

Subdivided Module Catalogue for the Subject

Quantum Technology

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

Examination regulations version: 2021 Responsible: Faculty of Physics and Astronomy

JMU Würzburg • generated 30-Mär-2024 • exam. reg. data record 82|k29|-|-|H|2021

Learning Outcomes

German contents and learning outcome available but not translated yet.

Wissenschaftliche Befähigung

- Die Absolventinnen und Absolventen verstehen die mathematischen, theoretischen und experimentellen Grundlagen der Quantentechnologie und können diese anwenden.
- Die Absolventinnen und Absolventen können unter Anleitung Experimente durchführen, analysieren und die erhaltenen Ergebnisse darstellen und bewerten.
- Die Absolventinnen und Absolventen setzen die erlernten die theoretischen und experimentellen Methoden unter Anleitung zur Erlangung neuer Erkenntnisse in der Quantentechnologie um.
- Die Absolventinnen und Absolventen sind in der Lage, Probleme mit wissenschaftlicher Arbeitsweise und unter Beachtung der Regeln guter wissenschaftlicher Praxis (Dokumentation, Fehleranalyse) zu bearbeiten.
- Die Absolventinnen und Absolventen können ihr Wissen und ihre Erkenntnisse einem Fachpublikum gegenüber darstellen und vertreten.
- Die Absolventinnen und Absolventen können ein breites Grundlagenwissen aus den wichtigsten Teilgebieten der Quantentechnologie sowie tiefergehende Kenntnisse in mindestens einem Teilgebiet abrufen.
- Die Absolventinnen und Absolventen verstehen die wesentlichen Zusammenhänge und Konzepte der einzelnen Teilgebiete der Quantentechnologie.
- Die Absolventinnen und Absolventen sind in der Lage, sich mit Hilfe von Fachliteratur in neue Aufgabengebiete einzuarbeiten, sowie physikalische und technische Methoden weitgehend selbstständig auf konkrete Aufgabenstellungen anzuwenden, Lösungswege zu entwickeln und die Ergebnisse zu interpretieren und zu bewerten.
- Die Absolventinnen und Absolventen besitzen Abstraktionsvermögen, analytisches Denken, Problemlösungskompetenz und die Fähigkeit, komplexe Zusammenhänge zu strukturieren.

Befähigung zur Aufnahme einer Erwerbstätigkeit

- Die Absolventinnen und Absolventen können ihr Wissen und ihre Erkenntnisse einem Fachpublikum gegenüber darstellen und vertreten.
- Die Absolventinnen und Absolventen sind in der Lage, konstruktiv und zielorientiert in einem heterogenen Team zusammenzuarbeiten, unterschiedliche und abweichende Ansichten produktiv zur Zielerreichung zu nutzen und auftretende Konflikte zu lösen.
- Die Absolventinnen und Absolventen können ihre erworbenen Kompetenzen in unterschiedlichen interkulturellen Kontexten und in international zusammengesetzten Teams anwenden.
- Die Absolventinnen und Absolventen sind in der Lage, Probleme und deren Lösungen zielgruppengerecht und auch in einer Fremdsprache aufzubereiten und darzustellen.
- Die Absolventinnen und Absolventen können physikalische und technische Methoden weitgehend selbstständig auf konkrete Aufgabenstellungen der Quantentechnologie anwenden, Lösungswege entwickeln und die Ergebnisse bewerten und interpretieren.
- Die Absolventinnen und Absolventen kennen die wichtigsten Anforderungen und Arbeitsweisen im industriellen Umfeld der Quantentechnologie.
- Die Absolventinnen und Absolventen kennen die wichtigsten Anforderungen und Arbeitsweisen in Forschung und Entwicklung.
- Die Absolventinnen und Absolventen sind befähigt, komplexe Probleme zu analysieren und zu lösen und sich sehr schnell auch in weniger vertraute Themenkomplexe einzuarbeiten.

Persönlichkeitsentwicklung

• Die Absolventinnen und Absolventen kennen die Regeln guter wissenschaftlicher Praxis und beachten sie.

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• Die Absolventinnen und Absolventen sind in der Lage, ihr Wissen und ihre Erkenntnisse einem Fachpublikum gegenüber darzustellen und zu vertreten.

Befähigung zum gesellschaftlichen Engagement

UNIVERSITÄT

WÜRZBURG

- Die Absolventinnen und Absolventen können naturwissenschaftliche Entwicklungen kritisch reflektieren und deren Auswirkungen auf die Wirtschaft, Gesellschaft und die Umwelt erfassen (Technikfolgenabschätzung).
- Die Absolventinnen und Absolventen haben ihr Wissen bezüglich wirtschaftlicher, gesellschaftlicher, naturwissenschaftlicher, kultureller etc. Fragestellungen erweitert und können begründet Position beziehen.
- Die Absolventinnen und Absolventen haben die Bereitschaft und Fähigkeit entwickelt, ihre Kompetenzen in partizipative Prozesse einzubringen und aktiv an Entscheidungen mitzuwirken.

Abbreviations used

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

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

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

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

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

Conventions

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

Notes

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

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

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

In accordance with

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

ASPO2015

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

28-Apr-2021 (2021-54)

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	page
Compulsory Courses (118	ECTS credits)			•
Quantum Technology (27	ECTS credits)			
11-N-EIN-212-m01	Introduction to Quantum Technology	7	NUM	118
11-N-IP-212-m01	Industrial Internship Quantum Technology	10	NUM	120
o8-AC-ExChem-152-mo1	Experimental Chemistry	5	NUM	22
08-ACP-NF-152-m01	General and Analytical Chemistry for students of natural sciences (lab)	2	B/NB	27
08-OC-NF-152-m01	Organic Chemistry for students of medicine, biomedicine, den- tal medicine and natural sciences	3	NUM	38
Classical Physics (16 ECI	'S credits)			
11-E-M-152-m01	Classical Physics 1 (Mechanics)	8	NUM	86
11-E-E-152-m01	Classical Physics 2 (Heat and Electromagnetism)	8	NUM	80
Optics and Quantum Phy				
11-E-OAV-152-m01	Optics and Quantum Physics	6	NUM	92
Optics and Quantum Phy				
11-E-OA-152-mo1	Optics and Waves - Exercises	5	NUM	91
11-E-AA-202-m01	Atoms and Molecules - Exercises	5	NUM	77
Solid State Physics (8 EC	1	J		_ //
11-E-F-152-m01	Introduction to Solid State Physics	8	NUM	8
Theoretical Physics I (6 E		0	NOM	0
11-T-QS-152-mo1	Quantum Mechanics and Statistical Physics	6	NUM	11
Theoretical Physics II (10		0	NOM	14
	Quantum Mechanics - Exercises	-	NILIAA	
11-T-QA-152-m01	-	5	NUM	14
11-T-SA-152-mo1	Statistical Physics - Exercises	5	NUM	15
Mathematics (24 ECTS cr				·
10-M-PHY1-212-m01	Mathematics 1 for Students of Physics and Quantum Technolo- gy	8	NUM	57
10-M-PHY2-212-m01	Mathematics 2 for Students of Physics and Quantum Technolo- gy	8	NUM	58
11-M-D-152-m01	Mathematics 3 for Students of Physics and related Disciplines (Differential Equations)	8	NUM	10
Laboratory Course Physi	cs (11 ECTS credits)			
11-P-PA-152-m01	Laboratory Course Physics A (Mechanics, Heat, Electromagne- tism)	3	B/NB	13
11-P-NB-212-m01	Laboratory Course Quantum Technology B (Classical Physics, Electricity, Circuits)	4	B/NB	12
11-P-NC-212-m01	Advanced Laboratory Course Quantum Technology C (Modern		B/NB	12
Compulsory Electives (32			<u> </u>	<u> </u>
Semiconductor Electroni				
11-EL-152-m01	Electronic Circuits	6	NUM	8
11-SPD-152-m01	Physics of Semiconductor Devices	6	NUM	14
11-HLF-152-m01	Semiconductor Lasers and Photonics	6	NUM	- <u>+4</u> 98
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11-HLP-152-m01	Fundamentals of Semiconductor Physics	6	NUM	100
11-KDS-152-m01	Crystal Growth, thin Layers and Lithography	6	NUM	10
11-BXN6A-152-m01	Current Topics in Semiconductor Electronics	6	NUM	69
Materials Science				
11-NAN-152-m01	Nanoanalytics	6	NUM	11
11-FK2B-202-m01	Solid State Physics 2	8	NUM	96
11-ENT-152-m01	Principles of Energy Technologies	6	NUM	89
11-NTE-152-m01	Nanotechnology in Energy Research	6	NUM	12
11-PPT-212-m01	Laboratory Course Physical Technology of Material Synthesis	5	B/NB	13
11-BVG-202-m01	Coating Technologies based on Vapour Deposition	5	NUM	60
08-FU-M0MaV-152-m01	Molecular Materials (Lecture)	5	NUM	34
08-FU-NT-152-m01	Chemically and bio-inspired Nanotechnology for Material Syn- thesis	5	NUM	30
08-PCM3-161-m01	Nanoscale Materials	5	NUM	5
08-FU-MaWi1-212-m01	Material Sciences 1 (Basic introduction)	5	NUM	3
08-FU-MaWi2-152-m01	Material Science 2 (The Material Groups)	5	NUM	3
08-FU-NT-AA-152-m01	Chemical Nanotechnology: Analytics and Applications	5	NUM	3
11-ZMB-152-m01	Methods of Non-Destructive Material Testing	4	NUM	15
Life Sciences				
07-4BFPS2-152-m01	Membranebiology of Plants for Advanced Students	5	NUM	8
07-4S1AMB-152-m01	Methods in Biotechnology	5	NUM	1
07-4S1MOLB-152-m01	Aspects of Molecular Biotechnology	5	NUM	1
07-4S1MZ6-152-m01	Special Bioinformatics 1	5	NUM	1
07-4S1MZ1-152-m01	Basics in Light- and Electron-Microscopy	5	NUM	1.
07-5S2MZ4-152-m01	Specific Biotechnology 2	10	NUM	1
11-LMB-152-m01	Laboratory and Measurement Technology in Biophysics	6	NUM	10
-	l Computer Aided Methods			<u> </u>
11-QUI-202-m01	Introduction to Quantum Computing and Quantum Information	6	NUM	13
11-RRF-202-m01	Introduction to Relativistic Physics and Classical Field Theory	6	NUM	13
11-SDC-152-m01	Statistics, Data Analysis and Computer Physics	4	NUM	13
10-M-NUM1af-152-m01	Numerical Mathematics 1 for students of other subjects	10	NUM	5
10-M-NUM2af-152-m01	Numerical Mathematics 2 for students of other subjects	10	NUM	5
10-M-PRG-152-m01	Programming course for students of Mathematics and other subjects	3	B/NB	5
10-M-COM-152-m01	Computational Mathematics	4	B/NB	5
11-M-F-152-m01	Mathematics 4 for Students of Physics and related Disciplines (Complex Analysis)	8	NUM	11
11-T-M-152-m01	Theoretical Mechanics	8	NUM	14
11-T-E-152-m01	Electrodynamics	8	NUM	14
Applied Physics		Ŭ,		1 14
11-ZDR-152-mo1	Principles of Two- and Three-Dimensional Röntgen Imaging	6	NUM	15
11-BMS-152-m01	Imaging Methods at the Synchroton	6	NUM	6
	Imaging Sensors in Infrared	3	NUM	6
11-A SI-162-0001		ر		
11-ASI-152-m01	Principles of Image Processing	2		1 7
11-EBV-152-m01	Principles of Image Processing	3	NUM	7
	Principles of Image Processing Laboratory and Measurement Technology Introduction to Labview	3 6 6	NUM NUM NUM	7 10 10

