y contact hours) and co	ourse language avail	able)		
Methoe 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, informat	on on whether	
a) writt in grou c) proje prox. 3 Assess 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 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (ap- prox. 30 minutes) Assessment offered: once a year, winter semester						
Allocat	ion of _l	olaces					
Additio	nal inf	ormation					
Workload							
Teaching cycle							
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	Module appears in						
Bachel	or' deg	ree (1 major) Physics (2	2010)				
Bachelor's (2010)	with 1 ma	jor Nanostructure Technology	JMU Würzburg • ta record Bachel	generated 26-Aug-2024 • ex. or (180 ECTS) Nanostrukturte	am. reg. da- chnik - 2010	page 41 / 182	

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

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 (2010) 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)

Module title				-	Abbreviation	
Semiconductor Lasers - Principles and Current Research					11-HLF-092-m01	
Module	e coord	inator		Module offered by		
Managi	ng Dire	ector of the Institute of Ap	oplied Physics	Faculty of Physics a	ind 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 according to according to according the terms.				
Conten	ts		<u>,</u>			
model, hold co riers an des, las ductor l cade la Intende	which onditior of phot ser reso lasers. sers, te	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	special aspects of se d laser efficiency are ecture are optical pro dynamic properties a urrent topics of laser erformance lasers.	emiconductor lasers. derived from couple ocesses in semicond as well as technology research such as qu	Basic concepts such as thres- d rate equations for charge car- uctors, layer and ridge wavegui- y for the generation of semicon- lantum dot lasers, quantum cas-	
The stu knowle	dents l dge to	have advanced knowledg modern questions and k	e of the principles of now the applications	semiconductor-lase in the current devel	er physics. They can apply their opment of components.	
Courses	S (type, n	number of weekly contact hours, l	anguage — if other than Ger	rman)		
R + V (n	o 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	ot 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	ion of p	olaces				
Additio	Additional information					
Worklo	ad					

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) 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) 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) 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					Abbreviation		
Applied Semiconductor Physics					11-AHL-092-m01		
Module	e coord	inator		Module offered by			
Manag	ing Dire	ector of the Institute of Ap	oplied Physics	Faculty of Physics a	ind 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 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						
The lec compo	ture di: nents c	scusses the principles of of electronics, optoelectro	Semiconductor Phys onics and photonics.	ics and provides an	exemplary overview of the main		
Intende	ed lear	ning outcomes					
phonor ties. The the sol miliar v ding of electro patt, Ba injectic of semi compo	The students know the characteristics of semiconductors, they have gained an overview of the electronic and phonon band structures of important semiconductors and the resulting electronic, optical and thermal properties. They know the principles of charge transport as well as the Poisson, Boltzmann and continuity equation for the solution of questions. They have gained insights into the methods of semiconductor production and are familiar with the theories of planar technology and recent developments in this field, they have a basic understanding of component production. They understand the structure and way of functioning of the main components of electronics (diode, transistor, field-effect transistor, thyristor, diac, triac), of microwave applications (tunnel, Impatt, Baritt or Gunn diode) and of optoelectronics (photo diode, solar cell, light-emitting diode, semiconductor injection laser), they know the realisation possibilities of low-dimensional charge carrier systems on the basis of semiconductors and their technological relevance, they are familiar with current developments in the field of						
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Gei	rman)			
R + V (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)		
Metho module is	d of ass s creditab	sessment (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether		
a) written examination (approx. 90 minutes) or b) oral examination of one candidate each 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	onal inf	ormation					

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) Nanostructure Technology (2010) Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Physics (2010) 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)

Module title					Abbreviation	
Semiconductor Nanostructures					11-HNS-092-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)		
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	its	L	<u> </u>			
or mac ging th tures o 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 t g dimensions (2D, 1D, oI n optical properties and electronic and quantum p ommunication and quan	c, optical and magne echnological challens)). It provides the bas light-matter coupling hotonic devices base tum computing archit	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	
Intend	ed learı	ning outcomes				
The stu knowle devices	Idents l dge of s. They	know the theoretical prin the technological metho are able to apply their kr	ciples and characteri ds to fabricate such s owledge to problems	stics of semiconduc tructures, and of the in this field of resea	tor nanostructures. They have eir applications to novel photonic arch.	
Course	S (type, n	number of weekly contact hours, l	anguage — if other than Ger	man)		
R + V (r	10 infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)	
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	
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	onal info	ormation				
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) 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		
Lithography in Semiconductor Technology and Theory of Quantum Transport				11-LHQ-092-m01			
Module	e coord	inator		Module offered by			
Manag	ing Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	nd Astronomy		
ECTS	Meth	od of grading	Only after succ. com	pl. of module(s)			
6	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 semester gra		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	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective detail 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 admi 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 admission to assessment anew.			
Conten	ts						
Introdu on qua	iction t ntum t	o the lithographic tech ransport.	niques of semiconducto	or technology and di	scussion of the requ	ired theory	
Intende	ed lear	ning outcomes					
The stu transpo	idents ort.	have specific and adva	nced knowledge of sem	niconductor lithogra	ohy and of the theor	/ of quantum	
Course	S (type, r	number of weekly contact hour	rs, language — if other than Ger	man)			
R + V (r	no infor	mation on SWS (week	y contact hours) and co	urse language avail	able)		
Metho module is	d of ass s creditab	sessment (type, scope, lang le for bonus)	guage — if other than German, e	examination offered — if no	t every semester, informati	on on whether	
a) writt groups project (approx Assess and wil examin Langua	en exa (appro report x. 30 m ment o Il be an nation r age of a	mination (approx. 90 n ix. 30 minutes per cand (approx. 8 to 10 pages inutes) ffered: When and how nounced in due form L egulations) 2009. ssessment: German, E	ninutes) or b) oral exam didate, for modules with t, time to complete: 1 to often assessment will b under observance of Sec	ination of one candi a less than 4 ECTS cr 4 weeks) or d) prese be offered depends o tion 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 outes) or c) esentation sessment demic and	
Allocat	ion of _l	olaces					
Additio	onal inf	ormation					
Workload							
Teaching cycle							
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	Module appears in						
Bachel	or' deg	ree (1 major) Physics (2	2010)				
Bachelor's (2010)	with 1 ma	jor Nanostructure Technology	JMU Würzburg ● ta record Bachele	generated 26-Aug-2024 • ex or (180 ECTS) Nanostrukturte	am. reg. da- chnik - 2010	page 49 / 182	

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

Bachelor' degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) Physics (2010) 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)

Module title					Abbreviation		
Nanoelectronics					11-NEL-092-m01		
Module	e coord	inator		Module offered by			
Manag	ing Dire	ector of the Institute of A	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 g		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 an environment of the subsequent the semester.				
Conten	ts		L				
Afterwa functio of nano the ope	s terms ards, we n of con ostructu erating ed learn	such as Fermi distribution e talk about application p mmon switches and stor ures. We gain an overview principle of quantum cor ning outcomes	on, density of states a potentials of nanostru ages through miniatu v of nanoelectric amp nputers.	and carrier concentra actures in electronics irisation and compar olifiers, rectifier, logic	ation in view of small structures. S. We examine the limits of the re them to electronic properties c lattices and circuits and discuss		
The stu	Idents I	nave mastered the basics	s of electronics of nar	nostructures in theor	y and practice. They know functi-		
ons an	d appli	cations of respective con	nponents.				
Course	S (type, n	umber of weekly contact hours,	anguage — if other than Ger	rman)			
R + V (r	no infor	mation on SWS (weekly	contact hours) and co	ourse language avail	able)		
Metho module is	d of ass s creditab	s essment (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	ot 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						
Teachi	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) Nanostructure Technology (2010)

Master's degree (1 major) Physics (2010)

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)

Module ti	tle	Abbreviation					
Semicond	luctor Physics and Devices			11-SPD-102-m01			
Module c	oordinator		Module offered by				
Managing	g Director of the Institute of Ap	oplied Physics	Faculty of Physics a	and Astronomy			
ECTS M	lethod of grading	Only after succ. com	npl. of module(s)				
6 n	umerical 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 anew					
Contents	l.						
Principles as of elec	of Semiconductor Physics. Ir tronics and photonics.	ntroduction to key the	eories on semicondu	ictors. Components from the are-			
Intended	learning outcomes						
perties. The equations on and ar- basic und nents of e and Gunn ser). They ductors a ents.	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-						
Courses (t	upe, number of weekly contact hours, l	anguage — if other than Ger	man)				
V + R (no	information on SWS (weekly o	contact hours) and co	ourse language avail	able)			
Method o module is cre	f assessment (type, scope, langua editable for bonus)	ge — if other than German, e	examination offered — if no	ot 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							
Additiona	l 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) 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		
Quantum Transport in Semiconductor Nanostructures					11-QTH-102-m01		
Module	e coord	inator		Module offered by			
Manag	ing Dire	ector of the Institute of Ap	plied Physics Faculty of Physics and Astronomy				
ECTS	Metho	od of grading	Only after succ. com	Only after succ. compl. 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	its						
The lect topics phenor transpo	ture ad of: ball mena b ort phe	dresses the fundamenta istic and diffuse transpor etween electrons, Coulor nomena, topological insu	l transport phenomer t, electron interferenc nb blockade, thermo Ilators, solid-state qu	na of electrons in na ce effects, quantisat electric properties, c antum computers.	nostructures. This includes the ion of conductivity, interaction lescription of spin-dependent		
Intend	ed lear	ning outcomes					
The stu ons an	ıdents l d appli	have mastered the basics cations of respective com	s of electronics of nar ponents.	nostructures in theor	y and practice. They know functi-		
Course	S (type, r	number 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 avail	able)		
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		
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							
Teachi	Teaching cycle						
Referre	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	
Spintro	Spintronics				11-SPI-102-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 Method of grading			Only after succ. con	npl. of module(s)		
6	nume	rical grade				
Duratio	on	Module level	Other prerequisites	i		
1 semester 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					
This lea magne spin dy	cture co toresist mamics	overs the basic principl tance and tunnel magr and current-induced s	es of spin transport, wi letoresistance. As a las spin phenomena.	th a particular emph t point, we discuss n	asis on the phenom ew phenomena fron	ena of giant 1 the field of
Intende	ed lear	ning outcomes				
The stu mation nel mag	idents l techno gnetore	know the basic princip blogy. They have gaine esistance).	les of spin transport mo d an overview of curren	odels and the applica t findings in this field	ations of spin transp d (giant magnetoresi	ort in infor- stance, tun-
Course	S (type, r	umber of weekly contact hour	s, language — if other than Ge	rman)		
V + R (r	no infor	mation on SWS (weekl	y contact hours) and co	ourse language availa	able)	
Metho module is	d of ass s creditab	essment (type, scope, lang le for bonus)	guage — if other than German,	examination offered — if no	t every semester, informat	ion 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.					amination in nutes) or c) esentation sessment demic and	
Allocat	ion of p	olaces				
Additio	Additional information					
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Bachelor's (2010)	with 1 ma	or Nanostructure Technology	JMU Würzburg ● ta record Bachel	generated 26-Aug-2024 • exa or (180 ECTS) Nanostrukturte	am. reg. da- chnik - 2010	page 57 / 182

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 (2006)

Module title					Abbreviation
Principles of Electronics (with Practical Course)					11-N2-092-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)	
6 numerical 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 anow.			
Conten	ts				
Princip coils ar Digital	les of e nd diod circuits	lectronic components an es) and active componer : different types of gates	d circuits. Analogous nts (bipolar and field- and CMOS circuits. N	circuit technology: effect transistors as Aicrocontroller	Passive (resistors, capacitors, well as operational amplifiers).
Intende	ed learı	ning outcomes			
The stu circuit t	dents l echnol	nave knowledge of the pr ogy.	actical setup of elect	ronic circuits from th	ne field of analogous and digital
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	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
written Assess and wil examin	examin ment o l be an ation r	nation (approx. 90 minut ffered: When and how of nounced in due form unc egulations) 2009.	es) ten assessment will b ler observance of Sec	be offered depends of the section 32 Subsection 3	on the method of assessment 3 ASPO (general academic and
Allocat	ion of p	olaces			
Only as	part o	f pool of general key skill	s (ASQ): 15 places. Pl	aces will be allocate	ed by lot.
Additio	nal inf	ormation			
Workload					
leaching cycle					
KETERINED TO IN LPUT (examination regulations for teaching-degree programmes)					
 Module appears in					
Bachel	or' dea	ree (1 major) Nanostructu	re Technology (2010))	
Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)					



Life Science (ECTS credits)

Module title				Abbreviation	
Biochei	mistry				08-BC-092-m01
Module coordinator				Module offered by	
holder	of the (Chair of Biochemistry		Chair of Biochemist	try
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
6	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
2 seme	ster	undergraduate	Admission prerequis ses in the respective (usually 70% of exer lar attendance of ex sed absence).	Admission prerequisite to assessment: successful completion of exerci- ses in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regu- lar attendance of exercises (usually a maximum of 2 incidents of unexcu- sed absence)	
Conten	ts				
Compri mistry.	sing le	ctures and exercises, this	s module acquaints s	tudents with the fun	damental principles of bioche-
Intende	ed leari	ning outcomes			
Studen key bio	ts have chemio	e become familiar with the al processes in cellular s	e fundamental princi systems.	ples of biochemistry	. They are able to describe the
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü +	V + Ü (no information on SWS (v	weekly contact hours) and course languag	ge available)
Methoo module is	l of ass	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) 1 to 3 or 90 m each (a	3 writte iinutes pprox.	n examinations (1 writter each; 3 written examinat 20 minutes) or c) oral exa	n examination: appro tions: approx. 60 min amination in groups (x. 90 minutes; 2 writ outes 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			
Worklo	ad				
Teachir	ng cycl	9			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module appears in					
Bachelor' degree (1 major) Chemistry (2010)					
Bachelor' degree (1 major) Chemistry (2009)					
Bachelor' degree (1 major) Nanostructure Technology (2010)					
Bachelo	or' deg	ree (1 major) Nanostructu	re Technology (2012)		
Bachel	or' deg	ree (1 major) FOKUS Chen	nistry (2011)		
Master'	s degr	ee (1 major) Chemistry (2	010)		

Module title					Abbreviation	
Current Topics in Nanostructure Technology 11					11-BXN5-112-m01	
Module	e coord	inator		Module offered by		
chairpe	erson o	f examination committee	_	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	undergraduate	Approval by examination	ation committee req	uired.	
Conten	ts					
Current or stud	topics y abroa	of Experimental Physics. ad.	Accredited academi	c achievements, e.g.	in case of change of university	
Intende	ed leari	ning outcomes				
The stu Techno nology ledge.	dents I logy of or nand They ar	nave advanced competer the Bachelor's programn o sciences and understar e able to classify the sub	ncies corresponding t ne. They have knowle nd the measuring and ject-specific contexts	o the requirements or edge of a current sub l evaluation method s and know the appli	of a module of Nanostructure discipline of nanostructure tech- s necessary to acquire this know- cation areas.	
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	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) writte in grou weeks) Langua	en exaı ps (app or d) p ge of a	mination (approx. 120 mi prox. 30 minutes per cand resentation/seminar pre ssessment: German, Eng	nutes) or b) oral exan lidate) or c) project re sentation (approx. 3c lish	nination of one cand eport (approx. 8 to 10 o minutes)	lidate each or oral examination o pages, time to complete: 1 to 4	
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						
Bachel	or' deg	ree (1 major) Nanostructu	re Technology (2010)			
Bachel	Bachelor' degree (1 major) Nanostructure Technology (2012)					

Module title					Abbreviation	
Current	Current Topics in Nanostructure Technology 11-BXN6-112-mo1					
Module	e coord	inator		Module offered by		
chairpe	erson o	f examination committee		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	undergraduate	Approval by examination	ation committee req	uired.	
Conten	ts					
Current or stud	topics y abroa	of Experimental Physics. ad.	Accredited academi	c achievements, e.g.	in case of change of university	
Intende	ed leari	ning outcomes				
The stu Techno nology ledge.	dents l logy of or nan They ar	nave advanced competer the Bachelor's programr o sciences and understar e able to classify the sub	ncies corresponding t ne. They have knowle nd the measuring and ject-specific contexts	o the requirements or edge of a current sub l evaluation method s and know the appli	of a module of Nanostructure discipline of nanostructure tech- s necessary to acquire this know- cation areas.	
Course	S (type, n	number 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	urse language avail	able)	
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	
a) writt in grou weeks) Langua	en exaı ps (apr or d) p ge of a	mination (approx. 120 mi prox. 30 minutes per cano resentation/seminar pre ssessment: German, Eng	nutes) or b) oral exan didate) or c) project re sentation (approx. 3c lish	nination of one cand eport (approx. 8 to 10 o minutes)	lidate each or oral examination o pages, time to complete: 1 to 4	
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						
Bachel	or' deg	ree (1 major) Nanostructu	re Technology (2010)			
Bachelor' degree (1 major) Nanostructure Technology (2012)						

Module title					Abbreviation
Current	Current Topics in Nanostructure Technology 11-BXN8-112-mo1				
Module	e coord	inator		Module offered by	
chairpe	erson o	f examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
8	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate	Approval by examination	ation committee req	uired.
Conten	ts				
Current or stud	topics y abroa	of Experimental Physics. ad.	Accredited academi	c achievements, e.g.	in case of change of university
Intende	ed lear	ning outcomes			
The stu Techno nology ledge.	dents l logy of or nan They ar	have advanced competer the Bachelor's programn o sciences and understar e able to classify the sub	ncies corresponding t ne. They have knowle nd the measuring and ject-specific contexts	o the requirements o edge of a current sub I evaluation method 5 and know the appli	of a module of Nanostructure discipline of nanostructure tech- s necessary to acquire this know- cation areas.
Course	S (type, r	number 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	urse language avail	able)
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
a) writt in grou weeks) Langua	en exaı ps (apı or d) p ge of a	mination (approx. 120 mi prox. 30 minutes per cano resentation/seminar pre ssessment: German, Eng	nutes) or b) oral exan didate) or c) project re sentation (approx. 3c lish	nination of one cand eport (approx. 8 to 10 o minutes)	lidate each or oral examination o pages, time to complete: 1 to 4
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					
Bachel	or' deg	ree (1 major) Nanostructu	re Technology (2010)		
Bachelor' degree (1 major) Nanostructure Technology (2012)					

Module	title				Abbreviation
Basics	in Ligh	t- and Electron-Microsco	DV		07-4S1MZ1-102-m01
			.,		
Module	Module coordinator			Module offered by	
head of	the De	epartment of Electronmic	roscopy	Faculty of Biology	
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	undergraduate	Admission prerequis and successful com beginning of the cou	site to assessment: pletion of the respectives.	regular attendance of exercises ctive exercises as specified at the
Conten	ts				
Fundam	nental	principles of confocal las	er scanning microsco	py and electron mic	roscopy.
Intende	ed learı	ning outcomes			
Studen	ts have	e acquired theoretical kno	owledge and practica	l skills in the area of	f light and electron microscopy.
Course	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü (n	infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)
Method module is	l of ass creditab	eessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, information on whether
written	exami	nation (approx. 30 to 60 i	minutes)		
Allocati	ion of p	olaces			
Allocation of places Number of places: 18. 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 (Biology) with 180 ECTS credits. Should the module be used in other subjects, there will be two quotas: 95% of places 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 subject Biologie (Biology) with 60 ECTS credits and to students of the Bachelor's degree subject S Computational Mathematics and Mathematik (Mathematics), each with 180 ECTS credits, as part of the application-oriented subject Biology (as well as potentially to students of ther 'importing' subjects). Should the number of places available in one quota exceed the number of applications, the remaining places will be allocated to applicants from the other quota. Should there be, within one module component, several courses with a restricted number of places, there will be a 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 procedure, applicants who already have successfully completed at least one other module carcording to the applicates or of all module. 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 to					
followir compor	ng quot nents d	tas: Quota 1 (50% of plac of the Faculty of Biology: a	es): total number of I among applicants wit	ECTS credits already h the same number	achieved in modules/module of ECTS credits achieved. pla-

ces 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.

