

Subdivided 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: 2012 Responsible: Faculty of Physics and Astronomy

JMU Würzburg • generated 26-Aug-2024 • exam. reg. data record 82|224|-|-|H|2012



Course of Studies - Contents and Objectives

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)):

28-Nov-2012 (2012-184) except for mandatory electives added in Fast Track procedure at a later time

04-Nov-2014 (2014-72)

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.

The subject is divided into

Abbreviation	Module title	ECTS credits	Method of grading	pag			
Compulsory Courses (92	ECTS credits)						
Nanostructure Technolo	gy (NP) (10 ECTS credits)						
11-EIN-092-m01	Introduction to Nanoscience	6	NUM	74			
11-HSN-122-m01	Advanced Seminar Nanostructure Technology	4	NUM	85			
Chemistry (CH) (10 ECTS credits)							
08-CP1-102-m01	General Chemistry for Physics and Engineers	10	NUM	27			
Experimental Physics (E	X) (32 ECTS credits)		<u>.</u>				
	Classical Physics (Mechanics, Thermodynamics, Waves, Oscil-	_		1			
11-KP-092-m01	lations, Electricity, Magnetism and Optics)	16	NUM	91			
11-KM-092-m01	Condensed Matter (Quanta, Atoms, Molecules, Solid State Physics)	16	NUM	89			
Lab Course Physics (PP)	(13 ECTS credits)		<u>.</u>				
Modules in this area will	not factor into the overall grade of the Bachelor's degree.			·			
11-P-PA-112-m01	Lab Course A	5	B/NB	11			
11-P-NB-122-m01	Laboratory Course Nanostructure Technology B	4	B/NB	11			
11-P-NC-122-m01	Advanced Laboratory Course Nanostructure Technology C	4	B/NB	11			
Mathematics (M) (24 EC	TS credits)						
10-M-NST12-092-m01	Mathematics 1 and 2 for students in Nanostructure Technology	16	NUM	4			
11-MPI3-062-m01	Mathematics 3 for students of Physics and Engineering	8	NUM	97			
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11-NTE-092-m01	Nanotechnology in Energy Research	4	NUM	104
11-TDO-092-m01	Thermodynamics and Economics	6	NUM	128
11-TMS-102-m01	Introduction to Functional Materials	5	NUM	134
11-BVG-092-m01	Coating Technologies based on Vapour Deposition	5	NUM	64
11-ZMB-112-m01	Methods for non-destructive Characterization of Materials and Components	4	NUM	139
11-ZDR-111-m01	Principles of two- and threedimensional Röntgen imaging	6	NUM	137
11-ASL-092-m01	Applied Superconduction	6	NUM	55
08-EEW-122-m01	Electrochemical Energy Storage and Conversion	5	NUM	32
08-CT-122-m01	Molecular Materials (Lecture and practical course)	10	NUM	29
08-CTO-122-m01	Molecular Materials for Students of Nanostructure Technology	5	NUM	31
08-NT-122-m01	Chemically and bio-inspired Nanotechnology for Material Syn- thesis	5	NUM	37
08-PCM3-102-m01	Nanoscale Materials		NUM	39
08-FS1-122-m01	Material Science 1 (basic introduction)	5	NUM	33
08-FS2-122-m01	Material Science 2 (the material groups)	5	NUM	34
08-FS5-101-m01	Chemical Nanotechnology: Analytics and Applications	5	NUM	35
11-BXN5-112-m01	Current Topics in Nanostructure Technology	5	NUM	66
11-BXN6-112-m01	Current Topics in Nanostructure Technology	6	NUM	67
11-BXN8-112-m01	Current Topics in Nanostructure Technology	8	NUM	68
11-TDOE-141-mo1	Thermodynamics and Economics		B/NB	130
11-BSV-122-m01	Image and Signal Processing in Physics	3	NUM	60
11-BXP5-112-m01	Current Topics in Physics		NUM	69
11-BXP6-112-m01	Current Topics in Physics	5	NUM	70
11-BXP8-112-m01	Current Topics in Physics	8	NUM	· ·
11-BSV-131-m01	Image and Signal Processing in Physics	6	NUM	71 62
11-PMM-132-m01	Physics of Advanced Materials	6	NUM	108
Life Science	ritysics of Auvaliced Materials	0	NOM	108
11-BMT-092-m01	Biophysical Measurement Technology in Medical Science	6	NUM	-0
	Laboratory and Measurement Technology in Biophysics	6		58
11-LMB-092-m01 03-NS-FBM-102-m01	Functional Biomaterials for Students of Nanostructure Techno- logy and Science	5	NUM	93 8
07-4BFMZ5N-102-m01	Biotechnology 1 for Nanostructure Technology		NUM	10
07-4BFPS2N-102-m01	Membrane Biology for advanced students for Nanostructure	5	NUM	10
	Technology			
07-4S1MZ4N-102-m01	Methods in Biotechnology for Nanostructure Technology	5	NUM	15
07-4S1MZ5N-102-m01	Molecular Biotechnology for Nanostructure Technology	5	NUM	17
07-BTNST-102-m01	Basics in Biotechnology	2	NUM	23
07-4S1MZ6-102-m01	Special Bioinformatics 1		NUM	19
07-4S1MZ1-102-m01	Basics in Light- and Electron-Microscopy		NUM	13
07-5S2MZ4-102-m01	Specific Biotechnology 2	10	NUM	21
08-BC-092-m01	Biochemistry	6	NUM	25
08-BC-LAGY-092-mo1	Biochemistry (teaching degree for secondary schools)	3	NUM	26
11-BXN5-112-m01	Current Topics in Nanostructure Technology	5	NUM	66
11-BXN6-112-m01	Current Topics in Nanostructure Technology	6	NUM	67
11-BXN8-112-m01	Current Topics in Nanostructure Technology	8	NUM	68
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11-BXP5-112-m01	Current Topics in Physics	5	NUM	6
11-BXP6-112-m01	Current Topics in Physics	6	NUM	7
11-BXP8-112-m01	Current Topics in Physics	8	NUM	7
Experimental Physics				
11-PKS-092-m01	Physics of Complex Systems	6	NUM	10
11-MSS-102-m01	Methods in Surface Spectroscopy	4	NUM	10
11-FKS-092-m01	Solid State Spectroscopy	6	NUM	7
11-HLP-092-m01	Semiconductor Physics	6	NUM	8
11-MAG-092-m01	Magnetism	6	NUM	9
11-BXN5-112-m01	Current Topics in Nanostructure Technology	5	NUM	6
11-BXN6-112-m01	Current Topics in Nanostructure Technology	6	NUM	6
11-BXN8-112-m01	Current Topics in Nanostructure Technology	8	NUM	6
11-BXP5-112-m01	Current Topics in Physics	5	NUM	6
11-BXP6-112-m01	Current Topics in Physics	6	NUM	7
11-BXP8-112-m01	Current Topics in Physics	8	NUM	7
Theoretical Physics				
11-TM-092-m01	Theoretical Mechanics	8	NUM	13
11-ED-092-m01	Theoretical Electrodynamics	8	NUM	7
11-QM2-092-m01	Quantum Mechanics II	8	NUM	11
11-BXN5-112-m01	Current Topics in Nanostructure Technology	5	NUM	6
11-BXN6-112-m01	Current Topics in Nanostructure Technology	6	NUM	6
11-BXN8-112-m01	Current Topics in Nanostructure Technology	8	NUM	6
11-BXP5-112-m01	Current Topics in Physics	5	NUM	6
11-BXP6-112-m01	Current Topics in Physics	6	NUM	7
11-BXP8-112-m01	Current Topics in Physics	8	NUM	7
Technical Lab Course an	d Computer-aided Methods			
11-A2-092-m01	Electronics	6	NUM	5
11-PPT-092-m01	Practical Course Physical Technology of Material Synthesis	5	B/NB	11
11-A1-092-m01	Computational Physics	6	NUM	4
11-A3-072-m01	Laboratory and Measurement Technology	6	NUM	5
10-M-NUW-122-m01	Numerical Mathematics 1 for Economathematics	10	NUM	4
10-M-PRG-122-m01	Programming course for students of Mathematics and other subjects	3	B/NB	4
10-I-EIN-111-m01	Introduction to Computer Science for Students of all Faculties	10	NUM	4
10-M-COM-122-m01	Computational Mathematics	4	B/NB	4
10-M-MWR-122-m01	Modelling and Computational Science	10	NUM	4
11-MPI4-062-m01	Mathematics 4 for Students of Physics and Engineering	8	NUM	9
11-BXN6-112-m01	Current Topics in Nanostructure Technology	6	NUM	6
11-BXN5-112-m01	Current Topics in Nanostructure Technology	5	NUM	6
11-BXN8-112-m01	Current Topics in Nanostructure Technology		NUM	6
11-BXP5-112-m01	Current Topics in Physics		NUM	6
11-BXP6-112-m01	Current Topics in Physics		NUM	7
11-BXP8-112-m01	Current Topics in Physics	8	NUM	7
11-SDC-131-m01	Statistics, Data Analysis and Computer Physics	4	NUM	12
	Statistics, Data Analysis and Computer Physics	4	NUM	12

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

11-BA-N-072-m01	Bachelor Thesis Nanostructure Technology	10	NUM	57			
Subject-specific Key Skills (16 ECTS credits)							
11-P-MR-092-m01	Mathematical Methods of Physics		B/NB	109			
11-IP-092-mo1 Industrial Practical Course Nanostructure Technology		10	NUM	88			

Module	e title				Abbreviation
Functio	onal Bio	omaterials for Students o	of Nanostructure Tech	nology and Science	03-NS-FBM-102-m01
Module	e coord	inator		Module offered by	
holder Dentist		Chair of Functional Mater	rials in Medicine and	Faculty of Medicine	
ECTS	ŕ	od of grading	Only after succ. com	pl. of module(s)	
5		rical grade		• • • •	
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate	<u> </u>		
Conten	ts				
		principles and specific k with surface modificatior			neering sciences in the field of
Intende	ed lear	ning outcomes			
		e developed an advanced with a particular focus o			ea or technology focus of engi-
Course	s (type	, number of weekly conta	act hours, language –	· if other than Germa	in)
compo • 0	nent. 93-NS-F	BM-1-102: V (no informa	tion on SWS (weekly o	contact hours) and c	sted separately for each module ourse language available) nd course language available)
Metho	d of as		anguage — if other tha	an German, examina	tion offered — if not every seme-
	iless st	ated otherwise, success			e components as specified be- successful completion of all indi
Techno 3 w a Assess Functio 2 p rd	ECTS, ritten minati ment i ECTS, ECTS, laceme eport /	nd Science Method of grading: num examination (approx. 90 on in groups (approx. 30 n module component 03 omaterials Method of grading: (not) ent report / fieldwork re report on technical cour	erical grade o to 120 minutes) or o minutes) - NS-FBM-2-102: Spec o successfully complet port / report on pract	ral examination of c ial Topics in Function ted ical training / repor	or Students of Nanostructure one candidate each or oral ex- nal Biomaterials Special Topics i t on practical course / project
Allocat	ion of _l	places			
Additio	nal inf	ormation			
Worklo	ad				
Teachi	ng cycl	e			
Referre	d to in	LPOI (examination regu	ulations for teaching-o	legree programmes)	
Module	e appea	ars in			
Bachol	or' dog	ree (1 major) Nanostruct	uro Tochnology (2010)		

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



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

Modul	e title				Abbreviation	
Biotec	hnology	1 for Nanostructure T	echnology		07-4BFMZ5N-102-m01	
Modul	e coord	inator		Module offered by	<u> </u>	
		Chair of Biotechnology		Faculty of Biology		
ECTS		od of grading	Only after succ. con	, ,,		
5	nume	rical grade		-		
Duratio	on	Module level	Other prerequisites			
1 seme	ester	undergraduate	By way of exception assessments.	, additional prerequ	isites are listed in the sec	tion on
Conter	nts					
During	this pra	actical course, student	s will acquire an insigh	t into a variety of top	oics in biotechnology.	
Intend	ed learı	ning outcomes				
Studer	nts are a	able to apply advanced	methods in biotechno	logy.		
Course	es (type	, number of weekly cor	itact hours, language –	- if other than Germa	an)	
This m	odule c	omprises 2 module co	mponents. Information	on courses will be li	isted separately for each n	nodule
compo						
					course language available course language availabl	
					ation offered — if not every	
			can be chosen to earn		ation onered — if not every	seme-
Assess Techno • 2 • F • 7 • 4 • 0 • 0 • 0 • 4 • 0 • 1 • 5 • 7 • 4 • 0 • 1 • 5 • 6 • 1 • 6 • 6 • 7 • 7 • 7 • 7 • 7 • 7 • 7 • 7 • 7 • 7	ology 4 ECTS, olaceme report / Assessn Other pr sment ir 1 ECTS, I oresenta	module component of Method of grading: numerication ent report / fieldwork report on technical com- nent offered: once a year rerequisites: Admission module component of Method of grading: (no ation/seminar presenta- nent offered: once a year	merical grade report / report on pract urse (approx. 10 to 20 p ar, summer semester n prerequisite to assess 7-4BFMZ5N-2-102: Biot t) successfully complet ation (approx. 20 to 30	ical training / repor bages) sment: regular atten technology 1 Semina red	tory Practice for Nanostruc t on practical course / pr dance of placement. ar für Nanostructure Techn	oject
			abox of applications av	and the number of	availabla placas, placas u	illho
allocat places course are allo of the i	ted by lo , there v es of a m ocated l respect	ot. Should there be, wit will be a uniform regula nodule component that by lot, applicants who	thin one module compo ation for the courses of are concerned will be already have successfu	onent, several course one module compor allocated in a standa lly completed at lea	available places, places w es with a restricted numbe nent. In this case, places o ardised procedure. When st one other module comp will be maintained and pla	er of on all places oonent
Additio	onal inf	ormation				
Worklo	oad					
Teel	ing cycl	<u></u>				
reachi	0.7.					
	0 , .					
		or Nanostructure Technology	IMU Würzburg •	generated 26-Aug-2024 • ex	am. reg. da- nage	2 10 / 139

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)

Module	e title				Abbreviation	
Membr	ane Bio	ology for advanced stude	ents for Nanostructur	e Technology	07-4BFPS2N-102-m01	
Module	e coord	inator		Module offered by	· · · · · · · · · · · · · · · · · · ·	
holder	of the (Chair of Plant Physiology		Faculty of Biology		
ECTS		od of grading	Only after succ. con	npl. of module(s)		
5	L	rical grade				
Duratio		Module level	Other prerequisites			
1 seme	ster	undergraduate			regular attendance of exercises	
			as well as successin		respective exercises.	
Conten						
method	ds with		rised. For this purpos	se, students will be i	ne transport and the biophysical ntroduced to modern methods of	
Intende	ed learı	ning outcomes				
		erstand basic membrane act plants, isolated plan			experimental methods in experi- ms.	
Course	s (type	, number of weekly conta	ct hours, language –	- if other than Germa	in)	
1) Ü + V	no infor	mation on SWS (weekly	contact hours) and co	ourse language avail	able)	
		s essment (type, scope, la on on whether module ca			tion offered — if not every seme-	
didate	each (a		oral examination in		r c) oral examination of one can- ndidates (approx. 60 minutes) or	
Allocat	ion of p	olaces				
allocate places, courses are allo of the r	ed by lo , there v s of a m ocated l respect	ot. Should there be, withi will be a uniform regulati nodule component that a by lot, applicants who ali	n one module compo on for the courses of re concerned will be ready have successfu	onent, several course one module compor allocated in a standa illy completed at leas	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	onal inf	ormation				
Worklo	Workload					
Teaching cycle						
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module	e appea	irs in				
		ree (1 major) Nanostructu	ire Technology (2010)		
	-	ree (1 major) Nanostructu				

Modul	e title			Abbreviation	
Basics in Light- and Electron-Microscopy					07-4S1MZ1-102-m01
Module coordinator Module				Module offered by	
head o	of the D	epartment of Electron	microscopy	Faculty of Biology	
ECTS	Meth	od of grading	Only after succ. co	mpl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites	5	
1 semester undergraduate Admission prerequisite to assessment: regular attendance of exerciand successful completion of the respective exercises as specified a beginning of the course.				-	
Contents					
Fundamental principles of confocal laser scanning microscopy and electron microscopy.					
Intond	Intended learning outcomes				

Intended learning outcomes

Students have acquired theoretical knowledge and practical skills in the area of light and electron microscopy.

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 can be chosen to earn a bonus)

written examination (approx. 30 to 60 minutes)

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 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, places will be allocated by lot. Quota 2 (25% of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25% of places): allocation by lot. Should the module be used only in the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits, places will be allocated according to the selection process of group 1.

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)

Nodule title				Abbreviation
Nethods in B	iotechnology for Nanostr	ucture Technology		07-4S1MZ4N-102-m01
Module coordinator			Module offered by	
older of the	Chair of Biotechnology	<u>.</u>	Faculty of Biology	
1	od of grading	Only after succ. con	npl. of module(s)	
nume	erical grade			
uration	Module level	Other prerequisites	5	
semester	undergraduate			
ontents				
icine. In par nethodology	ticular, imaging methods of biotechnology will be	as well as single-cell		ds in biotechnology and biome- e discussed. Publications on the
ntended lear	ning outcomes			
tudents are o a particula		ent-based method ir	n biotechnology and	biomedicine that is appropriate
ourses (type	e, number of weekly conta	act hours, language –	- if other than Germa	an)
• 07-4S1	MZ4N-2-102: S (no inform	ation on SWS (weekl	y contact hours) and	course language available) I course language available)
	sessment (type, scope, la ion on whether module c			ation offered — if not every seme
	tated otherwise, success			le components as specified be- successful completion of all indi
 3 ECTS, written ssessment echnology 2 ECTS, present 	Method of grading: numeramination (approx. 20	erical grade minutes) • 4S1MZ4N-2-102: Ser successfully comple ion (approx. 15 to 20	ninar Methods in Bio	ogy for Nanostructure Technology otechnology for Nanostructure
llocation 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.				
dditional in	formation			
Vorkload				
eaching cyc	le			

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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)

Module title				Abbreviation		
Molecu	Molecular Biotechnology for Nanostructure Technology 07-4S1MZ5N-102-m01					
Modul	e coord	inator		Module offered by	<u>, </u>	
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				
Durati	on	Module level	Other prerequisites	;		
1 seme	ester	undergraduate				
Contents						
Theore	tical as	pects of modern moled	ular biotechnology.			
Intend	ed lear	ning outcomes				
Studer	nts have	e acquired knowledge a	and skills in the area of	molecular biotechn	ology.	
Course	es (type	, number of weekly cor	itact hours, language –	- if other than Germa	ın)	
This m	odule c	omprises 2 module co	mponents. Information	on courses will be li	sted separately for each module	
compo						
					course language available) course language available)	
					tion offered — if not every seme	
			can be chosen to earn		luon onered — If not every serie	
					e components as specified be-	
					successful completion of all ind	
vidual	assess	ments.				
nology	,	n module component o Method of grading: nu		ects of Modern Biote	echnology for Nanostructure Tec	
• v	written e	examination (approx. 3	o minutes)			
		n module component o	7-4 S1MZ5N-2-102: Sen	ninar Modern Biotec	hnology for Nanostructure Tech	
nology		Method of grading: (no	ot) successfully comple	ted		
			ation (approx. 15 to 20			
• /	Assessn	nent offered: once a ye	ar, summer semester			
Allocat	tion of p	olaces				
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.						
Additio	Additional information					
Workload						
Teaching cycle						
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)					
Bachelor's	with 1 ma	jor Nanostructure Technology	JMU Würzburg •	generated 26-Aug-2024 • ex	am. reg. da- page 17 / 139	
(2012)			-	or (180 ECTS) Nanostrukturte		

Module appears in

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

Module title					Abbreviation
Special Bioinformatics 1					07-4S1MZ6-102-m01
Module	e coord	inator		Module offered by	
holder	ofthe	Chair of Bioinformatics		Faculty of Biology	
ECTS	Meth	od of grading	Only after succ. con	pl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	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	its				

Fundamental principles of the tree of life, fundamental principles of phylogenetics (methods and markers), fundamental principles of evolutionary biology (concepts), sequence analysis, RNA structure prediction, phylogenetic reconstruction.

Intended learning outcomes

Students are able to use software and databases for sequence analysis, RNA structure prediction and phylogenetic reconstruction.

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 can be chosen to earn a 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, places will be allocated by lot. Quota 2 (25% of places): number of subject semesters of the respective applicant;

Bachelor's with 1 major Nanostructure Technology	JMU Würzburg • generated 26-Aug-2024 • exam. reg. da-	page 19 / 139
(2012)	ta record Bachelor (180 ECTS) Nanostrukturtechnik - 2012	

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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

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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					Abbreviation	
Specif	Specific Biotechnology 2 07-5S2MZ4-102-m01					
Modu	le coord	linator		Module offered by		
holder of the Chair of Biotechnology and			and Biophysics	Faculty of Biology		
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
10	nume	rical grade				
Durati	on	Module level	Other prerequisites	i		
1 seme	ester	undergraduate	Admission prerequi	site to assessment:	regular attendance of exercises	
			and seminar as wel	and seminar as well as successful completion of the respective exercises		
			as specified at the beginning of the course.			
Conte	nts					
Under lar bio	expert techno	guidance, students wil logy, nano and microsy	l perform selected expe	eriments on the follow piomaterials and bio	ogical and biophysical topics. wing topics: cellular and molecu- sensors, high-resolution fluore- on of cells.	
Intend	led lear	ning outcomes				
Students will have acquired a knowledge of fundamental biotechnological and biophysical methods and their applications that will enable them to independently review relevant literature. In addition, they will have become acquainted with - or, where necessary, will be able to independently acquaint themselves with - biophysical me- chanisms. Students will have acquired practical experience performing experiments, using a variety of scientific tools. In the seminar, students will have acquired detailed theoretical knowledge on these experiments and will have delivered a short presentation (15 minutes) on one of the experiments they performed.						
Course	es (type	, number of weekly cor	ntact hours, language –	- if other than Germa	an)	
Ü + S ((no info	rmation on SWS (week	ly contact hours) and co	ourse language avail	able)	

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

methods of assessment: a) written examination (approx. 45 to 60 minutes) or b) log (approx. 10 to 20 pages) or c) oral examination of one candidate each (approx. 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or e) presentation (approx. 20 to 30 minutes); students will be informed about the method and length of the assessment prior to the course

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 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)

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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 with 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)

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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	e title				Abbreviation
Basics	in Biotechno	ology			07-BTNST-102-m01
Module	e coordinato	r		Module offered by	
holder	of the Chair	of Biotechnolog	ξγ.	Faculty of Biology	
ECTS	Method of	grading	Only after succ. com	npl. of module(s)	
2	numerical §	grade			
Duratio	on Mod	ule level	Other prerequisites		
1 seme	ster und	ergraduate	amination regulation ly of multiple choiced includes multiple choiced includes multiple choiced about this in due tim of questions and an PO (general academ mine which answerse nation consisting of cessfully completed asked was answered was answered corre- ly by the examination rage number of quest respective examination have correctly answ successful completion be awarded, in the p questions, the graded a minimum of 50% H ry) if they have correc- the grade ausreiched than 25% of the rest about the results of questions that was on, the number of q answered correctly H	ns), written examin e questions. If the se- noice questions, stu- ne. A minimum of tw swers in accordance ic and examination is are to be consider f multiple choice qu if a) a total of a min d correctly or if b) a ctly and the number on candidate is no n stions answered co tion for the first time ered the minimum on of the examination of the examination of the examination the grade gut (good but less than 75%, for ectly answered a min nd (sufficient) if the tof the questions a the examination, the required for succes uestions asked and by the reference group the minimum of the succes uestions asked and the university of the university of the university of the university of the university of the university of the university of the university	SPO (general academic and ex- ations can consist entirely or par- elected method of assessment idents will have to be informed wo examiners will compile the se- e with Section 16 Subsection 1 A regulations). They will also dete- ed correct. The part of the exami- estions will be considered suc- nimum of 60% of the questions minimum of 50% of questions r of questions answered correct- nore than 15% lower than the ave- rrectly by students that took the e. Examination candidates that number of questions required for ion as specified in sentence 5 wi- tion consisting of multiple choice t) if they have correctly answered the grade befriedigend (satisfact nimum of 25% but less than 50% ey have correctly answered sked. When students are informed the number of correctly answered sful completion of the examinati the average number of question oup mentioned under b) must be ty's notice boards or in another

This module will provide students with an overview of topics in biotechnology: biosensors and environmental biotechnology, microbiotechnology and nanobiotechnology, biomaterials, cryobiotechnology, bioprocess engineering and microbial biotechnology.