08-FU-EEW-152-m01	Electrochemical Energy Storage and Conversion	5	NUM	28
Current Topics in Quantu	m Technology			-0
11-BXN5-212-m01	Current Topics in Quantum Technology	5	NUM	67
11-BXN6-212-m01	Current Topics in Quantum Technology	6	NUM	68
11-BXN8-212-m01	Current Topics in Quantum Technology	8	NUM	70
11-BXP8-152-m01	Current Topics in Physics	8	NUM	73
11-BXP6-152-m01	Current Topics in Physics	6	NUM	72
11-BXP5-152-m01	Current Topics Physics	5	NUM	71
11-CSN6-212-m01	Selected Topics in Quantum Technology	6	NUM	76
11-CSF6-152-m01	Selected Topics in Solid State Physics	6	NUM	75
11-CSEM6-152-m01	Selected Topics in Energy and Material Science	6	NUM	74
11-NTP-152-m01	Novel Transport Phenomena	6	NUM	123
Key Skills Area (20 ECTS c	redits)			•
transferable skills (ASQ). General Key Skills (sub	ject-specific)	•		1
11-P-VKM-202-m01				
	MINT Preparatory Course Mathematical Methods of Physics	3	B/NB	133
11-FFI-202-m01	MINT Preparatory Course Mathematical Methods of Physics Fit for Industry	3	B/NB B/NB	133 95
11-FFI-202-m01 11-PMP-152-m01			1	
	Fit for Industry	3	B/NB	95
11-PMP-152-m01	Fit for Industry Project Management in Practice	3	B/NB B/NB	95 127
11-PMP-152-m01 07-SQF-BGA-152-m01	Fit for Industry Project Management in Practice Biotechnology and Social Acceptance General Competences for Students of Quantum Technology	3 3 3	B/NB B/NB NUM	95 127 20
11-PMP-152-m01 07-SQF-BGA-152-m01 11-NASQ5-212-m01	Fit for Industry Project Management in Practice Biotechnology and Social Acceptance General Competences for Students of Quantum Technology	3 3 3	B/NB B/NB NUM	95 127 20
11-PMP-152-m01 07-SQF-BGA-152-m01 11-NASQ5-212-m01 Subject-specific Key Skil	Fit for Industry Project Management in Practice Biotechnology and Social Acceptance General Competences for Students of Quantum Technology Is (15 ECTS credits)	3 3 3 5	B/NB B/NB NUM NUM	95 127 20 117
11-PMP-152-m01 07-SQF-BGA-152-m01 11-NASQ5-212-m01 Subject-specific Key Skil 11-M-MR-202-m01	Fit for Industry Project Management in Practice Biotechnology and Social Acceptance General Competences for Students of Quantum Technology Is (15 ECTS credits) Mathematical Methods of Physics	3 3 3 5 6	B/NB B/NB NUM NUM B/NB	95 127 20 117 113
11-PMP-152-m01 07-SQF-BGA-152-m01 11-NASQ5-212-m01 Subject-specific Key Skil 11-M-MR-202-m01 11-N-HS-212-m01	Fit for Industry Project Management in Practice Biotechnology and Social Acceptance General Competences for Students of Quantum Technology Is (15 ECTS credits) Mathematical Methods of Physics Seminar Quantum Technology	3 3 3 5 6 5	B/NB B/NB NUM NUM B/NB NUM	95 127 20 117 113 119
11-PMP-152-m01 07-SQF-BGA-152-m01 11-NASQ5-212-m01 Subject-specific Key Skil 11-M-MR-202-m01 11-N-HS-212-m01 11-P-FR1-152-m01	Fit for Industry Fit for Industry Project Management in Practice Biotechnology and Social Acceptance General Competences for Students of Quantum Technology Is (15 ECTS credits) Mathematical Methods of Physics Seminar Quantum Technology Data and Error Analysis	3 3 3 5 6 5 2	B/NB B/NB NUM NUM B/NB B/NB	95 127 20 117 113 119 124

Modul					Abbreviation
Memb	ranebio	ology of Plants for Advan	ced Students		07-4BFPS2-152-m01
Modul	e coord	inator		Module offered by	<u> </u>
		Chair of Plant Physiology	and Biophysics	Faculty of Biology	
ECTS	1	od of grading	Only after succ. com	, _,	
5		rical grade			
Duratio		Module level	Other prerequisites		
1 seme		undergraduate			
Conter	nts	•			
metho	ds with		rised. For this purpos	e, students will be in	ne transport and the biophysica ntroduced to modern methods o
Intend	ed lear	ning outcomes			
		erstand basic membrane tact plants, isolated plan			experimental methods in experi- ms.
Course	es (type	, number of weekly conta	ict hours, language —	if other than Germa	n)
V (1) +	Ü (5)				
		sessment (type, scope, la ion on whether module c			tion offered — if not every seme-
credita	able for				
16 plac Should Studer siderat ted to s nimum 60 ECT tik (Ma tentiall the nui there b form re ponent ve succ	ces. d the nunts of th tion. Sh studen n of one rS credi athema ly to stu mber o be, with egulatic t that a	imber of applications exc ne Bachelor's degree subj rould the module be used ts of the Bachelor's degree place in total) will be all ts and to students of the tics), each with 180 ECTS udents of other 'importing f applications, the remain in one module component on for the courses of one re concerned will be alloce ly completed at least one	ject Biologie (Biology) I in other subjects, the se subject Biologie (B ocated to students of Bachelor's degree su credits, as part of the g' subjects). Should th ning places will be all nt, several courses wi module component. I cated in the same pro) with 180 ECTS cred ere will be two quota iology) with 180 ECT the Bachelor's degr bjects Computation application-oriente he number of places ocated to applicants th a restricted numb n this case, places of cedure. In this proce	es will be allocated as follows: its will be given preferential con- as: 95% of places will be alloca- S credits and 5% of places (a mi ee subject Biologie (Biology) wit al Mathematics and Mathema- ed subject Biology (as well as po- available in one quota exceed from the other quota. Should ber of places, there will be a uni- on all courses of a module com- edure, applicants who already have we module will be given preferen
Selecti mic ach ve ach in the s at the t averag to their	ion pro- hievem ieved a subject time of ge grade r total r	ents. For this purpose, and nd their average grade of of Biologie (Biology) (exc application. This will be weighted according to the number of ECTS credits ac	es will primarily be all oplicants will be rank all assessments take cluding Chemie (Chen done as follows: First, he number of ECTS cr chieved (quantitative	ocated according to ed according to the en during their studi nistry), Physik (Phys , applicants will be r edits (qualitative rar ranking). The applic	ole. the applicants' previous acade- number of ECTS credits they ha- es or of all module components ics), Mathematik (Mathematics) anked, firstly, according to their nking) and, secondly, according ants' position in a third ranking d according to this third ranking.