Bachelor's with 1 major Nanostructure Technolog	sy
(2010)	

Additional information
Workload
Teaching cycle
Referred to in LPO I (examination regulations for teaching-degree programmes)
Module appears in
Bachelor' degree (1 major) Biology (2011)
Bachelor' degree (1 major) Biology (2010)
Bachelor' degree (1 major) Mathematics (2012)
Bachelor' degree (1 major) Mathematics (2013)
Bachelor' degree (1 major) Physics (2010)
Bachelor' degree (1 major) Nanostructure Technology (2010)
Bachelor' degree (1 major) Nanostructure Technology (2012)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
Bachelor's degree (1 major, 1 minor) Biology (Minor, 2010)

Module title					Abbreviation
Special	Bioinf	ormatics 1			07-4S1MZ6-102-m01
Module	e coord	inator		Module offered by	
holder	of the (Chair of Bioinformatics		Faculty of Biology	
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semester undergraduate		Admission prerequisite to assessment: regular attendance of exercises and successful completion of the respective exercises as specified at the beginning of the course.			
Conten	ts				
Fundamental principles of the tree of life, fundamental principles of phylogenetics (methods and markers), fun- damental principles of evolutionary biology (concepts), sequence analysis, RNA structure prediction, phylogene- tic reconstruction.					
Intended learning outcomes					
Students are able to use software and databases for sequence analysis, RNA structure prediction and phylogenetic reconstruction.					
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)	

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

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

log (approx. 10 to 20 pages)

Language of assessment: German or English

Allocation of places

Number of places: 20. 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 (Biology) with 180 ECTS credits. Should the module be used in other subjects, there will be two quotas: 95% of places 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 subject Biologie (Biology) with 60 ECTS credits and to students of the Bachelor's degree subjects Computational Mathematics and Mathematik (Mathematics), each with 180 ECTS credits, as part of the application-oriented subject Biology (as well as potentially to students of other 'importing' subjects). Should the number of places available in one quota exceed the number of applications, the remaining places will be allocated to applicants from the other quota. Should there be, within one module component, several courses with a restricted number of places, there will be a 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 procedure, applicants who already have successfully completed at least one other 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. 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, pla-

Bachelor's with 1 major Nanostructure TechnologyJMU Würzburg • generated 26-Aug-2024 • exam. reg. da-
ta record Bachelor (180 ECTS) Nanostrukturtechnik - 2010page 67 / 182

UNIVERSITÄT WÜRZBURG

ces 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.

Additional information

--

Workload

Teaching cycle

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

Module appears in

Bachelor' degree (1 major) Biology (2011) Bachelor' degree (1 major) Biology (2010) Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Nanostructure Technology (2012) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2013)

Module title					Abbreviation
Specific Biotechnology 2					07-5S2MZ4-102-m01
Module	e coord	inator		Module offered by	
holder	of the (Chair of Biotechnology ar	nd Biophysics	Faculty of Biology	
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)	
10	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate	Admission prerequise and seminar as well as specified at the b	site to assessment: ı as successful comp peginning of the cour	regular attendance of exercises letion of the respective exercises 'se.
Conten	ts				
This pra Under e lar biot scence	actical expert § echnol micros	course provides students guidance, students will p ogy, nano and microsyste copy, fluorescence spect	s with an insight into erform selected expe ems biotechnology, b troscopy, analysis an	different biotechnolo riments on the follow biomaterials and bios d electromanipulatio	ogical and biophysical topics. wing topics: cellular and molecu- sensors, high-resolution fluore- on of cells.
Intende	ed leari	ning outcomes			
Studen applica acquair chanisr tools. In have de	ts will I Itions the Inted wi Ins. Stu In the se Elivered	have acquired a knowled hat will enable them to ir th - or, where necessary, dents will have acquired eminar, students will hav d a short presentation (15	ge of fundamental bi ndependently review will be able to indep practical experience re acquired detailed t minutes) on one of t	otechnological and l relevant literature. Ir endently acquaint th performing experim heoretical knowledg the experiments they	biophysical methods and their n addition, they will have become nemselves with - biophysical me- ents, using a variety of scientific ge on these experiments and will y performed.
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	rman)	
Ü + S (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)
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
method c) oral d didates med ab	ds of as examin s (appro oout the	sessment: a) written exa ation of one candidate e ox. 20 minutes per candid e method and length of th	mination (approx. 45 ach (approx. 30 minu date) or e) presentati ne assessment prior t	to 60 minutes) or b) ites) or d) oral exami on (approx. 20 to 30 to the course	log (approx. 10 to 20 pages) or nation in groups of up to 3 can- minutes); students will be infor-
Allocat	ion of p	olaces			
Allocation of places Number of places: 18. 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 subjects 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- dure, applicants who already have successfully completed at least one other module component of the respec- 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 ap- plicants' 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), Ma-					

Bachelor's with 1 major Nanostructure Technology	JMU Würzburg • generated 26-Aug-2024 • exam. reg. da-	page 69 / 182
(2010)	ta record Bachelor (180 ECTS) Nanostrukturtechnik - 2010	

UNIVERSITÄT WÜRZBURG

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 of the respective applicant; among applicants 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.

Additional information

--

Workload

--

Teaching cycle

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

Module appears in

Bachelor' degree (1 major) Biology (2011) Bachelor' degree (1 major) Biology (2010) Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Nanostructure Technology (2012)

Module title					Abbreviation			
Functional Biomaterials for Students of Nanostructure Technology and Science 03-NS-FBM-102-m01								
Module coordinator				Module offered by				
holder of the Chair of Functional Materials in Medicine and Faculty of Medicine Dentistry								
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)				
5 numerical grade								
Duration Module level		Other prerequisites						
1 seme	1 semester undergraduate							
Contents								
Fundamental principles and specific knowledge for working in natural and engineering sciences in the field of biomaterials with surface modification and characterisation.								
Intended learning outcomes								
Students have developed an advanced knowledge in at least one application area or technology focus of engi- neering work, with a particular focus on biomedical materials.								
Courses (type, number of weekly contact hours, language — if other than German)								
This module comprises 2 module components. Information on courses will be listed separately for each module component. • 03-NS-FBM-1-102: V (no information on SWS (weekly contact hours) and course language available)								
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether								
module is creditable for bonus)								
low. Unless stated otherwise, successful completion of the module will require successful completion of all indi- vidual assessments.								
 Assessment in module component og-NS-FBM-1-102: Functional Biomaterials for Students of Nanostructure Technology and Science 3 ECTS, Method of grading: numerical grade written examination (approx. 90 to 120 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) Assessment in module component og-NS-FBM-2-102: Special Topics in Functional Biomaterials Special Topics in 								
Functional Biomaterials								
 2 ECIS, Method of grading: (not) successfully completed placement report / fieldwork report / report on practical training / report on practical course / project 								
Allocation of places								
Additional information								
Workload								
Teaching cycle								
Referred to in LPO I (examination regulations for teaching-degree programmes)								
Module	appea	in in						
Bachelor's (2010)	with 1 maj	or Nanostructure Technology	JMU Würzburg • ta record Bachel	generated 26-Aug-2024 • exa or (180 ECTS) Nanostrukturted	am. reg. da- chnik - 2010	page 71 / 182		

Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Nanostructure Technology (2012)
Biotechnology 1 for Nanostructure Technology Index Coordinator Module coordinator Module coordinator Module offered by Faculty of Biology ETS Method of grading Only after succ. compt. of module(s) faculty of Biology To merical grade Duration Module level Other prerequisites By way of exception, additional prerequisites are listed in the section on assessments. Contents During this practical course, students will acquire an insight into a variety of topics in biotechnology. Intended learning outcomes Students are able to apply advanced methods in biotechnology. Courses (spe. number of weekly contact hours, language – if other than German This module comprises 2 module components. Information on courses will be listed separately for each module component. or -4BFMZ5N-1-102: P (no information on SWS (weekly contact hours) and course language available) or -4BFMZ5N-1-102: P (no information on SWS (weekly contact hours) and course language available) or -4BFMZ5N-1-102: P (no information on SWS (weekly contact hours) and course language available) or -4BFMZ5N-1-102: P (no information on SWS (weekly contact hours) and course language available) or -4BFMZ5N-1-102: P (no information on SWS (weekly contact hours) and course language available) or -4BFMZ5N-1-102: P (no information on SWS (weekly contact hours) and course language available) withou of assessment in second of the module will require successful completion of all individual assessments in the individual module components as specified behavio) Assessment in module component or -4BFMZ5N-1-102: Biotechnology 1 Laboratory Practice for Nanostructure Technology Assessment is module component or -4BFMZ5N-1-102: Biotechnology 1 Laboratory Practice for Nanostructure Technology Assessment is module component or -4BFMZ5N-1-102: Biotechnology 1 Laboratory Practice for Nanostructure Technology Assessment is module component or -4BFMZ5N-1-102: Biotechnology 1 Laboratory Practice for Nanostructure Technology Assessment is module component or -4BFMZ5N	Module title					Abbreviation
Model Uniteder Model Generation Inderect Faculty of Biology Faculty of Biology ECTS Method of grading Only after succ. compl. or module(s) S numerical grade Duration Module level Other prerequisites During this practical course, students will acquire an insight into a variety of topics in biotechnology. Interned Courses (type, number of weeky contact hours, language – if dater than German) This module comprises z module components. Information on courses will be listed separately for each module component. or -4BFMZ5N-1-toz: P (no information on SWS (weekly contact hours) and course language available) or -4BFMZ5N-1-toz: P (no information on SWS (weekly contact hours) and course language available) Method of assessment in this module component 07-4BFMZ5N-1-toz: P (no information on SWS (weekly contact hours) and course language available) Method of assessment in this module component 07-4BFMZ5N-1-toz: Biotechnology 1 Laboratory Practice for Nanostructure Technology Assessment in module component 07-4BFMZ5N-1-toz: Biotechnology 1 Laboratory Practice for Nanostructure Technology 1 epicton in technical course (approx. to to 20 pages) Assessment in this module component 07-4BFMZ5N-1-toz: Biotechnology 1 Laboratory Practice for Nanostructure Technology 1 feldwork report / report on ractical grade + placement report / fieldwork repor	Biotechnology 1 for Nanostructure Technology					07-4BFMZ5N-102-m01
holder of the Chair of Biotechnology Faculty of Biology ECTS Method of grading Only after succ. compl. of module(s) s numerical grade undergraduate By way of exception, additional prerequisites are listed in the section on assessments. Contents By way of exception, additional prerequisites are listed in the section on assessments. Contents Students are able to apply advanced methods in biotechnology. Courses (type, number of weekly contact hours, language – if other than Geman) This module comporties 2 module components. Information on courses will be listed separately for each module component. or-q4BFMZ5N1-102: P (no information on SWS (weekly contact hours) and course language available) or-q4BFMZ5N1-102: S (no information on SWS (weekly contact hours) and course language available) Method of assessment (type, scope, language – if other than Geman, examination offered – if not every semester, information on whether module is contact hours), successful completion of the module will require successful completion of all individual sessments. Assessment in module component or-4BFMZ5N1-102: Biotechnology 1 Laboratory Practice for Nanostructure Technology 4 ECTS, Method of grading: numerical grade 9 placement report / fieldwork report / report on practical training / report on practical course / project report / report on technical course (approx. to to 20 pages) 4 Assessment fin module component or-4BFMZ5N1-102: Biotechnology 1 Semi	Module	e coord	inator		Module offered by	
ECTS Method of grading Only after succ. compl. of module(s) 5 nummerical grade Duration Module level Other prerequisites 1 semester undergraduate By way of exception, additional prerequisites are listed in the section on assessments. Contents During this practical course, students will acquire an insight into a variety of topics in biotechnology. Courses (type, number of weekly contact hours, language – if other than German) This module comprises 2 module components. Information on courses will be listed separately for each module component. • 07-4BFMZ5N1-102: P (no information on SWS (weekly contact hours) and course language available) • 07-4BFMZ5N1-102: P (no information on SWS (weekly contact hours) and course language available) • 07-4BFMZ5N1-102: P (no information on SWS (weekly contact hours) and course language available) • 07-4BFMZ5N1-202: S (no information on SWS (weekly contact hours) and course language available) • 04btod of assessment type, scope, language – if other than German, examination offered – if nor every semester, information on all individual module components as specified behave. • 07-4BFMZ5N1-20: P (no information on SWS (weekly contact hours) and course language available) • 04 ECTS, Method of grading; numerical grade • if otherwise, successful completion of the module will require successful completion of all individual assessments in theindividual module component or 4PMZ5N1-10: E Biote	holder	of the (Chair of Biotechnology		Faculty of Biology	
s numerical grade Duration Module level Other prerequisites 1 semester undergraduate By way of exception, additional prerequisites are listed in the section on assessments. Contents During this practical course, students will acquire an insight into a variety of topics in biotechnology. Intended learning outcomes Students are able to apply advanced methods in biotechnology. Courses (type, number of weekly contact hours, lunguage – if other than German) Ocurses (type, number of weekly contact hours, lunguage – if other than German) This module comprises 2 module components. Information on courses will be listed separately for each module component. or-4BFMZ5N-1-102: P (no information on SWS (weekly contact hours) and course language available) • 07-4BFMZ5N-2-102: S (no information on SWS (weekly contact hours) and course language available) or-4BFMZ5N-2-102: 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 all individual assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessment in this module component 07-4BFMZ5N-1-102: Biotechnology 1 Laboratory Practice for Nanostructure Technology • 4 ECTS, Method of grading: (numerical grade • placement report / fieldwork report / report on practical training / report on practical course / project report / report on technical course (approx.	ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
Duration Module level Other prerequisites 1 semester undergraduate By way of exception, additional prerequisites are listed in the section on assessments. Contents	5	nume	rical grade			
1 semester undergraduate By way of exception, additional prerequisites are listed in the section on assessments. Contents	Duratio	on	Module level	Other prerequisites		
Contents During this practical course, students will acquire an insight into a variety of topics in biotechnology. Intendel learning outcomes Students are able to apply advanced methods in biotechnology. Courses (type, number of weekly cantact hours, language – if other than German) This module comprises 2 module components. Information on courses will be listed separately for each module component. • 07-4BFMZ5N-1-102: P (no information on SWS (weekly contact hours) and course language available) • 07-4BFMZ5N-2-102: 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) Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessment is module component or-4BFMZ5N-1-102: Biotechnology 1 Laboratory Practice for Nanostructure Technology • 4 ECTS, Method of grading: numerical grade • placement report / fieldwork report / report on practical training / report on practical course / project report / report on technical course (approx. to to 20 pages) • Assessment in module component or-4BFMZ5N-2-102: Biotechnology 1 Seminar für Nanostructure Technology • Assessment offreed: once a year, summer semester • Other prerequisites: Admission prerequisite to assessment: regular attendance of p	1 seme	ster	undergraduate	By way of exception assessments.	, additional prerequi	sites are listed in the section on
During this practical course, students will acquire an insight into a variety of topics in biotechnology. Intended learning outcomes Students are able to apply advanced methods in biotechnology. Courses (type, number of weekly contact hours, language – if other than Geman) This module comprises 2 module components. Information on courses will be listed separately for each module component. org-4BFMZ5N-1+02: P (no information on SWS (weekly contact hours) and course language available) org-4BFMZ5N-2+02: S (no information on SWS (weekly contact hours) and course language available) Method of assessment (type, scope, language – if other than Geman, examination offered – if not every semester, information on whether module is creditable for bonus) Assessment in this module comprises the assessments in the individual module components as specified be-low. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessment in module component or-4BFMZ5N-1+102: Biotechnology 1 Laboratory Practice for Nanostructure Technology 4 ECTS, Method of grading: numerical grade blacement report / feldidwork report / report on practical training / report on practical course / project report / report on technical course (approx. 10 to 20 pages) Assessment offered: once a year, summer semester Other prerequisites: Admission prerequisite to assessment: regular attendance of placement. Assessment in module component or,4BFMZ5N-1-02: Biotechnology 1 Seminar für Nanostructure Technology 1 ECTS, Method of grading: (not) successfully completed presentation/seminar presentation (approx. 20 to 20 pages) Assessment offered: once a year, summer semester Allocation of places: 2. Should then humber of applications exceed the number of available places, places will be allocated by lot. Should there be, within one module component, several courses with a restricted number of places; 1. Should there be, within one module component, several courses with a restricted number of places; 1. Shou	Conten	ts				
Intended learning outcomes Students are able to apply advanced methods in biotechnology. Courses (type, number of weekly contact hours, language — if other than German) This module comprises 2 module components. Information on courses will be listed separately for each module component. • 07-4BFMZ5N-1-102: P (no information on SWS (weekly contact hours) and course language available) • 07-4BFMZ5N-2-102: 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) Assessment in this module comprises the assessments in the individual module components as specified be- low. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments. Assessment in module component 07-4BFMZ5N-1-102: Biotechnology 1 Laboratory Practice for Nanostructure Technology • 4 ECTS, Method of grading: numerical grade • placement report / fieldwork report / report on practical training / report on practical course / project report / report on technical course (approx. so to 20 pages) • Assessment offered: once a year, summer semester • Other prerequisites: Admission prerequisite to assessment: regular attendance of placement. Assessment in module component of apEMZS/S-1-20: Biotechnology 1 Seminar für Nanostructure Technology • 1 ECTS, Method of grading: (not) successfully completed • presentation/seminar presentation (approx. 20 to 30 minutes) • Assessment offered: once a year, summer semester Blocation of places: 2. Should the number of applications exceed the number of available places, places will be allocated by lot. Should there be, within one module component, several courses will a restricted number of places, there will be a uniform regularion for the courses of one module component. In this case, places on all courses of a module component of referential consideration. A waiting list	During	this pra	actical course, students v	vill acquire an insigh	t into a variety of top	ics in biotechnology.
Students are able to apply advanced methods in biotechnology. Courses (type, number of weekly contact hours, language – if other than German) This module comprises 2 module components. Information on courses will be listed separately for each module component. 07-4BFMZ5N-1-102: P (no information on SWS (weekly contact hours) and course language available) 07-4BFMZ5N-2-102: S (no information on SWS (weekly contact hours) and course language available) Aethod of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) Assessment in this module component of the than German, examination offered – if not every semester, information of all individual assessments. Assessment in module component of -4BFMZ5N-1-102: Biotechnology 1 Laboratory Practice for Nanostructure Technology 4 & CTS, Method of grading: numerical grade 9 placement report / fieldwork report / report on practical training / report on practical course / project report / report on technical course (approx. 10 to 2 op ages) Assessment in module component of -4BFMZ5N-1-102: Biotechnology 1 Seminar für Nanostructure Technology 1 & CTS, Method of grading: (not) successfull completed 1 presentation /seminar presentation (approx. 2 to 2 op ages) Assessment in module component of -4BFMZ5N-1-102: Biotechnology 1 Seminar für Nanostructure Technology 1 ECTS, Method of grading: (not) successfully completed 1 presentation /seminar presentation (approx. 2 to 2 op ages) Assessment offered: once a year, summer semester Allocation of places: 1. Should there be, whith 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 will be allocated by lot, applicants who already have successfully completed at least one other module component 1. There be available. Additional information	Intende	ed lear	ning outcomes			
Courses (type, number of weekly contact hours, language – if other than German) This module comprises 2 module components. Information on courses will be listed separately for each module component. Or-4BFMZ5N-1-102: P (no information on SWS (weekly contact hours) and course language available) Or-4BFMZ5N-2-102: 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 senester, information on whether module is creditable for bonus) Assessment in this module component or-4BFMZ5N-1-102: Biotechnology 1 Laboratory Practice for Nanostructure Technology 4 CCTS, Method of grading: numerical grade 9 placement report / fieldwork report / report on practical training / report on practical course / project report / report on technical course (approx. 10 to 20 pages) 4 Assessment in module component or-4BFMZ5N-2-102: Biotechnology 1 Laboratory Practice for Nanostructure Technology 4 ECTS, Method of grading: numerical grade 9 placement report / fieldwork report / report on practical training / report on practical course / project report / report on technical course (approx. 10 to 20 pages) 4 Assessment offered: once a year, summer semester 0 Other prerequistes: Admission prerequisite to assessment: regular attendance of placement. Assessment offered: once a year, summer semester 1 Other prerequistes: Admission prerequisite to assessment: regular attendance of placement. Assessment offered: once a year, summer semester 1 Other prerequistes: Admission prerequisite to assessment: regular attendance of placement. Assessment offered: once a year, summer semester 1 Other prerequistes: Admission prerequisite to assessment: regular attendance of placement. Assessment offered: once a year, summer semester 1 Other precessite: Admission precequisite to assessment: regular attendance of placement. Assessment offered: once a year, summer semester 1 Other precessite: Admission the courses of one module component.	Studen	ts are a	able to apply advanced m	ethods in biotechno	logy.	
This module comprises 2 module components. Information on courses will be listed separately for each module component. • o7-4BFMZ5N-1-102: P (no information on SWS (weekly contact hours) and course language available) • o7-4BFMZ5N-2-102: 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) Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessment in module component o7-4BFMZ5N-1-102: Biotechnology 1 Laboratory Practice for Nanostructure Technology • 4 ECTS, Method of grading: numerical grade placement report / fieldwork report / report on practical training / report on practical course / project report on technical course (approx. 10 to 20 pages) Assessment in module component o7-4BFMZ5N-2-102: Biotechnology 1 Seminar für Nanostructure Technology • 1 ECTS, Method of grading: (not) successfully completed presentation/seminar presentation (approx. 20 to 30 minutes) • Assessment offered: once a year, summer semester Mumber of places: 2. Should there unber of applications exceed the number of available places, places 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 by lot, applicants who already have successfully completed at least one other module component for data data and places reallocated by lot, applicants who already have successfully completed at least one other module component for places are allocated by lot, applicants who already have successfully completed at least one other module component for the courses of one module component. In this case, places on all courses of a module component that are concerned will be alloca	Course	S (type, r	umber of weekly contact hours, l	anguage — if other than Ger	man)	
 vidual assessments. Assessment in module component 07-4BFMZ5N-1-102: Biotechnology 1 Laboratory Practice for Nanostructure Technology 4 ECTS, Method of grading: numerical grade placement report / fieldwork report / report on practical training / report on practical course / project report / report on technical course (approx. 10 to 20 pages) Assessment offered: once a year, summer semester Other prerequisites: Admission prerequisite to assessment: regular attendance of placement. Assessment in module component 07-4BFMZ5N-2-102: Biotechnology 1 Seminar für Nanostructure Technology 1 ECTS, Method of grading: (not) successfully completed presentation/seminar presentation (approx. 20 to 30 minutes) Assessment offered: once a year, summer semester Allocation of places Number of places: 2. Should the number of applications exceed the number of available places, places will be allocated by lot. Should there be, within one module component, several courses with a restricted number of placess of a module component that are concerned will be allocated in a standardised procedure. When places are allocated by lot, applicants who already have successfully completed at least one other module component of the respective module will be given preferential consideration. A waiting list will be maintained and places reallocated as they become available.	comport o o Method module is Assess low. Un	nent. 97-4BFN 97-4BFN d of ass s creditab ment in lless st	MZ5N-1-102: P (no informa MZ5N-2-102: S (no informa iessment (type, scope, langua le for bonus) n this module comprises ated otherwise, successf	ation on SWS (weekly ation on SWS (weekly ge — if other than German, o the assessments in the ful completion of the	contact hours) and contact hours) and examination offered — if no he individual module module will require s	course language available) course language available) it every semester, information on whether e components as specified be- successful completion of all indi-
Allocation of places Number of places: 2. Should the number of applications exceed the number of available places, places will be allocated by lot. 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. When places are allocated by lot, applicants who already have successfully completed at least one other module component of the respective module will be given preferential consideration. A waiting list will be maintained and places reallocated as they become available. Additional information Workload	Assess Techno • 4 • p ra • A • C Assess • 1 • p • A	ment i logy ECTS, laceme eport / ssessn Other pi ment i ECTS, iresent ssessn	Method of grading: nume ent report / fieldwork rep report on technical cours nent offered: once a year rerequisites: Admission p n module component o7 - Method of grading: (not) ation/seminar presentati nent offered: once a year.	4BFMZ5N-1-102: Biot erical grade oort / report on pract se (approx. 10 to 20 p , summer semester orerequisite to assess 4BFMZ5N-2-102: Biot successfully complet on (approx. 20 to 30 , summer semester	echnology 1 Laborat ical training / report ages) ment: regular attenc technology 1 Semina red minutes)	ory Practice for Nanostructure t on practical course / project dance of placement. r für Nanostructure Technology
Number of places: 2. Should the number of applications exceed the number of available places, places will be allocated by lot. 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. When places are allocated by lot, applicants who already have successfully completed at least one other module component of the respective module will be given preferential consideration. A waiting list will be maintained and places reallocated as they become available. Additional information	Allocat	ion of r	olaces			
Additional information Workload	Number of places: 2. Should the number of applications exceed the number of available places, places will be allocated by lot. 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. When places are allocated by lot, applicants who already have successfully completed at least one other module component of the respective module will be given preferential consideration. A waiting list will be maintained and places reallocated as they become available.					
	Additional information					
Workload						
	Workload					