Intended learning outcomes

Students have become familiar with the fundamental principles of biotechnology.

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

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

Bachelor's with 1 major Nanostructure Technology	
(2012)	

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 30 minutes)

Allocation of places

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Additional information

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Workload

Teaching cycle

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

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Module appears in

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

Module	title				Abbreviation	
Bioche	Biochemistry				08-BC-092-m01	
Module	coord	inator		Module offered by		
holder of the Chair of Biochemistry				Chair of Biochemist	try	
ECTS		od of grading	Only after succ. con			
6		rical grade				
Duratio	L	Module level	Other prerequisites			
2 seme	ster	undergraduate			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 reg			
			lar attendance of exercises (usually a maximum of 2 incidents of unexc			
			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 learr	ning outcomes				
		e become familiar with th al processes in cellular s		ples of biochemistry	. They are able to describe the	
Course	s (type	, number of weekly conta	ct hours, language –	- if other than Germa	in)	
		no information on SWS (
Method	l of ass		nguage — if other tha	an German, examina	tion offered — if not every seme-	
or 90 m	inutes		tions: approx. 60 mir	nutes each) or b) oral	tten examinations: approx. 60 l examination of one candidate . 30 minutes)	
Allocat						
Additio	nal info	ormation				
Worklo	ad					
Teachir	ng cycl	e				
Referre	d to in	LPOI (examination regu	lations for teaching-o	legree programmes)		
		· · · · · ·				
Module	e appea	irs in				
	• •	ree (1 major) Chemistry (2	2010)			
		ree (1 major) Chemistry (2				
	-	ree (1 major) Nanostructu				
	-	ree (1 major) Nanostructu)		
	-	ree (1 major) FOKUS Cher	-			
master	s uegre	ee (1 major) Chemistry (2	010)			

Module tit	le			Abbreviation
Biochemis	stry (teaching degree for seco	ondary schools)		08-BC-LAGY-092-m01
Module co	ordinator		Module offered by	
holder of the Chair of Biochemistry			Chair of Biochemist	trv
	ethod of grading	Only after succ. com		
	imerical grade			
Duration	Module level	Other prerequisites		
1 semester	r undergraduate			successful completion of exerci-
			•	d at the beginning of the course
		•		fully completed) as well as regu-
			ercises (usually a ma	aximum of 2 incidents of unexcu-
		sed absence).		
Contents				
Comprising mistry.	g lectures and exercises, this	module acquaints s	tudents with the fun	damental principles of bioche-
Intended l	earning outcomes			
	nave become familiar with the emical processes in cellular s	•	ples of biochemistry	. They are able to describe the
Courses (ty	ype, number of weekly conta	ct hours, language —	· if other than Germa	n)
V + Ü (no i	nformation on SWS (weekly o	contact hours) and co	ourse language avail	able)
	assessment (type, scope, la nation on whether module ca			tion offered — if not every seme-
or 90 minu each (appr		ions: approx. 60 min amination in groups (utes each) or b) ora	tten examinations: approx. 60 l examination of one candidate . 30 minutes)
Allocation				
Additional	information			
Workload				
Teaching o	cycle			
Referred to	o in LPO I (examination regu	lations for teaching-c	legree programmes)	
§ 62 (1) 2.	Chemie "Organische und Bio	organische Chemie"		
Module ap	opears in			
Bachelor' o	degree (1 major) Physics (201	.0)		
	degree (1 major) Nanostructu			
	degree (1 major) Nanostructu			
First state	examination for the teaching	degree Gymnasium	Chemistry (2009)	

Module title		Abbreviation			
General Che	emistry for Physics and Eng	gineers		08-CP1-102-m01	
Module coordinator			Module offered by		
lecturer of th			Institute of Inorgan	ic Chemistry	
ECTS Method of grading Only after succ. compl. of module(s)					
10 num	nerical grade				
Duration	Module level	Other prerequisites			
1 semester	undergraduate				
Contents					
This module discusses the fundamental principles of both inorganic and organic chemistry. The lab course gives students the opportunity to learn essential methods and perform simple experiments.					
Intended lea	arning outcomes				
to explain b cal formulas	asic models of the structure	e of matter. They hav tions and to interpret	e developed the abil them by identifying	formation from it. They are able ity to use the language of chemi- the type of reaction. They are ab- lve them.	
	be, number of weekly conta	· · ·	•		
 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) 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) Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus) 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 o8-IOC-1-072: Organic Chemistry for students of medicine, biomedicine, dental medicine, engineering and natural science 3 ECTS, Method of grading: numerical grade written examination (approx. 60 minutes) 					
 Assessment in module component o8-CP1-3-072: General and Analytical Chemistry (lab) 2 ECTS, Method of grading: (not) successfully completed for each experiment: Vortestate (pre-experiment exams, approx. 10 minutes each), assessment of practical performance (log, 2 to 5 pages), Nachtestate (post-experiment exams, approx. 10 minutes each) Assessment offered: once a year, summer semester 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. 90 minutes) 					
Allocation o	fplaces				
Additional i	nformation				
Workload					

Teaching cycle

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

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Module appears in

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

	e title				Abbreviation	
	ular Ma	terials (Lecture and pra	ctical course)		08-CT-122-m01	
Module coordinator				Module offered by	<u> </u>	
Dean of Studies Funktionswerkstoffe (Functional Ma			(Functional Materials)		echnology of Materi	al Synthesis
			Only after succ. cor			
10		rical grade				
Duratio	on	Module level	Other prerequisites			
			By way of exception assessments.	, additional prerequ	isites are listed in th	e section on
Conten	nts					
This mo	odule c	iscusses the theoretica	l and practical princip	les of molecular and	soft materials.	
Intend	ed lear	ning outcomes				
		e developed a knowledg ge to research problems		nolecular and soft m	aterials and are able	e to apply
Course	es (type	, number of weekly cont	tact hours, language –	- if other than Germa	ın)	
compo • c • c	onent. 08-CT-1- 08-CT-2	omprises 2 module con 122: V + Ü (no informati 122: P (no information	ion on SWS (weekly co on SWS (weekly conta	ontact hours) and course ct hours) and course	urse language availa language available)	ıble))
		sessment (type, scope, on on whether module			tion offered — if not	every seme-
• 5		n module component of	B-CT-1-122: Molecular	Materials (Lecture) A	Aalaaular Matariala (
n g a u u a v a c c c a a Assess • 5 • V • V • A • L • C	present minutes minutes groups assessr want to after the Languag Other p respecti complet absence sment i 5 ECTS, Vortesta Assessr Languag Other p	Method of grading: num ation (approx. 30 minut i; 2 written examination each) or b) oral examina- (groups of 2, approx. 30 nent, all assessments w make changes to the wa estart of the course at the ge of assessment: Germ rerequisites: Admission ve classes as specified a ed) as well as regular a es). n module component of Method of grading: (not ate (pre-experiment examinent offered: once a year ge of assessment: Germ rerequisites: Admission	nerical grade es) and a) 1 to 3 written is: approx. 60 or 90 n ation of one candidate minutes). Should a m vill be equally weighten an which assessmen e latest and must comm an or English prerequisite to asses at the beginning of the ttendance of exercise B-CT-2-122: Molecular c) successfully comple ms, approx. 15 minute ar, winter semester an or English	n examinations (1 w ninutes each; 3 writ each (approx. 20 mi odule component co ed, unless otherwise ts are weighted, he c nunicate this to stud ssment: successful o course (usually 70% s (usually a maximu Materials (Practical ted s each) and logs (ap	ritten examination: a ten examinations: a nutes) or c) oral exan omprise more than o specified; should th or she must do so by ents in an appropriat completion of exerci of exercises to be su m of 2 incidents of u course) prox. 5 pages each)	approx. 90 approx. 60 nination in one graded he lecturer two weeks te manner. ises in the uccessfully unexcused
n 8 4 • L • C 7 7 6 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	present minutes minutes groups assessr want to after the Languag Other p respecti complet absence sment i 5 ECTS, Vortesta Assessr Languag	ation (approx. 30 minut i; 2 written examination each) or b) oral examina- (groups of 2, approx. 30 nent, all assessments w make changes to the wa estart of the course at the ge of assessment: Germ rerequisites: Admission ve classes as specified a red) as well as regular a e). n module component of Method of grading: (not ate (pre-experiment exam- nent offered: once a yea ge of assessment: Germ rerequisites: Admission	nerical grade es) and a) 1 to 3 written is: approx. 60 or 90 n ation of one candidate minutes). Should a m vill be equally weighten an which assessmen e latest and must comm an or English prerequisite to asses at the beginning of the ttendance of exercise B-CT-2-122: Molecular c) successfully comple ms, approx. 15 minute ar, winter semester an or English	n examinations (1 w ninutes each; 3 writ each (approx. 20 mi odule component co ed, unless otherwise ts are weighted, he c nunicate this to stud ssment: successful o course (usually 70% s (usually a maximu Materials (Practical ted s each) and logs (ap	ritten examination: a ten examinations: a nutes) or c) oral exan omprise more than o specified; should th or she must do so by ents in an appropriat completion of exerci of exercises to be su m of 2 incidents of u course) prox. 5 pages each)	approx. 90 approx. 60 nination in one graded he lecturer two weeks te manner. ises in the uccessfully unexcused

structure 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.

Additional information

Workload

Teaching cycle

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

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Module appears in

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

Module					Abbreviation
Molecu	lar Ma	terials for Students of Na	nostructure Technolo	ogy	08-CTO-122-m01
Module	coord	inator		Module offered by	
			Functional Materials)	•	echnology of Material Synthesis
ECTS		od of grading	Only after succ. com		
5	numerical grade				
Duratio	n	Module level	Other prerequisites		
1 semester undergraduate		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				
This mo	odule d	iscusses the theoretical	and practical principl	es of molecular and	soft materials.
Intende	ed learr	ning outcomes			
		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,	, number of weekly conta	ict hours, language —	if other than Germa	n)
V + Ü (r	no infor	mation on SWS (weekly	contact hours) and co	ourse language avail	able)
		s essment (type, scope, la on on whether module ca			tion offered — if not every seme-
2 writte oral exa prox. 30 will be which a and mu	en exam aminati o minut equally assessr ust com	ninations: approx. 60 or g ion of one candidate eac tes). Should a module co weighted, unless otherw	90 minutes each; 3 w h (approx. 20 minutes mponent comprise m vise specified; should r she must do so by t s in an appropriate m	ritten examinations: s) or c) oral examina ore than one graded d the lecturer want to wo weeks after the s	examination: approx. 90 minutes approx. 60 minutes each) or b) tion in groups (groups of 2, ap- d assessment, all assessments o make changes to the way in start of the course at the latest
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachir	ng cycl	e			
Referre	d to in	LPO I (examination regu	lations for teaching-d	legree programmes)	
Module	e appea	irs in			
Module appears in Bachelor' degree (1 major) Nanostructure Technology (2012)					

	e title				Abbreviation
Electro	chemic	al Energy Storage and C	onversion		08-EEW-122-m01
Module	e coord	inator		Module offered by	
holder thesis	of the (Chair of Chemical Techno	ology of Material Syn-	Chair of Chemical 1	echnology of Material Synthesi
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate	Admission prerequis		regular attendance of lab cours ed absence).
Conten	ts				
um and cal dou (Si, CIS	d nickel Ible lay 5, CIGS,	metal hydride, sodium s er capacitors, redox-flow GaAs, organic and dye s	sulphur, sodium nicke batteries, fuel cell sy	el chloride, lithium i stems (AFC, PEMFC,	ems such as lead, nickel cadmi- on accumulators), electrochemi , DMFC, PAFC, SOFC), solar cells
Intende	ed lear	ning outcomes	-		
		e developed a knowledge e to research problems.	e of electrochemical e	nergy storage and c	onversion and are able to apply
Course	s (type	, number of weekly conta	act hours, language —	if other than Germa	an)
V + P +	E (no ii	nformation on SWS (wee	kly contact hours) and	d course language a	vailable)
		s essment (type, scope, la on on whether module c			tion offered — if not every seme
report of nation minute equally sessme	on tech of one s). Sho v weigh ents are	nical course (approx. 5 p candidate each (approx. uld a module componen ted, unless otherwise sp	ages) and a) written e 20 minutes) or c) ora t comprise more than ecified; should the le st do so by two week	examination (approx l examination in gro one graded assess cturer want to make	ctical course / project report / k. 90 minutes) or b) oral exami- ups (groups of 2, approx. 30 ment, all assessments will be changes to the way in which as re course at the latest and must
Allocat	ion of p	olaces			
بعادا م	onal inf	ormation			
Additio					
A001110 					
	ad				
	ad				
 Worklo 		e			
 Worklo 		e			
 Worklo Teachir 	ng cycl		lations for teaching-o	legree programmes	
 Worklo Teachir 	ng cycl	e LPO I (examination regu	lations for teaching-o	legree programmes)	
 Worklo Teachir Referre 	ng cycl	LPOI (examination regu	llations for teaching-o	legree programmes)	
 Worklo Teachir Referre Module	ng cycl ed to in e appea	LPOI (examination regu			

Module title				Abbreviation		
Materia	al Scier	nce 1 (basic introduction)		08-FS1-122-m01		
Module	e coord	inator		Module offered by		
Dean o	f Studi	es Funktionswerkstoffe (F	unctional Materials)	Chair of Chemical T	echnology of Material Synthesis	
ECTS	1	od of grading	Only after succ. com			
5	nume	rical grade				
Duration Module level Other prerequisites						
1 seme	ster	graduate				
Conten	ts					
		iscusses the fundamenta rties of materials.	al relations between o	chemical bonding, th	ne structure, the microstructure	
Intende	ed lear	ning outcomes				
					al bonding, the structure, the to apply them to research pro-	
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)	
V + Ü (r	no infoi	mation on SWS (weekly o	contact hours) and co	urse language avail	able)	
ster, in a) 1 to 3	formati 3 writte	on on whether module ca n examinations (1 writter	an be chosen to earn examination: approx	a bonus) x. 90 minutes; 2 writ	tion offered — if not every seme-	
each (a	pprox.	20 minutes) or c) oral ex ssessment: German or E	amination in groups (l examination of one candidate . 30 minutes)	
Allocat						
Additio	nal inf	ormation				
Worklo	ad					
Teachi	ng cvcl	e				
	0 , , ,					
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Referre	d to in	LPOI (examination regu	lations for teaching-d	legree programmes)		
Referre	d to in	LPOI (examination regu	lations for teaching-d	legree programmes)		
			lations for teaching-d	legree programmes)		
 Module	e appea	ars in				
 Module Bachel	e appea or' deg		re Technology (2012)			

Modul	e title				Abbreviation
Materi	al Scie	nce 2 (the material group	s)		08-FS2-122-m01
Modul	e coord	inator		Module offered by	<u> </u>
Dean of Studies Funktionswerkstoffe (Functional Materials) Chair of Chemical Technology of Material Synthesi					echnology of Material Synthesis
ECTS		od of grading	Only after succ. com		<u> </u>
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
This m	odule c	leals with the fabrication	and properties of the	main material grou	ps.
Intend	ed lear	ning outcomes			
		e developed a knowledge knowledge to research pr		d properties of the n	nain material groups and are able
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	in)
V + Ü (I	no info	rmation on SWS (weekly o	contact hours) and co	ourse language avail	able)
		sessment (type, scope, la ion on whether module ca			tion offered — if not every seme-
or 90 n each (a	ninutes approx.		tions: approx. 60 min amination in groups	utes each) or b) ora	tten examinations: approx. 60 l examination of one candidate . 30 minutes)
Allocat	tion of	places			
Additio	onal inf	ormation			
Worklo	ad				
Teachi	ng cycl	e			
Referre	ed to in	LPOI (examination regu	lations for teaching-o	legree programmes)	
Modul	e appea	ars in			
Bachel	or' deg	ree (1 major) Nanostructu	re Technology (2012)		
	-	ree (1 major) Functional N			
Master	's degr	ee (1 major) Chemistry (2	013)		

Module title				Abbreviation
Chemical Nanotechnology: Analytics and Applications				08-FS5-101-m01
Module coordinator			Module offered by	
holder of the (Chair of Chemical Tech	nology of Material Syn-	Chair of Chemical T	echnology of Material Synthesis
ECTS Method of grading		Only after succ. con	Only after succ. compl. of module(s)	
5 numerical grade				
Duration	Module level	Other prerequisites	tes	
1 semester graduate				
Contents				
includes pract	tical exercises. It also d	liscusses thermoanalys	sis, rheological proce	on methods of nanochemistry and esses and dynamic light scatte- e industrial and technological
Intended lear	ning outcomes			
Students have developed an advanced knowledge of sol-gel chemistry and biomineralisation.				
Courses (type	, number of weekly con	itact hours, language –	- if other than Germa	an)
component. • 08-FS5- • 08-FS5- Method of ass ster, informat Assessment in	1-101: V (no information 2-101: V (no information sessment (type, scope, ion on whether module n this module comprise ated otherwise, succes	n on SWS (weekly conta n on SWS (weekly conta language — if other tha can be chosen to earn es the assessments in t	act hours) and cours act hours) and cours an German, examina a bonus) he individual modul	
 2 ECTS, a) oral e Assessment in ric systems 3 ECTS, 	Method of grading: nur examination (approx. 15 n module component o Method of grading: nur	; minutes) or b) written 8-FS5-2-101: Applicatio	examination (appro on oriented Characte	erization of colloidal and polyme-
Allocation of	places			
allocated in a lowing quotas subject; amor ta 2 (25% of p number of sul procedure, ap	standardised procedur Quota 1 (50% of place ag applicants with the s laces): number of subj pject semesters, places plicants who already h vill be given preferentia	re among all applicants es): total number of EC same number of ECTS c ect semesters of the res will be allocated by lo ave successfully compl	Firrespective of their IS credits already ac redits achieved, plac spective applicant; a t. Quota 3 (25% of p leted at least one mo	f available places, places will be r subjects according to the fol- chieved in the respective degree ces will be allocated by lot. Quo- among applicants with the same laces): allocation by lot. In this odule component of the respec- ained and places re-allocated as
Additional inf	ormation			
The course is	offered as a block cour	se at the end of the ser	nester.	
Workload				

Teaching cycle

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

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Module appears in

Bachelor' degree (1 major) 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 titl	e			Abbreviation	
Chemically	and bio-inspired Nanote	chnology for Material S	Synthesis	08-NT-122-m01	
Module coo	ordinator		Module offered by		
holder of th thesis	e Chair of Chemical Tech	nology of Material Syn-	Chair of Chemical T	echnology of Materi	al Synthesis
ECTS Me	thod of grading	Only after succ. con	npl. of module(s)		
5 nur	nerical grade				
Duration	Module level	Other prerequisites			
1 semester	graduate				
Contents					
of analysis	e provides an introduction used to characterise the § n and uses examples to in	generated materials. It	also discusses the f	undamental principle	
Intended le	arning outcomes				
Students ha	ave developed an advanc	ed knowledge of sol-ge	l chemistry and bior	nineralisation.	
Courses (ty	pe, number of weekly con	itact hours, language –	- if other than Germa	ın)	
component • o8-N	e comprises 2 module con I-1-122: V (no information I-2-122: V (no information	on SWS (weekly conta	ct hours) and course	language available))
	assessment (type, scope, ation on whether module			tion offered — if not	every seme-
low. Unless vidual asse Assessmen • 2 ECT	t in this module comprise stated otherwise, succes ssments. t in module component o 'S, Method of grading: nur itten examination (approx	sful completion of the 8-NT-1-122: Sol-Gel Cha merical grade	module will require : emistry 1: Fundamer	successful completion	on of all indi-
minu Assessmen thesis • 3 ECT • a) wr	tes) or c) oral examination t in module component o S, Method of grading: nur itten examination (approx tes) or c) oral examinatior	n in groups (groups of 2 8-NT-2-122: From Biom merical grade K. 45 minutes) or b) ora	e, approx. 30 minute ineralisation to biol al examination of on	s) ogically inspired Ma e candidate each (a	terials Syn-
Allocation				3)	
Additional	information				
Auditional					
Workload					
Teaching cy	/cle				
Referred to	in LPO I (examination re	gulations for teaching-o	degree programmes)		
Module app	pears in				
	egree (1 major) Nanostruc egree (1 major) Functiona)		
Bachelor's with 1 (2012)	major Nanostructure Technology	_	generated 26-Aug-2024 • ex or (180 ECTS) Nanostrukturte	-	page 37 / 139