Bachelor's with 1 major Quantum Technology (2021)

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

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

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

Additional information

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Workload

150 h

Teaching cycle

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

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Module appears in

Bachelor' degree (1 major) Biology (2015) Bachelor' degree (1 major) Nanostructure Technology (2015) Bachelor' degree (1 major) Biology (2017) Bachelor' degree (1 major) Nanostructure Technology (2020) Bachelor' degree (1 major) Biology (2021) Bachelor' degree (1 major) Quantum Technology (2021) Bachelor' degree (1 major) Biology (2022) exchange program Biosciences (2022)

Modu	le title				Abbreviation	
Metho	ods in Bi	otechnology			07-4S1AMB-152-mc)1
Modu	le coord	inator		Module offered by		
holde	r of the	Chair of Biotechnology a	nd Biophysics	Faculty of Biology		
ECTS		od of grading	Only after succ. cor	npl. of module(s)		
5	nume	rical grade				
Durati		Module level	Other prerequisites	;		
1 sem		undergraduate				
Conte						
techno lysis o	ology ar of biolog	lecture and seminar) wil Id biomedicine and the u ical matter on the molec oscopy, electron micros	underlying physical pr ular and cellular leve	rinciples. It will discu l. These methods inc	iss modern methods lude light microscop	for the ana- by, fluore-
Intend	led lear	ning outcomes				
		gain an overview of key ill learn to decide what n				d disadvan-
Cours	es (type	, number of weekly cont	act hours, language –	- if other than Germa	an)	
V (2) +	- S (2)					
		sessment (type, scope, l ion on whether module o			ition offered — if not	every seme-
	n exami able for	nation (approx. 30 to 60 bonus	minutes)			
Alloca	tion of	olaces				
sidera ted to nimum 60 EC tik (Ma tentia the nu there l form r ponen ve suc tial co A wait Select mic ac ve ach in the averag to the will be	tion. Sh student n of one TS credi athemat lly to stu mber of be, with egulatic that a ccessful nsidera ing list cion pro- chievem nieved a subject time of ge grade ir total r e calcula g applic	the Bachelor's degree sub ould the module be use is of the Bachelor's degr place in total) will be all ts and to students of the cics), each with 180 ECTS idents of other 'importin applications, the remai in one module compone on for the courses of one re concerned will be allo by completed at least one tion. will be maintained and p cess group 1 (95%): Plac ents. For this purpose, a nd their average grade of of Biologie (Biology) (ex application. This will be e weighted according to the umber of ECTS credits a sted as the sum of these ants with the same rank	d in other subjects, the ee subject Biologie (E located to students of Bachelor's degree subjects). Should the g' subjects). Should the ning places will be all ent, several courses w module component. cated in the same pro- e other module compo- places re-allocated as es will primarily be all pplicants will be rank f all assessments tak cluding Chemie (Cher done as follows: First the number of ECTS con- chieved (quantitative two rankings, and pla	nere will be two quot Biology) with 180 ECT of the Bachelor's degr ubjects Computation e application-oriente the number of places located to applicants ith a restricted number of the scase, places of condure. In this proce condure. In this proce onent of the respection they become available located according to the en during their studi mistry), Physik (Physic, applicants will be re redits (qualitative ran ranking). The applicated	as: 95% of places wi S credits and 5% of ree subject Biologie of al Mathematics and ed subject Biology (a s available in one que from the other quot ber of places, there we on all courses of a me edure, applicants wh ve module will be give ole. the applicants' prevenumber of ECTS credies es or of all module co ics), Mathematik (M ranked, firstly, accord nking) and, secondly ants' position in a the d according to this the	ill be alloca- places (a mi- (Biology) with Mathema- s well as po- ota exceed ta. Should vill be a uni- odule com- to already ha ven preferen- vious acade- lits they ha- omponents athematics)) ding to their v, according nird ranking.
		cess group 2 (5%): Place nber of ECTS credits alre				
3achelor'	s with 1 ma	jor Quantum Technology (2021)		generated 30-Mär-2024 • ex lor (180 ECTS) Quantentechno		page 10 / 155

among applicants with the same number of ECTS credits achieved, places will be allocated by lot. Quota 2 (25 % of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25 % of places): lottery.

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

Additional information

Workload

150 h

Teaching cycle

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

Module appears in

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

Module	e title				Abbreviation	
Aspects	s of Mo	olecular Biotechnology			07-4S1MOLB-152-m01	
Module	coord	inator		Module offered by		
		Chair of Biotechnology ar	nd Biophysics	Faculty of Biology		
ECTS		od of grading	Only after succ. con	· · · · · · · · · · · · · · · · · · ·		
5		rical grade		•		
Duratio	n	Module level	Other prerequisites	6		
1 seme	ster	undergraduate				
Conten	ts					
mes, pr sor des	roducti sign, dr	on of biomolecules, mole	ecular biology, recom	binant DNA technol	nobilisation of cells and enzy- ogy, protein engineering, biosen- tibodies, hybridoma technology,	
Intende	ed lear	ning outcomes				
Studen dently r to inde	ts will review pender	acquire a knowledge of fi relevant literature. In add ntly acquaint themselves	undamental methods dition, they will becon with - relevant mech	s in biotechnology th me acquainted with anisms.	for addressing a particular issue. at will enable them to indepen- - or, where necessary, will be able	
Course	s (type	, number of weekly conta	act hours, language –	– if other than Germa	an)	
V (2) + 9	S (2)					
ster, inf	formati	sessment (type, scope, la ion on whether module c nation (approx. 30 to 60	an be chosen to earn		ation offered — if not every seme-	
credital						
Allocat	ion of _l	places				
Studen siderati ted to s nimum 60 ECTS tik (Mat tentially the nun there by form res ponent ve succ tial con A waitir Selectic mic ach	the nut ts of th ion. Sh student of one S credi themat y to stu nber of e, with gulatio that an cessfull siderat on proo nievem eved a	the Bachelor's degree subj rould the module be used to of the Bachelor's degree place in total) will be all ts and to students of the tics), each with 180 ECTS udents of other 'importing f applications, the remain in one module component on for the courses of one re concerned will be alloc ly completed at least one tion. will be maintained and placess group 1 (95%): Place ents. For this purpose, and nd their average grade of	ject Biologie (Biology d in other subjects, the se subject Biologie (B ocated to students of Bachelor's degree su credits, as part of the g' subjects). Should the ning places will be all nt, several courses w module component. cated in the same pro- e other module component. laces re-allocated as es will primarily be all pplicants will be rank	a) with 180 ECTS creates and the second s	es will be allocated as follows: lits will be given preferential con- as: 95% of places will be alloca- 'S credits and 5% of places (a mi- ree subject Biologie (Biology) with al Mathematics and Mathema- ed subject Biology (as well as po- s available in one quota exceed as from the other quota. Should ber of places, there will be a uni- on all courses of a module com- edure, applicants who already ha ive module will be given preferen- ole. the applicants' previous acade- number of ECTS credits they ha- res or of all module components	

Bachelor's with 1 major Quantum Technology (2021)

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

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

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

Additional information

Workload

150 h

Teaching cycle

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

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Module appears in

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

Modul	e title				Abbreviation
Basics	in Ligh	it- and Electron-Microsco	ору		07-4S1MZ1-152-m01
Modul	Module coordinator			Module offered by	
head of the Department of Electronmicroscopy Faculty of Biology					
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Durati	on	Module level	Other prerequisites	i	
1 seme	ester	undergraduate			
Conter	nts				
Funda	mental	principles of confocal las	ser scanning microsco	opy and electron mic	croscopy.
Intend	ed lear	ning outcomes			
Studer	nts have	e acquired theoretical kn	owledge and practica	al skills in the area of	f light and electron microscopy.
Course	es (type	, number of weekly conta	act hours, language –	- if other than Germa	an)
V (1) +	Ü (5)				
		sessment (type, scope, la ion on whether module c	0 0		ation offered — if not every seme-
	n exami able for	nation (approx. 30 to 60 bonus	minutes)		
Alloca	tion of	places			
Studer sidera ted to nimum 60 ECT tik (Ma	d the nu nts of th tion. Sh studen n of one S credi athema	ne Bachelor's degree sub nould the module be used ts of the Bachelor's degre place in total) will be all ts and to students of the tics), each with 180 ECTS	ject Biologie (Biology d in other subjects, th ee subject Biologie (E located to students of Bachelor's degree su credits, as part of the) with 180 ECTS cred here will be two quot biology) with 180 ECT f the Bachelor's degr ubjects Computation e application-oriente	es will be allocated as follows: lits will be given preferential con- as: 95% of places will be alloca- 'S credits and 5% of places (a mi- ree subject Biologie (Biology) with al Mathematics and Mathema- ed subject Biology (as well as po-

tentially to students of other 'importing' subjects). Should the number of places available in one quota exceed the number of applications, the remaining places will be allocated to applicants from the other quota. Should there be, within one module component, several courses with a restricted number of places, there will be a 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 the same 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): lottery.