Teaching cycle

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

--

Module appears in

Module	title				Abbreviation	
Membr	ane Bio	ology for advanced stude	ents for Nanostructur	e Technology	07-4BFPS2N-102-m01	
Module	coord	inator		Module offered by	1	
holder	of the (Chair of Plant Physiology	and Biophysics	Faculty of Biology		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme:	ster	undergraduate	Admission prerequi as well as successfu	site to assessment: Il completion of the	regular attendance of exercises respective exercises.	
Conten	ts					
In this r methoc molecu	module Is with Iar bio	e, students will acquire th which it can be characte logy and imaging as well	ne general fundament rised. For this purpos as data collection an	als of plant membra e, students will be i d analysis.	ane transport and the biophysical ntroduced to modern methods of	
Intende	ed leari	ning outcomes				
Studen ments v	ts unde with int	erstand basic membrane tact plants, isolated plan	transport processes t cells as well as anin	and are able to use nal expression syste	experimental methods in experi- ms.	
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	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, o	examination offered — if no	ot every semester, information on whether	
a) writte didate e) prese	en exa each (a entatio	mination (approx. 60 mir approx. 30 minutes) or d) n (approx. 20 to 30 minu	utes) or b) log (appro oral examination in § tes)	ox. 10 to 20 pages) o groups of up to 3 car	r c) oral examination of one can- ndidates (approx. 60 minutes) or	
Allocat	ion of p	olaces				
Numbe allocate places, courses are allo of the re allocate	r of pla ed by lo there v s of a m ocated l espect ed as th	ices: 2. Should the numb ot. Should there be, withi will be a uniform regulati- nodule component that a by lot, applicants who all ive module will be given ney become available.	er of applications exe n one module compo on for the courses of re concerned will be ready have successfu preferential consider	ceed the number of a onent, several course one module compor allocated in a standa lly completed at leas ation. A waiting list v	available places, places will be es with a restricted number of nent. In this case, places on all ardised procedure. When places st one other module component will be maintained and places re-	
Additio	nal inf	ormation				
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	e appea	irs in	-	<u> </u>		
Bachel	or' deg or' deg	ree (1 major) Nanostructu ree (1 major) Nanostructu	re Technology (2010))		
Bachelor degree (1 major) Nanostructure Technology (2012)						

Module title			Abbreviation		
Method	ls in Bi	otechnology for Nanostr	ucture Technology		07-4S1MZ4N-102-m01
Module	coord	inator		Module offered by	
holder	of the C	Chair of Biotechnology		Faculty of Biology	
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	undergraduate			
This mo dicine. method	t s odule w In parti lology (vill provide students with icular, imaging methods of biotechnology will be a	an overview of instru as well as single-cell analysed.	iment-based methoc technologies will be	ds in biotechnology and biome- discussed. Publications on the
Intende	ed learn	ning outcomes			
Studen to a par	ts are a ticular	able to select the instrum problem.	ent-based method in	biotechnology and	biomedicine that is appropriate
Courses	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
his mo compor o 0 Method module is Assessi low. Un vidual a Assessi Techno 2 p A	 This module comprises 2 module components. Information on courses will be listed separately for each module component. 07-4\$1MZ4N-1-102: V (no information on SWS (weekly contact hours) and course language available) 07-4\$1MZ4N-2-102: 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) Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments. Assessment in module component 07-4\$1MZ4N-1-102: Methods in Biotechnology for Nanostructure Technology 3 ECTS, Method of grading: numerical grade written examination (approx. 20 minutes) Assessment in module component 07-4\$1MZ4N-2-102: Seminar Methods in Biotechnology for Nanostructure Technology 2 ECTS, Method of grading: (not) successfully completed presentation/seminar presentation (approx. 15 to 20 minutes) 				
Allocati	ion of p	olaces			
Numbe allocate places, courses are allo of the re allocate	Number of places: 2. Should the number of applications exceed the number of available places, places will be allocated by lot. 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. When places are allocated by lot, applicants who already have successfully completed at least one other module component of the respective module will be given preferential consideration. A waiting list will be maintained and places reallocated as they become available.				
Auuiti0					
Worklo	ad				
Teachir					

--

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

Module appears in

Module title				Abbreviation		
Molecu	lar Bio	technology for Nanostru	cture Technology		07-4S1MZ5N-102-m	01
Module	e coord	inator		Module offered by		
holder	of the (Chair of Biotechnology	_	Faculty of Biology		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
Theore	tical as	pects of modern molecu	lar biotechnology.			
Intende	ed leari	ning outcomes				
Studen	ts have	acquired knowledge an	d skills in the area of	molecular biotechno	ology.	
Course	S (type, n	umber of weekly contact hours,	language — if other than Ger	man)		
This mo	odule c nent.	omprises 2 module com	ponents. Information	on courses will be lis	sted separately for ea	ach module
• 0	7-4S1N	1Z5N-2-102: S (no inform	ation on SWS (weekly	contact hours) and	course language ava	ailable)
Methoo module is	d of ass creditab	essment (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	t every semester, informatio	on on whether
Assess low. Ur vidual a Assess nology 3 4 Massess nology 2 9 A Allocat Places, courses are allo of the r allocat	Assessment in this module comprises the assessments in the individual module components as specified be- ow. Unless stated otherwise, successful completion of the module will require successful completion of all indi- ridual assessments. Assessment in module component o7-4S1MZ5N-1-102: Aspects of Modern Biotechnology for Nanostructure Tech- nology • 3 ECTS, Method of grading: numerical grade • written examination (approx. 30 minutes) Assessment in module component o7-4S1MZ5N-2-102: Seminar Modern Biotechnology for Nanostructure Tech- nology • 2 ECTS, Method of grading: (not) successfully completed • presentation/seminar presentation (approx. 15 to 20 minutes) • Assessment offered: once a year, summer semester Allocation of places Vumber of places: 2. Should the number of applications exceed the number of available places, places will be allocated by lot. 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. When places are allocated by lot, applicants who already have successfully completed at least one other module component of the respective module will be given preferential consideration. A waiting list will be maintained and places re-					
Workland						
workload						
Teaching cycle						
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	mmes)		
Bachelor's (2010)	with 1 maj	or Nanostructure Technology	JMU Würzburg ● ta record Bachel	generated 26-Aug-2024 • exa or (180 ECTS) Nanostrukturted	am. reg. da- chnik - 2010	page 78 / 182

Module appears in

Module title					Abbreviation
Basics in Biotechnology					07-BTNST-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	npl. of module(s)	
2	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
DurationModule levelOther prerequisites1 semesterundergraduateAccording to Section 22 Subsection 8 ASPO (general academic and amination regulations), written examinations can consist entirely on ly of multiple choice questions. If the selected method of assessme includes multiple choice questions, students will have to be inform about this in due time. A minimum of two examiners will compile th of questions and answers in accordance with Section 16 Subsection PO (general academic and examination regulations). They will also mine which answers are to be considered correct. The part of the ex- nation consisting of multiple choice questions will be considered so cessfully completed if a) a total of a minimum of 50% of question was answered correctly and the number of questions answered correctly by students that took respective examination candidate is no more than 15% lower than the rage number of questions answered correctly by students that took respective examination of the examination consisting of multiple ch questions, the grade sehr gut (excellent) if they have correctly answ a minimum of 50% of the examination consisting of multiple ch questions, the grade sehr gut (excellent) if they have correctly answ a minimum of 50% of the result of the examination of 12% but less than the grade ausreichend (sufficient) if they have correctly answ questions that was required for successful completion of the examination, the number of questions are infa about the results of the examination, the number of duestions are infa about the results of the examination, the number of correctly answ eq uestions that was required for successful completion of the examination on, the number of questions asked and the average number of questions and they have correctly by the reference group mentioned under b) mus communicated to them via the University's notice boa			SPO (general academic and ex- tions can consist entirely or part- lected method of assessment dents will have to be informed o examiners will compile the set with Section 16 Subsection 1 AS- regulations). They will also deter- d correct. The part of the exami- stions will be considered suc- imum of 60% of the questions ninimum of 50% of questions of questions answered correct- ore than 15% lower than the ave- rectly by students that took the . Examination candidates that umber of questions required for on as specified in sentence 5 will on consisting of multiple choice 0 if they have correctly answered if they have correctly answered if they have correctly answered if they have correctly answered he grade befriedigend (satisfacto- imum of 25% but less than 50%, y have correctly answered ful completion of the examinati- the average number of questions up mentioned under b) must be y's notice boards or in another		
This mo biotech neering	odule v nology g and m	vill provide students with v, microbiotechnology an icrobial biotechnology.	an overview of topic: d nanobiotechnology	s in biotechnology: k , biomaterials, cryok	viosensors and environmental viotechnology, bioprocess engi-
Intende	ed lear	ning outcomes			
Studen	ts have	e become familiar with th	e fundamental princi	ples of biotechnolog	íy.
Course	Courses (type, number of weekly contact hours, language — if other than German)				
V + S (r	V + S (no information on SWS (weekly contact hours) and course language available)				
Metho module is	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	exami	nation (approx. 30 minut	es)		
Allocat	ion of _l	olaces			

Additional information

Workload

--

Teaching cycle

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

Module appears in

Module title				Abbreviation	
Biochemistry (teaching degree for secondary schools)					08-BC-LAGY-092-m01
Module	coord	inator		Module offered by	
holder	of the C	Chair of Biochemistry		Chair of Biochemist	ry
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
3	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	undergraduate	Admission prerequises in the respective (usually 70% of execute lar attendance of ex sed absence).	site to assessment: s e classes as specifie rcises to be successf ercises (usually a ma	successful completion of exerci- d at the beginning of the course fully completed) as well as regu- aximum of 2 incidents of unexcu-
Conten	ts				
Compri: mistry.	sing le	ctures and exercises, this	s module acquaints s	tudents with the fun	damental principles of bioche-
Intende	ed learr	ning outcomes			
Studen key bio	ts have chemic	e become familiar with th cal processes in cellular s	e fundamental princi systems.	ples of biochemistry	. They are able to describe the
Courses	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü (n	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)
Method 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) 1 to 3 or 90 m each (a Langua	3 writte iinutes 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 mir amination in groups nglish	x. 90 minutes; 2 writ nutes each) or b) oral (groups of 2, approx.	ten examinations: approx. 60 examination of one candidate . 30 minutes)
Allocati	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
§ 62 (1) 2. Chemie "Organische und Bioorganische Chemie"					
Module appears in					
Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Nanostructure Technology (2012) First state examination for the teaching degree Gymnasium Chemistry (2009)					



Energy and Material Science Research

(ECTS credits)