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

Module title				Abbreviation
Nanoscale Materials 08-PCM3-102-m01			08-PCM3-102-m01	
Module coor	dinator		Module offered by	
lecturer of th	e seminar "Nanoskalige M	aterialien"	Institute of Physica	l and Theoretical Chemistry
	nod of grading	Only after succ. com	pl. of module(s)	
5 num	erical grade			
Duration	Module level	Other prerequisites		
1 semester	graduate			
Contents				
	discusses advanced topic characterisation methods a			e structure, properties, fabricati- 'ials.
Intended lea	rning outcomes			
	able to characterise nano anoscale materials.	scale materials. They	vare able to name ar	nalytical methods and applicati-
Courses (typ	e, number of weekly conta	ct hours, language –	- if other than Germa	n)
S + Ü (no info	ormation on SWS (weekly o	contact hours) and co	ourse language avail	able)
written exam	assessment: German or Er	al examination of one		o minutes) or talk (30 minutes)
Additional in	formation			
Workload				
Teaching cyc	le			
Referred to i	n LPO I (examination regu	lations for teaching-o	degree programmes)	
Module appe	ears in			
	gree (1 major) Nanostructu			
	gree (1 major) Nanostructu)	
-	ree (1 major) Chemistry (2			
-	ree (1 major) Chemistry (2			
-	ree (1 major) Chemistry (2			
-	ree (1 major) Mathematics			
-	ree (1 major) Computation		2)	
master's deg	ree (1 major) Functional M	ateriais (2012)		

Module					Abbreviation
Introdu	uction t	o Computer Science for S	Students of all Facult	ies	10-I-EIN-111-m01
Module	e coord	inator		Module offered by	·
Dean o	f Studi	es Informatik (Computer	Science)	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
10	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate	Admission prerequi	site to assessment:	academic requirements to be me
			in exercises as spec	ified at the beginnin	g of the course.
Conten	Its				
		of computer science inclu hms and data structures,			ebsites (HTML, XML, EBNF), data
Intend	ed lear	ning outcomes			
					e areas of representation of infor- cures, programming in Java.
Course	s (type	, number of weekly conta	act hours, language –	- if other than Germa	ın)
V + Ü (I	no infoi	rmation on SWS (weekly	contact hours) and co	ourse language avail	able)
		sessment (type, scope, la ion on whether module c			tion offered — if not every seme-
		mination (80 to 90 minut ion in groups of 2 or 3 ca			te each (approx. 20 minutes) or
Allocat	ion of _l	olaces			
Additio	onal inf	ormation			
Worklo	ad				
Teachi		9			
reaciili	ig tytt	C			
			lations for to a lit	d \	
Kererre	ed to in	LPOI (examination regu	liations for teaching-	uegree programmes)	
Module					
	-	ree (1 major) Nanostructi	•, .)	
	-	ree (1 major) Functional I			
	-	ee (1 major) Psychology (
		gree (1 major, 1 minor) Di gree (2 majors) Digital Hu	•	101, 2012)	
Dachel		Siee (2 majors) Digital Al	amanities (2012)		

Module					Abbreviation
Compu	tationa	ll Mathematics			10-M-COM-122-m01
Module	e coord	inator		Module offered by	<u> </u>
Dean o	of Studio	es Mathematik (Mathema	atics)	Institute of Mathematics	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
4	(not) s	successfully completed			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate	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	rer will inform stude the course. Registrat n of will to seek adm d the qualification fo mester, the lecturer t. Students who mee n the current or in th date, students will h	alify for admission to as- nts about the respective details ion for the course will be con- nission to assessment. If stu- or admission to assessment over will put their registration for as- et all prerequisites will be admit- e subsequent semester. For as- ave to obtain the qualification for
Conten	te	<u> </u>			
10-M-A lar diffe Intende The stur fields o Course V + Ü (r Methoo ster, in project	NL) and erential ed learn of appli es (type no infor d of ass formati	d 10-M-LNA). Computer-b and integral calculus; vi ning outcomes earns the use of advanced cation to solve mathema , number of weekly conta mation on SWS (weekly of sessment (type, scope, la ion on whether module ca	ased solution of prob sualisation of function d modern mathemation tical problems. act hours, language — contact hours) and co anguage — if other that an be chosen to earn	olems in linear algeb ns. cal software package if other than Germa ourse language avail an German, examina a bonus)	
-	-	ssessment: German, Eng	lish if agreed upon w	ith the examiner	
Allocat	ion of p	olaces			
 Additio Worklo		ormation			
WORKIO	du				
Tooch	n <i>a</i> a!	•			
Teachi	ing cycl	e			
		IDO L (oversidentian	lations for to a bir		
Referre	eu co in	LPO I (examination regu	iations for teaching-o	legree programmes)	
		•			
Bachel	or' deg or' deg	ree (1 major) Nanostructu ree (1 major) Economathe ree (1 major) Mathematic	ematics (2012))	



Bachelor' degree (1 major) Functional Materials (2012) First state examination for the teaching degree Gymnasium Mathematics (2012)

Module t	itle			Abbreviation			
Modellin	g and Computational Scie	nce		10-M-MWR-122-m01			
Module c	oordinator		Module offered by				
Module coordinator Dean of Studies Mathematik (Mathematics)		omatics)		atics			
1	Nethod of grading	· · ·	atics) Institute of Mathematics Only after succ. compl. of module(s)				
	umerical grade						
		Other prerequisites					
1 semest				alify for admission to as-			
			•	nts about the respective details			
		at the beginning of	the course. Registrat	ion for the course will be con-			
		sidered a declaration	on of will to seek adm	nission to assessment. If stu-			
		dents have obtaine	dents have obtained the qualification for admission to ass				
			will put their registration for as-				
		sessment into effect. Students who meet all pre					
				e subsequent semester. For as-			
		sessment at a later date, students will have to obtain the qualification					
		admission to asses	sment anew.				
Contents							
ons, fund near equa	amental methods for num ations.			and partial differential equati- ns and the resulting systems of li-			
	learning outcomes						
	ent masters the fundamen neering sciences on a com		ds and techniques to	o simulate processes from natural			
Courses	type, number of weekly co	ontact hours, language –	– if other than Germa	ın)			
V + Ü (no	information on SWS (wee	kly contact hours) and c	ourse language avail	able)			
	of assessment (type, scope rmation on whether modul			tion offered — if not every seme-			
if annour each (app	kamination (approx. 90 to leed by the lecturer, the wi prox. 20 minutes) or an ora e of assessment: German,	ritten examination can b al examination in groups	s (groups of 2, approx	l examination of one candidate x. 30 minutes)			
	n of places						
Additiona	al information						
Workload	1						
Teaching	cycle						
Referred	to in LPO I (examination r	egulations for teaching-	degree programmes)				
Module a	ppears in						
	degree (1 major) Nanostri	icture Technology (2012)				
	degree (1 major) Mathem)				

Bachelor's with 1 major Nanostructure Technology	JMU Würzburg • generated 26-Aug-2024 • exam. reg. da-	page 43 / 139
(2012)	ta record Bachelor (180 ECTS) Nanostrukturtechnik - 2012	



Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013)

Module of Sectors Dean of Sectors 16 16 2 semest Contents Basics of in one vadifferent Intended The stud simple p is able to	er undergraduate n numbers and functions, s riable, vector calculus, line al and integral calculus in learning outcomes ent gets acquainted with in	ematics) Only after succ. co Other prerequisite By way of exception assessments.	Module offered by Institute of Mathem mpl. of module(s) s n, additional prerequ elementary functions, of linear equations, m	isites are listed in the sectio differential and integral calo	
Dean of 5 ECTS I 16 r Duration 2 semest Contents Basics of in one va different Intended The stud simple p is able to	Studies Mathematik (Mathematik (Mat	Only after succ. co Other prerequisite By way of exception assessments. sequences and series, e ear maps and systems of	Institute of Mathem mpl. of module(s) s n, additional prerequ elementary functions, of linear equations, m	isites are listed in the sectio differential and integral calo	
ECTSI16rDuration2 semestcontentsBasics ofin one vadifferentIntendedThe studsimple pis able to	Method of grading numerical grade Module level er undergraduate numbers and functions, s iriable, vector calculus, line ial and integral calculus in learning outcomes ent gets acquainted with in	Only after succ. co Other prerequisite By way of exception assessments. sequences and series, e ear maps and systems of	mpl. of module(s) s n, additional prerequ elementary functions, of linear equations, m	isites are listed in the sectio differential and integral calo	
16 r Duration 2 semest Contents Basics of in one va different Intended The stud simple p is able to	Module level Module level er undergraduate n numbers and functions, s riable, vector calculus, line al and integral calculus in learning outcomes ent gets acquainted with ir	 Other prerequisite By way of exception assessments. sequences and series, e ear maps and systems of	s n, additional prerequ elementary functions, of linear equations, m	differential and integral calo	
Duration 2 semest Contents Basics of in one va different Intended The stud simple p is able to	Module level er undergraduate in numbers and functions, s iriable, vector calculus, line ial and integral calculus in learning outcomes ent gets acquainted with in	By way of exception assessments. sequences and series, e ear maps and systems of	n, additional prerequ elementary functions, of linear equations, m	differential and integral calo	
2 semest Contents Basics of in one va different Intended The stud simple p is able to	er undergraduate n numbers and functions, s riable, vector calculus, line ial and integral calculus in learning outcomes ent gets acquainted with in	By way of exception assessments. sequences and series, e ear maps and systems of	n, additional prerequ elementary functions, of linear equations, m	differential and integral calo	
Contents Basics of in one va different Intended The stud simple p is able to	er undergraduate n numbers and functions, s riable, vector calculus, line ial and integral calculus in learning outcomes ent gets acquainted with in	By way of exception assessments. sequences and series, e ear maps and systems of	n, additional prerequ elementary functions, of linear equations, m	differential and integral calo	
Basics of in one va different Intended The stud simple p is able to	n numbers and functions, s riable, vector calculus, line al and integral calculus in learning outcomes ent gets acquainted with ir	assessments.	elementary functions, of linear equations, m	differential and integral calo	
Basics of in one va different Intended The stud simple p is able to	n numbers and functions, s riable, vector calculus, line al and integral calculus in learning outcomes ent gets acquainted with ir	ear maps and systems of	of linear equations, m		:ulus
in one va different Intended The stud simple p is able to	riable, vector calculus, line ial and integral calculus in learning outcomes ent gets acquainted with in	ear maps and systems of	of linear equations, m		ulus:
The stud simple p is able to	ent gets acquainted with in			urier analysis, integral theore	
simple p is able to					
Courses	interpret the results.			earns to apply these method f nanostructure technology,	
courses	(type, number of weekly co	ontact hours, language -	— if other than Germa	ın)	
• 10 Method of ster, info	M-NST12-2-092: V + Ü (no i of assessment (type, scope rmation on whether modul	information on SWS (we e, language — if other th e can be chosen to ear	eekly contact hours) a nan German, examina n a bonus)	nd course language availabl nd course language availabl ntion offered — if not every se	le) eme-
low. Unle				e components as specified b successful completion of all	
Mathema 8 E wri ea Lai Otl tur the ob pu as:	atics 1 for students of Nano ICTS, Method of grading: (n tten examination (approx. ch (approx. 20 minutes) or nguage of assessment: Ger ner prerequisites: Certain p er will inform students abo e course will be considered tained the qualification for t their registration for asses sessment in the current or ve to obtain the qualification	ostructure Technology (90 to 120 minutes, use oral examination in gro man, English if agreed orerequisites must be m out the respective deta d a declaration of will t admission to assessment in the subsequent sem on for admission to ass	eted ually chosen) or oral oups (groups of 2, app upon with the examin net to qualify for adm ails at the beginning to seek admission to ent over the course of dents who meet all pr nester. For assessmer essment anew.	ner ission to assessment. The le of the course. Registration f assessment. If students ha f the semester, the lecturer w erequisites will be admitted ht at a later date, students w	ec- for ve vill to vill
	ent in module component	-	inematics 2 for stude	ents of Nanostructure Techno	
Assessm Mathema • 8 E • wri ea • Lau • Ott tur the ob	atics 2 for students of Nanc CTS, Method of grading: in tten examination (approx. ch (approx. 20 minutes) or nguage of assessment: Ger ner prerequisites: Certain p er will inform students ab e course will be considered tained the qualification for	umerical grade 90 to 120 minutes, use oral examination in gro man, English if agreed prerequisites must be m out the respective deta d a declaration of will t admission to assessme	oups (groups of 2, app upon with the examinate net to qualify for adm ails at the beginning to seek admission to ent over the course of	examination of one candida prox. 30 minutes)	ec- for ve vill

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

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Workload

Teaching cycle

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

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Module appears in

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

Module	title				Abbreviation	
Numerio	cal Ma	thematics 1 for Econo	omathematics		10-M-NUW-122-m01	
Module	coord	inator		Module offered by	<u> </u>	
Dean of Studies Mathematik (Mathematics)		Institute of Mathem	natics			
1		od of grading	l l	ucc. compl. of module(s)		
		rical grade		1		
Duratio	n	Module level	Other prerequisites	i		
1 semes	ster	undergraduate	sessment. The lecture at the beginning of sidered a declaration dents have obtained the course of the set sessment into effect ted to assessment in sessment at a later	trer will inform stude the course. Registrat on of will to seek adm d the qualification for mester, the lecturer t. Students who mee n the current or in th date, students will h	alify for admission to as- ints about the respective details ion for the course will be con- nission to assessment. If stu- or admission to assessment over will put their registration for as- et all prerequisites will be admit- e subsequent semester. For as- nave to obtain the qualification for	
Content			admission to asses	admission to assessment anew.		
ons, inte Intende	erpola ed learr dent is	tion with polynomials ing outcomes acquainted with the	s, splines and trigonome fundamental concepts a	tric functions, nume	quations and systems of equati- rical integration. erical mathematics, applies them	
			pout their typical fields o	• •	`	
			ontact hours, language –			
			kly contact hours) and co			
			e, language — if other th le can be chosen to earn		ition offered — if not every seme-	
if annou each (aj	unced l pprox.	20 minutes) or an ora		(groups of 2, approx	l examination of one candidate x. 30 minutes)	
Allocati	ion of p	olaces				
Additio	nal info	ormation				
Workloa	ad					
Teachin	ig cycl	9				
Referre	d to in	LPOI (examination r	egulations for teaching-	degree programmes)		
			<u> </u>			
Module	appea	rs in				
Bachelo Bachelo	or' degi or' degi)		

Modul	e title			· · · · · · · · · · · · · · · · · · ·	Abbreviation
Progra	mming	course for students of M	lathematics and othe	r subjects	10-M-PRG-122-m01
Module coordinator		inator	Module offered by		<u> </u>
Dean o	of Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics
ECTS		od of grading	Only after succ. com		
3		successfully completed		• • • •	
Duratio	on	Module level	Other prerequisites		
1 seme	ester	undergraduate	sessment. The lectu at the beginning of t sidered a declaratio dents have obtained the course of the set sessment into effect ted to assessment in sessment at a later	rer will inform stude the course. Registrat n of will to seek adm d the qualification fo mester, the lecturer t. Students who mee n the current or in th date, students will h	alify for admission to as- nts about the respective details ion for the course will be con- nission to assessment. If stu- r admission to assessment over will put their registration for as- et all prerequisites will be admit- e subsequent semester. For as- ave to obtain the qualification fo
	_		admission to assess	sment anew.	
Conter					
Basics	of a mo	odern programming lang	uage (e. g. C).		
Intend	ed lear	ning outcomes			
	udent is hematio		ntly on small program	nming exercises and	standard programming problem
Course	es (type	, number of weekly conta	act hours, language —	- if other than Germa	n)
P (no iı	nformat	tion on SWS (weekly cont	act hours) and cours	e language available	e)
		s essment (type, scope, la ion on whether module c			tion offered — if not every seme-
beginn	ning of t	form of programming exe he course) Issessment: German, Eng			e specified by the lecturer at the
	tion of	· · · · · · · · · · · · · · · · · · ·			
Additio	onal inf	ormation			
Worklo	bad				
Teachi	ng cycl	e			
Referre	ed to in	LPOI (examination regu	lations for teaching-c	legree programmes)	
Modul	e appea	ars in			
		ree (1 major) Nanostructu	ure Technology (2012))	
	-	ree (1 major) Economath			
Bachel	lor' deg	ree (1 major) Mathematic	al Physics (2012)		
	-	ree (1 major) Functional I			
First st	ate exa	mination for the teaching	g degree Gymnasium	Mathematics (2012)	

Module	e title				Abbreviation	
Compu	tationa	ll Physics			11-A1-092-m01	
Modul	e coord	inator		Module offered by		
		ector of the Institute of T	heoretical Physics	Faculty of Physics a	and Astronomy	
-	trophys			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	· · · · · · · · · · · · · · · · · · ·	
ECTS	Metho	od of grading	Only after succ. con	mpl. of module(s)		
6	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme		undergraduate	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	arer will inform stude the course. Registrat on of will to seek adm d the qualification for mester, the lecturer t. Students who mee n the current or in th date, students will h	alify for admission to as- ents about the respective details tion for the course will be con- nission to assessment. If stu- or admission to assessment over will put their registration for as- et all prerequisites will be admit- e subsequent semester. For as- ave to obtain the qualification fo	
- gener - rando - many Intendo The stu They ha	ation o om walk -particl ed learn udents l ave kno	e processes and reactio ning outcomes have knowledge of two r	najor programming la andard methods and a	are able to apply com	algorithms important for Physics. nputer-assisted processes to the f Physics.	
Course	s (type	, number of weekly cont	act hours, language –	- if other than Germa	an)	
V + Ü (I	no infoi	rmation on SWS (weekly	contact hours) and co	ourse language avail	able)	
		essment (type, scope, l on on whether module o			tion offered — if not every seme-	
Assess and wi	ment o ll be an		ften assessment will		on the method of assessment 3 ASPO (general academic and	
Allocat	ion of p	olaces				
Only as	s part o	f pool of general key ski	lls (ASQ): 15 places. P	laces will be allocate	ed by lot.	
Additic	onal inf	ormation				
Worklo	ad					
Teachi	ng cycl	e				
Referre	ed to in	LPOI (examination reg	ulations for teaching-	degree programmes)		
 Referre	ed to in	LPOI (examination reg	ulations for teaching-	degree programmes)		
		LPOI (examination reg		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) 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	title				Abbreviation		
Electro	nics				11-A2-092-m01		
Module	coord	inator		Module offered by			
Managing Director of the Institute of Applied Physics		pplied Physics	Faculty of Physics a	nd Astronomy			
ECTS		od of grading	Only after succ. con	•			
6		rical grade		1			
Duratio	n	Module level	Other prerequisites	;			
1 semes	ster	undergraduate	sessment. The lecture at the beginning of sidered a declaration dents have obtained the course of the set sessment into effect ted to assessment in sessment at a later	es must be met to qua irer will inform stude the course. Registrat on of will to seek adm d the qualification fo emester, the lecturer t. Students who mee n the current or in th date, students will h	nts about the respe ion for the course w ission to assessme r admission to asse will put their registra t all prerequisites w e subsequent seme	ctive details ill be con- nt. If stu- ssment over ation for as- vill be admit- ster. For as-	
			admission to assessment anew.				
coils an cuits: d	les of e nd diod ifferen	lectronic components a es) and active compone types of gates and CMC	nts (bipolar and field	-effect transistors, or			
		ning outcomes	·				
circuit t	echnol					s and digital	
		number of weekly conta					
		mation on SWS (weekly					
		essment (type, scope, la on on whether module c			tion offered — if not	every seme-	
Assessi and will	ment o l be an	nation (approx. 90 minu: ffered: When and how o nounced in due form un egulations) 2009.	ften assessment will				
Allocati	ion of p	laces					
Only as	part o	f pool of general key skil	ls (ASQ): 15 places. P	laces will be allocate	ed by lot.		
Additio	nal inf	ormation					
Worklo	ad						
Teachin	ng cycl	2					
Referre	d to in	LPOI (examination reg	ulations for teaching-	degree programmes)			
Module	e appea	rs in					
Bachelo	or' degi	ree (1 major) Physics (2c ree (1 major) Physics (2c ree (1 major) Nanostruct	12))			
Bachelor's v (2012)	with 1 maj	or Nanostructure Technology		generated 26-Aug-2024 • ex- or (180 ECTS) Nanostrukturte		page 51 / 139	

Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) FOKUS Physics (2011) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)

Module	title				Abbreviation	
Laborat	tory an	d Measurement Techno	ology		11-A3-072-m01	
Module	e coord	inator		Module offered by		
Managing Director of the Institute of Applied Physics		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				
Duration Module level Other prerequisites						
1 semes	ster	undergraduate	50% of exercises. Considered a deconsidered a deconsidered a deconstruction of the course of the assessment into effect mitted to assessment into effect.	ertain prerequisites i . The lecturer will info ginning of the course claration of will to se ined the qualification he semester, the lect ect. Students who m nt in the current or ir	successful completion of must be met to qualify f orm students about the e. Registration for the co ek admission to assess n for admission to asses turer will put their regist teet all prerequisites will n the subsequent semes	or admis- respecti- urse will ment. If ssment ration for l be ad- ster. For
			assessment at a late for admission to ass		l have to obtain the qua	lification
Conten	ts					
		o electronic and optical cs, light sources, specti			y, vacuum technology an Juisition.	d cryoge-
Intende	ed leari	ning outcomes				
red valu Courses V + Ü (n Method ster, inf	ue acqu s (type) no infor d of ass formati	uisition. , number of weekly con mation on SWS (weekly	tact hours, language – r contact hours) and co language — if other th can be chosen to earn	- if other than Germa ourse language avail an German, examina		
Allocati	ion of p	olaces				
	· · · · ·	f pool of general key sk ormation	ills (ASQ): 15 places. P	laces will be allocate	ed by lot.	
Worklo	ad					
Teachir	ng cycl	e				
Referre	d to in	LPOI (examination reg	ulations for teaching-	degree programmes)		
Module	e appea	in				
		ree (1 major) Physics (2 ree (1 major) Physics (2	010)			
Bachelo Bachelo	or' deg or' deg	ree (1 major) Physics (2 ree (1 major) Physics (2 ree (1 major) Physics (2	012)			

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) 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)