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

Additional information

Workload

150 h

Teaching cycle

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

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Module appears in

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

Module ti	tle			Abbreviation	
Special B	ioinformatics 1			07-4S1MZ6-152-mo	1
Module c	oordinator		Module offered by		
	the Chair of Bioinformatics		Faculty of Biology		
	ethod of grading	Only after succ. con	· -·		
	umerical grade		1		
Duration	Module level	Other prerequisites			
1 semeste	er undergraduate				
Contents					
	ntal principles of the tree of li principles of evolutionary bio truction.				
Intended	learning outcomes				
	are able to use software and nstruction.	databases for seque	nce analysis, RNA str	ructure prediction an	nd phyloge-
	type, number of weekly conta	ict hours, language –	- if other than Germa	n)	
V (1) + Ü (5)				
	f assessment (type, scope, la mation on whether module c			tion offered — if not	every seme-
Language	ox. 10 to 20 pages) of assessment: German or E e for bonus	nglish			
	n of places				
follows: Students sideration ted to stu nimum of 60 ECTS of tik (Mathe tentially t the numb there be, form regu ponent th ve succes tial consid A waiting Selection mic achiev ve achiev in the sub at the tim average g to their to will be ca Among ap se by lot. Selection	. Should the number of appli of the Bachelor's degree subj h. Should the module be used dents of the Bachelor's degree one place in total) will be allor redits and to students of the ematics), each with 180 ECTS o students of other 'importing er of applications, the remain within one module componen- lation for the courses of one p at are concerned will be alloc sfully completed at least one deration. list will be maintained and pl process group 1 (95%): Place vements. For this purpose, application. This purpose, application. This will be rade weighted according to the tal number of ECTS credits according to the collicants with the same ranking process group 2 (5%): Places and the course of the same ranking process group 2 (5%): Places and the course of the same ranking process group 2 (5%): Places	ject Biologie (Biology I in other subjects, the e subject Biologie (B ocated to students of Bachelor's degree su credits, as part of the g' subjects). Should the ing places will be all nt, several courses with module component. I cated in the same pro- other module compo- to ther module compo- to the number of compo- the number of ECTS cre- thieved (quantitative two rankings, and pla- ng, places will be allocated accounts will be allocated accounts of the subject of th) with 180 ECTS cred ere will be two quota iology) with 180 ECTS the Bachelor's degre bjects Computational e application-oriente he number of places ocated to applicants ith a restricted numb n this case, places of cedure. In this proce onent of the respective they become available ocated according to the re en during their studie nistry), Physik (Physis , applicants will be ra edits (qualitative ran ranking). The applica- to the following to the following cording to the following to the following to the following to the following to the following to the following to the following to the following to the following to the following to the following to the following to the follow	its will be given pref as: 95% of places wi S credits and 5% of ee subject Biologie (al Mathematics and d subject Biology (a available in one que from the other quot er of places, there w in all courses of a me dure, applicants while we module will be give ole. the applicants' prev number of ECTS cred es or of all module c ics), Mathematik (Ma anked, firstly, accord king) and, secondly ants' position in a the l according to this the he qualitative rankin mg quotas: Quota 1	Ferential con- ill be alloca- places (a mi- (Biology) with Mathema- s well as po- ota exceed ta. Should vill be a uni- odule com- to already ha- ven preferen- rious acade- lits they ha- omponents athematics)) ding to their t, according nird ranking. ng or otherwi- (50 % of pla-
Bachelor's with	n 1 major Quantum Technology (2021)	-	generated 30-Mär-2024 • exa	-	page 16 / 155
		ta record Bachel	or (180 ECTS) Quantentechno	logie - 2021	ļ

among applicants with the same number of ECTS credits achieved, places will be allocated by lot. Quota 2 (25 % of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25 % of places): lottery.

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

Additional information

Workload

150 h

Teaching cycle

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

Module appears in

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

Modul	e title			Abbreviation
Specif	ic Biotechnology 2			07-5S2MZ4-152-m01
Modul	e coordinator		Module offered by	
holder	of the Chair of Biotechnology ar	nd Biophysics	Faculty of Biology	
ECTS	Method of grading	Only after succ. con	npl. of module(s)	
10	numerical grade			
Durati	on Module level	Other prerequisites		
1 seme	ester undergraduate			
Conter	nts			
Under lar bio	ractical course provides student expert guidance, students will p technology, nano and microsyst e microscopy, fluorescence spec	erform selected expe ems biotechnology, b	riments on the follow piomaterials and bios	wing topics: cellular and molecu- sensors, high-resolution fluore-
Intend	led learning outcomes			
applica acquai chanis tools.	inted with - or, where necessary, sms. Students will have acquired	ndependently review will be able to indep practical experience ve acquired detailed t	relevant literature. Ir endently acquaint th performing experim heoretical knowledg	n addition, they will have become nemselves with - biophysical me- ents, using a variety of scientific re on these experiments and will
Course	es (type, number of weekly conta	act hours, language –	- if other than Germa	n)
Ü (7) + Modul	S (1) e taught in: German and/or Engl	ish		
	d of assessment (type, scope, landor nformation on whether module c			tion offered — if not every seme-
candic tes per hours; Studer Langua	late each (approx. 30 minutes) c	or d) oral examination approx. 20 to 30 minu rding to subject area l ethod and length of t	in groups of up to 3 utes) or f) practical ex but will not exceed a	xamination (on average approx. 2 maximum of 4 hours).
Alloca	tion of places			
18 plac Should Studer sidera ted to nimum 60 ECT tik (Ma tential the nu there b form re ponen ve suc	ces. d the number of applications exe nts of the Bachelor's degree sub tion. Should the module be used students of the Bachelor's degre n of one place in total) will be all IS credits and to students of the athematics), each with 180 ECTS ly to students of other 'importing mber of applications, the remain be, within one module compone egulation for the courses of one t that are concerned will be allow	ject Biologie (Biology d in other subjects, the se subject Biologie (B ocated to students of Bachelor's degree su credits, as part of the g' subjects). Should t ning places will be all nt, several courses wi module component. I cated in the same pro) with 180 ECTS cred ere will be two quota iology) with 180 ECT the Bachelor's degr bjects Computation application-oriente he number of places ocated to applicants ith a restricted numb n this case, places of cedure. In this proce	its will be given preferential con- as: 95% of places will be alloca- S credits and 5% of places (a mi- ee subject Biologie (Biology) with al Mathematics and Mathema- d subject Biology (as well as po- available in one quota exceed s from the other quota. Should per of places, there will be a uni-
Select	ing list will be maintained and p ion process group 1 (95%): Place hievements. For this purpose, a	es will primarily be all	ocated according to	the applicants' previous acade-

Bachelor's with 1 major Quantum Technology (2021)	JMU Würzburg • generated 30-Mär-2024 • exam. reg. da-	page 18 / 155
	ta record Bachelor (180 ECTS) Quantentechnologie - 2021	

ve achieved and their average grade of all assessments taken during their studies or of all module components in the subject of Biologie (Biology) (excluding Chemie (Chemistry), Physik (Physics), Mathematik (Mathematics)) at the time of application. 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): lottery.