Module title			Abbreviation			
Chemically and biologically inspired Nanotechnology for Materials Synthesis					08-NT-101-m01	
Module	e coord	inator		Module offered by		
holder thesis	of the (Chair of Chemical Techno	ology of Material Syn-	Chair of Chemical T	echnology of Materi	al Synthesis
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
This mo of analy neralisa	odule p ysis us ation a	rovides an introduction ed to characterise the ge nd uses examples to int	to the synthesis meth enerated materials. It roduce students to bio	ods of sol-gel chemi also discusses the fu p-inspired material s	stry and discusses t undamental principle ynthesis.	he methods es of biomi-
Intende	ed learı	ning outcomes				
Studen	ts have	e developed an advance	d knowledge of sol-ge	l chemistry and bior	nineralisation.	
Course	S (type, n	umber of weekly contact hours,	language — if other than Ger	rman)		
This mo compor o	odule c nent. 8-NT-1- 8-NT-2	omprises 2 module com 101: V (no information c	ponents. Information	on courses will be li ct hours) and course	sted separately for e language available)	ach module
Method	d of acc		are if other than Corman	examination offered if no		on on whother
module is	creditab	le for bonus)	age — If other than German,		it every semester, informati	on on whether
Assessi low. Un vidual a	ment ir Iless st assessi	n this module comprises ated otherwise, success ments.	the assessments in t ful completion of the	he individual modul module will require	e components as sp successful completio	ecified be- on of all indi-
Assess als Syn ² • 2 • 0 Assess thesis	ment in thesis ECTS, ral exa ment in	n module component o8 Method of grading: num mination (approx. 15 mi n module component o8	s -NT-1-101: Chemically nerical grade nutes) s -NT-2-101: From Biom	and biologically ins	pired Nanotechnolog ogically inspired Mat	3y for Materi- erials Syn-
• 3	ECTS,	Method of grading: num	erical grade			
• 0	ral exa	mination (approx. 20 mi	inutes)			
Allocat	ion of p	olaces	-			
Additio	nal inf	ormation				
Worklo	Workload					
Teaching cycle						
-						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	Module appears in					
Bachelo Bachelo	or' deg or' deg	ree (1 major) Technology ree (1 major) Nanostruct	v of Functional Materia ure Technology (2010	als (2010))		
Bachelor's ((2010)	with 1 maj	or Nanostructure Technology	JMU Würzburg • ta record Bachel	generated 26-Aug-2024 • ex or (180 ECTS) Nanostrukturte	am. reg. da- chnik - 2010	page 84 / 182



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

Module title Abb					Abbreviation	
Materials Science 1 (Basic Introduction) 08-FS1-101-m01					08-FS1-101-m01	
Module	e coord	inator		Module offered by		
Dean o	f Studio	es Funktionswerkstoffe (F	unctional Materials)	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	undergraduate				
Conten	ts					
This mo and the	odule d e prope	iscusses the fundamenta rties of materials.	al relations between o	chemical bonding, th	ne structure, the microstructure	
Intende	ed learı	ning outcomes				
Studen microst blems.	ts have tructure	e become familiar with th e and the properties of m	e fundamental relatio aterials. They have do	ons between chemic eveloped the ability	al bonding, the structure, the to apply them to research pro-	
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	essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
written	examiı	nation (90 minutes)				
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teachir	Teaching cycle					
-						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Bachelor' degree (1 major) Technology of Functional Materials (2010) Bachelor' degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) Chemistry (2010)						

Module title					Abbreviation	
Materials Science 2 (The Major Material Groups)					08-FS2-101-m01	
Module	e coord	inator		Module offered by		
Dean of	f Studie	es Funktionswerkstoffe (F	unctional Materials)	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	undergraduate				
Conten	ts					
This mo	odule d	eals with the fabrication	and properties of the	main material grou	ps.	
Intende	ed learr	ning outcomes				
Studen to appl	ts have y that k	e developed a knowledge nowledge to research pr	of the fabrication an oblems.	d properties of the n	nain material groups and are able	
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	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	examir	nation (approx. 90 minut	es)			
Allocat	ion of p	olaces				
Additio	nal info	ormation				
Worklo	ad					
Teachir	ng cycl	e				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	Module appears in					
Bachel	or' deg	ree (1 major) Technology	of Functional Materia	lls (2010)		
Bachel	or' degi	ree (1 major) Nanostructu	re Technology (2010))		
Master	Master's degree (1 major) Chemistry (2010)					

Module title					Abbreviation	
Electro	chemic	al Energy Storage and Co	onversion		08-EEW-101-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					
Chemis um and cal dou (Si, CIS	stry and I nickel Ible lay , CIGS,	l application of: battery s metal hydride, sodium s er capacitors, redox-flow GaAs, organic and dye so	ystems (aqueous and sulphur, sodium nicke batteries, fuel cell sy olar cell), thermoelec	d non-aqueous syste el chloride, lithium ic ystems (AFC, PEMFC, tric devices.	ems such as lead, nickel cadmi- on accumulators), electrochemi- DMFC, PAFC, SOFC), solar cells	
Intende	ed lear	ning outcomes				
Studen that kn	ts have owledg	e developed a knowledge se to research problems.	of electrochemical e	nergy storage and co	onversion and are able to apply	
Course	S (type, r	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V + P +	E (no ii	nformation on SWS (weel	kly contact hours) and	d course language av	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	
written	exami	nation (90 minutes) and l	ab report (approx. 5	pages)		
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teachi	ng cycl	e				
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module appears in						
Bachel	or' deg	ree (1 major) Nanostructu	re Technology (2010)			
Master	's degr	ee (1 major) Physics (201	0)			
Master	's degr	ee (1 major) Physics (201)	1)			
Master	s aegri 's degri	ee (1 major) Technology C	or Functional Material	5 (2010)		
Master	's degr	ee (1 major) Nanostructur	re Technology (2011)			

Module title					Abbreviation
Current Topics in Nanostructure Technology					11-BXN5-112-m01
Module	e coord	inator		Module offered by	
chairpe	erson o	f examination committee	_	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	undergraduate	Approval by examination	ation committee req	uired.
Conten	ts				
Current or stud	topics y abroa	of Experimental Physics. ad.	Accredited academi	c achievements, e.g.	in case of change of university
Intende	ed leari	ning outcomes			
The stu Techno nology ledge.	dents I logy of or nand They ar	nave advanced competer the Bachelor's programn o sciences and understar e able to classify the sub	ncies corresponding t ne. They have knowle nd the measuring and ject-specific contexts	o the requirements or edge of a current sub l evaluation method s and know the appli	of a module of Nanostructure discipline of nanostructure tech- s necessary to acquire this know- cation areas.
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	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) writte in grou weeks) Langua	en exaı ps (app or d) p ge of a	mination (approx. 120 mi prox. 30 minutes per cand resentation/seminar pre ssessment: German, Eng	nutes) or b) oral exan lidate) or c) project re sentation (approx. 3c lish	nination of one cand eport (approx. 8 to 10 o minutes)	lidate each or oral examination o pages, time to complete: 1 to 4
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				
Bachel	or' deg	ree (1 major) Nanostructu	re Technology (2010)		
Bachel	Bachelor' degree (1 major) Nanostructure Technology (2012)				

Module title					Abbreviation
Current Topics in Nanostructure Technology					11-BXN6-112-m01
Module	e coord	inator		Module offered by	
chairpe	erson o	f examination committee		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	undergraduate	Approval by examination	ation committee req	uired.
Conten	ts				
Current or stud	topics y abroa	of Experimental Physics. ad.	Accredited academi	c achievements, e.g.	in case of change of university
Intende	ed leari	ning outcomes			
The stu Techno nology ledge.	dents l logy of or nan They ar	nave advanced competer the Bachelor's programr o sciences and understar e able to classify the sub	ncies corresponding t ne. They have knowle nd the measuring and ject-specific contexts	o the requirements or edge of a current sub l evaluation method s and know the appli	of a module of Nanostructure discipline of nanostructure tech- s necessary to acquire this know- cation areas.
Course	S (type, n	number 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	urse language avail	able)
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
a) writt in grou weeks) Langua	en exaı ps (apr or d) p ge of a	mination (approx. 120 mi prox. 30 minutes per cano resentation/seminar pre ssessment: German, Eng	nutes) or b) oral exan didate) or c) project re sentation (approx. 3c lish	nination of one cand eport (approx. 8 to 10 o minutes)	lidate each or oral examination o pages, time to complete: 1 to 4
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				
Bachel	or' deg	ree (1 major) Nanostructu	re Technology (2010)		
Bachelor' degree (1 major) Nanostructure Technology (2012)					

Module title				Abbreviation	
Current Topics in Nanostructure Technology					11-BXN8-112-m01
Module	e coord	inator		Module offered by	
chairpe	erson o	f examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
8	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate	Approval by examination	ation committee req	uired.
Conten	ts				
Current or stud	topics y abroa	of Experimental Physics. ad.	Accredited academi	c achievements, e.g.	in case of change of university
Intende	ed lear	ning outcomes			
The stu Techno nology ledge.	dents l logy of or nan They ar	have advanced competer the Bachelor's programn o sciences and understar e able to classify the sub	ncies corresponding t ne. They have knowle nd the measuring and ject-specific contexts	o the requirements of edge of a current sub l evaluation method s and know the appli	of a module of Nanostructure discipline of nanostructure tech- s necessary to acquire this know- cation areas.
Course	S (type, r	number 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	urse language avail	able)
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
a) writt in grou weeks) Langua	en exaı ps (apı or d) p ge of a	mination (approx. 120 mi prox. 30 minutes per cano resentation/seminar pre ssessment: German, Eng	nutes) or b) oral exan didate) or c) project re sentation (approx. 3c lish	nination of one cand eport (approx. 8 to 10 o minutes)	lidate each or oral examination o pages, time to complete: 1 to 4
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	e appea	ars in			
Bachel	or' deg	ree (1 major) Nanostructu	re Technology (2010)		
Bachelor' degree (1 major) Nanostructure Technology (2012)					

Module title				Abbreviation		
FOKUS Research Module Topological Insulators					11-FM-TI-131-m01	
Module	e coord	inator		Module offered by		
chairpe	erson o	f examination committee		Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)		
10	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
Topolog present sults.	gical in t and d	sulators are a new class iscuss the principles nec	of materials with spe essary to understand	cial electrical proper I these materials on	ties. In this research module, we the basis of current research re-	
Intende	ed lear	ning outcomes				
The stu sulator sub-are	dents l s, and ea of th	nave special and advance are able to reproduce the e current research area ir	ed knowledge of inde acquired knowledge an oral presentatior	pendent scientific w , to apply the acquir n.	rork in the field of topological in- red methods and to summarise a	
Course	S (type, r	umber of weekly contact hours, l	anguage — if other than Ger	rman)		
kly con Kompa hours), wards t	tact ho ktsemi Germa he end	urs) + Ü/P (1 weekly cont nar Topologische Isolato n or English, details on a of semester break or at	act hour), German or ren (Block Taught Ser vailability to be anno the beginning of the s	English, once a year minar Topological Insourced (block taught subsequent semeste	sulators): S (2 weekly contact t seminar (1 to 3 days) held to- er)	
Method	d of ass	Sessment (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)				
This mo 1. Topio tes) o repo 2. Semi	odule h cs cove or oral rt (appi inar: ta	as the following assessm red in lectures and exerc examination of one cand rox. 8 pages) lk (approx. 30 to 45 minu	nent components ises: written examina idate each or oral exa tes)	ation (approx. 90 mir amination in groups	nutes) or talk (approx. 30 minu- (approx. 30 minutes) or project	
Assess Studen Assess ponent To pass	ment c ts mus ment c 2 will I s this m	omponents 1 and 2 will b t register for assessment omponent 1 will be offere be offered to be announc nodule, students must pa	e offered in German o components 1 and 2 ed once a year in the s ed. ss both assessment	or English. online (details to be summer semester; d component 1 and as	e announced). etails on when assessment com- sessment component 2.	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Workload						
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) Nanostructu	re Technology (2010))		



Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011)

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	npl. 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	nalytical methods and applicati-
Courses	5 (type, n	umber of weekly contact hours, la	anguage — if other than Ger	rman)	
S + Ü (n	io infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)
Method module is written	l of ass creditab	eessment (type, scope, languag le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
Langua	ge of a	ssessment: German or Er	nglish		
Allocati	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachir	ng cycl	9			
Referre	d to in	LPO I (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 degr	ee (1 major) Chemistry (20	013)		
Master'	s degre	ee (1 major) Chemistry (20	010) 01 ()		
Master	s degre	ee (1 major) Criemistry (2)	U14) (2012)		
Master	s degr	e (1 major) Mathematics	al Mathematics (2017)	2)	
Master'	s degr	ee (1 major) Functional M	aterials (2012)	<i>~</i>)	
			×/		

Module title					Abbreviation		
Applied Superconduction 11-ASL-092-m01							
Module coordinator				Module offered by			
Manag	ing Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	nd Astronomy		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
6	nume	rical grade					
Duratio	on	Module level	Other prerequisites	;			
1 semester grad		graduate	Certain prerequisite sessment. The lectu 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 admission to assessment anew.			
Conten	ts						
Physica thods o	al princ of mate	iples of superconducti rials sciences for the c	vity. Application in ene alculation of temperatu	rgy engineering. Inst Ire profiles in superc	rumental developme onductors.	ents. Me-	
Intende	ed lear	ning outcomes					
are abl able to energy Course R + V (r Method	e to eva discus techno s (type, r to infor	aluate the contribution is questions on superc ology. Furthermore, the number of weekly contact hour mation on SWS (weekly sessment (type, scope, lang	is of materials sciences onductivity in a scientif y can deal with practica rs, language — if other than Ge ly contact hours) and co guage — if other than German,	to the development fic manner and to crit al mathematical ques rman) purse language avail examination offered — if no	of superconductivity tically question deve stions. able)	ion on whether	
module is	s creditab	le for bonus)			· · · ·		
a) writt in grou c) proje prox. 3 Assess Langua	en exa ps (app ect repo o minu ment o ge of a	mination (approx. 90 n prox. 30 minutes per ca prt (approx. 8 pages, til tes) ffered: once a year, wi ssessment: German, E	ninutes) or b) oral exam andidate, for modules v me to complete: 1 to 4 v nter semester nglish	nination of one candi vith less than 4 ECTS weeks) or d) presenta	date each or oral exa credits approx. 20 r ation/seminar prese	amination ninutes) or ntation (ap-	
Allocat	ion of _l	olaces					
Additio	nal inf	ormation					
Worklo	ad						
Teachi	ng cycl	e					
Referre	d to in	LPO I (examination regulat	ions for teaching-degree progra	ammes)			
Module	e appea	ars in	<u> </u>				
Bachel	or' deg	ree (1 major) Physics (2	2010)				
Bachelor's (2010)	with 1 ma	jor Nanostructure Technology	JMU Würzburg ● ta record Bachel	generated 26-Aug-2024 • ex or (180 ECTS) Nanostrukturte	am. reg. da- chnik - 2010	page 95 / 182	

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

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 (2010) 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)

Module title					Abbreviation	
Principles of Energy Technologies					11-ENT-092-m01	
Module	e coord	inator		Module offered by		
Manag	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	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			sment unew.		
as rene ting ma studen verters Electric Intende The stu port an	at princ wable aterials, ts. Ene . Nucles ity. Bio ed learn d ents I d stora	iples of energy conservations of energy. We as a selective layers, highly a rgy conservation via them ar power plants. Hydroeld mass. Geothermal energy in outcomes a selective principles of diffing outcomes are principles of diffinge. They understand the understand the selections of the principles of the selection of the principles of the selection of the selec	fon and energy conve also discuss aspects activated carbons). The mal insulation. Therm ectricity. Wind turbine y. Energy storage. En- fferent methods of en structures of corresp	ergy technology, esp of optimising materi ne course is especia odynamic energy ef es. Photovoltaics. So ergy transport ergy technology, esp onding installations	bort and energy storage as well als (e.g. nanostructured insula- lly suitable for teaching degree ficiency. Fossil fired energy con- olar thermal: Heat. Solar thermal: becially energy conversion, trans- and are able to compare them.	
	S (type, n	umber of weekly contact hours, l	anguage — If other than Ger	man)		
R + V (r				urse language availa	able)	
module is	s creditab	le for bonus)	ge — If other than German, e	examination offered — If no	t every semester, information on whether	
a) writt groups project (approx 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.					
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

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				
Thermodynam	11-TDO-092-m01					
Module coordinator M			Module offered by			
Managing Dir and Astrophy	ector of the Institute of sics	Theoretical Physics	Faculty of Physics a	nd Astronomy		
ECTS Meth	od of grading	Only after succ. con	npl. of module(s)			
6 nume	rical grade					
Duration	Module level	Other prerequisites				
1 semester	graduate	Certain prerequisite sessment. The lectur at the beginning of the 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			
Contents	1					
sion in the development of the universe, the evolution of life and the unfolding of civilisation. In non-equilibrium thermodynamics, the entropy production density shows the relevance of the second law of thermodynamics for ecological damage and resource consumption. Energy conversion, entropy production and natural resources define the technological and ecological boundaries of industrial economic growth. Part 2 analyses how the factors capital, work, energy and creativity produce the goods and services of a national economy and determine economic growth. The productive power of cheap energy by far exceeds that of expensive labour. Within the current system of taxes and social security contributions, this discrepancy between power and costs of production factors leads to job cuts, waste of resources, impoverishment of nations and growing social tensions. The course discusses how factor income taxation can counteract this development. Part 3 includes seminar presentations, comprises the techniques of rational energy use and non-fossil energy use, and introduces the optimisation programme deeco (Dynamic Energy, Emission and Cost Optimization).						
his own theor	the module that was ru y of economy, it has ye	et to be decided whethe	r we will continue to	ed. As the module wa offer this module.	as tailored to	
Courses (type,	number of weekly contact hou	rs, language — if other than Gei	man)			
R + V (no info	rmation on SWS (week	ly contact hours) and co	ourse language avail	able)		
Method of as module is credital	sessment (type, scope, lang	guage — if other than German,	examination offered — if no	t every semester, informati	on 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						
Bachelor's with 1 major Nanostructure Technology JMU Würzburg • generated 26-Aug-2024 • exam. reg. da- page 99 / :						

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) 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)