Applied	e title				Abbreviation
Applied Superconduction					11-ASL-092-m01
Module	e coord	inator		Module offered by	<u> </u>
		ector of the Institute of A	unnlied Physics	Faculty of Physics a	and Astronomy
			Only after succ. cor		
6		rical grade			
Duratio	I	Module level	Other prerequisites	6	
1 semester		graduate	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		
	1		admission to asses	sment anew.	
Conten	nts				
		iples of superconductivi rials sciences for the ca			rumental developments. Me- onductors.
Intende	ed lear	ning outcomes			
energy Course R + V (n	techno s (type	s questions on superco logy. Furthermore, they , number of weekly cont mation on SWS (weekly	can deal with practica act hours, language -	al mathematical que – if other than Germa	ın)
ster, in a) writt in grou c) proje prox. 30 Assess Langua	formation format	on on whether module omination (approx. 90 mi prox. 30 minutes per car prt (approx. 8 pages, tim tes) ffered: once a year, wint ssessment: German, En	anguage — if other th can be chosen to earr nutes) or b) oral exan ididate, for modules v e to complete: 1 to 4 v ter semester	an German, examina a bonus) nination of one candi vith less than 4 ECTS	able) ition offered — if not every seme- date each or oral examination credits approx. 20 minutes) or ation/seminar presentation (ap-
a) writte in grou c) proje prox. 30 Assess	formation format	on on whether module omination (approx. 90 mi prox. 30 minutes per car prt (approx. 8 pages, tim tes) ffered: once a year, wint ssessment: German, En	anguage — if other th can be chosen to earr nutes) or b) oral exan ididate, for modules v e to complete: 1 to 4 v ter semester	an German, examina a bonus) nination of one candi vith less than 4 ECTS	tion offered — if not every seme- date each or oral examination credits approx. 20 minutes) or
ster, ini a) writti in grou c) proje prox. 30 Assess Langua Allocat	formati en exa ps (app ect repo o minu sment o age of a tion of p	on on whether module omination (approx. 90 mi prox. 30 minutes per car prt (approx. 8 pages, tim tes) ffered: once a year, wint ssessment: German, En places	anguage — if other th can be chosen to earr nutes) or b) oral exan ididate, for modules v e to complete: 1 to 4 v ter semester	an German, examina a bonus) nination of one candi vith less than 4 ECTS	tion offered — if not every seme- date each or oral examination credits approx. 20 minutes) or
ster, ini a) writti in grou c) proje prox. 30 Assess Langua Allocat	formati en exa ps (app ect repo o minu sment o age of a tion of p	on on whether module omination (approx. 90 mi prox. 30 minutes per car prt (approx. 8 pages, tim tes) ffered: once a year, wint ssessment: German, En	anguage — if other th can be chosen to earr nutes) or b) oral exan ididate, for modules v e to complete: 1 to 4 v ter semester	an German, examina a bonus) nination of one candi vith less than 4 ECTS	tion offered — if not every seme- date each or oral examination credits approx. 20 minutes) or
ster, int a) writte in grou c) proje prox. 30 Assess Langua Allocat Additio	formati en examps (app pect repo o minu sment o age of a tion of p onal inf	on on whether module omination (approx. 90 mi prox. 30 minutes per car prt (approx. 8 pages, tim tes) ffered: once a year, wint ssessment: German, En places	anguage — if other th can be chosen to earr nutes) or b) oral exan ididate, for modules v e to complete: 1 to 4 v ter semester	an German, examina a bonus) nination of one candi vith less than 4 ECTS	tion offered — if not every seme- date each or oral examination credits approx. 20 minutes) or
ster, ini a) writti in grou c) proje prox. 30 Assess Langua Allocat	formati en examps (app pect repo o minu sment o age of a tion of p onal inf	on on whether module omination (approx. 90 mi prox. 30 minutes per car prt (approx. 8 pages, tim tes) ffered: once a year, wint ssessment: German, En places	anguage — if other th can be chosen to earr nutes) or b) oral exan ididate, for modules v e to complete: 1 to 4 v ter semester	an German, examina a bonus) nination of one candi vith less than 4 ECTS	tion offered — if not every seme- date each or oral examination credits approx. 20 minutes) or
ster, int a) writt in grou c) proje prox. 30 Assess Langua Allocat Additio Worklo	formati en examps (app ect repo o minu sment o age of a tion of p onal inf	on on whether module of mination (approx. 90 mi prox. 30 minutes per car ort (approx. 8 pages, tim tes) ffered: once a year, wint ssessment: German, En places	anguage — if other th can be chosen to earr nutes) or b) oral exan ididate, for modules v e to complete: 1 to 4 v ter semester	an German, examina a bonus) nination of one candi vith less than 4 ECTS	tion offered — if not every seme- date each or oral examination credits approx. 20 minutes) or
ster, int a) writte in grou c) proje prox. 30 Assess Langua Allocat Additio	formati en examps (app ect repo o minu sment o age of a tion of p onal inf	on on whether module of mination (approx. 90 mi prox. 30 minutes per car ort (approx. 8 pages, tim tes) ffered: once a year, wint ssessment: German, En places	anguage — if other th can be chosen to earr nutes) or b) oral exan ididate, for modules v e to complete: 1 to 4 v ter semester	an German, examina a bonus) nination of one candi vith less than 4 ECTS	tion offered — if not every seme- date each or oral examination credits approx. 20 minutes) or
ster, ini a) writti in grou c) proje prox. 30 Assess Langua Allocat Additio Worklo Teachin 	formati en exa ps (app ect repo o minu sment o age of a tion of p onal inf	on on whether module of mination (approx. 90 mi prox. 30 minutes per car prt (approx. 8 pages, tim tes) ffered: once a year, wint ssessment: German, En places ormation	anguage — if other th can be chosen to earr nutes) or b) oral exan ididate, for modules v e to complete: 1 to 4 v ter semester glish	an German, examina a bonus) nination of one candi vith less than 4 ECTS weeks) or d) present	ition offered — if not every seme- idate each or oral examination credits approx. 20 minutes) or ation/seminar presentation (ap-
ster, ini a) writti in grou c) proje prox. 30 Assess Langua Allocat Additio Worklo Teachin 	formati en exa ps (app ect repo o minu sment o age of a tion of p onal inf	on on whether module of mination (approx. 90 mi prox. 30 minutes per car ort (approx. 8 pages, tim tes) ffered: once a year, wint ssessment: German, En places	anguage — if other th can be chosen to earr nutes) or b) oral exan ididate, for modules v e to complete: 1 to 4 v ter semester glish	an German, examina a bonus) nination of one candi vith less than 4 ECTS weeks) or d) present	ition offered — if not every seme- idate each or oral examination credits approx. 20 minutes) or ation/seminar presentation (ap-
ster, ini a) writti in grou c) proje prox. 30 Assess Langua Allocat Additio Worklo Teachin 	formati en exa ps (app ect repo o minu sment o age of a tion of p onal inf	on on whether module of mination (approx. 90 mi prox. 30 minutes per car prt (approx. 8 pages, tim tes) ffered: once a year, wint ssessment: German, En places ormation	anguage — if other th can be chosen to earr nutes) or b) oral exan ididate, for modules v e to complete: 1 to 4 v ter semester glish	an German, examina a bonus) nination of one candi vith less than 4 ECTS weeks) or d) present	ition offered — if not every seme- idate each or oral examination credits approx. 20 minutes) or ation/seminar presentation (ap-
ster, ini a) writti in grou c) proje prox. 30 Assess Langua Allocat Additio Worklo Teachin 	formati en exal ps (app ect repo o minu sment o age of a tion of p tion of p onal inf pad	on on whether module of mination (approx. 90 mi prox. 30 minutes per car prt (approx. 8 pages, tim tes) ffered: once a year, wint ssessment: German, En places ormation e LPO I (examination reg	anguage — if other th can be chosen to earr nutes) or b) oral exan ididate, for modules v e to complete: 1 to 4 v ter semester glish	an German, examina a bonus) nination of one candi vith less than 4 ECTS weeks) or d) present	ition offered — if not every seme- idate each or oral examination credits approx. 20 minutes) or ation/seminar presentation (ap-
ster, ini a) writti in grou c) proje prox. 30 Assess Langua Allocat Additio Worklo Teachin Referre Bachelo	formati en exat ps (app ect repo o minu ment o age of a tion of p onal inf onal inf onal inf oad ed to in e appea or' deg	on on whether module of mination (approx. 90 mi prox. 30 minutes per car prt (approx. 8 pages, tim tes) ffered: once a year, wint ssessment: German, En places ormation e LPO I (examination reg	anguage — if other th can be chosen to earr nutes) or b) oral exan adidate, for modules v e to complete: 1 to 4 ter semester glish ulations for teaching-	an German, examina a bonus) nination of one candi vith less than 4 ECTS weeks) or d) present	ition offered — if not every seme- idate each or oral examination credits approx. 20 minutes) or ation/seminar presentation (ap-

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					
Bachel	or The	sis Nanostructure Techno	logy		11-BA-N-072-m01
Module	e coord	inator		Module offered by	
		f examination committee		Faculty of Physics a	and Astronomy
ECTS		od of grading	Only after succ. com		
10		rical grade			
Duratio		Module level	Other prerequisites		
1 seme		undergraduate			
Conten	ts				
					ask in the field of nanostructure rriting of the Bachelor's thesis.
Intend	ed lear	ning outcomes			
structu	re tech		ce of a supervisor, es	pecially in accordan	d engineering task from nano- ce with known methods and
Course	s (type	, number of weekly conta	ct hours, language –	- if other than Germa	ın)
no cou	rses as	signed			
		sessment (type, scope, la ion on whether module ca			tion offered — if not every seme-
written	thesis	(approx. 25 pages)			
Allocat	ion of _l	places			
Additio	onal inf	ormation			
Worklo	ad				
Teachi	ng cvcl	e			
	0 . 7				
Referre	ed to in	LPOI (examination regu	lations for teaching-c	degree programmes)	
Module	e appea	ars in			
Bachel	or' deg	ree (1 major) Nanostructu	re Technology (2010))	
Bachel	or' deg	ree (1 major) Nanostructu	re Technology (2012))	
	-	ree (1 major) Nanostructu	•, •		
Bachel	or' deg	ree (1 major) Nanostructu	re Technology (2007))	

Module title					Abbreviation	
Biophy	/sical N	Aeasurement Techn	ology in Medical Science	e	11-BMT-092-m01	
Module	e coord	linator		Module offered by		
Managing Director of the Institute of App		of Applied Physics		ics and Astronomy		
6	Method of grading Only after succ. compl. of module(s) numerical grade					
Duratio		Module level	Other prerequisit	A 6		
					qualify for admission to as-	
1 semester		sessment. T at the begin sidered a de dents have the course of sessment in ted to asses		in prerequisites must be met to qualify for admission to as- nent. The lecturer will inform students about the respective details beginning of the course. Registration for the course will be con- ed a declaration of will to seek admission to assessment. If stu- have obtained the qualification for admission to assessment over ourse of the semester, the lecturer will put their registration for as- nent into effect. Students who meet all prerequisites will be admit- assessment in the current or in the subsequent semester. For as- nent at a later date, students will have to obtain the qualification for		
topics	cture co are cor	nventional X-ray tech	nnique, computer tomog	raphy, imaging teo	pplication in Biomedicine. The main hniques of nuclear medicine, ultra-	
sound	and M					
image			ecture additionally addr	esses systems the	ory of imaging systems and digital	
image	proces		ecture additionally addr	esses systems the	ory of imaging systems and digital	
image Intend The stu	proces ed lear udents nd the	sing. ning outcomes know the physical p	rinciples of imaging tech	hniques and their a	ory of imaging systems and digital application in Biomedicine. They un- t techniques and interpret simple	
image Intende The stu derstar images	proces ed lear udents nd the s.	sing. ning outcomes know the physical p principles of image	rinciples of imaging tech	nniques and their a to explain differen	application in Biomedicine. They un- t techniques and interpret simple	
image Intende The stu derstar images Course	proces ed lear udents nd the s. es (type	sing. ning outcomes know the physical p principles of image e, number of weekly	principles of imaging tech generation and are able contact hours, language	nniques and their a to explain differen e — if other than Ge	application in Biomedicine. They un- t techniques and interpret simple erman)	
image Intende The stu derstar images Course R + V (r Metho	proces ed lear udents nd the s. es (type no info d of as	sing. ning outcomes know the physical p principles of image e, number of weekly rmation on SWS (we sessment (type, sco	orinciples of imaging tech generation and are able contact hours, language rekly contact hours) and	hniques and their a to explain differen — if other than Ge course language a than German, exar	application in Biomedicine. They un- t techniques and interpret simple erman)	
image Intende The stu derstar images Course R + V (r Methor ster, in a) writt groups project (appro: Assess and wil examin	proces ed lear udents nd the s. es (type d of as format ten exa (approt t report x. 30 m sment c ll be ar nation n	sing. ming outcomes know the physical p principles of image e, number of weekly rmation on SWS (we sessment (type, sco ion on whether mod mination (approx. 9 px. 30 minutes per c (approx. 8 to 10 page inutes) offered: When and h	orinciples of imaging tech generation and are able contact hours, language rekly contact hours) and pe, language — if other t lule can be chosen to ea o minutes) or b) oral exa andidate, for modules w ges, time to complete: 1 ow often assessment wil m under observance of S	hniques and their a to explain differen e — if other than Ge course language a than German, exar rn a bonus) amination of one ca tith less than 4 ECT to 4 weeks) or d) p Il be offered deper	application in Biomedicine. They un- t techniques and interpret simple erman) vailable)	
image Intende The stu derstar images Course R + V (r Methor ster, in a) writt groups project (appro: Assess and wil examin	proces ed lear udents nd the s. es (type no info d of as format ten exa s (approt t report x. 30 m sment c ll be ar nation n age of a	sing. ming outcomes know the physical p principles of image e, number of weekly rmation on SWS (we sessment (type, sco ion on whether mod mination (approx. 9 px. 30 minutes per c (approx. 8 to 10 page hinutes) offered: When and h mounced in due for regulations) 2009. assessment: Germar	orinciples of imaging tech generation and are able contact hours, language rekly contact hours) and pe, language — if other t lule can be chosen to ea o minutes) or b) oral exa andidate, for modules w ges, time to complete: 1 ow often assessment wil m under observance of S	hniques and their a to explain differen e — if other than Ge course language a than German, exar rn a bonus) amination of one ca tith less than 4 ECT to 4 weeks) or d) p Il be offered deper	application in Biomedicine. They un- t techniques and interpret simple erman) vailable) nination offered — if not every seme- andidate each or oral examination in TS credits approx. 20 minutes) or c) oresentation/seminar presentation	
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image Intende The stu derstar images Course R + V (r Methoo ster, in a) writt groups project (appro: Assess and wil examir Langua Allocat	ed lear adents adents nd the s. es (type d of ass format ten exa s (approt t report x. 30 m sment c ll be ar nation n age of a tion of	sing. ning outcomes know the physical p principles of image e, number of weekly rmation on SWS (we sessment (type, sco ion on whether mod mination (approx. 9 px. 30 minutes per c (approx. 8 to 10 page hinutes) offered: When and h mounced in due form regulations) 2009. assessment: German places	orinciples of imaging tech generation and are able contact hours, language rekly contact hours) and pe, language — if other t lule can be chosen to ea o minutes) or b) oral exa andidate, for modules w ges, time to complete: 1 ow often assessment wil m under observance of S	hniques and their a to explain differen e — if other than Ge course language a than German, exar rn a bonus) amination of one ca tith less than 4 ECT to 4 weeks) or d) p Il be offered deper	application in Biomedicine. They un- t techniques and interpret simple erman) vailable) nination offered — if not every seme- andidate each or oral examination in TS credits approx. 20 minutes) or c) oresentation/seminar presentation	
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image Intende The studerstar images Course R + V (r Methor ster, in a) writt groups project (appro: Assess and wil examir Langua Allocat 	proces ed lear udents nd the s. es (type no info d of as format ten exa s (approt t report x. 30 m sment c ll be ar nation n age of a tion of	sing. ning outcomes know the physical p principles of image e, number of weekly rmation on SWS (we sessment (type, sco ion on whether mod mination (approx. 9 px. 30 minutes per c (approx. 8 to 10 page hinutes) offered: When and h mounced in due form regulations) 2009. assessment: German places	orinciples of imaging tech generation and are able contact hours, language rekly contact hours) and pe, language — if other t lule can be chosen to ea o minutes) or b) oral exa andidate, for modules w ges, time to complete: 1 ow often assessment wil m under observance of S	hniques and their a to explain differen e — if other than Ge course language a than German, exar rn a bonus) amination of one ca tith less than 4 ECT to 4 weeks) or d) p Il be offered deper	application in Biomedicine. They un- t techniques and interpret simple erman) vailable) nination offered — if not every seme- andidate each or oral examination in TS credits approx. 20 minutes) or c) oresentation/seminar presentation	
image Intende The studerstar images Course R + V (r Methor ster, in a) writt groups project (appro: Assess and wil examir Langua Allocat 	proces ed lear udents nd the s. es (type no info d of as format ten exa (approt treport x. 30 m sment c ll be ar nation n age of a tion of	sing. ming outcomes know the physical p principles of image e, number of weekly rmation on SWS (we sessment (type, sco ion on whether mod mination (approx. 9 px. 30 minutes per c c (approx. 8 to 10 pag- ninutes) offered: When and h mounced in due form regulations) 2009. assessment: German places	orinciples of imaging tech generation and are able contact hours, language rekly contact hours) and pe, language — if other t lule can be chosen to ea o minutes) or b) oral exa andidate, for modules w ges, time to complete: 1 ow often assessment wil m under observance of S	hniques and their a to explain differen e — if other than Ge course language a than German, exar rn a bonus) amination of one ca tith less than 4 ECT to 4 weeks) or d) p Il be offered deper	application in Biomedicine. They un- t techniques and interpret simple erman) vailable) nination offered — if not every seme- andidate each or oral examination in TS credits approx. 20 minutes) or c) oresentation/seminar presentation	

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)

woulle	e title				Abbreviation	
Image a	and Sig	nal Processing in Phys	ics		11-BSV-122-m01	
Module	o coord	inator		Module offered by		
		ector of the Institute of A	Applied Physics			
ECTS		od of grading	<u> </u>	Only after succ. compl. of module(s)		
6 numerical grade				1		
Duratio	on	Module level	Other prerequisites			
Duration 1 semester		graduate	Other prerequisitesCertain 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 con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over 			
			admission to assess	sment anew.		
getic ob transfor Intende The stu les of ir ferent n Courses V + R (n Methoc ster, inf a) writte (approx d) prese Assess	bservat rmation ed learn idents I mage p nethod s (type formati en exan x. 30 m entatio ment o	ion; statistical signals, i n. ning outcomes nave advanced knowled rocessing and are famili s and to implement the number of weekly cont mation on SWS (weekly cessment (type, scope, l on on whether module of nination (90 minutes) o inutes per candidate) of n/seminar presentation ffered: When and how o	image noise, moments ge of digital image an iar with different meth m, especially in the fie act hours, language – contact hours) and co anguage – if other the can be chosen to earn r b) oral examination r c) project report (app (approx. 30 minutes) ften assessment will b	s, stationary signals; d signal processing. ods of signal proces eld of tomography. - if other than Germa purse language avail an German, examina a bonus) of one candidate ead rox. 8 to 10 pages, ti pe offered depends of		
		egulations) 2009.		citon 32 Subsection	3 ASFO (general academic and	
Allocat	ion of p	olaces				
	nal info	ormation				
	onal info	ormation				
		ormation				
 Additio 		ormation				
 Additio	ad					
 Additio Worklo	ad					
 Additio Worklo Teachir 	ad ng cycl		ulations for teaching-o	degree programmes)		
 Additio Worklo Teachir 	ad ng cycl	e	ulations for teaching-o	degree programmes)		
 Additio Worklo Teachir Referre 	ad ng cycle ed to in	e		degree programmes)		

Module appears in

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

Modul	e title				Abbreviation			
Image and Signal Processing in Physics					11-BSV-131-m01			
Modul	e coord	linator		Module offered by	,			
Manag	ging Dir	ector of the Institute	of Applied Physics	Faculty of Physics	and Astronomy			
ECTS	Meth	od of grading	Only after succ. co	mpl. of module(s)				
6	nume	erical grade						
Durati	on	Module level	Other prerequisite	S				
1 seme	ester	graduate	Certain prerequisit	es must be met to qu	alify for admission to as-			
			sessment. The lect	urer will inform stude	ents about the respective details			
			at the beginning of	the course. Registra	tion for the course will be con-			
			sidered a declarati	sidered a declaration of will to seek admission to assessment. If stu-				
			dents have obtaine	dents have obtained the qualification for admission to assessment over				
			the course of the s	the course of the semester, the lecturer will put their registration for as-				
			sessment into effe	sessment into effect. Students who meet all prerequisites will be admit				
			ted to assessment	in the current or in th	ne subsequent semesters.			
Conte	nts	·						
and im convol getic o	nage pro lution p	ocessing; discretisat roduct; tapering fun tion; statistical signa	ion of signals/sampling to the second s	theorem (Shannon); of images; the Parsiv	mation; principles of digital signa homogeneous and linear filters, val theorem, correlation and ener- s; tomography: Hankel and Radon			
Intend	led lear	ning outcomes						
les of i	image p	processing and are fa		hods of signal proce	. They know the physical princip- ssing. They are able to explain dif			
Course	es (type	e, number of weekly o	contact hours, language	— if other than Germ	an)			
V + R (no info	rmation on SWS (we	ekly contact hours) and c	ourse language avai	lable)			
			pe, language — if other th ule can be chosen to ear		ation offered — if not every seme-			
		/	minutes) as h) and examination of one condidate each as and even instian					

a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate) 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

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Additional information

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Workload

--

Teaching cycle

--

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

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Module appears in

Bachelor's with 1 major Nanostructure Technology	
(2012)	

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 ti	tle			Abbreviation	
Coating T	echnologies based on Vapo	ur Deposition		11-BVG-092-m01	
Module c	oordinator		Module offered by		
	Director of the Institute of A	nnlied Physics	Faculty of Physics a	and Astronomy	
	ethod of grading	Only after succ. con	· · · · · · · · · · · · · · · · · · ·	ind Astronomy	
	umerical grade				
Duration	Module level	Other prerequisites			
1 semeste	er graduate	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 the semester.			
		admission to assess			
Contents					
Physical t	echnical principles of PVD a polication of layer materials		nd processes. Coati	ng deposit and layer characteri-	
Intended	learning outcomes				
	nts have advanced knowled dustrial relevance and varie		processes in the gas	seous phase and gain insights in-	
Courses (type, number of weekly cont	act hours, language –	- if other than Germa	n)	
V + R (no i	information on SWS (weekly	contact hours) and co	ourse language avail	able)	
	f assessment (type, scope, l mation on whether module o			tion offered — if not every seme-	
groups (a) project rej (approx. 3 Assessme and will b	pprox. 30 minutes per candi port (approx. 8 to 10 pages, 30 minutes) ent offered: When and how o	date, for modules with time to complete: 1 to ften assessment will b	n less than 4 ECTS cr 4 weeks) or d) prese pe offered depends o	date each or oral examination in edits approx. 20 minutes) or c) entation/seminar presentation on the method of assessment 3 ASPO (general academic and	
Allocation	n of places				
Additiona	linformation				
Workload					
Teaching	cycle				
Referred t	to in LPO I (examination reg	ulations for teaching-o	degree programmes)		
Module a	ppears in				
	degree (1 major) Nanostruct				
	degree (1 major) Nanostruct) generated 26-Aug-2024 • exa	am. reg. da- page 64 / 139	
(2012)		-	or (180 ECTS) Nanostrukturte		