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

Additional information

Workload

300 h

Teaching cycle

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

Module appears in

Bachelor' degree (1 major) Biology (2015)

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

Bachelor' degree (1 major) Biology (2017)

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

Bachelor' degree (1 major) Biology (2021)

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

Bachelor' degree (1 major) Biology (2022)

exchange program Biosciences (2022)

Module 1				Abbreviation	
Biotechr	nology	and Social Acceptance	2		07-SQF-BGA-152-m01
Module	coordi	inator		Module offered by	,
holder of	f the C	Chair of Plant Physiology	y and Biophysics	Faculty of Biology	
		od of grading	Only after succ. con		
		rical grade			
Duration	1	Module level	Other prerequisites		
1 semest	ter	undergraduate			
Contents	5				
Applicati bility.	ions o	f green biotechnology;	biological background	l, economic interest	s, ecological risks, social accepta
Intended	d learr	ning outcomes			
enhance lected.	d thei		ntation skills and are	able to use these to	raised by society. Students have present the data they have col-
V (1) + S	(2)	t in: German and/or Eng			
		essment (type, scope, on on whether module			ation offered — if not every seme
	e of a	preparing educational r ssessment: German and bonus		10 pages)	
Allocatio	on of p	olaces			
Students sideratio ted to stu- nimum o 60 ECTS tik (Math tentially the num there be, form reg ponent t	he nu s of th on. Sho udent of one credit to stu ber of , withi ulatio hat ar	e Bachelor's degree sul ould the module be use s of the Bachelor's degr place in total) will be a s and to students of the ics), each with 180 ECT dents of other 'importin applications, the rema n one module compone n for the courses of one e concerned will be allo y completed at least on	bject Biologie (Biology ed in other subjects, the ree subject Biologie (B llocated to students of e Bachelor's degree su S credits, as part of the ng' subjects). Should t ining places will be all ent, several courses w e module component. I bocated in the same pro-) with 180 ECTS creater ere will be two quo- iology) with 180 EC the Bachelor's deg ubjects Computation e application-orient he number of place ocated to applicant ith a restricted num n this case, places cedure. In this proc	ces will be allocated as follows: dits will be given preferential con- tas: 95% of places will be alloca- TS credits and 5% of places (a mi ree subject Biologie (Biology) wit hal Mathematics and Mathema- ed subject Biology (as well as po- s available in one quota exceed s from the other quota. Should ber of places, there will be a uni- on all courses of a module com- edure, applicants who already ha ive module will be given preferen

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.

Bachelor's with 1 major Quantum Technology (2021)

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

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

Additional information

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Workload

90 h

Teaching cycle

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

Module appears in

Bachelor' degree (1 major) Biology (2015) Bachelor' degree (1 major) Nanostructure Technology (2015) Bachelor' degree (1 major) Nanostructure Technology (2020) Bachelor' degree (1 major) Quantum Technology (2021)

Module	e title				Abbreviation	
Experin	nental	Chemistry			o8-AC-ExChem-152-mo1	
Module	e coord	inator		Module offered by		
lecture	r of lect	ure "Experimentalchemi	e" (Experimental	Institute of Inorgan	ic Chemistrv	
Chemis		,			,	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites	;		
1 seme	ster	undergraduate				
Conten	ts					
	•			. ,	mphasis is placed on the mat	
al and p	particle	level, metals, acid-base	reactions, the period	dic table, chemical e	quilibrium and complexometr	
Intende	ed lear	ning outcomes				
cient in	basic		of matter and can des	cribe them properly.	ormation from it. He/she is pro He/she can depict chemical in ng the type of reaction.	
Course	s (type	, number of weekly conta	act hours, language –	- if other than Germa	n)	
V (4)						
	d of ass	essment (type, scope, la	anguage — if other th	an German. examina	tion offered — if not every ser	
		on on whether module c				
written	exami	nation (approx. 90 minut	tes)			
		ssessment: German and				
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teachir	ng cycl	e	-			
		e: every year, winter sem	ester			
		LPO I (examination regu		dagraa pragrammac)		
Referre				degree programmes)		
		•				
Module			<u>``</u>			
	-	ree (1 major) Biology (20				
Bachel	-	ree (1 major) Physics (20				
Pachal	or' do~	roo (1 major) Douchology	(2010)			
	-	ree (1 major) Psychology ree (1 major) Economath				
Bachel	or' deg	ree (1 major) Economath	ematics (2012)	anish) (2013)		
Bachelo Bachelo	or' deg or' deg	ree (1 major) Economath ree (1 major) Romanic La	ematics (2012) nguages (French/Spa	anish) (2013)		
Bachelo Bachelo Bachelo	or' deg or' deg or's deg	ree (1 major) Economath	ematics (2012) nguages (French/Spa edagogy (2011)	anish) (2013)		
Bachelo Bachelo Bachelo Bachelo	or' deg or' deg or's deg or's deg	ree (1 major) Economath ree (1 major) Romanic La gree (1 major, 1 minor) Po	ematics (2012) nguages (French/Spa edagogy (2011) edagogy (2013)	anish) (2013)		
Bachelo Bachelo Bachelo Bachelo Bachelo	or' deg or' deg or's deg or's deg or's deg	ree (1 major) Economath ree (1 major) Romanic La gree (1 major, 1 minor) Po gree (1 major, 1 minor) Po	ematics (2012) nguages (French/Spa edagogy (2011) edagogy (2013) rench Studies (2013)	anish) (2013)		
Bachelo Bachelo Bachelo Bachelo Bachelo Bachelo	or' deg or's deg or's deg or's deg or's deg or's deg or's deg	ree (1 major) Economath ree (1 major) Romanic La gree (1 major, 1 minor) Po gree (1 major, 1 minor) Po gree (1 major, 1 minor) Fr gree (1 major, 1 minor) H gree (1 major, 1 minor) Po	ematics (2012) nguages (French/Spa edagogy (2011) edagogy (2013) ench Studies (2013) istory (2010) re- and Protohistoric /	Archaeology (2012)		
Bachelo Bachelo Bachelo Bachelo Bachelo Bachelo Bachelo	or' deg or's deg or's deg or's deg or's deg or's deg or's deg or's deg	ree (1 major) Economath ree (1 major) Romanic La gree (1 major, 1 minor) Po gree (1 major, 1 minor) Po gree (1 major, 1 minor) Fr gree (1 major, 1 minor) H gree (1 major, 1 minor) Po gree (1 major, 1 minor) S	ematics (2012) Inguages (French/Spa edagogy (2011) edagogy (2013) rench Studies (2013) istory (2010) re- and Protohistoric / panish Studies (2010)	Archaeology (2012))		
Bachelo Bachelo Bachelo Bachelo Bachelo Bachelo Bachelo Bachelo	or' deg or's deg or's deg or's deg or's deg or's deg or's deg or's deg or's deg	ree (1 major) Economath ree (1 major) Romanic La gree (1 major, 1 minor) Po gree (1 major, 1 minor) Po gree (1 major, 1 minor) Fr gree (1 major, 1 minor) H gree (1 major, 1 minor) S gree (1 major, 1 minor) S gree (1 major, 1 minor) Po	ematics (2012) Inguages (French/Spa edagogy (2011) edagogy (2013) rench Studies (2013) istory (2010) re- and Protohistoric / panish Studies (2010 plitical and Social Stu	Archaeology (2012)) Idies (2013)		
Bachelo Bachelo Bachelo Bachelo Bachelo Bachelo Bachelo Bachelo Bachelo	or' deg or's deg or's deg or's deg or's deg or's deg or's deg or's deg or's deg or's deg	ree (1 major) Economath ree (1 major) Romanic La gree (1 major, 1 minor) Po gree (1 major, 1 minor) Po gree (1 major, 1 minor) Fr gree (1 major, 1 minor) H gree (1 major, 1 minor) So gree (1 major, 1 minor) So gree (1 major, 1 minor) En	ematics (2012) inguages (French/Spa edagogy (2011) edagogy (2013) rench Studies (2013) istory (2010) re- and Protohistoric / panish Studies (2010 plitical and Social Stu nglish and American S	Archaeology (2012)) Idies (2013) Studies (2010)		
Bachelo Bachelo Bachelo Bachelo Bachelo Bachelo Bachelo Bachelo Bachelo Bachelo	or' deg or's deg or's deg or's deg or's deg or's deg or's deg or's deg or's deg or's deg	ree (1 major) Economath ree (1 major) Romanic La gree (1 major, 1 minor) Po gree (1 major, 1 minor) Po gree (1 major, 1 minor) Fr gree (1 major, 1 minor) H gree (1 major, 1 minor) S gree (1 major, 1 minor) S gree (1 major, 1 minor) Po	ematics (2012) inguages (French/Spa edagogy (2011) edagogy (2013) rench Studies (2013) istory (2010) re- and Protohistoric / panish Studies (2010 olitical and Social Stu- nglish and American Sussian Language and	Archaeology (2012)) Idies (2013) Studies (2010)		