Module title					Abbreviation	
Nanote	echnolo	gy in Energy Research			11-NTE-092-m01	
Modul	Module coordinator			Module offered by		
Manag	ing Dire	ector of the Institute of A	pplied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
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 admission to assessment.				
Conter	nts	<u> </u>				
and str cal cor accum cuum i Intend The stu researd They a Course	ructures htexts. I ulators, nsulati ed learn udents ch. They re able	s that have optimised pro- t uses specific materials , functional nanoscale la ons and electrode mater ning outcomes have specific and advan y know methods of nano to apply their knowledge number of weekly contact hours,	operties due to effects and components as e yer and particle syste ials. ced knowledge of the technology to influence to specific questions language — if other than Ger	s of nanotechnology. examples, such as th ms with spectral self application of nanot ce the properties of r 5. man)	. It explains the underlying physi- nermal insulation materials, heat ective properties, nanoporous va- technology in the field of energy materials and their applications.	
V + R (I	no infor	mation on SWS (weekly	 contact hours) and co	ourse language avail	able)	
Metho module i	d of ass s creditab	sessment (type, scope, langu le for bonus)	age — if other than German, d	examination offered — if no	t every semester, information on whether	
a) writh groups project (appro Assess and wi examir	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 approx.					
Allocat	tion of p	olaces				
Additio	onal inf	ormation				
Worklo	bad					
Teachi	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) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010)

Modu	e title				Abbreviation	
Molecular Materials (Lecture and practical course)08-CT-102-m01						
Module coordinator Module offered by						
Dean	of Studie	es Funktionswerkstoffe	(Functional Materials)	Chair of Chemical T	echnology of Materi	al Synthesis
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
10	nume	rical grade	08-FS2			
Durati	on	Module level	Other prerequisites			
1 seme	ester	undergraduate				
Conte	nts					
This m	iodule d	iscusses the theoretica	al and practical principl	es of molecular and	soft materials.	
Intend	led learr	ning outcomes				
Stude that ki	nts have nowledg	e developed a knowledge to research problems	ge of the principles of r 5	nolecular and soft m	aterials and are able	e to apply
Course	es (type, n	umber of weekly contact hours	s, language — if other than Ger	man)		
This m	odule c	omprises 2 module cor	nponents. Information	on courses will be li	sted separately for e	ach module
compo •	onent. 08-CT-1- 08-CT-2-	101: V + Ü (no informat 102: P (no information	ion on SWS (weekly co	ntact hours) and course	Irse language availa	ble)
Metho	d of ass	essment (type, scope, lang	uage — if other than German.	examination offered — if no	t every semester, informati	ion on whether
module	is creditab	le for bonus)			,,	
Asses: low. U vidual	sment ir nless st assessi	i this module comprise ated otherwise, succes nents.	s the assessments in t sful completion of the	he individual module module will require s	e components as sp successful completio	ecified be- on of all indi-
Asses Asses	sment ir 5 ECTS, 1 presenta tes; 2 wi examina approx. sment ir 5 ECTS, 1 Vortesta	module component of Method of grading: nur ation (approx. 30 minu ritten examinations: 60 ation of one candidate 30 minutes) module component of Method of grading: (no te (pre-experiment exa	8-CT-1-101: Molecular M nerical grade tes) and a) 1 to 3 writte o or 90 minutes each; 3 each (approx. 20 minu 8-CT-2-102: Molecular t) successfully complete ms, approx. 15 minutes	Materials (Lecture) M en examinations (1 w written examinatior tes) or c) oral exami Materials (Practical (red s each) and logs (ap)	lolecular Materials (written examination: ns: 60 minutes each) nation in groups (gr Course) prox. 5 pages each)	Lecture) 90 minu-) or b) oral oups of 2,
Alloca	tion of p	olaces				
 Allocation of places Information on the allocation of places will be listed separately for each module component. o8-CT-2-102: Students from the Faculty of Chemistry: no restrictions. Nanostrukturtechnik (Nanostructure Technology): 4. Should there be more than 4 applications from students of Nanostrukturtechnik (Nanostructure Technology), places will be allocated among these applicants as follows: (1) Places will be allocated by lot. (2) 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 procedure, applicants who already have successfully completed at least one other module component of the respective module will be given preferential consideration. (3) A waiting list will be maintained and places re-allocated as they become available. o8-CT-1-101: 						
Additi	onal info	ormation				
Workl	oad					
Bachelor's (2010)	s with 1 maj	or Nanostructure Technology	JMU Würzburg ● ta record Bachele	generated 26-Aug-2024 • exa or (180 ECTS) Nanostrukturter	am. reg. da- chnik - 2010	page 103 / 182

Teaching cycle

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

--

Module appears in

Bachelor' degree (1 major) Nanostructure Technology (2010)

Bachelor's with 1 major Nanostructure Technology (2010)

Module title					Abbreviation	
Molecular Materials for Students of Nanostructure Technology					08-CTO-101-m01	
Module	coord	inator		Module offered by		
Dean of	fStudie	es Funktionswerkstoffe (F	unctional Materials)	Chair of Chemical T	echnology of Material Synthesis	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
5	numei	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
This mo	odule d	iscusses the theoretical	and practical principl	es of molecular and	soft materials.	
Intende	ed learr	ning outcomes				
Studen that kn	ts have owledg	e developed a knowledge e to research problems.	of the principles of n	nolecular and soft m	aterials and are able to apply	
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	essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
present ten exa one car	tation (mination didate	approx. 30 minutes) and ons: 60 or 90 minutes ea each (approx. 20 minute	a) 1 to 3 written exan ch; 3 written examina es) or c) oral examina	ninations (1 written e ations: 60 minutes e tion in groups (grou	examination: 90 minutes; 2 writ- ach) or b) oral examination of ps of 2, approx. 30 minutes)	
Allocat	ion of p	olaces				
Additio	nal info	ormation				
Worklo	ad					
Teachir	ng cycl	e				
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)		
Module	appea	rs in				
Bachelo	Bachelor' degree (1 major) Nanostructure Technology (2010)					

Module title					Abbreviation	
Introduction to Functional Materials					11-TMS-102-m01	
Module	coord	inator		Module offered by		
Managi	ng Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
5	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					
Theoret ectrics,	ical an metals	d practical principles of p and oxides. Principles o	ohysical material pro f structuring technolo	perties and semicon ogy, growth and coat	ductor process technology, diel- ting procedures.	
Intende	ed learı	ning outcomes				
The stu nology	dents l for mai	nave knowledge of the th terial synthesis.	eoretical and practica	al principles of physi	ical material properties and tech-	
Courses	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V + 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 Assessi and wil examin	examii ment o l be an ation r	nation (approx. 120 minu ffered: When and how of nounced in due form unc egulations) 2009.	tes) ten assessment will b ler observance of Sec	be offered depends of the section of	on the method of assessment 3 ASPO (general academic and	
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teachir	Teaching cycle					
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)					
Bachold	appea	IFS IN	ure Technology (2010)	1		
Bachelo	or' deg	ree (1 major) Nanostructu	ire Technology (2010)			
Bachelo	or' deg	ree (1 major) Functional N	Aaterials (2012)			

(2010)

Module title					Abbreviation	
Coating Technologies based on Vapour Deposition					11-BVG-092-m01	
Module	e coord	inator		Module offered by		
Manag	ing Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	ind Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites	5		
1 semester graduate		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 asses	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 f admission to assessment anew.		
Conten	Its					
Physica sation.	al techr Applic	nical principles of PVD a ation of layer materials	and CVD installations a on an industrial level.	and processes. Coati	ng deposit and layer	characteri-
Intend	ed lear	ning outcomes				
The stu to their	udents r indust	have advanced knowled trial relevance and varie	dge of coating deposit ety.	processes in the gas	eous phase and gai	n insights in-
Course	S (type, r	number of weekly contact hours	s, language — if other than Ge	rman)		
V + R (r	no infor	mation on SWS (weekly	y contact hours) and co	ourse language avail	able)	
Metho module is	d of ass s creditab	Sessment (type, scope, lang ole for bonus)	uage — if other than German,	examination offered — if no	ot every semester, informat	ion on whether
a) writt groups project (appro: Assess and wil examir	en exa (appro report x. 30 m ment o ll be an	mination (approx. 90 m ox. 30 minutes per cand (approx. 8 to 10 pages, inutes) ffered: When and how o nounced in due form u egulations) 2009.	inutes) or b) oral exam idate, for modules with time to complete: 1 to often assessment will nder observance of Se	nination of one candi h 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 j	places				
Additio	onal inf	ormation				
Worklo	ad					
Teachi	ng cycl	e				
Referre	ed to in	LPO I (examination regulation	ons for teaching-degree progra	ammes)		
Module	e appea	ars in				
Bachel Bachel	or' deg or' deg	ree (1 major) Nanostruc ree (1 major) Nanostruc	ture Technology (2010 ture Technology (2012)		
Bachelor's (2010)	with 1 ma	jor Nanostructure Technology	JMU Würzburg • ta record Bachel	generated 26-Aug-2024 • ex or (180 ECTS) Nanostrukturte	am. reg. da- chnik - 2010	page 107 / 182



Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Functional Materials (2012)
Module title				Abbreviation	
Thermodynamics and Economics					11-TDOE-141-m01
Module	coord	inator		Module offered by	
Managi and Ast	ng Dire rophys	ector of the Institute of Th sics	eoretical Physics	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	ıpl. of module(s)	
3	(not) s	successfully completed			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate			
Conten	ts				
Energy and economic growth, entropy production, emission reduction. Part I describes the role of energy conversion in the development of the universe, the evolution of life and the un- folding of civilisation. The entropy production density of non-equilibrium thermodynamics shows the relevance of the second law of thermodynamics for ecological damage and resource consumption. Energy conversion, ent- ropy production and natural resources define the technological and ecological boundaries of industrial econo- mic growth. Part 2 analyses how the factors capital, work, energy and creativity produce the goods and services of a national economy and determine economic growth. The productive power of cheap energy by far exceeds that of expensi- ve labour. Within the current system of taxes and social security contributions, this discrepancy between power and costs of production factors leads to job cuts, waste of resources, impoverishment of nations and growing so- cial tensions. The course discusses how factor income taxation can counteract this development. Part 3 includes seminar presentations, comprises the techniques of rational energy use and non-fossil energy use, and introduces the optimisation programme deeco (Dynamic Energy, Emission and Cost Optimization). Intended learning outcomes The students understand that energy conversion and entropy production are going to play an important role in the world's economic and social development. As an extension of economic theory, the students know the connections between thermodynamics and economy as well as the productive physical basis of modern econo- mies. They are able to apply the acquired knowledge to particular problems.					
	theory	y of economy, it has yet to	D be decided whethe	r we will continue to	offer this module.
V (no in	format	ion on SWS (weekly cont	act hours) and cours	e language available)
Method module is	l of ass creditab	essment (type, scope, language) le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
a) writte in group weeks)	en exar os (app or d) p	mination (approx. 90 min prox. 30 minutes per cano resentation/seminar pre	utes) or b) oral exam lidate) or c) project re sentation (approx. 30	ination of one candie eport (approx. 8 to 10 o minutes)	date each or oral examination o pages, time to complete: 1 to 4
Allocati	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachir	ıg cycl	e			
Referre	d to in	LPO I (examination regulations	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)

Module title					Abbreviation		
Image and Signal Processing in Physics					11-BSV-131-m01		
Module coordinator				Module offered by			
Manag	ing Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	and Astronomy		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
6	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 semester 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	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 semesters				
Conten	ts						
Periodi and im convolu getic ol transfo	c and a age pro ution p bservat rmation	periodic signals; princ ocessing; discretisatior roduct; tapering function ion; statistical signals; n.	iples of discreet and ex n of signals/sampling th ons and interpolation o , image noise, moments	act Fourier transform neorem (Shannon); H f images; the Parsiva s, stationary signals;	nation; principles of nomogeneous and li al theorem, correlation; tomography: Hanke	digital signal near filters, on and ener- el and Radon	
Intende	ed lear	ning outcomes					
The stu les of in ferent r	idents l mage p nethod	have advanced knowle rocessing and are fam is and to implement th	dge of digital image an iliar with different meth em, especially in the fie	d signal processing. ods of signal proces ld of tomography.	They know the phys sing. They are able t	ical princip- o explain dif-	
Course	S (type, r	number of weekly contact hour	rs, language — if other than Ger	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	eessment (type, scope, lang le for bonus)	guage — if other than German, o	examination offered — if no	ot every semester, informat	ion on whether	
a) writt in grou weeks) Assess and wil examin Langua	en exa ps (app or d) p ment o Il be an ation r ige of a	mination (approx. 90 m prox. 30 minutes per ca resentation/seminar p ffered: When and how nounced in due form u egulations) 2009. ssessment: German, E	ninutes) or b) oral exam andidate) or c) project re presentation (approx. 30 often assessment will b ander observance of Sec nglish	ination of one candi eport (approx. 8 to 10 o minutes) be offered depends o ction 32 Subsection	date each or oral exa o pages, time to com on the method of ass 3 ASPO (general aca	amination 1plete: 1 to 4 sessment demic and	
Allocat	ion of p	olaces					
Additional information Workload							
Teachi	Teaching cycle						
Referre	ed to in	LPO I (examination regulation	ions for teaching-degree progra	mmes)			
Module	e appea	ars in					
Bachelor's (2010)	with 1 ma	or Nanostructure Technology	JMU Würzburg • ta record Bachel	generated 26-Aug-2024 • ex or (180 ECTS) Nanostrukturte	am. reg. da- chnik - 2010	page 111 / 182	

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)

Module title					Abbreviation	
Physic	s of Ad	vanced Materials			11-PMM-132-m01	
Module coordinator				Module offered by		
Manag	ing Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	,	
6	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	nte	Sidudite				
Conora		rtios of various matoria	al groups such as liquid	le liquid enetals an	d polymors, magnet	ic matorials
and su groups	percon ; two-d	ductors; thin films, het imensional layer mater	erostructures and supe ials.	rlattices. Methods o	f characterising thes	se material
Intend	ed lear	ning outcomes				
The stu	udents	know the properties an	d characterising metho	ds of some modern	materials.	
Course	S (type, r	number of weekly contact hour	s, language — if other than Gei	rman)		
V + R (r	no infoi	mation on SWS (weekl	v contact hours) and co	ourse language availa	able)	
Metho	d of as	sessment (type scope lang	uage — if other than German	examination offered — if no	t every semester informati	ion on whether
module i	s creditat	le for bonus)			it every semester, mornal	
weeks) Assess and wi examir Langua	or d) p ment o Il be an nation r age of a	presentation/seminar p ffered: When and how nounced in due form u egulations) 2009. ssessment: German, El	resentation (approx. 30 often assessment will l nder observance of Sec nglish	o minutes) oe offered depends of ction 32 Subsection ;	on the method of ass 3 ASPO (general aca	sessment demic and
Allocat	tion of	olaces				
Additio	onal inf	ormation				
Worklo	ad					
Teachi	ng cycl	Δ				
reaction	ing cycl					
Deferre				`		
Referre		LPUT (examination regulation	ons for teaching-degree progra	mmes)		
		•				
Module	e appea	ars in				
Bachel	or' deg	ree (1 major) Physics (2	2010)			
Bachel	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	Master's degree (1 major) Nanostructure Technology (2010)					
Master	Master's degree (1 major) FOKUS Physics (2010)					
master	s degr	ee (1 major) FUKUS Phy	SICS (2011)			
Bachelor's (2010)	with 1 ma	jor Nanostructure Technology	JMU Würzburg • ta record Bachel	generated 26-Aug-2024 • ex or (180 ECTS) Nanostrukturte	am. reg. da- chnik - 2010	page 113 / 182



Analytics and Metrology

(ECTS credits)

Module title					Abbreviation		
Laboratory and Measurement Technology 11-A3-072-m01							
Module coordinator				Module offered by			
Manag	ing Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	nd Astronomy		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
6	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 semester undergraduate		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	iction to yogeni	o electronic and optica cs, light sources, spec	l measuring methods o troscopic methods and	f physical metrology measured value acq	, vacuum technology uisition.	y and cryoge-	
Intende	ed lear	ning outcomes					
The stu cal met red valu	idents l trology, ue acqi	have acquired the follo cryogenics and vacuu uisition.	wing transferable skills m technology, cryogeni	: Electronic and opti cs, light sources, sp	cal measuring meth ectroscopic method	ods in physi- s and measu-	
Course	S (type, r	number of weekly contact hou	rs, language — if other than Ge	rman)			
V + Ü (r	no infoi	mation on SWS (week	ly contact hours) and co	ourse language avail	able)		
Methoo 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, informat	ion on whether	
written	exami	nation (approx. 120 mi	nutes)				
Allocat	ion of p	olaces					
Only as	s part o	f pool of general key sl	kills (ASQ): 15 places. P	laces will be allocate	ed by lot.		
Additio	onal inf	ormation					
Worklo	ad						
Teachi	ng cycl	e					
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	e appea	urs 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)							
(2010)			ta record Bachel	or (180 ECTS) Nanostrukturte	chnik - 2010	P 30 11 / 102	

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		
Chemic	al Nan	otechnology: Analytics a	nd Applications		08-FS5-101-m01	
Module	coord	inator		Module offered by		
holder of thesis	of the C	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	numei	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate				
Conten	ts					
The mo include ring. Th sectors	dule pr s pract e lectu	ovides 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	developed an advanced	knowledge of sol-ge	l chemistry and bion	nineralisation.	
Courses	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
This mc compor • 0 • 0	 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) 					
Method 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	
Assessi low. Un vidual a	ment ir less sta assessr	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 						
Allocati	ion of r	laces				
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.						
Additio	nal info	ormation				
The cou	ırse is o	offered as a block course	at the end of the ser	nester.		
Worklo	ad					

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

Module title					Abbreviation		
Current	Current Topics in Nanostructure Technology				11-BXN5-112-m01		
Module	e coord	inator		Module offered by			
chairpe	erson o	f examination committee	_	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	undergraduate	Approval by examination	ation committee req	uired.		
Conten	ts						
Current or stud	topics y abroa	of Experimental Physics. ad.	Accredited academi	c achievements, e.g.	in case of change of university		
Intende	ed leari	ning outcomes					
The stu Techno nology ledge.	dents I logy of or nand They ar	nave advanced competer the Bachelor's programn o sciences and understar e able to classify the sub	ncies corresponding t ne. They have knowle nd the measuring and ject-specific contexts	o the requirements or edge of a current sub l evaluation method s and know the appli	of a module of Nanostructure discipline of nanostructure tech- s necessary to acquire this know- cation areas.		
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	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) writte in grou weeks) Langua	en exaı ps (app or d) p ge of a	mination (approx. 120 mi prox. 30 minutes per cand resentation/seminar pre ssessment: German, Eng	nutes) or b) oral exan lidate) or c) project re sentation (approx. 3c lish	nination of one cand eport (approx. 8 to 10 o minutes)	lidate each or oral examination o pages, time to complete: 1 to 4		
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	ad						
Teachir	Teaching cycle						
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	appea	irs in					
Bachel	or' deg	ree (1 major) Nanostructu	re Technology (2010)				
Bachelor' degree (1 major) Nanostructure Technology (2012)							