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

Module title					Abbreviation	
Curren	t Topics	s in Nanostructure Techn		11-BXN5-112-m01		
Modul	e coord	inator		Module offered by	<u>, </u>	
chairpe	erson o	f examination committee	_	Faculty of Physics a	and Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ester	undergraduate	Approval by examin	ation committee req	uired.	
Conten	nts					
Current or stud			. Accredited academi	c achievements, e.g	. in case of change of university	
Intend	ed lear	ning outcomes				
nology ledge.	or nan They ar		nd the measuring and ject-specific contexts	l evaluation method and know the appl		
V + R (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)	
		s essment (type, scope, la on on whether module ca			tion offered — if not every seme-	
in grou weeks)	ips (app) or d) p		didate) or c) project reservation (approx. 30	eport (approx. 8 to 1	lidate each or oral examination o pages, time to complete: 1 to 4	
Allocat						
Additic	onal inf	ormation				
Worklo	ad					
Teachi	ng cycl	e				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Referre						
Referre	ea to in	LPOI (examination regu	lations for teaching-o	legree programmes)		
Referre			lations for teaching-o	legree programmes)		

Module title					Abbreviation	
Current Topics in Nanostructure Technology					11-BXN6-112-m01	
Module coordinator				Module offered by	<u> </u>	
chairpe	erson o	f examination committee	2	Faculty of Physics a	and Astronomy	
ECTS	Metho	od of grading	Only after succ. con		·	
6	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	undergraduate	Approval by examin	ation committee req	uired.	
Conten	ts					
Current or stud			. Accredited academi	c achievements, e.g	. in case of change of university	
Intend	ed lear	ning outcomes				
nology ledge.	or nan They ar		nd the measuring and oject-specific contexts	d evaluation method and know the appli		
		mation on SWS (weekly				
Metho	d of ass	· · ·	anguage — if other tha	an German, examina	tion offered — if not every seme-	
in grou weeks)	ps (app or d) p		didate) or c) project re esentation (approx. 30	eport (approx. 8 to 1	lidate each or oral examination o pages, time to complete: 1 to 4	
Allocat						
	_					
Additio	onal inf	ormation				
Worklo	ad					
Teachi	ng cycl	9				
Referre	ed to in	LPOI (examination regu	ulations for teaching-o	degree programmes)		
		-				
Module	e appea	irs in				
		t rs in ree (1 major) Nanostructi	ure Technology (2010))		

Module title					Abbreviation	
Current Topics in Nanostructure Technology					11-BXN8-112-m01	
Module coordinator				Module offered by		
chairpe	erson o	f examination committee	2	Faculty of Physics a	and Astronomy	
ECTS	Metho	od of grading	Only after succ. con			
8	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	undergraduate	Approval by examin	ation committee req	uired.	
Conten	ts					
Current or stud			. Accredited academi	c achievements, e.g	. in case of change of university	
Intend	ed lear	ning outcomes				
nology ledge.	or nan They ar		nd the measuring and oject-specific contexts	d evaluation method and know the appli		
		mation on SWS (weekly				
Metho	d of ass		anguage — if other tha	an German, examina	tion offered — if not every seme-	
in grou weeks)	ps (app or d) p		didate) or c) project re esentation (approx. 30	eport (approx. 8 to 1	lidate each or oral examination o pages, time to complete: 1 to 4	
Allocat						
Additio	onal inf	ormation				
Worklo	ad					
Teachi	ng cycl	e				
Referre	ed to in	LPOI (examination regu	ulations for teaching-o	degree programmes)		
Module	e appea	irs in				
Bachel	or ueg	ree (1 major) Nanostructi	ure Technology (2010))		

Module title					Abbreviation	
Current	t Topics	s in Physics			11-BXP5-112-m01	
Module coordinator				Module offered by		
chairpe	erson o	f examination committee		Faculty of Physics a	nd Astronomy	
		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	Approval by examination	ation committee req	uired.	
Conten	ts					
	•	of Experimental and The versity or study abroad.	oretical Physics. Acci	redited academic ac	hievements, e.g. in case of	
Intende	ed lear	ning outcomes				
subdiso knowle	cipline dge. Tł	of Physics and understan	nd the measuring and e subject-specific cor	l/or calculation methet ntexts and know the		
		, number of weekly conta				
		mation on SWS (weekly o				
		sessment (type, scope, la ion on whether module ca			tion offered — if not every seme-	
in group weeks)	ps (app or d) p		didate) or c) project re sentation (approx. 30	eport (approx. 8 to 10	lidate each or oral examination o pages, time to complete: 1 to 4	
Allocati						
Additio	nal inf	ormation				
Worklo	ad					
Teaching cycle						
	_ ,					
Referre	d to in	LPOI (examination regu	lations for teaching-c	legree programmes)		
		``		<u> </u>		
Module	e appea	ars in				

Module title					Abbreviation	
Current Topics in Physics 11-BXP6-112-m01					11-BXP6-112-m01	
Module coordinator				Module offered by		
chairpe	erson o	f examination committee		Faculty of Physics a	nd Astronomy	
ECTS		od of grading	Only after succ. com	pl. of module(s)		
6	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ester	undergraduate	Approval by examination committee required.			
Conten	nts					
	•	of Experimental and The versity or study abroad.	oretical Physics. Acc	redited academic ac	hievements, e.g. in case of	
Intend	ed lear	ning outcomes				
The students have advanced competencies corresponding to the requirements of a module of Experimental or Theoretical Physics of the Bachelor's programme of Nanostructure Technology. They have knowledge of a current subdiscipline of Physics and understand the measuring and/or calculation methods necessary to acquire this knowledge. They are able to classify the subject-specific contexts and know the application areas. Courses (type, number of weekly contact hours, language — if other than German)						
		mation on SWS (weekly o				
		sessment (type, scope, la ion on whether module ca			tion offered — if not every seme-	
in grou weeks)	ips (app) or d) p		didate) or c) project re sentation (approx. 30	eport (approx. 8 to 10	lidate each or oral examination o pages, time to complete: 1 to 4	
Allocat		о.				
Additio	onal inf	ormation				
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Mouule	e appec					

Module title Abbreviat					Abbreviation	
Current Topics in Physics 11-BXP8-112-m01						
Module	e coord	inator		Module offered by	<u> </u>	
chairpe	erson o	f examination committee		Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	nly after succ. compl. of module(s)		
8	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 semester undergraduate		undergraduate	Approval by examination committee required.			
Conten	ts					
	•	of Experimental and The versity or study abroad.	oretical Physics. Acc	redited academic ac	hievements, e.g. in case of	
Intende	ed lear	ning outcomes				
Theoretical Physics of the Bachelor's programme of Nanostructure Technology. They have knowledge of a current subdiscipline of Physics and understand the measuring and/or calculation methods necessary to acquire this knowledge. They are able to classify the subject-specific contexts and know the application areas. Courses (type, number of weekly contact hours, language — if other than German)						
		mation on SWS (weekly o				
		on on whether module ca			tion offered — if not every seme-	
in grou weeks)	ps (app or d) p		didate) or c) project re sentation (approx. 30	eport (approx. 8 to 10	lidate each or oral examination o pages, time to complete: 1 to 4	
Allocat						
		-				
Additio	onal inf	ormation				
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	e appea	ars in				

8 numerical grade Duration 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 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 an 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. Contents Principles of electrostatics, magnetostatics, Maxwell equations, covariant formulation, electrodynamics and matter Intended learning outcomes The students have knowledge of the principles of classical electrodynamics and the required calculation me- thods. Courses (type, number of weekly contact hours, language — if other than German, examination offered — if not every seme ster, 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 seme ster, information on whether module can be chosen to eam a bonus) witten examination (approx. 120 minutes, for modules with less than 4 ECTS credits approx. 90 minutes; unles otherwise specified) Assessment offered: When and how often assessment will be offered depend	Module title Abbreviation							
Managing Director of the Institute of Theoretical Physics Faculty of Physics and Astronomy ECTS Method of grading Only after succ. compl. of module(s) a numerical grade Duration Module level Other prerequisites sensester undergraduate 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 stude have obtained the qualification for admission to assessment as a sessment in the current or in the subsequent seemster. For assessment at a later date, students will have to obtain the qualification for admission to assessment at a later date, students will have to obtain the qualification for admission to assessment at later date, students will have to obtain the qualification for admission to assessment and with the domission to assessment and with the subsequent seemster. For assessement for the course of the semster, the lecturer will put their registration for assessment at later date, students will have to obtain the qualification for admission to assessment and will can be obtain the qualification for admission to assessessment for the subsequent seemster. For assessement for the students will have to obtain the qualification for admission to assessment at later date, students will have to obtain the qualification for admission to assessment and will can be done of the principles of classical electrodynamics and the required calculation methods. Contents Principles of lectorstatics, magnetostatics, Maxwell equations, covariant formulation offered — ifn	Theore	tical El	ectrodynamics			11-ED-092-m01		
Managing Director of the Institute of Theoretical Physics Faculty of Physics and Astronomy ECTS Method of grading Only after succ. compl. of module(s) a numerical grade Duration Module level Other prerequisites sensester undergraduate 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 stude have obtained the qualification for admission to assessment as a sessment in the current or in the subsequent seemster. For assessment at a later date, students will have to obtain the qualification for admission to assessment at a later date, students will have to obtain the qualification for admission to assessment at later date, students will have to obtain the qualification for admission to assessment and with the domission to assessment and with the subsequent seemster. For assessement for the course of the semster, the lecturer will put their registration for assessment at later date, students will have to obtain the qualification for admission to assessment and will can be obtain the qualification for admission to assessessment for the subsequent seemster. For assessement for the students will have to obtain the qualification for admission to assessment at later date, students will have to obtain the qualification for admission to assessment and will can be done of the principles of classical electrodynamics and the required calculation methods. Contents Principles of lectorstatics, magnetostatics, Maxwell equations, covariant formulation offered — ifn	Module	coord	inator					
and Astrophysics ECTS Method of grading Only after succ. compl. of module(s) 8 numerical grade Duration Module level Other prerequisites 1 semester undergraduate 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 to the test have obtained the qualification for admission to assessment ove the course of the semester, the lecturer will put their registration for as- sessment. The lecturer will course will be admit ted to assessment anew. Contents Principles of electrostatics, magnetostatics, Maxwell equations, covariant formulation, electrodynamics and matter Intended learning outcomes The students have knowledge of the principles of classical electrodynamics and the required calculation me- thods. Courses (type, number of weekly contact hours, language — if other than German) V + 0 (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 seme ster, information on whether module can be chosen to era a bonus) written examination (approx. 120 minutes, for modules with less than 4 ECTS credits approx. 90 minutes; unles ather module can be chosen to era a bonus) written examination of places				Theoretical Physics	· · ·	and Astronomy		
ECTS Method of grading Only after succ. compl. of module(s) 8 num=rical grade Duration Module level Other 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. If second the semester, the lecturer will purt their registration for adsecond the course of the semester, the lecturer will prerequisites will be admit ted to assessment in the current or in the subsequent semester. For assessment in the fore. Students will have to obtain the qualification for admission to assessment at a later date, students will have to obtain the qualification fadmited tearning outcomes Principles of electrostatics, magnetostatics, Maxwell equations, covariant formulation, electrodynamics and matter Intended learning outcomes The students have knowledge of the principles of classical electrodynamics and the required calculation methods. Courses (type, number of weekly contact hours, language — if other than German) V + 0 (no information on SWS (weekly contact hours) and course language available) Method of assessment time under observance of Section 32 Subsection 3 ASPO (general academic and examination forgultions) zoo. Additional information Additional information V + 0 (no information complement in thow often assessment will be offered depends on the method of asse				medicati nysics		and Astronomy		
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Workload Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in								
Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in	Additional information							
Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in								
 Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in	Workload							
 Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in								
	Teaching cycle							
	Referred to in LPO I (examination regulations for teaching-degree programmes)							
Bachelor' degree (1 major) Mathematics (2012)	Module appears in							
Dathetor degree (1 major) mathematics (2012)								
Bachelor' degree (1 major) Mathematics (2013)								

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

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) Physics (Minor, 2010)

Module	e title				Abbreviation	
Introdu	uction t	o Nanoscience			11-EIN-092-m01	
Module	a coord	inator		Module offered by		
		ector of the Institute of	of Applied Physics	Faculty of Physics and Astronomy		
ECTS		od of grading	Only after succ. con			
6		rical grade				
Duratio		Module level	Other prerequisites			
2 semester 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 con- 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 qualification				ents about the respective details tion for the course will be con- nission to assessment. If stu- or admission to assessment over will put their registration for as- et all prerequisites will be admit- ne subsequent semester. For as-		
admission to assessment anew.						
Conten						
			oducing, characterising a	nd applying nanosti	ructures.	
		ning outcomes				
		have knowledge of th ructures.	e fundamental propertie	s, technologies, cha	racterising methods and functi-	
Course	s (type	, number of weekly c	ontact hours, language –	- if other than Germa	an)	
V + S (r	no infoi	mation on SWS (wee	kly contact hours) and co	ourse language avail	able)	
			e, language — if other th le can be chosen to earn		ation offered — if not every seme-	
written otherw			ninutes, for modules with	less than 4 ECTS cr	edits approx. 90 minutes; unless	
Allocat	ion of	olaces				
Only as	s part o	f pool of general key	skills (ASQ): 15 places. P	laces will be allocate	ed by lot.	
Additio	onal inf	ormation				
Worklo	ad					
Teachi	ng cycl	e				
Referre	ed to in	LPOI (examination	regulations for teaching-	degree programmes)		
Module	e appea	ars in				
Bachel Bachel Bachel Bachel	Module appears inBachelor' 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)					

Modul	Module title								
Princip	oles of E	inergy Technologies			11-ENT-092-m01				
Modul	e coord	inator		Module offered by	~ ·				
Manag	ging Dire	ector of the Institute of	Applied Physics	plied Physics Faculty of Physics and Astronomy					
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)					
6	nume	rical grade		-					
Durati	on	Module level	Other prerequisites	Other prerequisites					
1 seme	ester	graduate		s must be met to qu	•				
				irer will inform stude	•				
				the course. Registrat					
				sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over					
				•					
				mester, the lecturer					
				t. Students who mee					
				n the current or in th date, students will h	•				
			admission to asses		ave to obtain the qu	alification for			
Conter			vation and energy conv						
ting ma studer verters	aterials its. Ene 5. Nucle	, selective layers, high rgy conservation via th ar power plants. Hydro	le also discuss aspects ly activated carbons). T ermal insulation. Thern electricity. Wind turbin ergy. Energy storage. En	he course is especia nodynamic energy ef es. Photovoltaics. Sc	lly suitable for teach ficiency. Fossil fired	iing degree energy con-			
		ning outcomes							
			different methods of er ne structures of corresp						
Course	es (type	, number of weekly cor	ntact hours, language –	- if other than Germa	ın)				
R + V (no infor	mation on SWS (weekl	y contact hours) and co	ourse language avail	able)				
			language — if other the can be chosen to earn		tion offered — if not	every seme-			
groups project (appro Assess and wi examin	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								
Alloca	Allocation of places								
Additional information									
Workload									
Teachi	ng cycl	e							
Pachala.	with a m-	or Nanoctructure Technology	INALI VARTURE	generated 26-Aug-2024 • ex	am rog da	page 75 / 100			
Bachelor S (2012)	with 1 ma	jor Nanostructure Technology		or (180 ECTS) Nanostrukturte		page 75 / 139			

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						
Solid S	itate Sp	pectroscopy			11-FKS-092-m01	
Module		instor		Module offered by		
			Applied Dhysics	Faculty of Physics and Astronomy		
ECTS	-	ector of the Institute of A od of grading	Only after succ. con		and Astronomy	
6		rical grade				
-			Other prerequisites			
sessment. The lecturer will inf at the beginning of the course sidered a declaration of will to dents have obtained the quali the course of the semester, th sessment into effect. Students ted to assessment in the curre sessment at a later date, stud		s must be met to qu irer will inform stude the course. Registrat on of will to seek adn d the qualification fo mester, the lecturer t. Students who mee n the current or in th	must be met to qualify for admission to as- er will inform students about the respective details ne course. Registration for the course will be con- of will to seek admission to assessment. If stu- the qualification for admission to assessment over nester, the lecturer will put their registration for as- Students who meet all prerequisites will be admit- the current or in the subsequent semester. For as- ate, students will have to obtain the qualification for			
Conten	te					
Single- spectro	and m	any-particle picture of e X-ray spectroscopies. ning outcomes	lectrons in solids. Ligh	nt-matter interaction	. Optical spectrosco	py. Electron
types o develo	of spect	have specific and advar roscopy and their fields in research.	of application. They u	inderstand the theor	etical principles and	
		, number of weekly cont				
		mation on SWS (weekly				
		sessment (type, scope, ion on whether module			ition offered — if not	t every seme-
groups project (approx Assess and wil examin	(appro report x. 30 m ment o Il be an nation r	mination (approx. 90 m ix. 30 minutes per cand (approx. 8 to 10 pages, inutes) ffered: When and how of nounced in due form ur egulations) 2009. ssessment: German, Er	idate, for modules with time to complete: 1 to often assessment will h nder observance of Sec	n less than 4 ECTS cr 4 weeks) or d) prese be offered depends o	redits approx. 20 mi entation/seminar pr on the method of as	nutes) or c) esentation sessment
Allocat	ion of j	olaces				
 Worklo Teachin 	oad ng cycl	ormation e LPOI (examination reg	ulations for teaching-	degree programmes)		
Module	e appea	ars in				
	with 1 ma	jor Nanostructure Technology		generated 26-Aug-2024 • ex	-	page 77 / 139
012) ta record Bachelor (180 ECTS) Nanostrukturtechnik - 2012						

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

Module title				Abbreviation		
Semiconduc	tor Lasers - Principle	s and Current Research		11-HLF-092-m01		
Module coor	dinator		Module offered by	<u> </u>		
	rector of the Institute	of Applied Physics	Faculty of Physics a			
	hod of grading	Only after succ. co	, ,			
	erical grade					
Duration	Module level	Other prerequisites	5			
1 semestergraduateCertain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective deta 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 ov the course of the semester, the lecturer will put their registration for a sessment into effect. Students who meet all prerequisites will be adm ted to assessment in the current or in the subsequent semester. For a sessment at a later date, students will have to obtain the qualification				ents about the respective details tion for the course will be con- nission to assessment. If stu- or admission to assessment over will put their registration for as- et all prerequisites will be admit- ne subsequent semester. For as-		
		admission to asses	sment anew.			
riers and photons. Other topics of the lecture are optical processes in semiconductors, layer and ridge wavegui- des, laser resonators, mode selection, dynamic properties as well as technology for the generation of semicon- ductor lasers. The lecture closes with current topics of laser research such as quantum dot lasers, quantum cas- cade lasers, terahertz lasers or high-performance lasers. Intended learning outcomes The students have advanced knowledge of the principles of semiconductor-laser physics. They can apply their knowledge to modern questions and know the applications in the current development of components.						
Courses (typ	e, number of weekly	contact hours, language -	– if other than Germa	an)		
R + V (no info	ormation on SWS (we	ekly contact hours) and c	ourse language avail	lable)		
		pe, language — if other th ule can be chosen to earr		ation offered — if not every seme-		
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 ir	formation					
-						
Workload						
-						

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

Module appears in

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

Module	e title				Abbreviation	
Semico	onducto	or Physics			11-HLP-092-m01	
Module	e coord	inator		Module offered by	<u> </u>	
		ector of the Institute of A	nnlied Physics			
ECTS		od of grading	Only after succ. cor	•	and Astronomy	
6		rical grade				
Duratio	on	Module level	Other prerequisites	i		
Duration Module level 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-				
			admission to asses	date, students will h sment anew	ave to obtain the q	admeation to
Conten	ts					
sation Intende The stu	effects ed lear udents l nciples	coupling effects. Electro of semiconductors with ning outcomes nave specific and advan of semiconductors and l	reduced dimensions.	(Semi-)magnetic ser field of Semiconduc	miconductors. tor Physics. They k	now the physi
		, number of weekly cont	- act hours language -	- if other than Germa	n)	
		mation on SWS (weekly				
Metho	d of ass	essment (type, scope, l on on whether module of	anguage — if other th	an German, examina		ot every seme-
groups project (approx Assess and wil examin	(appro report x. 30 m ment o Il be an nation r	nination (approx. 90 mi x. 30 minutes per candi (approx. 8 to 10 pages, inutes) ffered: When and how o nounced in due form un egulations) 2009. ssessment: German, En	date, for modules wit time to complete: 1 to ften assessment will der observance of Se	h less than 4 ECTS cr 9 4 weeks) or d) prese be offered depends o	edits approx. 20 m entation/seminar p on the method of a:	inutes) or c) resentation ssessment
Allocat						
Additio	onal inf	ormation				
Worklo	ad					
 Teachiı	ng cycl	e				
Referre	ed to in	LPOI (examination reg	ulations for teaching-	degree programmes)		
Bachelor's	with 1 maj	or Nanostructure Technology		generated 26-Aug-2024 • ex- lor (180 ECTS) Nanostrukturte		page 81 / 139

Module appears in

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

	Module title				Abbreviation		
Semico	onducto	or 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 and Astronomy				
ECTS	Metho	od of grading	Only after succ. com	y after succ. compl. of module(s)			
6 numerical grade							
Duratio	on	Module level	Other prerequisites				
1 seme	ester	graduate	Certain prerequisites must be met to qualify for admission to as-				
			sessment. The lecturer will inform				
				-	ion for the course will be con-		
					nission to assessment. If stu-		
					r admission to assessment over		
					will put their registration for as-		
					t all prerequisites will be admit-		
					e subsequent semester. For as-		
					ave to obtain the qualification for		
	_		admission to assess	sment anew.			
Conten	nts						
					. In contrast to atoms, molecules		
					e systematically tailored by chan-		
					on of semiconductor nanostruc-		
					pts to describe their properties, ses the challenges and concepts		
					ctures, including building blocks		
		ommunication and quan					
Intend	ed lear	ning outcomes					
					tor nanostructures. They have		
					eir applications to novel photonic		
		are able to apply their kr					
		, number of weekly conta					
		mation on SWS (weekly o					
		on on whether module ca			tion offered — if not every seme-		
a) writt	en exai	nination (approx. 90 min	utes) or b) oral exam	ination of one candi	date each or oral examination in		
					edits approx. 20 minutes) or c)		
			ime to complete: 1 to	4 weeks) or d) prese	entation/seminar presentation		
	x. 30 m	-	ton accoccmont will b	a offered depender	on the method of assessment		
				•			
	and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009.						
Language of assessment: German, English							
Allocation of places							
Additio	Additional information						
Worklo	ad						