Bachelor's degree (1 major, 1 minor) Gallo-Roman philology (2010) Bachelor's degree (1 major, 1 minor) German Language and Literature (2013) Bachelor's degree (1 major, 1 minor) German Language and Literature (2010) Bachelor's degree (1 major, 1 minor) Italian Studies (2010) Bachelor's degree (2 majors) Classical Archaeology (2013) Bachelor's degree (2 majors) Pedagogy (2013) Bachelor's degree (2 majors) Philosophy (2013) Bachelor's degree (2 majors) Special Education (2009) Bachelor's degree (2 majors) Digital Humanities (2012) Bachelor's degree (2 majors) Political and Social Studies (2011) Bachelor's degree (2 majors) Russian Language and Culture (2012) Bachelor's degree (2 majors) European Ethnology (2013) Magister Theologiae Catholic Theology (2013) Bachelor's degree (2 majors) English and American Studies (2009) Bachelor's degree (2 majors) German Language and Literature (2013) Bachelor' degree (1 major) Geography (2015) Bachelor' degree (1 major) Mathematics (2015) Bachelor' degree (1 major) Musicology (2015) Bachelor' degree (1 major) Physics (2015) Bachelor' degree (1 major) Psychology (2015) Bachelor' degree (1 major) Business Management and Economics (2015) Bachelor' degree (1 major) Nanostructure Technology (2015) Bachelor' degree (1 major) Biomedicine (2015) Bachelor' degree (1 major) Music Education (2015) Bachelor' degree (1 major) Computational Mathematics (2015) Bachelor' degree (1 major) Political and Social Studies (2015) Bachelor' degree (1 major) Functional Materials (2015) Bachelor' degree (1 major) Academic Speech Therapy (2015) Bachelor' degree (1 major) Indology/South Asian Studies (2015) Bachelor's degree (1 major, 1 minor) Egyptology (2015) Bachelor's degree (1 major, 1 minor) Pedagogy (2015) Bachelor's degree (1 major, 1 minor) History (2015) Bachelor's degree (1 major, 1 minor) Musicology (2015) Bachelor's degree (1 major, 1 minor) Philosophy (2015) Bachelor's degree (1 major, 1 minor) Pre- and Protohistoric Archaeology (2015) Bachelor's degree (1 major, 1 minor) Ancient World (2015) Bachelor's degree (1 major, 1 minor) Music Education (2015) Bachelor's degree (1 major, 1 minor) Philosophy and Religion (2015) Bachelor's degree (1 major, 1 minor) Theological Studies (2015) Bachelor's degree (1 major, 1 minor) Political and Social Studies (2015) Bachelor's degree (1 major, 1 minor) Russian Language and Culture (2015) Bachelor's degree (1 major, 1 minor) German Language and Literature (2015) Bachelor's degree (2 majors) Egyptology (2015) Bachelor's degree (2 majors) Pedagogy (2015) Bachelor's degree (2 majors) Protestant Theology (2015) Bachelor's degree (2 majors) Musicology (2015) Bachelor's degree (2 majors) Philosophy (2015) Bachelor's degree (2 majors) Special Education (2015) Bachelor's degree (2 majors) Pre- and Protohistoric Archaeology (2015) Bachelor's degree (2 majors) Latin Philology (2015) Bachelor's degree (2 majors) Music Education (2015) Bachelor's degree (2 majors) Philosophy and Religion (2015) Bachelor's degree (2 majors) Theological Studies (2015) Bachelor's with 1 major Quantum Technology (2021) IMU Würzburg • generated 30-Mär-2024 • exam. reg. data record Bachelor (180 ECTS) Quantentechnologie - 2021

Bachelor's degree (2 majors) Digital Humanities (2015) Bachelor's degree (2 majors) Political and Social Studies (2015) Bachelor's degree (2 majors) Russian Language and Culture (2015) Bachelor's degree (2 majors) Greek Philology (2015) Bachelor's degree (2 majors) European Ethnology (2015) Bachelor's degree (2 majors) Indology/South Asian Studies (2015) Bachelor's degree (2 majors) Ancient Near Eastern Studies (2015) Bachelor's degree (2 majors) Geography (2015) Bachelor's degree (2 majors) French Studies (2015) Bachelor's degree (2 majors) History (2015) Bachelor's degree (2 majors) Sport Science (Focus on health and Pedagogics in Movement) (2015) Bachelor's degree (2 majors) German Language and Literature (2015) Bachelor' degree (1 major) Mathematical Physics (2016) Bachelor's degree (2 majors) Theological Studies (2011) Bachelor's degree (1 major, 1 minor) French Studies (2016) Bachelor's degree (2 majors) French Studies (2016) Bachelor's degree (1 major, 1 minor) Italian Studies (2016) Bachelor's degree (2 majors) Italian Studies (2016) Bachelor's degree (1 major, 1 minor) Spanish Studies (2016) Bachelor's degree (2 majors) Spanish Studies (2016) Bachelor' degree (1 major) Romanic Languages (French/Italian) (2016) Bachelor' degree (1 major) Romanic Languages (French/Spanish) (2016) Bachelor' degree (1 major) Romanic Languages (Italian/Spanish) (2016) Bachelor' degree (1 major) Business Information Systems (2016) Bachelor' degree (1 major) Games Engineering (2016) Bachelor's degree (1 major, 1 minor) English and American Studies (2016) Bachelor's degree (2 majors) English and American Studies (2016) Bachelor' degree (1 major) Media Communication (2016) Bachelor's degree (1 major, 1 minor) Digital Humanities (2016) Bachelor' degree (1 major) Biology (2017) Bachelor's degree (1 major, 1 minor) Geography (2017) Bachelor's degree (1 major, 1 minor) History of Medieval and Modern Art (2017) Bachelor's degree (2 majors) History of Medieval and Modern Art (2017) Bachelor's degree (2 majors) Comparative Indo-European Linguistics (2017) Bachelor' degree (1 major) Aerospace Computer Science (2017) Bachelor' degree (1 major) Modern China (2017) Bachelor's degree (1 major, 1 minor) Museology and material culture (2017) Bachelor' degree (1 major) Economathematics (2017) Bachelor' degree (1 major) Games Engineering (2017) Bachelor' degree (1 major) Computer Science (2017) Bachelor' degree (1 major) Media Communication (2018) Bachelor' degree (1 major) Biomedicine (2018) Bachelor' degree (1 major) Human-Computer Systems (2018) Bachelor's degree (2 majors) Classical Archaeology (2018) Bachelor's degree (1 major, 1 minor) Classical Archaeology (2018) Bachelor's degree (1 major, 1 minor) Digital Humanities (2018) Bachelor's degree (2 majors) Digital Humanities (2018) Bachelor' degree (1 major) Computer Science (2019) Bachelor's degree (1 major, 1 minor) English and American Studies (2019) Bachelor's degree (1 major, 1 minor) Indology/South Asian Studies (2019) Bachelor' degree (1 major) Indology/South Asian Studies (2019) Bachelor' degree (1 major) Business Information Systems (2019) Bachelor's degree (2 majors) Indology/South Asian Studies (2019) Bachelor's with 1 major Quantum Technology (2021) JMU Würzburg • generated 30-Mär-2024 • exam. reg. dapage 24 / 155

ta record Bachelor (180 ECTS) Quantentechnologie - 2021

Bachelor' degree (1 major) Business Management and Economics (2019) Bachelor' degree (1 major) Modern China (2019) Bachelor' degree (1 major) Biomedicine (2020) Bachelor' degree (1 major) Pedagogy (2020) Bachelor' degree (1 major) Political and Social Studies (2020) Bachelor' degree (1 major) Business Information Systems (2020) Bachelor's degree (1 major, 1 minor) Political and Social Studies (2020) Bachelor's degree (2 majors) European Ethnology (2020) Bachelor's degree (2 majors) Political and Social Studies (2020) Bachelor's degree (2 majors) Special Education (2020) Bachelor' degree (1 major) Physics (2020) Bachelor' degree (1 major) Nanostructure Technology (2020) Bachelor' degree (1 major) Mathematical Physics (2020) Bachelor' degree (1 major) Aerospace Computer Science (2020) Bachelor's degree (1 major, 1 minor) Museology and material culture (2020) Bachelor's degree (1 major, 1 minor) Pedagogy (2020) Bachelor's degree (2 majors) Pedagogy (2020) Bachelor' degree (1 major) Psychology (2020) Bachelor' degree (1 major) Biology (2021) Magister Theologiae Catholic Theology (2021) Bachelor's degree (2 majors) History (2021) Bachelor's degree (1 major, 1 minor) History (2021) Bachelor' degree (1 major) Media Communication (2021) Bachelor's degree (2 majors) Theological Studies (2021) Bachelor's degree (1 major, 1 minor) Theological Studies (2021) Bachelor's degree (1 major, 1 minor) English and American Studies (2021) Bachelor's degree (2 majors) English and American Studies (2021) Bachelor' degree (1 major) Functional Materials (2021) Bachelor' degree (1 major) Computer Science und Sustainability (2021) Bachelor's degree (2 majors) Comparative Indo-European Linguistics (2021) Bachelor' degree (1 major) Quantum Technology (2021) Bachelor's degree (2 majors) Special Education (2021) Bachelor' degree (1 major) Business Information Systems (2021) Bachelor' degree (1 major) Economathematics (2021) Bachelor' degree (1 major) Business Management and Economics (2021) Bachelor' degree (1 major) Human-Computer Systems (2022) Bachelor's degree (1 major, 1 minor) Museology and material culture (2022) Bachelor' degree (1 major) Biology (2022) Bachelor' degree (1 major) Economathematics (2022) Bachelor' degree (1 major) Mathematical Data Science (2022) Bachelor' degree (1 major) Artificial Intelligence and Data Science (2022) Bachelor's degree (2 majors) Ancient Near Eastern Archaeology (2022) Bachelor's degree (1 major, 1 minor) Ancient World (2022) Bachelor's degree (2 majors) Ancient Near Eastern Studies (2022) Bachelor' degree (1 major) Franco-German studies: language, culture, digital competence (2022) Bachelor' degree (1 major) Midwifery (2022) Bachelor' degree (1 major) European Law (2023) Bachelor's degree (1 major, 1 minor) English and American Studies (2023) Bachelor's degree (2 majors) English and American Studies (2023) Bachelor' degree (1 major) Artificial Intelligence and Data Science (2023) Bachelor' degree (1 major) Mathematics (2023) Bachelor' degree (1 major) Business Information Systems (2023) Bachelor' degree (1 major) Economathematics (2023) Bachelor's with 1 major Quantum Technology (2021) JMU Würzburg • generated 30-Mär-2024 • exam. reg. dapage 25 / 155