Module title					Abbreviation	
Current	Topics	s in Nanostructure Techn	ology		11-BXN6-112-m01	
Module	e coord	inator		Module offered by		
chairpe	erson o	f examination committee		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	undergraduate	Approval by examination	ation committee req	uired.	
Conten	ts					
Current or stud	topics y abroa	of Experimental Physics. ad.	Accredited academi	c achievements, e.g.	in case of change of university	
Intende	ed leari	ning outcomes				
The stu Techno nology ledge.	dents l logy of or nan They ar	nave advanced competer the Bachelor's programr o sciences and understar e able to classify the sub	ncies corresponding t ne. They have knowle nd the measuring and ject-specific contexts	o the requirements or edge of a current sub l evaluation method s and know the appli	of a module of Nanostructure discipline of nanostructure tech- s necessary to acquire this know- cation areas.	
Course	S (type, n	number 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	urse language avail	able)	
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	
a) writt in grou weeks) Langua	en exaı ps (apr or d) p ge of a	mination (approx. 120 mi prox. 30 minutes per cano resentation/seminar pre ssessment: German, Eng	nutes) or b) oral exan didate) or c) project re sentation (approx. 3c lish	nination of one cand eport (approx. 8 to 10 o minutes)	lidate each or oral examination o pages, time to complete: 1 to 4	
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	Module appears in					
Bachel	or' deg	ree (1 major) Nanostructu	re Technology (2010)			
Bachelor' degree (1 major) Nanostructure Technology (2012)						

Module title					Abbreviation		
Current	t Topics	s in Nanostructure Techn	ology		11-BXN8-112-m01		
Module	e coord	inator		Module offered by			
chairpe	erson o	f examination committee		Faculty of Physics a	nd Astronomy		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)			
8	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 seme	ster	undergraduate	Approval by examination	ation committee req	uired.		
Conten	ts						
Current or stud	topics y abroa	of Experimental Physics. ad.	Accredited academi	c achievements, e.g.	in case of change of university		
Intende	ed lear	ning outcomes					
The stu Techno nology ledge.	dents l logy of or nan They ar	have advanced competer the Bachelor's programn o sciences and understar e able to classify the sub	ncies corresponding t ne. They have knowle nd the measuring and ject-specific contexts	o the requirements o edge of a current sub I evaluation method 5 and know the appli	of a module of Nanostructure discipline of nanostructure tech- s necessary to acquire this know- cation areas.		
Course	S (type, r	number 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	urse language avail	able)		
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		
a) writt in grou weeks) Langua	en exaı ps (apı or d) p ge of a	mination (approx. 120 mi prox. 30 minutes per cano resentation/seminar pre ssessment: German, Eng	nutes) or b) oral exan didate) or c) project re sentation (approx. 3c lish	nination of one cand eport (approx. 8 to 10 o minutes)	lidate each or oral examination o pages, time to complete: 1 to 4		
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	ad						
Teaching cycle							
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)			
Module	e appea	ars in					
Bachel	or' deg	ree (1 major) Nanostructu	re Technology (2010)				
Bachelor' degree (1 major) Nanostructure Technology (2012)							

Module title				Abbreviation		
Magnetism and Spin Transport					11-MST-092-m01	
Module	e coord	inator		Module offered by		
Manag	ing Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	and Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
6	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
2 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	L	_			
les of n to char tallic sy tion in rent-ind Intende The stu tic expe an over mulatio	nagneti acteris ystems magne duced s ed learn idents l eriment rview o on of m	ism (ranging from atoms e magnetic properties. Du in due consideration of g tic memory. As a last poin spin phenomena. ning outcomes know the basic terms, co ts; they are familiar with f modern findings in this athematical-physical app	to solids), properties uring the summer ser giant magnetoresistant, we discuss new pl ncepts and phenome spin transport application area (GMR, TMR). The proaches and are able	of magnetic materia nester, the students nce and tunnel magn henomena from the ma of magnetism an ations of information by are skilled in simple to apply them to ta	Il (individual usage) and methods learn about spin transport in me- netoresistance and its applica- field of spin dynamics and cur- d measuring methods for magne- n technologies and have gained ble model building and in the for- sks in the stated areas.	
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)		
V + R +	V (no i	nformation on SWS (wee	kly contact hours) an	d course language a	vailable)	
Metho module is	d of ass s creditab	sessment (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	ot 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)

--

Module appears in

Bachelor' degree (1 major) Physics (2010)

Bachelor' degree (1 major) Physics (2012)

Bachelor' degree (1 major) Nanostructure Technology (2010)

Master's degree (1 major) Physics (2010)

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)

Module	e title				Abbreviation	
Nanoanalytics					11-NAN-092-m01	
Module	e coord	inator		Module offered by		
Manag	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	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					
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-						
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
R + V (r	no infor	mation on SWS (weekly o	contact hours) and co	urse language availa	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) 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	blaces				
Additio	Additional information					
Worklo	ad					

--

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		
Biophysical Measurement Technology in Medical Science					11-BMT-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)			
6	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 semester grad		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						
The lect topics a sound a image p	ture co are con and MF 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 c	cation in Biomedicin ques of nuclear med of imaging systems a	e. The main icine, ultra- and digital	
Intende	ed lear	ning outcomes					
The stu derstar images	dents id the p	know the physical prin principles of image ger	ciples of imaging techn ieration and are able to	iques and their appl explain different tec	ication in Biomedici hniques and interpr	ne. They un- et simple	
Course	S (type, r	number of weekly contact hour	rs, language — if other than Ge	rman)			
R + V (n	o infor	mation on SWS (week	y 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	ion 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.							
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	ad						
Teachi	ıg cycl	е					
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)						
Bachelor's (2010)	with 1 ma	or Nanostructure Technology	JMU Würzburg • ta record Bachel	generated 26-Aug-2024 • exa or (180 ECTS) Nanostrukturte	am. reg. da- chnik - 2010	page 126 / 182	

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 (2011) Master's degree (1 major) FOKUS Physics (2012)

Module title					Abbreviation	
Laboratory and Measurement Technology in Biophysics					11-LMB-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 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					
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, more ructure elucidation of bio	of molecular and cellu on and manipulation o ethods of single-parti omolecules.	llar 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 b nd manipulation of bi ations and are able to	biology as well as the iological systems. Th b 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	man)		
R + V (n	io infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)	
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	
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						
Teachi	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		
Metho	ds for n	on-destructive Charac	and Components	11-ZMB-102-m01			
Module coordinator				Module offered by			
Manag	ing Dire	ector of the Institute of	Applied Physics	plied Physics Faculty of Physics and Astronomy			
ECTS	Methe	od of grading	Only after succ. con	npl. of module(s)			
3	nume	rical grade					
Duratio	on	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 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	nts						
Princip Ultrasc	oles of r ound. O	ion-destructive materia ptical testing, laser. Im	al and component testir nage processing.	ng. Thermography. N	eutron radiography.	X-ray testing.	
Intend	ed lear	ning outcomes					
The stu on (hea thods f proble	udents at, X-ray for the o ms of n	have basic knowledge y, terahertz), particles detection of radiation t naterial testing and cha	of the generation and in (neutrons) or ultrasound ypes, particles and ultra aracterisation.	nteraction processes d waves with materia asound waves and a	s of different types of als. They know the a re able to apply ther	f radiati- pplied me- n to basic	
	s (type, r	mation on SWS (wook	v contact hours) and co	man) Nurso languago avail	abla)		
Metho	d of as		and contract mours) and co	ovamination offered — if no	able)	ion on whothor	
module is	s creditab	ele for bonus)		examination onered — in no	it every semester, mormat	on on whether	
a) writt groups project (appro. Assess and wi examir	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						
Allocat	tion of _l	places					
Additio	onal inf	ormation					
Workload							
Teaching cycle							
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module	e appea	ars in					
Bachelor's (2010)	with 1 ma	jor Nanostructure Technology	JMU Würzburg ● ta record Bachel	generated 26-Aug-2024 • ex or (180 ECTS) Nanostrukturte	am. reg. da- chnik - 2010	page 130 / 182	

Bachelor' degree (1 major) Nanostructure Technology (2010)

Module title					Abbreviation	
Principles of two- and threedimensional Röntgen imaging			al Röntgen imaging		11-ZDR-111-m01	
Module	e coord	inator		Module offered by		
Manag	ing 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				
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	its					
Physics of X-ray generation (X-ray tubes, synchrotron). Physics of the interaction between X-rays and matter (pho- ton absorption, scattering), physics of X-ray detection. Mathematics of reconstruction algorithms (filtered rear projection, Fourier reconstruction, iterative methods). Image processing (image data pre-processing, feature ex- traction, visualisation,). Applications of X-ray imaging in the industrial sector (component testing, material characterisation, metrology, biology,). Radiation protection and biological radiation effect (dose,). Intended learning outcomes The students know the principles of generating X-rays and of their interactions with matter. They know imaging techniques using X-rays and methods of image processing as well as application areas of these methods. Courses (type, number of weekly contact hours, language – if other than German) V + R (no information on SWS (weekly contact hours) and course language available) Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes) per candidate. for modules with less than 4 ECTS credits approx. 20 minutes) or c)						
(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.						
Additional information						
Workload						
Teaching cycle						
Referre	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) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2012) Master's degree (1 major) FOKUS Physics (2006)

Module title					Abbreviation
Introduction to Electron Microscopy					11-IEM-111-m01
Module	Module coordinator			Module offered by	
Managi	ing Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	ind Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
4	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				
(selecte on tech formati image f 7. Chen spectro	ed-area inique) on, ima formati- nical ar oscopy)	ED, convergent beam EL . 4. Transmission electron aging of microstructure). on, image simulation). 6. nalysis with the electron . 8. Sample preparation.	D, 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 learr	ning outcomes			
The stu They kr copic m	dents h now mic nethods	nave basic knowledge of croscoping procedures th s for chemical analysis. T	modern research me nat are used in praction they are able to evalu	thods of electron mi ce in labs and the in 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 (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					
Allocation of places					
Additional information					
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) 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 major) FOKUS Physics (2006)



Lab Course Engineering

(ECTS credits)

Module title					Abbreviation
Current	Current Topics in Nanostructure Technology 11-BXN5-112-m01				
Module	e coord	inator		Module offered by	
chairpe	erson o	f examination committee		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	undergraduate	Approval by examination	ation committee req	uired.
Conten	ts				
Current or stud	topics y abroa	of Experimental Physics. ad.	Accredited academi	c achievements, e.g.	in case of change of university
Intende	ed lear	ning outcomes			
The stu Techno nology ledge.	dents l logy of or nan They ar	have advanced competer the Bachelor's programn o sciences and understar e able to classify the sub	ncies corresponding t ne. They have knowle nd the measuring and ject-specific contexts	o the requirements of edge of a current sub l evaluation method s and know the appli	of a module of Nanostructure discipline of nanostructure tech- s necessary to acquire this know- cation areas.
Course	S (type, r	number 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	urse language avail	able)
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
a) writt in grou weeks) Langua	en exaı ps (apı or d) p ge of a	mination (approx. 120 mi prox. 30 minutes per cano resentation/seminar pre ssessment: German, Eng	nutes) or b) oral exan didate) or c) project re sentation (approx. 3c lish	nination of one cand eport (approx. 8 to 10 o minutes)	lidate each or oral examination o pages, time to complete: 1 to 4
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					
Bachel	or' deg	ree (1 major) Nanostructu	re Technology (2010)		
Bachel	Bachelor' degree (1 major) Nanostructure Technology (2012)				

Module title					Abbreviation
Current	Current Topics in Nanostructure Technology 11-BXN6-112-mo1				
Module	e coord	inator		Module offered by	
chairpe	erson o	f examination committee		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	undergraduate	Approval by examination	ation committee req	uired.
Conten	ts				
Current or stud	topics y abroa	of Experimental Physics. ad.	Accredited academi	c achievements, e.g.	in case of change of university
Intende	ed leari	ning outcomes			
The stu Techno nology ledge.	dents l logy of or nan They ar	nave advanced competer the Bachelor's programr o sciences and understar e able to classify the sub	ncies corresponding t ne. They have knowle nd the measuring and ject-specific contexts	o the requirements or edge of a current sub l evaluation method s and know the appli	of a module of Nanostructure discipline of nanostructure tech- s necessary to acquire this know- cation areas.
Course	S (type, n	number 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	urse language avail	able)
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
a) writt in grou weeks) Langua	en exaı ps (apr or d) p ge of a	mination (approx. 120 mi prox. 30 minutes per cano resentation/seminar pre ssessment: German, Eng	nutes) or b) oral exan didate) or c) project re sentation (approx. 3c lish	nination of one cand eport (approx. 8 to 10 o minutes)	lidate each or oral examination o pages, time to complete: 1 to 4
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					
Bachel	or' deg	ree (1 major) Nanostructu	re Technology (2010)		
Bachelor' degree (1 major) Nanostructure Technology (2012)					

Module title					Abbreviation
Current	Current Topics in Nanostructure Technology 11-BXN8-112-m01				
Module	e coord	inator		Module offered by	
chairpe	erson o	f examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
8	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate	Approval by examination	ation committee req	uired.
Conten	ts				
Current or stud	topics y abroa	of Experimental Physics. ad.	Accredited academi	c achievements, e.g.	in case of change of university
Intende	ed lear	ning outcomes			
The stu Techno nology ledge.	dents l logy of or nan They ar	have advanced competer the Bachelor's programn o sciences and understar e able to classify the sub	ncies corresponding t ne. They have knowle nd the measuring and ject-specific contexts	o the requirements of edge of a current sub l evaluation method s and know the appli	of a module of Nanostructure discipline of nanostructure tech- s necessary to acquire this know- cation areas.
Course	S (type, r	number 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	urse language avail	able)
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
a) writt in grou weeks) Langua	en exaı ps (apı or d) p ge of a	mination (approx. 120 mi prox. 30 minutes per cano resentation/seminar pre ssessment: German, Eng	nutes) or b) oral exan didate) or c) project re sentation (approx. 3c lish	nination of one cand eport (approx. 8 to 10 o minutes)	lidate each or oral examination o pages, time to complete: 1 to 4
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					
Bachel	or' deg	ree (1 major) Nanostructu	re Technology (2010)		
Bachel	Bachelor' degree (1 major) Nanostructure Technology (2012)				

Module title					Abbreviation
Principles of Electronics (with Practical Course)					11-N2-092-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)	
6	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				
Princip coils ar Digital	les of e nd diod circuits	lectronic components an es) and active componer : different types of gates	d circuits. Analogous nts (bipolar and field- and CMOS circuits. N	circuit technology: effect transistors as Aicrocontroller	Passive (resistors, capacitors, well as operational amplifiers).
Intende	ed learr	ning outcomes			
The stu circuit t	dents l echnol	nave knowledge of the pr ogy.	actical setup of elect	ronic circuits from th	e field of analogous and digital
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	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
written Assess and wil examin	examir ment o l be an ation re	nation (approx. 90 minut ffered: When and how of nounced in due form unc egulations) 2009.	es) ten assessment will b ler observance of Sec	be offered depends of the contract of the cont	on the method of assessment 3 ASPO (general academic and
Allocat	ion of p	olaces			
Only as	part o	f pool of general key skill	s (ASQ): 15 places. P	laces will be allocate	ed by lot.
Additio	nal inf	ormation			
Workload					
Teaching cycle					
Keterred to in LPO I (examination regulations for teaching-degree programmes)					
 Modulo appears in					
Bachel	or' dea	ree (1 major) Nanostructu	Ire Technology (2010))	
Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)					

Module title					Abbreviation		
Practic	Practical Course Physical Technology of Material Synthesis 11-PPT-092-m01						
Module	e coord	inator		Module offered by			
Manag	ing Dire	ector of the Institute of A	pplied Physics	blied Physics Faculty of Physics and Astronomy			
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
5	(not) s	successfully completed					
Duratio	on	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.			o as- ctive details ill be con- nt. If stu- ssment over ation for as- ill be admit- ster. For as- alification for	
Conten	its						
Physica nologie	al mate es.	rial properties, growth a	nd coating procedure	s, methods of charac	terisation and struc	turing tech-	
Intend	ed lear	ning outcomes					
The stu terial s	ıdents l ynthesi	have knowledge of the p is.	ractical basics of mat	erial characterisatio	n and physical techr	ology for ma-	
Course	S (type, r	number of weekly contact hours,	language — if other than Ger	man)			
P (no ir	nformat	tion on SWS (weekly con	tact hours) and cours	e language available	2)		
Metho module is	d of ass s creditab	sessment (type, scope, langu le for bonus)	age — if other than German, o	examination offered — if no	t every semester, informat	ion on whether	
Preparites) prices pric	ing the ior to th eted if a assessr een suc eted. ment o	experiment will be cons te experiment is passed a Testat (exam) is passed nent can be repeated or ccessfully completed in ffered: once a year, wint	idered successfully co Performing and evalu d. An experiment log (ace in the respective s the same semester wi ter semester	ompleted if an oral te lating the experimen approx. 8 pages) is t emester. Only if both Il the module compo	est (duration: approx t will be considered o be prepared. Each n components of the ment be considered	a. 15 minu- successfully component assessment successfully	
Allocat	ion of p	olaces					
Additio	onal inf	ormation					
worklo	WORKLOAD						
Teaching syste							
Referred to in LPO L (examination regulations for teaching-degree programmes)							
Module appears in							
Bachel Bachel	or' deg or' deg	ree (1 major) Nanostruct ree (1 major) Nanostruct	ure Technology (2010) ure Technology (2012))			
Bachelor's (2010)	with 1 ma	jor Nanostructure Technology	JMU Würzburg • ta record Bachel	generated 26-Aug-2024 • ex- or (180 ECTS) Nanostrukturter	am. reg. da- chnik - 2010	page 141 / 182	



Bachelor' degree (1 major) Functional Materials (2012)



Computer Aided Methods

(ECTS credits)