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

Referred to in Er of (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 titl	e			Abbreviation	
Advanced S	Seminar Nanostructure Te	echnology		11-HSN-122-m01	
Module cod	ordinator		Module offered by		
	Directors of the Institute c	of Applied Physics and			
	e of Theoretical Physics a			and historionity	
	thod of grading	Only after succ. con	npl. of module(s)		
· .	nerical grade				
Duration	Module level	Other prerequisites			
1 semesterundergraduateAdmission prerequisite to assessment: regular attendance a cessful preparation of seminar presentation. Certain prerequ be met to qualify for admission to assessment. The lecturer students about the respective details at the beginning of the gistration for the course will be considered a declaration of v admission to assessment. If students have obtained the qua admission to assessment over the course of the semester, th will put their registration for assessment into effect. Student all prerequisites will be admitted to assessment in the curre subsequent semester. For assessment at a later date, stude			tion. Certain prerequisites must sement. The lecturer will inform the beginning of the course. Re- red a declaration of will to seek ave obtained the qualification for se of the semester, the lecturer t into effect. Students who meet essment in the current or in the at a later date, students will have		
to obtain the qualification for admission to assessment anew.				n to assessment anew.	
Contents					
	ues in advanced topics of	f nanostructure zechnol	ogy		
	arning outcomes				
	ts have in-depth knowled dently acquire this knowl			ructure technology. They are able ration.	
Courses (ty	pe, number of weekly cor	ntact hours, language –	- if other than Germa	an)	
S (no inforr	nation on SWS (weekly co	ontact hours) and cours	e language available	e)	
	assessment (type, scope ation on whether module			ation offered — if not every seme-	
	x. 30 to 45 minutes) with f assessment: German or				
Allocation	of places				
Additional	information				
Workload					
Teaching c	ycle				
Referred to	in LPO I (examination re	gulations for teaching-	degree programmes)		
 Module ap _l	pears in				
Bachelor' d	egree (1 major) Nanostru	cture Technology (2012)		

Module title	9			Abbreviation	
Introduction	to Electron Microsc	ору		11-IEM-111-m01	
Module coor	rdinator		Module offered by		
Managing D	irector of the Institut	e of Applied Physics	Faculty of Physics and Astronomy		
<u> </u>	hod of grading		ifter succ. compl. of module(s)		
	nerical grade		1		
Duration	Module level	Other prerequisit	es		
1 semester graduate		sessment. The lead at the beginning of sidered a declarat dents have obtain the course of the sessment into effor ted to assessmen sessment at a late	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for		
Contents		admission to asse	essment anew.		
image forma 7. Chemical spectroscop Intended lea The students	ation, image simulati analysis with the ele y). 8. Sample prepar arning outcomes s have basic knowled	on). 6. Scanning electron ectron microscope (energy ration. Electron microscop dge of modern research n	n microscopy (the instr y-dispersive X-ray micro oy and complementary nethods of electron mi	ectron microscopy (principle of rument, contrast mechanisms). roanalysis, electron energy loss y techniques. icroscopy up to an atomic level. dustry as well as electron-micros-	
· ·		<u>·</u> ·		different research methods.	
	•	contact hours, language			
Method of a	ssessment (type, sc	eekly contact hours) and ope, language — if other dule can be chosen to ea	than German, examina	able) ation offered — if not every seme-	
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					
and will be a examination	regulations) 2009.		Section 32 Subsection		
and will be a examination	regulations) 2009. assessment: Germa		Section 32 Subsection		
and will be a examination Language of	regulations) 2009. assessment: Germa		Section 32 Subsection		
and will be a examination Language of	regulations) 2009. assessment: Germa f places		Section 32 Subsection		
and will be a examination Language of Allocation o	regulations) 2009. assessment: Germa f places		Section 32 Subsection		
and will be a examination Language of Allocation o	regulations) 2009. assessment: Germa f places		Section 32 Subsection		

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 (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2012) Master's degree (1 major) FOKUS Physics (2012) Master's degree (1 major) FOKUS Physics (2012)

Module	e title				Abbreviation	
Industr	rial Pra	ctical Course Nanost	ructure Technology		11-IP-092-m01	
Module	e coord	inator		Module offered by		
		ector of the Institute of	of Applied Physics	Faculty of Physics and Astronomy		
ECTS		od of grading	Only after succ. cor	•		
10		rical grade	11-EIN and 11-KP			
Duratio	on	Module level	Other prerequisites	5		
1 semester undergraduate			sessment. The lecture at the beginning of sidered a declaration dents have obtained the course of the set sessment into effect ted to assessment	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	tc	<u> </u>				
and tas Intended The stur- ce to na Course P + S (r Method ster, in a) place Assess and will examin	Contents Insights into industrial methods, work processes, goals and production methods. Summary of own experiences and tasks in a report and an oral presentation. Intended learning outcomes The students have knowledge and practical experience of using a variety of industrial technologies with relevance to nanostructure technology and are able to summarise their experience in a report and an oral presentation. Courses (type, number of weekly contact hours, language — if other than German) P + 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 can be chosen to earn a bonus) a) placement report and b) presentation/seminar presentation (approx. 30 to 90 minutes), weighted 1:4 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	nal inf	ormation				
Worklo	ad					
Teachi	Teaching cycle					
Referre	 Referred to in LPO I (examination regulations for teaching-degree programmes)					
	 Module appears in					
			ucturo Tochnology (cost	.).		
	Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Nanostructure Technology (2012)					

					Abbreviation		
			Molecules, Solid State	•	11-KM-092-m01		
	e coord			Module offered by			
	Managing Director of the Institute of Applied Physics			Faculty of Physics a	ind Astronomy		
				pl. of module(s)			
16		rical grade					
Durati		Module level	Other prerequisites				
	2 semester undergraduate						
Conter Quanti		nomena, introduction	to Atomic Physics and p	hysical laws of solic	ls. Experimental prir	ciples of	
			nulation of quantum m				
			on atoms. Optical trans				
			nd vibrations. Bonding				
		nsulators. Electrons in	al lattice. Structure det	ermination. Lattice v	ibrations (phonons)	. Inermat	
		ning outcomes					
			s and principles of qua	ntum phenomena A	tomic Physics and s	olids (bon-	
			thermal properties, pri				
They a	re able	to apply mathematical	methods to the formul	ation of modern phy		•	
apply t	heir kn	owledge to the solution	n of mathematical-phys	ical tasks.			
			ntact hours, language –				
			ome, Moleküle) (Conde		ita, Atoms, Molecule	s)): V (4 wee-	
			act hours), once a year hysik 1) (Condensed M		Physics)). V (1, wookly	/ contact	
			once a year (summer s		пузісэ)). V (4 мескі		
			language — if other the can be chosen to earn		tion offered — if not	every seme-	
		as the following asses red in lectures and exe	sment components ercises in part 1 (Konder	nsierte Materie 1 (Co	ndensed Matter 1)):	written ex-	
amiı	nation (approx. 120 minutes).	ercises in part 2 (Konde				
		approx. 120 minutes).				,	
			ercises in parts 1 and 2: n examination (approx.		one candidate each	(approx. 30	
			ered in German; Englisł % of practice work eacl			ssment com-	
	ts 1 and		is of practice work cac	ris a prerequisite to			
			ent component 3, stude				
			o attend both courses K				
		iponent 3.	Matter 2). The topics di	scussed in these two	o courses will be co	/ered in as-	
			nt components 1 throu	gh 3 online (details t	o be announced).		
			first pass assessment o	component 1 or 2 and	d must then pass as	sessment	
	onent 3.		omnonont e or o (which	over is better) and th	a arrada a chiavad ir	accoccmont	
			omponent 1 or 2 (which wards the overall grade			assessment	
· · ·	tion of p						
Additio	onal inf	ormation					
Bachelor's	with 1 ma	or Nanostructure Technology	JMU Würzburg •	generated 26-Aug-2024 • ex	am. reg. da-	page 89 / 139	
(2012)			ta record Bachel	or (180 ECTS) Nanostrukturte	chnik - 2012		

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' degree (1 major, 1 minor) Physics (Minor, 2010) Julius-Maximilians-UNIVERSITÄT WÜRZBURG

Module	e title		Abbreviation			
Classical Physics (Mechanics, Thermodynamics, Waves, Oscillations, Electrici-						
ty, Mag	gnetisn	n and Optics)			,	
Module	e coord	inator		Module offered by		
Managi	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)		
16	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
2 seme	ster	undergraduate	Bridge course Mathe	ematische Rechenme	ethoden der Physik (Mathemati-	
			cal Methods of Phys	ics) for first-semeste	er students.	
Conten	ts					
Physica	al laws	of mechanics, thermodyr	namics, vibrations, wa	aves, science of elec	ctricity, magnetism, electroma-	
gnetic v	vibratic	ons and waves, radiation	and wave optics. Tim	e, room and motion.	. Physical values. Force and mo-	
					s. Friction. Vibration and waves.	
			-		ics. Electrostatics. Electric cur-	
		sms of conduction. Magn ent. Electromagnetic wave			axwell equations. Science of al-	
			es. Geometric optics.	wave optics.		
		ning outcomes				
					ermodynamics, vibrations, wa-	
					diation and wave optics. They and autonomously apply their	
		the solution of mathema		or physical contexts	and autonomously apply them	
		, number of weekly conta	· ·	if other than Germa	n)	
		J (2 weekly contact hours			, Waves, Heat)): V (4 weekly con-	
					agnetism, Optics)): V (4 weekly	
) + Ü (2 weekly contact ho				
Method	d of ass	sessment (type, scope, la	nguage — if other tha	ın German, examina	tion offered — if not every seme-	
		on on whether module ca				
		as the following assessm	•			
•			ises in part 1 (Klassis	che Physik 1 (Classio	cal Physics 1)): written examinati-	
		120 minutes).	in a set a (Klassia	aha Dhuailea (Classi		
		k. 120 minutes).	ises in part 2 (Klassis	Che Physik 2 (Classi	cal Physics 2)): written examina-	
			ises in parts 1 and 2:	oral examination of	one candidate each (approx. 30	
		ually chosen) or written e				
		omponent 3 will be offere				
ponent			of plactice work each	i is a prerequisite to	r admission to assessment com-	
•			component 3. stude	nts must pass asses	ssment component 1 and/or 2.	
					Classical Physics 1) and Klassi-	
					vill be covered in assessment	
compo						
		t register for assessment				
compo		iouule, students must firs	si pass assessment c	omponent 1 or 2 and	d must then pass assessment	
		ieved in assessment com	ponent 1 or 2 (which	ever is better) and th	ne grade achieved in assessment	
		will each count 50% towa				
Allocat			5			

dditional information	
/orkload	
eaching cycle	
eferred to in LPO I (examination regulations for teaching-degree programmes)	
lodule appears in	
achelor' degree (1 major) Mathematics (2012)	
achelor' degree (1 major) Mathematics (2013)	
achelor' degree (1 major) Physics (2010)	
achelor' degree (1 major) Physics (2012)	
achelor' degree (1 major) Nanostructure Technology (2010)	
achelor' degree (1 major) Nanostructure Technology (2012)	
achelor' degree (1 major) Mathematical Physics (2009)	
achelor' degree (1 major) Mathematical Physics (2012)	
achelor' degree (1 major) Computational Mathematics (2012)	
achelor' degree (1 major) Computational Mathematics (2013)	
achelor's degree (1 major, 1 minor) Physics (Minor, 2010)	
o final examination Special study offering (2010)	

Module tit	tle			Abbreviation	
Laborator	y and Measurement Techno	logy in Biophysics		11-LMB-092-m01	
Module co	ordinator		Module offered by		
Managing	Director of the Institute of A	pplied Physics	Faculty of Physics a	and Astronomy	
ECTS M	ethod of grading	Only after succ. compl. of module(s)			
6 nı	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			sment anew.		
physical p measuring	e covers relevant principles rocedures for the examinat g techniques and sensors, n of structure elucidation of b	on and manipulation nethods of single-part	of biological system	s. The main topics ar	re optical
Intended l	earning outcomes				
sical proce	nts know the principles of n edures for the examination g techniques and their appli Iles.	and manipulation of b	oiological systems. Th	hey have knowledge	of optical
Courses (t	ype, number of weekly cont	act hours, language –	– if other than Germa	an)	
R + V (no i	nformation on SWS (weekly	contact hours) and co	ourse language avail	able)	
	assessment (type, scope, mation on whether module			ition offered — if not	every seme-
groups (ap project rep (approx. 3 Assessme and will be examinati	examination (approx. 90 m oprox. 30 minutes per candi oort (approx. 8 to 10 pages, o minutes) nt offered: When and how c e announced in due form ur on regulations) 2009. of assessment: German, En	date, for modules wit time to complete: 1 to ften assessment will ider observance of Se	h less than 4 ECTS cr 4 weeks) or d) preso be offered depends o	redits approx. 20 mir entation/seminar pre on the method of ass	nutes) or c) esentation sessment
Allocation	of places				
	•				
Additional	linformation				
Workload		-			
Teaching	cycle				
Bachelor's with 2012)	1 major Nanostructure Technology		e generated 26-Aug-2024 • ex lor (180 ECTS) Nanostrukturte		page 93 / 139

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					Abbreviation	
Magne	tism				11-MAG-092-m01	
Module	e coord	inator		Module offered by		
Managing Director of the Institute of Applied Physics			pplied Physics	Faculty of Physics and Astronomy		
ECTS		od of grading	Only after succ. con	nly after succ. compl. of module(s)		
6	I	rical grade				
Duratio		Module level	Other prerequisites			
1 seme	ster	graduate			alify for admission to as- nts about the respective details	
					ion for the course will be con-	
					ission to assessment. If stu-	
			dents have obtained	d the qualification fo	r admission to assessment over	
			the course of the se	mester, the lecturer	will put their registration for as-	
					t all prerequisites will be admit-	
					e subsequent semester. For as-	
					ave to obtain the qualification for	
			admission to assess	sment anew.		
Conten			· · · ·			
					etism, anisotropy, domain struc- magnetic properties, Kondo ef-	
Intende	ed lear	ning outcomes				
experin ches ar	nents; nd are a	they are skilled in simple	e model building and ks in the stated areas	in the formulation of s; they have compete	easuring methods for magnetic mathematical-physical approa- encies in independently working ons and analyses.	
Course	s (type	, number of weekly conta	act hours, language –	- if other than Germa	n)	
R + V (n	io infor	mation on SWS (weekly	contact hours) and co	ourse language availa	able)	
					tion offered — if not every seme-	
ster, information on whether module can be chosen to earn a 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. Language of assessment: German, English						
Allocat	ion of J	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teachi	ng cycl	e				

Module appears in

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

Modul					Abbreviation	
Mathe	matics	3 for students of Physi	cs and Engineering		11-MPI3-062-m01	
Modul	e coord	inator		Module offered by		
Manag	ing Dire	ector of the Institute of	Theoretical Physics	Faculty of Physics a	and Astronomy	
and As	trophys	sics	· ·		-	
ECTS	1	od of grading	Only after succ. cor	npl. of module(s)		
8	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 semester undergraduate		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 as		a nave to obtain the qualified	
Conter	nts					
Ordina	ry and	partial differential equa	ations in Physics.			
Intend	ed lear	ning outcomes				
partial	differe	ntial equations.		-	olution methods for common	and
		, number of weekly con				
		mation on SWS (weekl	•			
ster, in	format	ion on whether module	can be chosen to earn		ation offered — if not every se	me-
		nation (approx. 120 min	nutes)			
Allocat	tion of _l	places				
Additio	onal inf	ormation				
Worklo	ad					
		_				
Teachi	iig cycl	e				
Defer			nulations for to a lite			
Referre	ea to in	LPOI (examination reg	guiations for teaching-	uegree programmes)		
Maded						
Modul						
	-	ree (1 major) Physics (2 ree (1 major) Physics (2				
	-	ree (1 major) Physics (2	•			
	-	ree (1 major) Technolog		als (2009)		
		ree (1 major) Technolog				
Bachel	or' deg	ree (1 major) Nanostruc	ture Technology (2010))		
Bachelor's (2012)	with 1 ma	jor Nanostructure Technology	-	• generated 26-Aug-2024 • ex lor (180 ECTS) Nanostrukturte		/ 139
2012)			la recuru bache		.cmmX - 2012	

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

Modul	e title				Abbreviation
Mathe	matics	4 for Students of Physics	s and Engineering		11-MPI4-062-m01
Modul	e coord	inator		Module offered by	
-	ing Dire trophys	ector of the Institute of Th sics	neoretical Physics	Faculty of Physics a	and Astronomy
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)	
8	nume	rical grade			
Duratio	on	Module level	Other prerequisites	;	
1 seme	ester	undergraduate			
Conter	nts		·		
Functio	onal an	alysis and complex analy	sis.		
		ning outcomes			
		have basic knowledge of as the required calculation		ert space and the the	eory of functions of a complex va-
Course	s (type	, number of weekly conta	act hours, language –	– if other than Germa	ın)
V + Ü (no info	mation on SWS (weekly	contact hours) and co	ourse language avail	able)
		sessment (type, scope, la ion on whether module c			tion offered — if not every seme-
written	exami	nation (approx. 120 minu	ites)		
Allocat	tion of	olaces			
Additio	onal inf	ormation			
			_		
Worklo	ad				
Teachi	ng cycl	e			
Referre	ed to in	LPOI (examination regu	llations for teaching-	degree programmes)	
Modul	e appea	ars in			
Bachel	or' deg	ree (1 major) Physics (20	07)		
	-	ree (1 major) Physics (20			
	-	ree (1 major) Physics (20			
	-	ree (1 major) Nanostructu			
	-	ree (1 major) Nanostructu			
		ree (1 major) Nanostructu			
Bachel	or' deg	ree (1 major) Nanostructu	ure Technology (2007	7)	

Module	e title				Abbreviation		
Metho	ds in Sı	Irface Spectroscopy			11-MSS-102-m01		
Module	e coord	inator		Module offered by	<u> </u>		
Managing Director of the Institute of Applied Physics			nnlied Physics	Faculty of Physics and Astronomy			
ECTS	-	od of grading	Only after succ. compl. of module(s)				
4		rical grade					
Duratio	on	Module level	Other prerequisites	i			
1 seme	ster	graduate	Certain prerequisites must be met to qualify for admission to as-				
				rer will inform stude	•		
				the course. Registrat			
				n of will to seek adm			
				d the qualification fo			
				mester, the lecturer			
				t. Students who mee n the current or in th			
				date, students will h	•		
			admission to asses		are to obtain the qu		
Conten	te						
radiation Intended The stucconducc Course V (no ir Methoon ster, in a) writt groups project (approx	on, rela ed learn idents l is (type formati formati en exan (appro report x. 30 m	-	ples and experimenta e measurements. act hours, language – itact hours) and cours anguage — if other th can be chosen to earn nutes) or b) oral exam date, for modules with time to complete: 1 to	Il methods of surface - if other than Germa e language available an German, examina a bonus) ination of one candi n less than 4 ECTS cr 4 weeks) or d) prese	e spectroscopy. The n) e) tion offered — if no date each or oral ex edits approx. 20 mi entation/seminar pr	y are able to t every seme- camination in nutes) or c) resentation	
and wil examin	ll be an nation r	ffered: When and how o nounced in due form un egulations) 2009. ssessment: German, En	der observance of Se				
-	tion of p		<u> </u>				
Additio	onal inf	ormation	-				
Worklo	ad		-				
Toachi	ng cycl	0					
callill	ing cycl	5					
 Dofo		IDO L (overside the second	ulations for targeting				
kererre	a to in	LPOI (examination reg	ulations for teaching-	uegree programmes)			
	with 1 ma	or Nanostructure Technology		generated 26-Aug-2024 • ex		page 100 / 139	
2012)			ta record Bachel	or (180 ECTS) Nanostrukturte	сппік - 2012		

Module appears in

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 (2010) 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	e title				Abbreviation	
Nanoanalytics 11-NAN-092-m01					11-NAN-092-m01	
Module	e coord	inator		Module offered by		
Managing Director of the Institute of Applied Physics			pplied Physics	Faculty of Physics and Astronomy		
ECTS		od of grading	Only after succ. com			
6		rical grade				
Duratio	on	Module level	Other prerequisites			
1 semester graduate 1 semester graduate Contents graduate Principles of analytic procedures in the level up to an atomic level, examinatio of X-ray methods Physics and materia py. Scanning tunneling microscopy E		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.				
The stu vel. The	udents ey knov	v microscoping procedu	es that are used in pr	actice in labs and th	anostructures up to an atomic le- e industry as well as spectrosco- uate the efficiency of different re-	
search	metho	ds.				
		, number of weekly cont				
R + V (r	no infor	mation on SWS (weekly	contact hours) and co	urse language availa	able)	
		sessment (type, scope, laion on whether module of			tion offered — if not every seme-	
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	tion of j	olaces				
Additio	onal 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) 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)

Nancta	e title				Abbreviation
Manote	chnolo	ogy in Energy Research			11-NTE-092-m01
Module coordinator				Module offered by	
Managing Director of the Institute of Applied Physics			pplied Physics	Faculty of Physics a	and Astronomy
ECTS	Meth	od of grading	Only after succ. compl. of module(s)		
4	nume	rical grade			
Duratio	on	Module level	Other prerequisites	;	
1 semester graduate		graduate	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective det 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 of 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 qualification		
			admission to asses	sment anew.	
accumu cuum ir Intende The stu	ulators nsulati ed lear idents	, functional nanoscale la ons and electrode mater ning outcomes have specific and advan	ayer and particle systerials. ced knowledge of the	ems with spectral sel	nermal insulation materials, heat ective properties, nanoporous va technology in the field of energy materials and their applications.
They ar	re able	to apply their knowledge	e to specific question	S.	· ·
Course	s (type	, number of weekly cont	act hours, language –	– if other than Germa	an)
V + R (n	no info	rmation on SWS (weekly	contact hours) and co	ourse language avail	able)
		sessment (type, scope, l ion on whether module o			tion offered — if not every seme-
groups project (appro>	(appro report x. 30 m ment o	ox. 30 minutes per candi (approx. 8 to 10 pages, inutes) iffered: When and how o	date, for modules wit time to complete: 1 to ften assessment will	h less than 4 ECTS cr 9 4 weeks) or d) prese	idate each or oral examination in redits approx. 20 minutes) or c) entation/seminar presentation
and wil		nounced in due form un egulations) 2009.	der observance of Se		on the method of assessment 3 ASPO (general academic and
and wil	nation r	egulations) 2009.	der observance of Se		
and wil examin	nation r	egulations) 2009.	der observance of Se		
and wil examin Allocat 	ion of	egulations) 2009.	der observance of Se		
and wil examin Allocat Additio 	ion of ponal inf	egulations) 2009. places	der observance of Se		
and wil examin Allocat Additio 	ion of ponal inf	egulations) 2009. places			
and wil examin Allocat Additio Worklo 	nation r ion of p onal inf oad	egulations) 2009. places formation			
and wil examin Allocat Additio 	nation r ion of p onal inf oad	egulations) 2009. places formation			
and wil examin Allocat Additio Worklo 	nation r ion of p onal inf oad	egulations) 2009. places formation			