ta record Bachelor (180 ECTS) Quantentechnologie - 2021

Bachelor's degree (1 major, 1 minor) History of Medieval and Modern Art (2023) Bachelor's degree (2 majors) History of Medieval and Modern Art (2023) Bachelor's degree (2 majors) Special Education (2023) Bachelor' degree (1 major) Business Management and Economics (2023) Bachelor' degree (1 major) Geography (2023) Bachelor's degree (2 majors) Geography (2023) Bachelor's degree (1 major, 1 minor) Geography (2023) Bachelor's degree (2 majors) European Ethnology/Empiric Cultural Studies (2023) Bachelor' degree (1 major) Mathematical Physics (2024) Bachelor's degree (2 majors) German Language and Literature (2024) Bachelor's degree (1 major, 1 minor) German Language and Literature (2024) Bachelor' degree (1 major) Music Education (2024) Bachelor's degree (2 majors) Music Education (2024) Bachelor's degree (1 major, 1 minor) Music Education (2024) Bachelor' degree (1 major) Indology/South Asian Studies (2024) Bachelor's degree (2 majors) Indology/South Asian Studies (2024) Bachelor's degree (1 major, 1 minor) Indology/South Asian Studies (2024) Bachelor's degree (1 major, 1 minor) Ancient World (2024) Bachelor's degree (2 majors) Digital Humanities (2024) Bachelor's degree (1 major, 1 minor) Digital Humanities (2024) Bachelor' degree (1 major) Midwifery (2024) Bachelor's degree (2 majors) Greek Philology (2024) Bachelor's degree (2 majors) Latin Philology (2024) Bachelor' degree (1 major) Business Information Systems (2024) Bachelor' degree (1 major) Economathematics (2024) Bachelor' degree (1 major) Business Management and Economics (2024) Bachelor' degree (1 major) Artificial Intelligence and Data Science (2024) Bachelor' degree (1 major) Human-Computer-Interaction (2024)

Module	e title				Abbreviation	
Genera	l and A	nalytical Chemistry for s	tudents of natural sc	iences (lab)	08-ACP-NF-152-m01	
Module	e coord	inator		Module offered by		
holder	of the (Chair of Anorganic Chemi	stry	Institute of Inorga	anic Chemistry	
ECTS		od of grading	Only after succ. com	pl. of module(s)		
2	(not) s	successfully completed	o8-AC-ExChem			
Duratio	on	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
lated le course	ecture(s focuse	s). After a safety briefing,	the students autonor	nously conduct e	e they have gained through the re- operiments in the laboratory. The simple substances and analyses of	
Intende	ed learı	ning outcomes				
have d	evelope		he necessary stoichio	ometric calculation	experiments to solve them. They ns and describe the chemical pro-	
Course	s (type	, number of weekly conta	ct hours, language —	if other than Gerr	nan)	
P (4)						
ster, in Vortest pages o Assess	formati ate/Na each) a ment o	on on whether module ca	an be chosen to earn experiment examinati cal performance (2 to mer semester	a bonus) on talks approx. 1	nation offered — if not every seme- .5 minutes each, log approx. 5 to 10 ations)	
Allocat	ion of p	olaces				
Additio	onal info	ormation				
Worklo	ad					
60 h						
Teachi	ng cycl	e				
			-			
Referre	ed to in	LPOI (examination regu	lations for teaching-c	legree programme	es)	
			0			
Module	e appea	urs in				
Bachel Bachel Bachel	or' deg or' deg or' deg	ree (1 major) Physics (20: ree (1 major) Nanostructu ree (1 major) Physics (20: ree (1 major) Nanostructu ree (1 major) Quantum Te	ire Technology (2015) 20) ire Technology (2020)			

Module					Abbreviation	
Electro	chemic	al Energy Storage and Co	onversion		08-FU-EEW-152-mo	1
Module coordinator				Module offered by		
		Chair of Chemical Techno	logy of Material Syn-		echnology of Materi	al Synthesis
thesis	orthet		nogy of Material Syn	chair of chemical f	centrology of Materi	at Synthesis
ECTS Method of grading Only after succ. compl. of module(s)						
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
um anc cal dou	l nickel Ible lay	l application of: battery s metal hydride, sodium s er capacitors, redox-flow GaAs, organic and dye s	sulphur, sodium nicke batteries, fuel cell sy	el chloride, lithium io stems (AFC, PEMFC,	on accumulators), el	ectrochemi-
Intende	ed learı	ning outcomes				
		e developed a knowledge ge to research problems.	e of electrochemical e	nergy storage and co	onversion and are al	ble to apply
Course	s (type	, number of weekly conta	act hours, language –	· if other than Germa	n)	
V (2) +	P (1) +	E (1)				
		s essment (type, scope, la on on whether module ca			tion offered — if not	every seme
	ge of a	ffered: Once a year, sum ssessment: German and, slaces				
Additio	nal inf	ormation				
Worklo			-			
150 h	au					
-		•				
Teachiı	ig cycu	e				
Referre	d to in	LPO I (examination regu	llations for teaching-o	legree programmes)		
Module	e appea	irs in				
		ree (1 major) Nanostructu				
	-	ee (1 major) Physics (201				
	-	ee (1 major) Nanostructu				
	-	ee (1 major) Functional M				
	-	ee (1 major) Nanostructur				
	-	ee (1 major) Physics (202 ee (1 major) Physics Inter				
	-	ee (1 major) Quantum En				
	-	ree (1 major) Quantum En)		
Juchel	-	τος τε πιαροιλιναποριτατί				
Bachel	or' deg	ree (1 major) Quantum Te)		
	_		echnology (2021)	′ generated 30-Mär-2024 ● ex:		page 28 / 15



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

Module title					Abbreviation
Materia	al Scier	nces 1 (Basic introduction	ı)		08-FU-MaWi1-212-m01
Module	e coord	inator		Module offered by	<u> </u>
		Chair of Chemical Techno	logy of Material Syn-	•	echnology of Material Synthesis
thesis				chair of chemical f	connotogy of material by https://
ECTS		od of grading	Only after succ. com	pl. of module(s)	
5		rical grade			
Duratio		Module level	Other prerequisites		
2 seme		undergraduate	-		
Conten					
		re of materials earn about the atomic st	ructuro of colid mator	rialc	
inc stu	lucints i	cam about the atomic st		nats.	
		Materials			
					chanical properties including de-
		ection of metallic materia		mechanical properti	es. In addition, the corrosion and
2011001	511 p.01				
		cal Methods			
The stu on.	dents a	are introduced to numerio	cal methods like finit	e element methods	(FEM) and Monte-Carlo-Simulati-
	ad loar	ning outcomes			
	-		de thermodynamic r	roportios liko optha	lpy and entropy, the laws of dif-
					chanisms in metals. The students
					nsitions, alloys and phase separa
tion of	metals	. The students can explai	n the deformation as	well as hardening d	lue to dislocations of metals. The
					the Monte-Carlo-method.
		, number of weekly conta	ct hours, language —	if other than Germa	an)
V (2) +					
		s essment (type, scope, la on on whether module ca			ation offered — if not every seme-
					e candidate each (20 to 30 minu-
		examination in groups of) presentation (approx. 3		approx. 15 minutes p	per candidate) or d) log (approx.
		ssessment: German and			
Allocat			-		
Additio	nal inf	ormation			
Worklo	ad				
150 h					
Teachi	ng cycl	e			
Referre	d to in	LPOI (examination regu	lations for teaching-c	legree programmes)	
Module	e appea	irs in			
		ree (1 major) Functional N	Naterials (2021)		
		ree (1 major) Quantum Te			
	•••	or Quantum Technology (2021)	INALL VA/Company	generated 30-Mär-2024 • ex	am. reg. da- page 30 / 155