Module title					Abbreviation			
Mathematics 4 for Students of Physics and Engineering11-MPI4-062-m01					11-MPI4-062-m01			
Module	e coord	inator		Module offered by				
Manag and As	ing Dire trophys	ector of the Institute of Th sics	eoretical Physics	Faculty of Physics a	nd Astronomy			
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)				
8	nume	rical grade						
Duratio	n	Module level	Other prerequisites					
1 seme	ster	undergraduate						
Conten	ts							
Functio	nal ana	alysis and complex analy	sis.					
Intende	ed learı	ning outcomes						
The stu riable a	dents l is well	nave basic knowledge of as the required calculation	mathematics of Hilbe on methods.	ert space and the the	eory of functions of a complex va-			
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)			
Method 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			
written	exami	nation (approx. 120 minu	tes)					
Allocat	ion of p	olaces						
Additio	nal inf	ormation						
Worklo	ad							
			,					
Teachi	ng cycl	e						
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	mmes)				
Module appears in								
Bachelor' degree (1 major) Physics (2007) Bachelor' degree (1 major) Physics (2009) Bachelor' degree (1 major) Physics (2008) Bachelor' degree (1 major) Nanostructure Technology (2010)								
Bachel	or' deg	ree (1 major) Nanostructu	re Technology (2012)	1				
Bachel	or' deg	ree (1 major) Nanostructu	re Technology (2008)				
Bachel	Bachelor' degree (1 major) Nanostructure Technology (2007)							
Module title					Abbreviation			
---	-------------------------------	---	---	--	--	-------------------------------	--	--
Labora	tory an	d Measurement Techn	ology		11-A3-072-m01			
Module	e coord	inator		Module offered by				
Manag	ing Dire	ector of the Institute of	Applied Physics	lied Physics Faculty of Physics and Astronomy				
ECTS	Metho	od of grading	Only after succ. con	Only after succ. compl. of module(s)				
6	nume	rical grade						
Duratio	on	Module level	Other prerequisites					
1 semester undergraduate		Admission prerequi 50% of exercises. Co 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 admission to assessment. The lecturer will inform students about the respective 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 admitted 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.					
Conter	Its							
Introdu nics, ci	uction to ryogeni	o electronic and optica cs, light sources, spec	al measuring methods o troscopic methods and	f physical metrology measured value acq	, vacuum technology uisition.	/ and cryoge-		
Intend	ed lear	ning outcomes	· ·					
The stu cal me red val	ıdents trology, ue acqı	have acquired the follo , cryogenics and vacuu uisition.	owing transferable skills m technology, cryogeni	: Electronic and opti cs, light sources, sp	cal measuring methe ectroscopic methods	ods in physi- s and measu-		
Course	S (type, r	number of weekly contact hou	rs, language — if other than Gei	rman)				
V + Ü (I	no infoi	rmation on SWS (week	ly contact hours) and co	ourse language avail	able)			
Metho module is	d of ass s creditab	sessment (type, scope, lan le for bonus)	guage — if other than German,	examination offered — if no	t every semester, informati	on on whether		
written	exami	nation (approx. 120 mi	nutes)					
Allocat	ion of _l	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	onal inf	ormation						
Worklo	ad							
Teachi	Teaching cycle							
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)								
Bachelor's (2010)	with 1 ma	jor Nanostructure Technology	JMU Würzburg ● ta record Bachel	generated 26-Aug-2024 • ex or (180 ECTS) Nanostrukturte	am. reg. da- chnik - 2010	page 145 / 182		

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
Compu	tationa	l Mathematics, advance	d		10-M-COMg-082-m01
Module	coord	inator		Module offered by	
Dean o	f Studie	es Mathematik (Mathema	atics)	Institute of Mathem	atics
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
4 (not) successfully completed					
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduateAdmission prerequisite to assessment: regular attendance of exercises (attendance monitored, a maximum of one incident of unexcused ab- sence).			
Conten	ts				
Introdu merical 10-M-A lar diffe	ction to compu NL and erential	o modern mathematical s utation (e.g. Matlab) to s 10-M-LNA). Computer-ba and integral calculus; vi	software for symbolic upplement the basic used solution of probl sualisation of functio	computation (e.g. modules in analysis ems in linear algebr ns.	Mathematica or Maple) and nu- s and linear algebra (10-M-ANA, a, geometry, analysis, in particu-
Intende	ed learr	ning outcomes			
The stu fields o	dent le f appli	arns the use of advanced cation to solve mathema	d modern mathematio tical problems.	cal software package	es, and is able to assess their
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
Ü + V (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
project beginn Assess Langua	in the f ing of t ment o ge of a	form of programming exe he course) ffered: once a year, sumr ssessment: German. Eng	rcises (type and expe ner semester lish if agreed upon w	enditure of time to be ith the examiner	e specified by the lecturer at the
Allocat	ion of p	olaces			
Additio	nal info	ormation			
Worklo	ad				
Teachi	ıg cycl	9			
Referre	d to in	LPOI (examination regulation	s for teaching-degree progra	mmes)	
§ 73 (1)	5. Mat	hematik Angewandte Ma	thematik		
Module appears in					
Bachelor' degree (1 major) Mathematics (2008) 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) Master's degree (1 major) Technology of Functional Materials (2009) 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 subjects, simple					10-M-PRGk-082-m01
Module	coord	inator		Module offered by	
Dean of	fStudi	es Mathematik (Mathema	atics)	Institute of Mathem	atics
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
2	(not) s	successfully completed		-	
Duratio	n	Module level	Other prerequisites		
1 semester undergraduate Admission prerequisite to assessment: regular attendance (att monitored, a maximum of one incident of unexcused absence)		regular attendance (attendance of unexcused absence).			
Conten	ts				
Basics matics.	of a mo	odern programming langu	uage (e. g. C or Fortrai	n) taking into accour	nt the particular needs in mathe-
Intende	ed lear	ning outcomes			
The stu in math	dent is Iematio	able to work independents.	ntly on small program	nming exercises and	standard programming problems
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)	
P (no in	format	ion on SWS (weekly cont	act hours) and cours	e language available	2)
Methoo 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
project beginni Langua	in the ing of t ge of a	form of programming exe he course) ssessment: German, Eng	rcises (type and expe lish if agreed upon w	enditure of time to be ith the examiner	e specified by the lecturer at the
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachir	ıg cycl	e			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
§ 73 (1)	5. Mat	hematik Angewandte Ma	thematik		
Module appears in					
Bachelo	Bachelor' degree (1 major) Mathematics (2008)				
Bachelo	Bachelor' degree (1 major) Nanostructure Technology (2010)				
Bachel	or' deg	ree (1 major) Economathe	ematics (2009)		
Bachel	or deg	ree (1 major) Economathe	ematics (2008)		
Bachel	or deg	ree (1 major) Mathematic	al Physics (2009)	20)	
Bachel	n ueg nr's de	gree (1 major) Computatio	athematics (Minor 20	497 180	
First sta	ate exa	mination for the teaching	g degree Gymnasium	Mathematics (2009)	

Module title					Abbreviation	
Numeri	cal Ma	thematics 1			10-M-NM1-082-mo:	1
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)		
8	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 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					
Solutio ons, int	n of sy: terpola	stems of linear equation tion with polynomials,	ons and curve fitting pro splines and trigonome	bblems, nonlinear eq tric functions, nume	uations and system rical integration.	s of equati-
Intende	ed lear	ning outcomes				
The stu to pract	dent is tical pr	acquainted with the for oblems and knows abo	undamental concepts a out their typical fields o	nd methods in nume f application.	erical mathematics,	applies them
Course	S (type, r	number of weekly contact hour	rs, language — if other than Ger	rman)		
V + Ü (r	no infor	rmation on SWS (week	ly contact hours) and co	ourse language avail	able)	
Methoo module is	l of ass creditab	sessment (type, scope, lang le for bonus)	guage — if other than German, o	examination offered — if no	t every semester, informat	ion on whether
written by an o 2, appr Langua	examiı ral exa ox. 30 ge of a	nation (approx. 90 min mination of one candio minutes) ssessment: German, F	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 kamination in groups	n be replaced s (groups of
Allocat	ion of r	places	<u></u>			
Additio	nal inf	ormation				
Worklo	ad					
Teachi	ng cycl	e				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
§ 73 (1) 5. Mathematik Angewandte Mathematik						
Module appears in						
Bachelor' degree (1 major) Computer Science (2010)						
Bachel	or' deg	ree (1 major) Mathema	tics (2008)			
Bachel	or deg	ree (1 major) Physics (2 ree (1 major) Physics (2	2010)			
Bachel	or' deg	ree (1 major) Physics (2	2012)			
Bachelor's (2010)	with 1 maj	or Nanostructure Technology	JMU Würzburg ● ta record Bachel	generated 26-Aug-2024 • ex or (180 ECTS) Nanostrukturte	am. reg. da- chnik - 2010	page 149 / 182

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			
Numeri	cal Ma	thematics 2			10-M-NM2-082-mo	1		
Module	e 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	Only after succ. compl. 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							
Solutio nary dif	n meth fferenti	ods and applications a al equations, boundar	for eigenvalue problems y value problems.	s, linear programmin	g, initial value probl	ems for ordi-		
Intende	ed learı	ning outcomes						
The stu about t and eng	dent is heir ad gineeri	able to draw a distinc vantages and limitatic ng sciences and econo	tion between the difference of the second seco	ent concepts of num ibilities of applicatio	erical mathematics a on in different fields	and knows of natural		
Course	S (type, n	umber of weekly contact hou	rs, language — if other than Ger	rman)				
V + Ü (r	no infor	mation on SWS (week	ly contact hours) and co	ourse language avail	able)			
Methoo module is	d of ass creditab	s essment (type, scope, lan le for bonus)	guage — if other than German,	examination offered — if no	t every semester, informat	on on whether		
written by an o 2, appr 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 Inglish if agreed upon w	the lecturer, the writ ninutes) or an oral ex rith the examiner	ten examination car amination in groups	be replaced (groups of		
Allocat	ion of r	olaces	<u></u>					
Additio	nal inf	ormation						
Worklo	ad							
Teaching cycle								
Referred to in LPO I (examination regulations for teaching-degree programmes)								
§ 73 (1) 5. Mathematik Angewandte Mathematik								
Module appears 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)							
(2010)	with 1 maj	or manostructure rechnology	ta record Bachel	or (180 ECTS) Nanostrukturte	chnik - 2010	page 151 / 182		

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	
Progra	mming	course for students of M	Aathematics and othe	r subjects	10-M-PRG-082-m01	
Module	e coord	inator		Module offered by		
Dean o	f Studi	es Mathematik (Mathem	atics)	Institute of Mathem	natics	
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)		
3	(not)	successfully completed				
Duratic	n (1101) 1		Other prerequisites			
monitored, a maximum of one incident of unexcused absence).				:e).		
Conten	ts					
Basics matics.	of a mo	odern programming lang	uage (e. g. C or Fortra	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 cs.	ently 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	ion on SWS (weekly con	tact hours) and cours	e language available	2)	
Metho	d of ass	sessment (type, scope, langu	age — if other than German, o	examination offered — if no	ot every semester, informati	on on whether
module is	in the	form of programming ov		t the beginning of th		
Langua	in the ige of a	ssessment: German, En	glish if agreed upon w	ith the examiner	le course)	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teachi	ng cvcl	e	_			
		-				
Poforro	d to in	IPOL (ovamination regulation		mmoc)		
8 70 (d)		homatik Angowandto M	athomatik	inines)		
<u>873(1)</u>	5. Mai					
Dechol	e appea	IIS III roo (1 maior) Mathamati				
Bachel	or deg or deg	ree (1 major) Mathemati ree (1 major) Physics (20	(2008)			
Bachel	or deg or' deg	ree (1 major) Physics (20	(10) (10)			
Bachel	or deg or deg	ree (1 major) Physics (20	(12)			
Bachel	or' deg or' deg	ree (1 major) Physics (20	no8)			
Bachel	Bachelor' degree (1 major) Technology of Functional Materials (2000)					
Bachelor' degree (1 major) Technology of Functional Materials (2010)						
Bachelor' degree (1 major) Nanostructure Technology (2010)						
Bachelor' degree (1 major) Economathematics (2009)						
Bachel	Bachelor' degree (1 major) Economathematics (2008)					
Bachel	or' deg	ree (1 major) Mathemati	cal Physics (2009)			
Bachel	or' deg	ree (1 major) Computatio	onal Mathematics (20	09)		
Master	's degr	ee (1 major) Physics (20:	10)			
Master	's degr	ee (1 major) Technology	of Functional Material	s (2010)		
Bachelor's (2010)	with 1 maj	or Nanostructure Technology	JMU Würzburg ● ta record Bachel	generated 26-Aug-2024 • ex or (180 ECTS) Nanostrukturte	am. reg. da- chnik - 2010	page 153 / 182

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

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	
Compu	terorie	nted Mathematics			10-M-COM-082-mo	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. con	pl. of module(s)		
3	(not) s	successfully completed		•		
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate	Admission prerequi (attendance monito	site to assessment: red, a maximum of o	regular attendance o ne incident of unexo	f exercises used ab-
Conten	te	<u> </u>	sence).			
Lintrodu	LS	a madarn mathamatical	afturara far cumbalia	computation (a. a. N	Asthomatics or Man	la) and nu
merical 10-M-A lar diffe	l compi NL) and erential	utation (e. g. Matlab) to s d 10-M-LNA). Computer-b l and integral calculus; vi	supplement the basic ased solution of prob sualisation of function	modules in analysis lems in linear algeb	and linear algebra (ra, geometry, analys	((10-M-ANA or is, in particu-
Intende	ed lear	ning outcomes				
The stu fields o	dent le of appli	earns the use of advance cation to solve mathema	d modern mathemati tical problems.	cal software package	es, and is able to ass	sess their
Course	S (type, r	number of weekly contact hours,	language — if other than Ger	man)		
V + Ü (r	no infor	rmation on SWS (weekly	contact hours) and co	ourse language avail	able)	
Method module is	d of ass s creditab	Sessment (type, scope, langua le for bonus)	age — if other than German, o	examination offered — if no	t every semester, informati	on on whether
project Assess Langua	in the ment o ge of a	form of programming exe ffered: once a year, sum ssessment: German, Eng	ercises (as specified a mer semester glish if agreed upon w	it the beginning of th ith the examiner	ne course)	
Allocat	ion of p	olaces				
			-			
Additio	nal inf	ormation				
Worklo	ad					
Teachi	ng cvcl	e				
Referre	d 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)						
Bachelor' degree (1 major) Physics (2012)						
Bachel	Bachelor' degree (1 major) Physics (2008)					
Bachel	or' deg	ree (1 major) Technology	of Functional Materia	lls (2009)		
Bachel	or deg	ree (1 major) Technology	or Functional Materia	115 (2010)		
Bachel	or deg	ree (1 major) Nanostructi	ure rechnology (2010))		
Dachel	oi ueg		ematics (2009)			
Bachelor's	with 1 maj	jor Nanostructure Technology	JMU Würzburg ● ta record Bachel	generated 26-Aug-2024 • ex	am. reg. da- chnik - 2010	page 155 / 182

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

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
Modell	ing and	l Computational Science			10-M-MWR-092-m01
Module	e coord	inator		Module offered by	
Dean o	f Studie	es Mathematik (Mathema	atics)	Institute of Mathem	natics
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)	
8	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
Aspects scaling ons, fu near ec	s of ma the mo ndame Juation	thematical modelling of f odelling, asymptotic serie ntal methods for numeric s.	technical or scientific es, classical methods cal solution of partial	processes. Basic pr for solving ordinary differential equatior	inciples of modelling, aspects of and partial differential equati- is and the resulting systems of li-
Intende	ed learı	ning outcomes			
The stu and en	dent m gineeri	asters the fundamental r ng sciences on a comput	nathematical methoo er.	ds and techniques to	simulate processes from natural
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	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 prox. 2	en exaı o minu	mination (approx. 90 min tes) or c) oral examinatio	utes; usually chosen n in groups (groups c) or b) oral examinat of 2, approx. 30 minu	ion of one candidate each (ap- utes)
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	e appea	ars in			
Bachel	or' deg	ree (1 major) Nanostructu	re Technology (2010))	
Bachel	or' deg	ree (1 major) Mathematic	al Physics (2009))	
Bachel	Bachelor' degree (1 major) Computational Mathematics (2009)				

Module title					Abbreviation
Introduction to Computer Science for Students of all Faculties			es	10-I-EIN-072-m01	
Module	coord	inator		Module offered by	
Dean of	fStudie	es Informatik (Computer S	Science)	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
10	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semester undergraduate Admission prerequisite to assessment: academic requirements to in exercises as specified at the beginning of the course.			academic requirements to be met g of the course.		
Conten	ts				
Founda bases,	tions o algoritl	f computer science inclu hms and data structures,	ding representation of programming (Java).	of information and w	ebsites (HTML, XML, EBNF), data-
Intende	ed learı	ning outcomes			
The stu mation	dents a and we	are familiar with the fund ebsites (HTML, XML, EBN	amentals of compute F), databases, algorit	r science, e.g. in the hms and data struct	e areas of representation of infor- ures, programming in Java.
Course	5 (type, n	umber of weekly contact hours, la	anguage — if other than Ger	man)	
V + Ü +	Ü (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
a) writte or c) ora	en exar al exan	mination (approx. 90 min nination in groups (group	utes) or b) oral exam is of 2: 30 minutes, gr	ination of one candi oups of 3: 40 minut	date each (approx. 20 minutes) es)
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	urs in			
Bachelo	or' deg	ree (1 major) Geography ((2007)		
Bachelo	or' deg	ree (1 major) Geography ((2008)		
Bachelo	Bachelor' degree (1 major) Geography (2010)				
Bachelor' degree (1 major) Physics (2007)					
Bachelo	Bachelor' degree (1 major) Physics (2010)				
Bachelo	or' deg	ree (1 major) Physics (200	09)		
Bachelo	or deg	ree (1 major) Physics (201	12)		
Bachelo	or deg	ree (1 major) Physics (200	DOJ		
Mactor	n degi	nee (1 major) Naflostfuctu	ne rechnology (2010) a)		
Bachol	s uegn sr's der	ree (1 major) rilysics (2010 gree (1 major - 1 minor) Dia	oj gital Humanities (Min	or 2000)	
Bachelo	or's de	gree (2 majors) Digital Hu	imanities (2009)	, 2003)	

Module title					Abbreviation
Current	Current Topics in Nanostructure Technology				11-BXN5-112-m01
Module	e coord	inator		Module offered by	
chairpe	erson o	f examination committee		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	undergraduate	Approval by examination	ation committee req	uired.
Conten	ts				
Current or stud	topics y abroa	of Experimental Physics. ad.	Accredited academi	c achievements, e.g.	in case of change of university
Intende	ed lear	ning outcomes			
The stu Techno nology ledge.	dents l logy of or nan They ar	have advanced competer the Bachelor's programn o sciences and understar e able to classify the sub	ncies corresponding t ne. They have knowle nd the measuring and ject-specific contexts	o the requirements of edge of a current sub l evaluation method s and know the appli	of a module of Nanostructure discipline of nanostructure tech- s necessary to acquire this know- cation areas.
Course	S (type, r	number 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	urse language avail	able)
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
a) writt in grou weeks) Langua	en exaı ps (apı or d) p ge of a	mination (approx. 120 mi prox. 30 minutes per cano resentation/seminar pre ssessment: German, Eng	nutes) or b) oral exan didate) or c) project re sentation (approx. 3c lish	nination of one cand eport (approx. 8 to 10 o minutes)	lidate each or oral examination o pages, time to complete: 1 to 4
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				
Bachel	or' deg	ree (1 major) Nanostructu	re Technology (2010)		
Bachelor' degree (1 major) Nanostructure Technology (2012)					