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)

Module	e title				Abbreviation	
Physics	s of Coi	mplex Systems			11-PKS-092-m01	
Module	coord	inator		Module offered by	<u> </u>	
		ector of the Institute of Tl	heoretical Physics	Faculty of Physics a	and Astronomy	
and Ast					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 graduate 1 semester graduate Contents graduate 1. Theory of critical phenomena in ther graduate 2. Introduction into the physics out of graduations graduations 3. Entropy production and fluctuations graduations 4. Phase transitions away from equilib graduations 5. Universalityt graduate 6. Spin glassest 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 mal equilibriumt equilibriumt	es must be met to qu irer will inform stude the course. Registrat on of will to seek adn d the qualification fo mester, the lecturer t. Students who mee n the current or in th date, students will h	nts about the respe ion for the course w nission to assessme or admission to asse will put their registr et all prerequisites w e subsequent seme	ctive details vill be con- ent. If stu- essment over ation for as- vill be admit- ester. For as-
Intende The stu	ed lear dents l	eural networks ning outcomes have specific and advance				
		atistical Physics, Compu . They are able to work o			, which are used to	describe
Course	s (type	, number of weekly conta	act hours, language –	- if other than Germa	ın)	
R + V (n	infor	mation on SWS (weekly	contact hours) and co	ourse language avail	able)	
		sessment (type, scope, la on on whether module c			tion offered — if no	t every seme-
groups project (approx Assess and wil examin Langua	(appro report k. 30 m ment o l be an ation re ge of a	ffered: When and how of nounced in due form un egulations) 2009. ssessment: German, Eng	date, for modules with ime to complete: 1 to ften assessment will der observance of Se	h less than 4 ECTS cr 4 weeks) or d) prese be offered depends o	edits approx. 20 mi entation/seminar pr on the method of as	nutes) or c) resentation sessment
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Bachelor's (2012)	with 1 maj	ior Nanostructure Technology	-	generated 26-Aug-2024 • ex or (180 ECTS) Nanostrukturte	-	page 106 / 139

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 (2012) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Mathematical Physics (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) Mathematical Physics (2012) 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	
Physics of Advanced Materials 11-PMM-132-mo1						
Module coordinator				Module offered by		
Managing Director of the Institute of Ap			oplied Physics Faculty of Physics and Astronomy			
ECTS Method of grading Only after succ. compl. of module(s)						
6 numerical grade						
Duration Module level			Other prerequisites			
1 semes	ter gradua	ate				
Contents						
General properties of various material groups such as liquids, liquid crystals and polymers; magnetic materials						
and superconductors; thin films, heterostructures and superlattices. Methods of characterising these material groups; two-dimensional layer materials.						
Intended learning outcomes						
The students know the properties and characterising methods of some modern materials.						
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 seme-						
ster, information on whether module can be chosen to earn a 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) 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						
					3 ASPO (general academic and	
examination regulations) 2009.						
Language of assessment: German, English						
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 (2010)					
Master's degree (1 major) FOKUS Physics (2011)						

Module title					Abbreviation	
Mather	natical	Methods of Physics			11-P-MR-092-m01	
Module	e coord	inator		Module offered by		
Managi and Ast		ector of the Institute of ⁻ sics	Theoretical Physics	Faculty of Physics a	and Astronomy	
ECTS		od of grading	Only after succ. cor	npl. of module(s)		
6		successfully completed		• • • •		
Duratio	'n	Module level	Other prerequisites	;		
2 seme	ster	undergraduate				
Conten	ts					
duction on of b	Principles of mathematics and basic calculation methods beyond the school curriculum, especially for the intro- duction to and preparation of the modules of Theoretical Physics and Classical or Experimental Physics. Repetiti- on of basic knowledge, functions of several real variables, differential equations, linear algebra, vector analysis, other (delta distribution, Fourier transform).					
Intende	ed lear	ning outcomes				
require	d in Th	have knowledge of the eoretical and Experime he field of Physics.				
Course	s (type	, number of weekly con	tact hours, language –	– if other than Germa	ın)	
hour), o Mather	once a natisch	ne Rechenmethoden 1 (l year (winter semester) ne Rechenmethoden 2 (year (summer semester	Mathematical Method			-
		sessment (type, scope, ion on whether module			tion offered — if not	every seme-
1. Topio 1)): e 2. Topio	cs cove xercise cs cove	as the following assess red in lectures and exe es or talk (approx. 15 mi ered in lectures and exe es or talk (approx. 15 mi	rcises in part 1 (Mathe nutes, usually chosen rcises in part 2 (Mathe) or written examinat matische Rechenme	ion (approx. 60 min thoden 2 (Mathemat	utes) tical Methods
ponent Studen	s 1 and ts mus	t register for assessmer	nt components 1 and 2	online (details to be	e announced).	
To pass	s this m	nodule, students must p	bass both assessment	component 1 and as	sessment componer	nt 2.
Allocat	ion of _l	olaces				
Additio	nal inf	ormation				
Worklo	ad					
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 § 77 (1) 1. a) Physik "Grundlagen der Experimentalphysik"						
Module		· -				
		ree (1 major) Physics (2	010)			
Bachelor's (2012)	with 1 ma	jor Nanostructure Technology	-	generated 26-Aug-2024 • ex lor (180 ECTS) Nanostrukturte	-	page 109 / 139

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

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

Module title				Abbreviation		
Laborat	tory Co	urse Nanostructure Tech	nology B		11-P-NB-122-m01	
Module	coord	inator		Module offered by		
Managi	ng Dire	ector of the Institute of Ap	oplied Physics	Faculty of Physics a	nd Astronomy	
ECTS		od of grading	Only after succ. com	pl. of module(s)		
4	(not) s	successfully completed	11-P-PA			
Duratio		Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
Physica	Physical laws of optics, vibrations and waves, science of electricity and circuits with electric components.					
Intende	ed learr	ning outcomes				
le to ind measur principl	The students know and have mastered physical measuring methods and experimenting techniques. They are ab- le to independently plan and conduct experiments, to cooperate with others, and to document the results in a measuring protocol. They are able to evaluate the measuring results on the basis of error propagation and of the principles of statistics and to draw, present and discuss the conclusions.					
Courses	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)	
P (no in	format	ion on SWS (weekly cont	act hours) and cours	e language available	2)	
		e ssment (type, scope, la on on whether module ca			tion offered — if not every seme-	
a Testa discuss dule co	t (exam sion; ap mpone	n) is passed. Experiments oprox. 30 minutes) to test	that were not succes the candidate's und uccessfully completed	ssfully completed ca erstanding of the ph	dered successfully completed if n be repeated once. Talk (with hysics-related contents of the mo- nce. Both components of the as-	
Allocat	ion of p	olaces				
Additio	nal info	ormation				
Worklo	ad					
Teaching cycle						
-						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	Module appears in					
		ree (1 major) Nanostructu	re Technology (2012))		

Module c	d Laboratory Course Nanostru	ucture Technology C		11-P-NC-122-m01	
	oordinator				
Managing	Module coordinator Module offered by				
	g Director of the Institute of A	pplied Physics	Faculty of Physics a	nd Astronomy	
ECTS N	Nethod of grading	Only after succ. con	· · · ·		
4 (I	not) successfully completed	11-P-PA and 11-P-NB	-		
Duration Module level Other prerequisites					
1 semester undergraduate					
Contents	;				
•	laws of wave optics, Molecula outerised devices with examp		-	n measuring methods using spe-	
Intended	learning outcomes				
by using and discu	error propagation and statist uss them in a scientific paper	ics. They are able to e and a presentation.	valuate results, to di	affic, and to analyse the results raw conclusions and to present	
	(type, number of weekly cont				
	ormation on SWS (weekly con				
	of assessment (type, scope, la rmation on whether module o			tion offered — if not every seme-	
a Testat (discussic dule com	(exam) is passed. Experiment on; approx. 30 minutes) to tes	s that were not succes st the candidate's und successfully complete	ssfully completed ca lerstanding of the ph	dered successfully completed if n be repeated once. Talk (with nysics-related contents of the mo- nce. Both components of the as-	
Allocatio	n of places				
Additiona	al information				
		_			
Workload	d				
Teaching	r cvcle				
	, -,	-			
Referred	to in LPO I (examination reg	lations for teaching.	legree programmes)		
u			acore programmes)		
 Module a	appears in				

Module title					Abbreviation		
Lab Co					11-P-PA-112-m01		
Module	e coord	inator		Module offered by			
		ector of the Institute of Ap	r · · · · · · · · · · · · · · · · · · ·				
ECTS		od of grading	Only after succ. con	fter succ. compl. of module(s)			
5		successfully completed					
Duratio		Module level	Other prerequisites				
1 seme		undergraduate					
Conten							
pagatic	on, grap	of mechanics, thermodyn ohs, linear regression, av of lab reports and publica	erage values and sta				
Intende	ed lear	ning outcomes					
le to in measu	depeno ring pro	know and have mastered lently plan and conduct e stocol. They are able to ev tatistics and to draw, pre	experiments, to coop valuate the measurin	erate with others, an g results on the basi	d to document the re	sults in a	
Course	s (type	, number of weekly conta	ct hours, language –	- if other than Germa	ın)		
Ü (1 we Beispie	ekly co ele aus	on Messungen und Fehle ntact hour), once a year Mechanik, Wärmelehre u ekly contact hours)	(winter semester)				
		sessment (type, scope, la on on whether module ca			tion offered — if not e	very seme-	
1. Topic 2. Lab c ted if	cs cove course: f a Test	as the following assessn red in lectures and exerc a) Preparing, performing at (exam) is passed. b) T nts of the course (approx	ises: written examina and evaluating the e alk (with discussion)	experiments will be c	onsidered successful		
1.		mpletion of approx. 50%					
portuni Studen	ity to re ts mus	sment component 2, stu- take element a) and/or e t register for assessment	lement b). components 1 and 2	online (details to be	e announced).		
re atter Electric	nding B :ity).	t attend Auswertung von eispiele aus Mechanik, V	Värmelehre und Elek	trik (Examples from I	Mechanics, Thermody	namics and	
		odule, students must pa	ss both assessment	component 1 and as	sessment component	i 2 .	
Allocat	ion of p	Diaces					
Additio	nal inf	ormation					
Worklo	ad						
 -	-	_					
Teachi	ng cycl	e					
	d 6 - 1-		lations for the shire				
		LPOI (examination regu					
		hysik Mechanik, Wärmel					
Bachelor's (2012)	with 1 ma	or Nanostructure Technology		generated 26-Aug-2024 • ex or (180 ECTS) Nanostrukturte		page 113 / 139	

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

§ 77 (1) 1. a) Physik "Grundlagen der Experimentalphysik"

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

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Bachelor' degree (1 major) Mathematics (2012)

Bachelor' degree (1 major) Mathematics (2013)

Bachelor' degree (1 major) Physics (2012)

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

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

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

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

First state examination for the teaching degree Grundschule Physics (2009)

First state examination for the teaching degree Hauptschule Physics (2009)

First state examination for the teaching degree Realschule Physics (2009)

First state examination for the teaching degree Gymnasium Physics (2009)

First state examination for the teaching degree Mittelschule Physics (2013)

Module	title				Abbreviation		
Practica	al Cour	se Physical Technology	of Material Synthesis	5	11-PPT-092-m01		
Module	coord	inator		Module offered by			
		ector of the Institute of A	Applied Physics		nd Astronomy		
ECTS		od of grading	Oplied Physics Faculty of Physics and Astronomy Only after succ. compl. of module(s)				
5		successfully completed					
Duratio	n	Module level	Other prerequisites	i			
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		,				
Physica nologie		rial properties, growth a	nd coating procedure	s, methods of charad	cterisation and struc	turing tech-	
		ning outcomes					
	dents l	have knowledge of the p	practical basics of mat	erial characterisatio	n and physical techr	nology for ma-	
Courses	s (type	, number of weekly cont	act hours, language –	- if other than Germa	n)		
P (no in	format	ion on SWS (weekly cor	ntact hours) and cours	e language available	2)		
		essment (type, scope, on on whether module			tion offered — if not	every seme-	
tes) prio comple of the a have be comple	or to th ted if a ssessr een suc ted.	experiment will be cons le experiment is passed l Testat (exam) is passe nent can be repeated of ccessfully completed in ffered: once a year, win	. Performing and evalu d. An experiment log (nce in the respective s the same semester wi	uating the experimer approx. 8 pages) is t emester. Only if both	it will be considered o be prepared. Each n components of the	successfully component assessment	
Allocati	ion of p	olaces					
Additio	nal inf	ormation					
 Worklo	ad						
Teachir	ıg cycl	e					
Referre	d to in	LPOI (examination reg	ulations for teaching-	degree programmes)			
Module	e appea	nrs in					
	-	ree (1 major) Nanostruc					
		ree (1 major) Nanostruct	= •) generated 26-Aug-2024 • ex	am, reg. da-	page 115 / 139	
2012)		is. nanostracture reclinology		or (180 ECTS) Nanostrukturte		Puse 115 / 139	



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

	le title				Abbreviation
Quant	um Mee	chanics II			11-QM2-092-m01
Modu	Nodule coordinator			Module offered b	y
	ging Dir strophy		of Theoretical Physics	Faculty of Physics	and Astronomy
ECTS Method of grading Only after succ		Only after succ. co	mpl. of module(s)		
8 numerical grade -					
Durati	ion	Module level	Other prerequisite	S	
Instruction Discretion 1 semester Undergraduate 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 and mission to assessment and admission to assessment and admission to assessment and the qualification for admission to 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 assess assessment and admission to assessment and will be admitted to assessment and the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assess assessment and admission to assessment and the subsequent semester. For assessment will support basics which are acquired in the lecture "Quantum mechanics I" of the Bachelor's degree. While the specific emphasis can be adjusted individually, the core topics that are supposed to be covered should include: 1. Second quantisation: Fermions and bosons 2. Band structures of particles in a crystal 3. Angular momentum, symmetry operators, Lie Algebras 4. Sccattering theory: Potential scattering, partial wave expansion 5. R					
Intend	led lear	ning outcomes			
of the mode thods	mather rn theor and to Energy F	natical and theoretica etical Quantum Phys interpret the results p	al concepts of the listed ics mathematically, to so physically. The course is	topics. They are abl blve problems analy pivotal to subseque	nd have a thorough understanding e to describe or model problems o rtically, to use approximation me- ent theory courses in Astrophysics, s mandatory for all Master's stu-
Cours	es (type	, number of weekly c	ontact hours, language -	– if other than Gern	nan)
R + V ((no info	rmation on SWS (wee	kly contact hours) and c	ourse language ava	ilable)
			e, language — if other th Ile can be chosen to ean		nation offered — if not every seme-
group	s (appro	ox. 30 minutes per ca	ndidate, for modules wit	th less than 4 ECTS	didate each or oral examination in credits approx. 20 minutes) or c)

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

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	
(2012)	

Allocation of places

Additional information

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Workload

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Teaching cycle

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

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Module appears in

••
Bachelor' degree (1 major) Physics (2010)
Bachelor' degree (1 major) Physics (2012)
Bachelor' degree (1 major) Nanostructure Technology (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) Mathematical Physics (2012)
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)

	le title				Abbreviation	
Quant	um Trar	nsport in Semicondu	ctor Nanostructures		11-QTH-102-m01	
Modul	le coord	inator		Module offered by		
		ector of the Institute	of Applied Physics	Faculty of Physics a	and Astronomy	
ECTS		od of grading	Only after succ. co		,	
6		rical grade		•		
Duration Module level		Other prerequisite	s			
1 Sem6	ester	graduate	sessment. The lect at the beginning of sidered a declarati dents have obtaine the course of the s sessment into effe ted to assessment	urer will inform stude the course. Registrat on of will to seek adn ed the qualification for emester, the lecturer ct. Students who mee in the current or in th date, students will h	alify for admission to as- ents about the respective details tion for the course will be con- nission to assessment. If stu- or admission to assessment over will put their registration for as- et all prerequisites will be admit- ne subsequent semester. For as- nave to obtain the qualification for	
Contents						
phenomena between electrons, Coulomb blockade, thermoelectric properties, description of spin-dependent transport phenomena, topological insulators, solid-state quantum computers. Intended learning outcomes The students have mastered the basics of electronics of nanostructures in theory and practice. They know functi- ons and applications of respective components. 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 seme-						
ster, ir a) writ groups projec (appro Assess and wi exami	nformat tten exa s (appro t report ox. 30 m sment o ill be an nation r	ion on whether modu mination (approx. 90 ox. 30 minutes per ca (approx. 8 to 10 pag inutes) iffered: When and ho	ile can be chosen to ear minutes) or b) oral exar ndidate, for modules wi es, time to complete: 1 to w often assessment will under observance of Se	n a bonus) nination of one candi th less than 4 ECTS cr o 4 weeks) or d) prese be offered depends	idate each or oral examination in redits approx. 20 minutes) or c) entation/seminar presentation on the method of assessment 3 ASPO (general academic and	
Alloca	tion of	places				
 Additi Workle	onal inf	ormation				
Referr	ed to in	LPOI (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)

Bachelor's with 1 major Nanostructure Technology (2012)

Modul	le title				Abbreviation
Statis	tics, Da	ta Analysis and Compu	ter Physics		11-SDC-092-m01
Modu	le coord	inator		Module offered by	1
Managing Director of the Institute of Ap		Applied Physics	pplied Physics Faculty of Physics and Astronomy		
ECTS		od of grading	Only after succ. co	· · · ·	,
4 numerical grade					
		Other prerequisites	5		
1 semester graduate				alify for admission to as-	
			sessment. The lectu	urer will inform stude	ents about the respective details
			at the beginning of	the course. Registrat	tion for the course will be con-
			sidered a declaration	on of will to seek adn	nission to assessment. If stu-
				•	or admission to assessment over
					will put their registration for as-
					et all prerequisites will be admit-
					e subsequent semester. For as-
					ave to obtain the qualification for
			admission to asses	sment anew.	
Conte	nts				
		a analysis and comput	er physics.		
Intend	led lear	ning outcomes			
The st Physic		have specific and adva	nced knowledge in the	e field of statistics, da	ata analysis and Computational
Course	es (type	, number of weekly cor	itact hours, language -	– if other than Germa	an)
R + V ((no infoi	mation on SWS (weekl	y contact hours) and c	ourse language avail	able)
		s essment (type, scope, ion on whether module			ation offered — if not every seme-
groups projec (appro Assess and w exami	s (appro t report ox. 30 m sment o ill be an nation r	ox. 30 minutes per canc (approx. 8 to 10 pages inutes) ffered: When and how	lidate, for modules wit , time to complete: 1 to often assessment will nder observance of Se	h less than 4 ECTS cr o 4 weeks) or d) preso be offered depends	idate each or oral examination in redits approx. 20 minutes) or c) entation/seminar presentation on the method of assessment 3 ASPO (general academic and
Alloca	tion of	places			
	onal inf	ormation			
	Unatim	ormation			
Workl	oad				
 Teachi	ing cycl	A			
	ing cycl	6			
Referr	ed to in	LPOI (examination re	gulations for teaching-	degree programmes)	
Modul	le appea	ars in			
		ree (1 major) Physics (2	2010)		
	-	ree (1 major) Physics (2			
Bachelor's		jor Nanostructure Technology	JMU Würzburg	• generated 26-Aug-2024 • ex	
(2012)			ta record Bache	lor (180 ECTS) Nanostrukturte	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) 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 (2010)

Julius-Maxi

UNIVERSITÄT

WÜRZBURG

Modul					Abbreviation	
Statist	ics, Da	ta Analysis and Con	puter Physics		11-SDC-131-m01	
Modul	e coord	linator		Module offered by		
Manag	ing Dir	ector of the Institute	of Applied Physics	Faculty of Physics and Astronomy		
ECTS		od of grading	Only after succ. co		, , , , , , , , , , , , , , , , , , ,	
4		rical grade		•		
Duratio	on	Module level	Other prerequisite	25		
1 semester graduate		sessment. The lect at the beginning o sidered a declarati dents have obtain the course of the s	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-			
Conter	nts	1				
		a analysis and com	puter physics			
		ning outcomes				
	udents		dvanced knowledge in th	e field of statistics, d	ata analysis and Computational	
		, number of weekly	contact hours, language	— if other than Germa	an)	
			ekly contact hours) and o			
Metho	d of as	sessment (type, sco	· · ·	han German, examina	ation offered — if not every seme-	
in grou weeks) Assess and wi examir Langua	ips (ap)) or d) p sment c Il be ar nation r age of a	prox. 30 minutes per presentation/semina offered: When and he mounced in due form regulations) 2009. assessment: German	r candidate) or c) project ar presentation (approx. <u>;</u> ow often assessment wil m under observance of S	report (approx. 8 to 1 30 minutes) l be offered depends	idate each or oral examination o pages, time to complete: 1 to 4 on the method of assessment 3 ASPO (general academic and	
Allocat	tion of	places				
Additio	onal inf	ormation				
Worklo	oad					
Teachi	ng cycl	e				
 Referre	ed to in	LPOI (examination	regulations for teaching	-degree programmes)	
Modul	e appea	ars in				
	-		tructure Technology (201			
Bachel	lor' deg	ree (1 major) Nanos	tructure Technology (201	2)		

Module title			Abbreviation				
Semiconductor Physics and Device	5		11-SPD-102-m01				
Module coordinator		Module offered by					
Managing Director of the Institute of	f Applied Physics	Faculty of Physics a	and Astronomy				
ECTS Method of grading	Only after succ. con	npl. of module(s)					
6 numerical grade							
Duration Module level	Other prerequisites						
1 semestergraduateCertain prerequisites must be met to qualify for admission to a sessment. The lecturer will inform students about the respecti at the beginning of the course. Registration for the course will sidered a declaration of will to seek admission to assessment dents have obtained the qualification for admission to assess the course of the semester, the lecturer will put their registrati sessment into effect. Students who meet all prerequisites will ted to assessment in the current or in the subsequent semester sessment at a later date, students will have to obtain the quali		nts about the respective details ion for the course will be con- nission to assessment. If stu- or admission to assessment over will put their registration for as- et all prerequisites will be admit- e subsequent semester. For as-					
Contents	admission to asses	sment anew.					
as of electronics and photonics. Intended learning outcomes The students are familiar with the properties of semiconductors, they have gained an overview of the electronic and phononic band structures of important semiconductors and the resulting electronic, optical and thermal pre- 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- ents.							
Courses (type, number of weekly co	ntact hours, language –	- if other than Germa	ın)				
\vee + R (no information on SWS (week	ly contact hours) and co	urce language avail	V + R (no information on SWS (weekly contact hours) and course language available)				
		Juise language avail	able)				
Method of assessment (type, scope ster, information on whether modul		an German, examina					
ster, information on whether modul written examination (approx. 90 min groups (approx. 30 minutes per can ject report (approx. 8 to 10 pages, ti 30 minutes) Assessment offered: When and how and will be announced in due form examination regulations) 2009.	e can be chosen to earn nutes) or oral examination didate, for modules with me to complete: 1 to 4 v v often assessment will h under observance of Sec	an German, examina a bonus) on of one candidate n less than 4 ECTS cr veeks) or presentation be offered depends of	ition offered — if not every seme- each or oral examination in redits approx. 20 minutes) or pro- on/seminar presentation (approx on the method of assessment				
ster, information on whether modul written examination (approx. 90 min groups (approx. 30 minutes per can ject report (approx. 8 to 10 pages, ti 30 minutes) Assessment offered: When and how and will be announced in due form examination regulations) 2009. Language of assessment: German, B	e can be chosen to earn nutes) or oral examination didate, for modules with me to complete: 1 to 4 v v often assessment will h under observance of Sec	an German, examina a bonus) on of one candidate n less than 4 ECTS cr veeks) or presentation be offered depends of	ition offered — if not every seme- each or oral examination in redits approx. 20 minutes) or pro- on/seminar presentation (approx on the method of assessment				
ster, information on whether modul written examination (approx. 90 min groups (approx. 30 minutes per can ject report (approx. 8 to 10 pages, ti 30 minutes) Assessment offered: When and how and will be announced in due form examination regulations) 2009.	e can be chosen to earn nutes) or oral examination didate, for modules with me to complete: 1 to 4 v v often assessment will h under observance of Sec	an German, examina a bonus) on of one candidate n less than 4 ECTS cr veeks) or presentation be offered depends of	ition offered — if not every seme- each or oral examination in redits approx. 20 minutes) or pro- on/seminar presentation (approx on the method of assessment				

Workload

Teaching cycle

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

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Module appears in

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

Module	title				Abbreviation	
Spintro	onics				11-SPI-102-m01	
Module	coordi	nator		Module offered by	<u> </u>	
		ctor of the Institute of A	nnlied Physics	Faculty of Physics and Astronomy		
ECTS		d of grading	Only after succ. con		ind Astronomy	
6		ical grade				
Duratio	n	Module level	Other prerequisites			
1 semestergraduateCertain prerequisites must be met to qualify for admission sessment. The lecturer will inform students about the resp at the beginning of the course. Registration for the course sidered a declaration of will to seek admission to assess dents have obtained the qualification for admission to ass the course of the semester, the lecturer will put their regis sessment into effect. Students who meet all prerequisites ted to assessment in the current or in the subsequent sem sessment at a later date, students will have to obtain the admission to assessment anew.		nts about the respe ion for the course w nission to assessme r admission to asse will put their registr t all prerequisites w e subsequent seme	ctive details vill be con- ent. If stu- essment over ation for as- vill be admit- ester. For as-			
Content	ts					
magnet spin dy Intende The stur mation nel mag Courses V + R (n Method ster, inf	toresist namics ed learr dents k techno gnetore s (type, to inform formati	vers the basic principle ance and tunnel magne and current-induced sp ing outcomes mow the basic principle logy. They have gained sistance). number of weekly cont mation on SWS (weekly essment (type, scope, l on on whether module of pination (approx, appring)	toresistance. As a las bin phenomena. s of spin transport mo an overview of curren act hours, language – contact hours) and co anguage — if other the can be chosen to earn	t point, we discuss n odels and the applica t findings in this field - if other than Germa ourse language avail an German, examina a bonus)	ew phenomena from ations of spin transp d (giant magnetores n) able) tion offered — if no	m the field of port in infor- istance, tun- t every seme-
groups project (approx Assess and will examina	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					nutes) or c) resentation sessment
Allocati	ion of p	laces				
Additio	nal info	ormation				
Worklo	ad					
Teachin	ng cycle	e				
Referre	d to in	LPOI (examination reg	ulations for teaching-	degree programmes)		
Bachelor's v (2012)	with 1 maj	or Nanostructure Technology		generated 26-Aug-2024 • ex or (180 ECTS) Nanostrukturte		page 126 / 139

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)

Thormo	e title				Abbreviation		
Thermodynamics and Economics					11-TDO-092-m01		
Module	e coord	inator		Module offered by			
Managi and Ast	-	ector of the Institute of T	heoretical Physics	Faculty of Physics a	and Astronomy		
ECTS	<u> </u>	od of grading	Only after succ. con	npl. of module(s)			
6		rical grade					
Duratio	·	Module level	Other prerequisites	i			
DefaultionInducte teventOther prerequisites1 semestergraduateCertain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective de at the beginning of the course. Registration for the course will be co sidered a declaration of will to seek admission to assessment. If str dents have obtained the qualification for admission to assessment 				ctive details ill be con- nt. If stu- ssment over ation for as- ill be admit- ster. For as- alification for			
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 pro-							
<u> </u>		gramme deeco (Dynamic Energy, Emission and Cost Optimization).					
Intende	ed lear	. ,	ssion and Cost Optimi		introduces the optir	sentations,	
The stu in the w connec mies. T NOTE: t his owr Courses R + V (n Methoo ster, inf a) writte groups project (approx Assess	idents i vorld's tions b hey are this is t this is t the theon s (type to infor s (type to infor d of ass formati en exar (appro report x. 30 m ment o	ning outcomes understand that energy economic and social de etween thermodynamic able to apply the acqui he module that was run y of economy, it has yet number of weekly cont mation on SWS (weekly ressment (type, scope, l on on whether module of nination (approx. 90 mi x. 30 minutes per candi (approx. 8 to 10 pages,	conversion and entrop velopment. As an exte s and economy as we ired knowledge to par by Prof. Dr. R. Kümme to be decided whethe act hours, language – contact hours) and co anguage — if other th can be chosen to earn nutes) or b) oral exam date, for modules wit time to complete: 1 to ften assessment will	zation). by production are go ension of economic t Il as the productive p ticular problems. el, who has now retir er we will continue to - if other than Germa ourse language avail an German, examina a bonus) hination of one candi h less than 4 ECTS cr 4 weeks) or d) prese	ing to play an import heory, the students ohysical basis of mod ed. As the module w offer this module. (an) able) (tion offered — if not date each or oral exa redits approx. 20 min entation/seminar pre	sentations, misation pro- cant role know the dern econo- as tailored to every seme- amination in nutes) or c) esentation sessment	
The stu in the w connec mies. T NOTE: t his owr Courses R + V (n Methoc ster, inf a) writte groups project (approx Assess and wil examin	idents i vorld's tions b hey are this is t they are this is t they are this is t to they are they are	ning outcomes understand that energy economic and social de etween thermodynamic able to apply the acqui he module that was run y of economy, it has yet number of weekly cont mation on SWS (weekly eessment (type, scope, l on on whether module on nination (approx. 90 mi x. 30 minutes per candi (approx. 8 to 10 pages, inutes) ffered: When and how o	conversion and entrop velopment. As an exte s and economy as we ired knowledge to par by Prof. Dr. R. Kümme to be decided whethe act hours, language – contact hours) and co anguage — if other th can be chosen to earn nutes) or b) oral exam date, for modules with time to complete: 1 to ften assessment will der observance of Se	zation). by production are go ension of economic t Il as the productive p ticular problems. el, who has now retir er we will continue to - if other than Germa ourse language avail an German, examina a bonus) hination of one candi h less than 4 ECTS cr 4 weeks) or d) prese	ing to play an import heory, the students ohysical basis of mod ed. As the module w offer this module. (an) able) (tion offered — if not date each or oral exa redits approx. 20 min entation/seminar pre	sentations, misation pro- cant role know the dern econo- as tailored to every seme- amination in nutes) or c) esentation sessment	

Allocation of places

Additional information

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Workload

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Teaching cycle

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

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Module appears in

Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Nanostructure Technology (2012) Master's degree (1 major) 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	
Thermodyna	mics and Economics			11-TDOE-141-m01	
Module cool	dinator		Module offered by		
Managing D and Astroph	rector of the Institute of ysics	Theoretical Physics	Faculty of Physics and Astronomy		
ECTS Met	hod of grading	Only after succ. con	npl. of module(s)		
) successfully completed				
Duration	Module level	Other prerequisites	i		
1 semester	graduate				
Contents					
Part I descrill folding of civ of the secon ropy product mic growth. Part 2 analys economy an ve labour. W and costs of cial tensions Part 3 includ use, and int Intended lea The students in the world connections mies. They a	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. NOTE: this is the module that was run by Prof. Dr. R. Kümmel, who has now retired. As the module was tailored to				
	e, number of weekly con				
	ation on SWS (weekly co				
Method of a	ssessment (type, scope, ation on whether module	language — if other th	an German, examina		every seme-
in groups (a	amination (approx. 90 m oprox. 30 minutes per ca presentation/seminar p	ndidate) or c) project r	eport (approx. 8 to 1		
Allocation o	fplaces				
Additional in	nformation				
Workload					
Teaching cy	cle				
Referred to i	n LPO I (examination reg	ulations for teaching	degree programmoc)		
Keieneu lu			active programmes)		
 Modulo ann	pars in				
Module app	eais III				
Bachelor's with 1 r (2012)	najor Nanostructure Technology	-	generated 26-Aug-2024 • ex or (180 ECTS) Nanostrukturte	-	page 130 / 139

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					Abbreviation	
Theore	tical M	echanics			11-TM-092-m01	
Module	e coord	inator		Module offered by		
		ector of the Institute of Th	neoretical Physics	*		
and As	-					
ECTS	1	od of grading	Only after succ. con	npl. of module(s)		
8	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 semesterundergraduateCertain prerequisites must be met to qualify for admission sessment. The lecturer will inform students about the resp at the beginning of the course. Registration for the course sidered a declaration of will to seek admission to assessm dents have obtained the qualification for admission to assess the course of the semester, the lecturer will put their regist sessment into effect. Students who meet all prerequisites ted to assessment in the current or in the subsequent sem sessment at a later date, students will have to obtain the course		nts about the respective details ion for the course will be con- nission to assessment. If stu- r admission to assessment over will put their registration for as- t all prerequisites will be admit- e subsequent semester. For as-				
-			admission to assess	sment anew.		
Conten						
			I Hamiltonian formali	sm, conservation lav	vs, limits of classical physics.	
		ning outcomes				
The stu method		have knowledge of the pr	rinciples of classical t	heoretical mechanic	cs and the required calculation	
				if a the are the are Common		
		, number of weekly conta				
		mation on SWS (weekly				
		on on whether module c			tion offered — if not every seme-	
otherw Assess and wil	ise spe ment o Il be an	cified) ffered: When and how of	ten assessment will l	be offered depends of	edits approx. 90 minutes; unless on the method of assessment 3 ASPO (general academic and	
Allocat	ion of _l	olaces				
Additio	onal inf	ormation				
Worklo	ad					
Teachi	ng cycl	e				
Referre	ed to in	LPOI (examination regu	lations for teaching-	degree programmes)		
Module	e appea	in in				
Bachel	or' deg	ree (1 major) Mathematic ree (1 major) Mathematic ree (1 major) Nanostructu	cs (2013))		



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	_				Abbreviation	
Introduc	tion to F	unctional Materials			11-TMS-102-m01	
Module	coordina	tor		Module offered by		
			pplied Dhysics	Faculty of Physics and Astronomy		
		or of the Institute of A of grading	Only after succ. com	, ,	ind Astronomy	
	numerica					
5 r Duration		odule level	Other prerequisites			
1 semester undergraduate		1	s must be met to au	alify for admission to as-		
		sessment. The lectu at the beginning of t sidered a declaratio dents have obtained the course of the set	rer will inform stude he course. Registrat n of will to seek adm the qualification fo mester, the lecturer	nts about the respective details ion for the course will be con- nission to assessment. If stu- r admission to assessment over will put their registration for as-		
					t all prerequisites will be admit-	
					e subsequent semester. For as-	
					ave to obtain the qualification for	
			admission to assess	sment anew.		
Contents			_			
			physical material pro of structuring technol		ductor process technology, diel- ting procedures.	
Intended	d learnin	g outcomes				
		ve knowledge of the t al synthesis.	neoretical and practica	al principles of phys	ical material properties and tech-	
Courses	(type, n	umber of weekly cont	act hours, language —	· if other than Germa	ın)	
V + Ü (nc	o informa	ation on SWS (weekly	contact hours) and co	ourse language avail	able)	
			anguage — if other tha an be chosen to earn		tion offered — if not every seme-	
Assessm and will	nent offe be anno		ften assessment will b		on the method of assessment 3 ASPO (general academic and	
Allocatio	on of pla	ces				
Addition	al inform	nation				
Workloa	d					
Teaching	g cycle					
			-			
Referred	to in I D	OI (examination root	ulations for teaching-c	legree programmoc		
Module	annears	in				
			ure Technology (2010))		
	-	-	ure Technology (2010) ure Technology (2012)			
	-	(1 major) Functional				
	<u> </u>		. ,			

Module	e title				Abbreviation	
Theore	Theoretical Physics for Students of Nanostructure Technol			ogy	11-TP-N-122-m01	
Modul	e coord	inator		Module offered by		
	ing Dire trophys	ector of the Institute of sics	Theoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS	<u> </u>	od of grading	Only after succ. con	npl. of module(s)		
16	·	rical grade		• • • •		
Duratio	on	Module level	Other prerequisites	5		
2 seme	ester	undergraduate				
Conten	nts					
conser applica chanic equatio mics: H	vation l ations, l s, abstr ons, ele leat, en	aws, systems of mass Hamiltonian dynamics act quantum mechanic ctrostatics, magnetost	ds of Theoretical Physi points, reference syste . Quantum mechanics: cs (operator formalism) tatics, dynamics of elec rium, measurands, leve	ms, one-dimensiona Schrödinger equatio , angular momentun tromagnetic fields, s	l motion, Lagrange e n, one-dimensional n, spin. Electrodynan special relativity. The	equations, quantum me nics: Maxwell ermodyna-
sitions		· · · · · · · · · · · · · · · · · · ·				
		ning outcomes				
			les, contexts and elemo odynamics, electrodyn			eoretical me
			·		·	
			<u>ntact hours, language –</u> ostrukturtechnik) (Theo			
hours) Quante (summ Quante + Ü (2 v	+ Ü (2 v enmech er seme enmech weekly	veekly contact hours), anik (Quantum Mecha ester) anik für FOKUS-Studie	ynamik (Statistical Mec once a year (winter ser nics): V (4 weekly conta rende (Quantum Mecha eekly contact hour), on	nester) act hours) + Ü (2 wee anics for FOKUS Stud	kly contact hours), c ents): V (4 weekly co	once a year ontact hours)
			language — if other th can be chosen to earn		tion offered — if not	every seme-
1. Topi amir tes). 2. Topi amir	cs cove nation (cs cove nation (approx. 120 minutes, t red in lectures and exe	sment components ercises in part 1 (Theore usually chosen) or oral ercises in part 2 (Theore usually chosen) or oral	examination of one o etische Physik 2 (The	andidate each (approved)	rox. 30 minu- written ex-
char on o 4. Topi	cs cove nics and f one ca		ercises in part 1 (Statist rritten examination (ap . 30 minutes).			
5. Topi char of or 6. Topi tical	(approx cs cove nics for ne cand cs cove Physics	x. 120 minutes, usually red in lectures and exe FOKUS Students)): writ idate each (approx. 30 red in lectures and exe	ercises in part 2 (Quant chosen) or oral examiner ercises in part 2 (Quant tten examination (appro- minutes). ercises in parts 1 and 2 nation of one candidate	nation of one candid enmechanik für FOKI ox. 120 minutes, usu (assessment in mod	ate each (approx. 30 JS-Studierende (Qua ally chosen) or oral e ules Theoretische Ph	Il examinati- ten examina- minutes). antum Me- examination nysik (Theore

7. Topics covered in lectures and exercises in parts 1 and 2 (assessment in module Theoretische Physik für Studierende der Nanostrukturtechnik (Theoretical Physics for Students of Nanostructure Technology)): 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 through 5.

To qualify for admission to assessment component 6, students must pass assessment component 1 and/or 2. To qualify for admission to assessment component 7, students must pass assessment component 3 and/or 4 and/or 5.

Students are highly recommended to attend both courses Theoretische Physik 1 (Theoretical Physics 1) and Theoretische Physik 2 (Theoretical Physics 2) or, respectively, both courses Statistische Mechanik (Statistical Mechanics) and Thermodynamik und Quantenmechanik (Thermodynamics and Quantum Mechanics). The topics discussed in these courses will be covered in assessment component 6 or, respectively, assessment component 7.

Students must register for assessment components 1 through 7 online (details to be announced).

To pass this module, students must first pass assessment component 1 or 2 and must then pass assessment component 6 or students must first pass assessment component 3, 4 or 5 and must then pass assessment component 7.

The grade achieved in assessment component 1 or 2 (whichever is better) or, respectively, in assessment component 3, 4 or 5 (whichever is the best) and the grade achieved in assessment component 6 or, respectively, assessment component 7 will each count 50% towards the overall grade awarded for the module.

Allocation of places

Additional information

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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 (2012)

Module title	9			Abbreviation	
Principles o	f two- and threedimension	onal Röntgen imaging		11-ZDR-111-m01	
Module coo	rdinator		Module offered by		
Managing D	irector of the Institute of	Applied Physics	Faculty of Physics and Astronomy		
	hod of grading	Only after succ. cor	· · · · ·	,	
6 nun	nerical grade		E		
Duration	Module level	Other prerequisites	5		
1 semestergraduateCertain prerequisites must be met to qualify for admission sessment. The lecturer will inform students about the resp at the beginning of the course. Registration for the course sidered a declaration of will to seek admission to assess m dents have obtained the qualification for admission to ass the course of the semester, the lecturer will put their regis sessment into effect. Students who meet all prerequisites ted to assessment in the current or in the subsequent sem sessment at a later date, students will have to obtain the option		ective details will be con- nent. If stu- sessment over tration for as- will be admit- nester. For as-			
		admission to asses	sment anew.		
Contents					
projection, l traction, vis characterisa Intended lea The student techniques Courses (typ V + R (no inf Method of a ster, inform a) written ex groups (app project repo (approx. 30 Assessment and will be	t offered: When and how announced in due form u 1 regulations) 2009.	erative methods). Imagons of X-ray imaging in). Radiation protecting generating X-rays and on s of image processing tact hours, language - y contact hours) and con- language — if other the can be chosen to earr ninutes) or b) oral exam- lidate, for modules wit , time to complete: 1 to often assessment will	e processing (image the industrial sector on and biological rac of their interactions w as well as applicatio – if other than Germa ourse language avail an German, examina a bonus) nination of one candi h less than 4 ECTS cr o 4 weeks) or d) prese be offered depends of	data pre-processi (component testin diation effect (dos with matter. They k n areas of these m n) able) ttion offered — if n date each or oral of redits approx. 20 n entation/seminar p on the method of a	ng, feature ex- ng, material e,). anow imaging nethods. ot every seme- examination in ninutes) or c) presentation assessment
Allocation o	of places				
Additional i	nformation				
Workload					
 Teaching cy	cle				
 Teaching cy 	rcle				
	rcle in LPO I (examination re	gulations for teaching-	degree programmes)		
		gulations for teaching-	degree programmes)		
 Referred to			degree programmes) • generated 26-Aug-2024 • ex		page 137 / 139

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 (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FURUS Physics (2012) Master's degree (1 major) FOKUS Physics (2012)

Module					Abbreviation	
Metho	ds for r	on-destructive Chara	acterization of Material	s and Components	11-ZMB-112-m01	
Module	e coord	linator		Module offered by		
		ector of the Institute of	of Applied Physics	Faculty of Physics and Astronomy		
		od of grading		c. compl. of module(s)		
4		rical grade				
4 Duratio		Module level	Other prerequisite			
1 semester undergraduate					alify for admission to as-	
1 Senie	5101			•	ents about the respective details	
			at the beginning o	tion for the course will be con-		
			sidered a declarat	ion of will to seek adn	nission to assessment. If stu-	
			dents have obtain	ed the qualification fo	or admission to assessment over	
			the course of the s	semester, the lecturer	will put their registration for as-	
			sessment into effe	ect. Students who mee	et all prerequisites will be admit-	
			ted to assessment	in the current or in th	e subsequent semester. For as-	
			sessment at a late	r date, students will h	ave to obtain the qualification for	
			admission to asse	ssment anew.		
Conten	ts					
Method	ds of no	on-destructive materi	al and component char	acterisation.		
Intend	ed lear	ning outcomes				
The stu	idents	know methods of nor	-destructive characteri	sation of materials an	d components.	
Course	s (type	, number of weekly c	ontact hours, language	— if other than Germa	an)	
V + R (r	no infoi	rmation on SWS (wee	kly contact hours) and	course language avail	able)	
			e, language — if other t le can be chosen to ear		ation offered — if not every seme-	
a) writt	en exa	mination (approx. 90	minutes) or b) oral exa	mination of one candi	idate each or oral examination in	
					s, time to complete: 1 to 4 weeks)	
			tation (approx. 30 minu			
					on the method of assessment	
		regulations) 2009.	under observance of 5	ection 32 Subsection	3 ASPO (general academic and	
Allocat		· · · · · · · · · · · · · · · · · · ·				
Additio	nal inf	ormation				
Worklo	ad					
Teachi	ng cycl	e				
Referre	ed to in	LPOI (examination	regulations for teaching	g-degree programmes)		
Module	e appea	ars in				
	-		ucture Technology (201			
	-		cture Technology (2011	l)		
Master	's degr	ee (1 major) Function	al Materials (2012)			