Module title					Abbreviation
Current	Current Topics in Nanostructure Technology				11-BXN6-112-m01
Module	e coord	inator		Module offered by	
chairpe	erson o	f examination committee		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	undergraduate	Approval by examination	ation committee req	uired.
Conten	ts				
Current or stud	topics y abroa	of Experimental Physics. ad.	Accredited academi	c achievements, e.g.	in case of change of university
Intende	ed leari	ning outcomes			
The stu Techno nology ledge.	dents l logy of or nan They ar	nave advanced competer the Bachelor's programr o sciences and understar e able to classify the sub	ncies corresponding t ne. They have knowle nd the measuring and ject-specific contexts	o the requirements or edge of a current sub l evaluation method s and know the appli	of a module of Nanostructure discipline of nanostructure tech- s necessary to acquire this know- cation areas.
Course	S (type, n	number 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	urse language avail	able)
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
a) writt in grou weeks) Langua	en exaı ps (apr or d) p ge of a	mination (approx. 120 mi prox. 30 minutes per cano resentation/seminar pre ssessment: German, Eng	nutes) or b) oral exan didate) or c) project re sentation (approx. 3c lish	nination of one cand eport (approx. 8 to 10 o minutes)	lidate each or oral examination o pages, time to complete: 1 to 4
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				
Bachel	or' deg	ree (1 major) Nanostructu	re Technology (2010)		
Bachelor' degree (1 major) Nanostructure Technology (2012)					

Module title					Abbreviation
Current	Current Topics in Nanostructure Technology				11-BXN8-112-m01
Module	e coord	inator		Module offered by	
chairpe	erson o	f examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
8	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate	Approval by examination	ation committee req	uired.
Conten	ts				
Current or stud	topics y abroa	of Experimental Physics. ad.	Accredited academi	c achievements, e.g.	in case of change of university
Intende	ed lear	ning outcomes			
The stu Techno nology ledge.	dents l logy of or nan They ar	have advanced competer the Bachelor's programn o sciences and understar e able to classify the sub	ncies corresponding t ne. They have knowle nd the measuring and ject-specific contexts	o the requirements o edge of a current sub I evaluation method 5 and know the appli	of a module of Nanostructure discipline of nanostructure tech- s necessary to acquire this know- cation areas.
Course	S (type, r	number 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	urse language avail	able)
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
a) writt in grou weeks) Langua	en exaı ps (apı or d) p ge of a	mination (approx. 120 mi prox. 30 minutes per cano resentation/seminar pre ssessment: German, Eng	nutes) or b) oral exan didate) or c) project re sentation (approx. 3c lish	nination of one cand eport (approx. 8 to 10 o minutes)	lidate each or oral examination o pages, time to complete: 1 to 4
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	ars in			
Bachel	or' deg	ree (1 major) Nanostructu	re Technology (2010)		
Bachelor' degree (1 major) Nanostructure Technology (2012)					

Module	title				Abbreviation
Introdu	ction t	o LabVIEW			11-LVW-092-m01
Module	coord	inator		Module offered by	
Managi	ng Dire	ector of the Institute of Ap	oplied Physics	Faculty of Physics a	and Astronomy
ECTS	Metho	od of grading	Only after succ. com	ipl. 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		<u>.</u>		
The module comprises basic and advanced courses. The basic course "NI LabVIEW Basic 1" is the first level of each LabVIEW learning phase. LabVIEW Basic provides a systematic introduction to the functions and application fields of the development environment of LabVIEW. The students become acquainted with dataflow programming and with common LabVIEW architectures. They learn to develop LabVIEW applications for various application fields, from assessment and measurement applications up to data collection, device control, data recording and measurement analysis. In the advanced course "NI LabVIEW Core 2", the students learn to develop comprehensive standalone applications, including the graphical development environment LabVIEW. The course builds upon LabVIEW Basic 1 and provides an introduction to the most common development technologies, in order to enable the students to successfully implement and distribute LabVIEW applications for different application fields. Course topics include techniques and procedures for the optimisation of application performance, e.g. through an optimised reuse of existing codes, usage of file I/O functions, principles of data management, event computing and methods of error handling. After finishing the course, the students have the ability to apply Lab-VIEW functions according to individual requirements, which enables a fast and productive application develop-					
Intende	ed learn	ning outcomes			
The stu les of w ta.	dents l orking	nave specific and advanc with LabVIEW and are at	ed knowledge in the ble to develop applica	application field of l ations, e.g. for record	LabVIEW. They know the princip- ding and analysing measuring da-
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	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	ot 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) or e) project (approx. 60 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		Jaces			

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) Nanostructure Technology (2010)

Master's degree (1 major) Physics (2010)

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)

Module title					Abbreviation	
Statist	Statistics, Data Analysis and Computer Physics 11-SDC-092-m01					
Modul	e coord	inator		Module offered by		
Manag	ing Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
4	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 semester graduate		Certain prerequisite sessment. The lectur at the beginning of t 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.			
Conter	nts					
Statist	ics, dat	a analysis and comput	er physics.			
Intend	ed lear	ning outcomes				
The stu Physic	udents s.	have specific and adva	nced knowledge in the	field of statistics, da	ata analysis and Com	nputational
Course	S (type, r	number of weekly contact hour	s, language — if other than Gei	rman)		
R + V (I	no infor	mation on SWS (weekl	y contact hours) and co	ourse language avail	able)	
Metho module i	d of ass s creditab	sessment (type, scope, lang le for bonus)	guage — if other than German,	examination offered — if no	t every semester, informat	ion 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						amination in nutes) or c) esentation sessment demic and
Allocat	tion of p	olaces				
Additio	onal inf	ormation				
WOFKIC						
Peferred to in LDO L (
 Modulo appears in						
Bachel	or' dea	ree (1 major) Physics (2	2010)			
Bachel	or' deg	ree (1 major) Physics (2	2012)			
Bachelor's (2010)	with 1 ma	or Nanostructure Technology	JMU Würzburg ● ta record Bachel	generated 26-Aug-2024 • ex or (180 ECTS) Nanostrukturte	am. reg. da- chnik - 2010	page 164 / 182

UNIVERSITÄT WÜRZBURG
Bachelor' degree (1 major) Nanostructure Technology (2010)
Bachelor' degree (1 major) Nanostructure Technology (2012)
Bachelor' degree (1 major) Mathematical Physics (2009)
Bachelor' degree (1 major) Mathematical Physics (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) 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)

Julius-Maxi

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

Master's degree (1 major) Computational Mathematics (2012)

Module title					Abbreviation		
Compu	tationa	l Physics		11-A1-092-m01			
Module	e coord	inator		Module offered by	ered by		
Managi and Ast	ing Dire trophys	ector of the Institute of sics	Theoretical Physics	Faculty of Physics a	and Astronomy		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
6	nume	rical grade					
Duratio	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						
 Introduction to programming on the basis of C++ / Java /Mathematica numerical solution of differential equations simulation of chaotic systems generation of random numbers random walk many-particle processes and reaction diffusion model Intended learning outcomes The students have knowledge of two major programming languages and know algorithms important for Physics. They have knowledge of numerical standard methods and are able to apply computer-assisted processes to the solution of physical problems, e.g. algorithms for solving numerical problems of Physics. Courses (type, number of weekly contact hours, language – if other than German) V + Ü (no information on SWS (weekly contact hours) and course language available) Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) written examination (approx. 120 minutes) 							
examin	ation r	egulations) 2009.		cion 32 Subsection			
Allocat	ion of p	olaces					
Only as	part o	f pool of general key sl	kills (ASQ): 15 places. P	laces will be allocate	ed by lot.		
Additio	nal inf	ormation					
Workload							
Teaching cycle							
Referre	d to in	LPOI (examination regulation	ons for teaching-degree progra	mmes)			
Bachelor's (2010)	with 1 maj	or Nanostructure Technology	JMU Würzburg • ta record Bachel	generated 26-Aug-2024 • ex or (180 ECTS) Nanostrukturte	am. reg. da- chnik - 2010	page 166 / 182	

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) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Mathematical Physics (2012) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)

Module	e title				Abbreviation	
Statistics, Data Analysis and Computer Physics				11-SDC-131-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)		
4	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 semesters.				
Conten	ts					
Statisti	cs, dat	a analysis and computer	physics.			
Intende	ed learı	ning outcomes				
The stu Physics	dents l 5.	nave specific and advanc	ed knowledge in the	field of statistics, da	ata analysis and Computational	
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V + R (n	io 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 in grou weeks) Assess and wil examin Langua	en exar ps (app or d) p ment o l be an ation r ge of a	mination (approx. 90 min prox. 30 minutes per cano resentation/seminar pre ffered: When and how of nounced in due form uno egulations) 2009. ssessment: German, Eng	utes) or b) oral exam didate) or c) project re sentation (approx. 30 ten assessment will b der observance of Sec dish	ination of one candi eport (approx. 8 to 10 o minutes) oe offered depends o ction 32 Subsection	date each or oral examination o pages, time to complete: 1 to 4 on the method of assessment 3 ASPO (general academic and	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	Workload					
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	e appea	irs in				
Bachel Bachel	or' deg or' deg	ree (1 major) Nanostructu ree (1 major) Nanostructu	ıre Technology (2010) ıre Technology (2012))		



Thesis (10 ECTS credits)

The grade awarded for the thesis will count double in the calculation of the overall grade of the Bachelor's degree.

Module title					Abbreviation
Bachelor Thesis Nanostructure Technology11-BA-N-072-m01					11-BA-N-072-m01
Module	e coord	inator		Module offered by	
chairpe	erson o	f examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
10	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
Mostly techno	indepe logy, es	ndent processing of an e specially according to kno	xperimental, theoret own procedures and	ical or engineering ta scientific aspects; w	ask in the field of nanostructure riting of the Bachelor's thesis.
Intende	ed lear	ning outcomes			
The stu structu scientif	idents a re tech fic aspe	are able to independently nology under the guidance ects and to summarise th	/ work on an experim ce of a supervisor, es eir results in a final p	ental, theoretical an pecially in accordan aper.	d engineering task from nano- ce with known methods and
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)	
no cou	rses as	signed			
Method 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	thesis	(approx. 25 pages)			
Allocat	ion of p	olaces			
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) Nanostructure Technology (2010) Bachelor' degree (1 major) Nanostructure Technology (2012) Bachelor' degree (1 major) Nanostructure Technology (2008) Bachelor' degree (1 major) Nanostructure Technology (2007)					



Subject-specific Key Skills

(16 ECTS credits)

Successful completion of module 11-IP is mandatory; the grade achieved in module 11-IP will factor into the grade awarded for the area of transferable skills with a weighting of 5/10. Successful completion of at least one additional module worth no less than 6 ECTS credits is required; the grade achieved in this additional module will factor into the grade awarded for the area of transferable skills with a weighting of 5/10. Modules that were accredited in the specialisation Analytik und Messtechnik (Analytics and Measurement Technology) cannot be accredited in the area of subject-specific transferable skills and vice versa.



Industrial Work Placement

(10 ECTS credits)

Successful completion of module 11-IP is mandatory; the grade achieved in module 11-IP will factor into the grade awarded for the area of transferable skills with a weighting of 5/10.

Module title			Abbreviation		
Industrial Practical Course Nanostructure Technology			ure Technology		11-IP-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)	
10	nume	rical grade	11-EIN and 11-KP		
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				
Insights and tas	s into ii sks in a	ndustrial methods, work report and an oral prese	processes, goals and ntation.	production method	s. Summary of own experiences
Intende	ed learı	ning outcomes			
The stu ce to na	dents l anostru	have knowledge and prac acture technology and are	ctical experience of use able to summarise t	sing a variety of indu heir experience in a	Istrial technologies with relevan- report and an oral presentation.
Course	S (type, n	number of weekly contact hours, l	anguage — if other than Ger	man)	
P + S (n	io 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
a) place Assess and wil examin	ement i ment o l be an ation r	report and b) presentatio ffered: When and how of nounced in due form unc egulations) 2009.	n/seminar presentat ten assessment will b der observance of Sec	on (approx. 30 to 90 be offered depends o tion 32 Subsection ;	o minutes), weighted 1:4 on the method of assessment 3 ASPO (general academic and
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Workload					
reaching cycle					
Peferred to in LPO L (evention regulations for the shifts descent and an and a second					
Module appears in					
Bachel	or' deg	ree (1 major) Nanostructu	ire Technology (2010)		
Bachel	Bachelor' degree (1 major) Nanostructure Technology (2012)				



Compulsory Electives

(6 ECTS credits)

Successful completion of at least one additional module worth no less than 6 ECTS credits is required; the grade achieved in this additional module will factor into the grade awarded for the area of transferable skills with a weighting of 5/10. Modules that were accredited in the specialisation Analytik und Messtechnik (Analytics and Measurement Technology) cannot be accredited in the area of subject-specific transferable skills and vice versa.

Module title				Abbreviation		
Key Qualifications for Students of Nanostructure Technolo				<u>sy</u>	11-NFSQ5-112-m01	
Module	e coord	inator		Module offered by		
chairpe	erson o	f examination committee		Faculty of Physics a	ind Astronomy	
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	undergraduate	Approval by examin	ation committee req	uired.	
Conten	ts					
Subjec	t comp	etencies for students of r	anostructure techno	logy.		
Intend	ed lear	ning outcomes				
The stu ture teo techno and kn	เdents chnolog logy an ow the	have subject-specific con gy of the Bachelor's progr d the required understan application areas.	npetencies correspor amme. They have kn Iding of this topic. Th	nding to the requiren owledge of a current ey are able to classi	nents of a module of nanostruc- subdiscipline of nanostructure fy the subject-specific contexts	
Course	S (type, r	number 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	ourse language avail	able)	
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	ot every semester, information on whether	
a) writt in grou weeks) Langua	en exai ps (app or d) p ige of a	mination (approx. 120 mi prox. 30 minutes per cano resentation/seminar pre ssessment: German, Eng	nutes) or b) oral exar didate) or c) project re sentation (approx. 3c lish	nination of one cand eport (approx. 8 to 10 o minutes)	lidate each or oral examination o pages, time to complete: 1 to 4	
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	e appea	urs in				
Bachel	or' deg	ree (1 major) Nanostructu	ire Technology (2010))		

Module title					Abbreviation	
Key Qualifications for Students of Nanostructure Technolog				<u>s</u> y	11-NFSQ6-112-m01	
Module	e coord	inator		Module offered by		
chairpe	erson o	f examination committee	_	Faculty of Physics a	and Astronomy	
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)		
6	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	undergraduate	Approval by examin	ation committee req	uired.	
Conten	ts					
Subjec	t comp	etencies for students of r	anostructure techno	logy.		
Intende	ed lear	ning outcomes				
The stu ture teo techno and kn	idents chnolog logy an ow the	have subject-specific con gy of the Bachelor's progr d the required understar application areas.	npetencies correspor amme. They have kn iding of this topic. Th	nding to the requiren owledge of a current ey are able to classi	nents of a module of nanostruc- t subdiscipline of nanostructure fy the subject-specific contexts	
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)		
V + R (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)	
Method module is	d of ass s creditab	sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, information on whether	
a) writt in grou weeks) Langua	en exai ps (app or d) p ige of a	mination (approx. 120 mi prox. 30 minutes per cand resentation/seminar pre ssessment: German, Eng	nutes) or b) oral exar didate) or c) project re sentation (approx. 30 lish	nination of one cand eport (approx. 8 to 10 o minutes)	lidate each or oral examination o pages, time to complete: 1 to 4	
Allocat	ion of p	olaces				
Additio	onal inf	ormation				
Worklo	ad					
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	e appea	ars in				
Bachel	or' deg	ree (1 major) Nanostructu	ire Technology (2010))		

Module	e title				Abbreviation	
Nanoanalytics 11-NAN-092-				11-NAN-092-m01		
Module	e coord	inator		Module offered by		
Manag	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	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					
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 officiency of different re-						
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
R + V (r	no infor	mation on SWS (weekly o	contact hours) and co	urse language availa	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) 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)				
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	
Biophysical Measurement Technology in Medical Science					11-BMT-092-m01	
Module	e coord	inator		Module offered by		
Manag	ing Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semester graduat		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 lec topics a sound image	ture co are con and MF 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- ınd digital
Intende	ed lear	ning outcomes				
The stu derstar images	idents l nd the p	know the physical prin orinciples of image ger	ciples of imaging techn leration and are able to	iques and their appl explain different tec	ication in Biomedici hniques and interpr	ne. They un- et simple
Course	S (type, r	number of weekly contact hour	s, language — if other than Ge	rman)		
R + V (r	no infor	mation on SWS (weekl	y contact hours) and co	ourse language avail	able)	
Method 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) 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.						amination in iutes) or c) esentation sessment demic and
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Bachelor's (2010)	with 1 ma	jor Nanostructure Technology	JMU Würzburg • ta record Bachel	generated 26-Aug-2024 • ex or (180 ECTS) Nanostrukturte	am. reg. da- chnik - 2010	page 179 / 182

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 (2011) Master's degree (1 major) FOKUS Physics (2012)
Module title					Abbreviation	
Laboratory and Measurement Technology in Biophysics					11-LMB-092-m01	
Module coordinator				Module offered by		
Managing Director of the Institute of A			pplied Physics Faculty of Physics and Astronomy			
ECTS Method of g		od of grading	Only after succ. compl. of module(s)			
6 numerical 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 anew.			
Contents						
The lecture covers relevant principles of molecular and cellular biology as well as the physical principles of bio- physical procedures for the examination and manipulation of biological systems. The main topics are optical measuring techniques and sensors, methods of single-particle detection, special microscoping techniques and methods of structure elucidation of biomolecules.						
Intended learning outcomes						
The students know the principles of molecular and cellular biology as well as the physical principles of biophy- sical procedures for the examination and manipulation of biological systems. They have knowledge of optical measuring techniques and their applications and are able to apply techniques of structure elucidation to simple biomolecules						
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)						
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)						
a) written examination (approx. 90 minutes) or b) oral examination of one candidate each 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)