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

	e title				Abbreviation		
Material Science 2 (The Material Groups)					08-FU-MaWi2-152-r	n01	
Module	e coord	inator		Module offered by			
		Chair of Chemical Techno	logy of Material Syn-	•	echnology of Materi	al Synthesis	
thesis	orthet		nogy of material Syn	chair of chemical f	centrology of Materia	ut Synthesis	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)			
5	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 seme	ster	undergraduate					
Conten	ts						
and pro loys. Ce	operties eramics	d properties of the main s; thermo-mechanical tre s: oxidic and non-oxidic s olymer materials: thermo	atment; Martensitic t structural ceramics; e	ransitions; ductility lectric and magnetic	and strength; form n properties of function	nemory al-	
Intende	ed learı	ning outcomes					
		e developed a knowledge nowledge to research pr		d properties of the r	nain material groups	and are able	
Course	s (type	, number of weekly conta	act hours, language —	if other than Germa	in)		
V (3) + I	Ü (1)						
		essment (type, scope, la on on whether module c			ition offered — if not	every seme-	
tes) or o 20 page Langua	c) oral (es) or e ge of a	nination (approx. 90 to 1 examination in groups of) presentation (approx. 3 ssessment: German and	f up to 3 candidates (a 30 minutes)				
Allocat	ion of p	olaces					
Additio	nat inf	ormation					
	<u> </u>						
Worklo	ad						
150 h							
Teachir	ng cycl	e					
Referre	d to in	LPOI (examination regu	llations for teaching-o	legree programmes)			
Module	e appea	ars in					
Bachelo Master' Master' Supple Master' Supple Bachelo	or' deg 's degro 's teach mentar 's degro 's teach mentar or' deg	ree (1 major) Nanostructu ree (1 major) Functional <i>I</i> ee (1 major) Chemistry (2 ning degree Gymnasium y course MINT Teacher E ee (1 major) Chemistry (2 ning degree Gymnasium y course MINT Teacher E ree (1 major) Nanostructu ree (1 major) Functional <i>I</i>	Materials (2015) 016) MINT Teacher Educati ducation PLUS, Elite M 018) MINT Teacher Educati ducation PLUS, Elite M ure Technology (2020)	on PLUS, Elite Netw Network Bavaria (EN on PLUS, Elite Netw Network Bavaria (EN	B) (2016) ork Bavaria (ENB) (24		
	or' deg	ree (1 major) Quantum Te					



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

Module	Module title Abbreviation							
Molecu	Molecular Materials (Lecture) 08-FU-MoMaV-152-mo1							
Module	a coord	inator		Module offered by				
degree programme coordinator Funktionswerkstoffe (Func-								
tional N			onswerkstoffe (Func-	Chair of Chemical T	echnology of Materia	al Synthesis		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)				
5	5 numerical grade							
Duratio	on	Module level	Other prerequisites					
1 seme	1 semester undergraduate							
Conten	Its							
Chemic ticles, t		ds and molecular interac ns.	tions, supramolecula	r chemistry, molecul	ar materials, colloid	ls, nanopar-		
Intende	ed lear	ning outcomes						
cal prop teractic themse feedba	perties ons and elves w .ck.	e developed an understan of materials and their str I how they determine the ith a topic in the field, de	ructure. They know the properties of molecu- liver a presentation of	e significance of var Ilar materials. They h on that topic, discuss	ious inter and intran ave learned how to s it as well as to give	nolecular in- familiarise		
Course	s (type	, number of weekly conta	ect hours, language –	- if other than Germa	n)			
V (3) +	S (1)							
ster, in [a) writ	formati ten exa	sessment (type, scope, la ion on whether module co amination (approx. 90 to	an be chosen to earn 180 minutes) or b) or	a bonus) al examination of on	e candidate each (2	o to 30 minu-		
20 pag	es) or e	examination in groups of e) presentation (approx. <u>a</u> ssessment: German and	30 minutes)] as well a					
Allocat	ion of _l	places						
Additio	onal inf	ormation						
Worklo	ad		-					
150 h								
Teachi	ng cycl	e						
Referre	ed to in	LPOI (examination regu	llations for teaching-o	degree programmes)				
Module	e appea	ars in						
Bachel	or' deg	ree (1 major) Nanostructı	ure Technology (2015)					
Bachel	or' deg	ree (1 major) Functional <i>N</i>	Materials (2015)					
	-	ee (1 major) Chemistry (2						
		hing degree Gymnasium				016)		
		ry course MINT Teacher E		Network Bavaria (EN	B) (2016)			
	-	ee (1 major) Chemistry (2				``		
		hing degree Gymnasium				020)		
		ry course MINT Teacher E			B) (2020)			
	-	ree (1 major) Nanostructu)				
Bachel	or' deg	ree (1 major) Quantum Te	ecnnology (2021)					
Bachelor's	with 1 ma	jor Quantum Technology (2021)	-	generated 30-Mär-2024 • exa or (180 ECTS) Quantentechno	-	page 34 / 155		



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

	itle			Abbreviation	
Chemical	ly and bio-inspired Nanote	chnology for Material S	iynthesis	08-FU-NT-152-m01	
Module c	oordinator		Module offered by		
degree pı tional Ma	ogramme coordinator Funk trierials)	tionswerkstoffe (Func-		nical Technology of Material Synthesis	
ECTS N	Nethod of grading	Only after succ. con	pl. of module	(s)	
5 n	umerical grade				
Duration	Module level	Other prerequisites			
1 semeste	0				
Contents					
ted mater				terisation and applications of the crea- of biomaterials, introduction to bio-in-	
Intended	learning outcomes				
Students	have developed a sound k	nowledge of sol-gel che	mistry and bio	omineralisation.	
Courses (type, number of weekly cor	ntact hours, language –	- if other than	German)	
V (4)					
	f assessment (type, scope, rmation on whether module			amination offered — if not every seme	
tes) or c) 20 pages Language	oral examination in groups) or e) presentation (approx e of assessment: German ar	of up to 3 candidates (. 30 minutes)		of one candidate each (20 to 30 minu uutes per candidate) or d) log (approx.	
Allocatio	n of places				
Additiona	al information				
Workload					
150 h					
Teaching	cycle				
Referred	to in LPO I (examination re	gulations for teaching-o	degree prograr	nmes)	
	ppears in				
	' degree (1 major) Nanostru ' degree (1 major) Functiona				
	degree (1 major) Functiona degree (1 major) Chemistry				
Master's Supplem		m MINT Teacher Educat Education PLUS, Elite		Network Bavaria (ENB) (2016) ia (ENB) (2016)	
Master's Supplem Bachelor		n MINT Teacher Educat Education PLUS, Elite Cture Technology (2020	Network Bavar	Network Bavaria (ENB) (2020) ia (ENB) (2020)	
Bachelor'	degree (1 major) Ouamum	lechnology (2021)			

Modul				Abbreviation	
Chemi	cal Nar	otechnology: Analyt	ics and Applications	08-FU-NT-AA-152-m01	
Modul	e coord	linator		Module offered by	
-	e progra Matrier		nktionswerkstoffe (Func-	Chair of Chemical Technology of Material S	Synthesis
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Durati	on	Module level	Other prerequisites		
1 seme	ester	graduate			
Conter	nts				
				on methods in nanotechnology. Thermoana of nanomaterials in industry and technolog	
Intend	ed lear	ning outcomes			
Studer	nts hav	e developed an adva	nced knowledge of the ch	naracterisation and application of nanomate	erials.
			contact hours, language –	••	
V (4)	. /1			,	
ster, ir a) writ	nformat ten exa	ion on whether modi mination (approx. 90	ule can be chosen to earn o to 180 minutes) or b) ora	an German, examination offered — if not ev a bonus) al examination of one candidate each (20 to approx. 15 minutes per candidate) or d) log	30 mini
20 pag	ges) or (e) presentation (appi ssessment: German	ox. 30 minutes)		(upprox
Alloca	tion of	places			
Additi	onal inf	ormation			
Worklo	oad				
150 h					
-	ng cvc	e			
-	ing cyc	e			
Teachi			regulations for teaching-	degree programmes)	
Teachi			regulations for teaching-	degree programmes)	
Teachi Referro		LPO I (examination	regulations for teaching-	degree programmes)	
Teachi Referro Modul	ed to in e appe	LPOI (examination			
Teachi Referro Modul Bache	ed to in e appea	LPOI (examination	ructure Technology (2015		
Teachi Referro Modul Bache Master Bache	ed to in e appe lor' deg r's degr lor' deg	LPOI (examination ars in gree (1 major) Nanost gree (1 major) Functior gree (1 major) Nanost	ructure Technology (2015) nal Materials (2016) ructure Technology (2020)	
Teachi Referro Modul Bache Bache Bache Bache	ed to in e apper lor' deg lor' deg lor' deg	LPOI (examination ars in gree (1 major) Nanost gree (1 major) Functior gree (1 major) Nanost	ructure Technology (2015) nal Materials (2016) ructure Technology (2020) Im Technology (2021))	

Module	e title				Abbreviation	
Organi	c Chem	istry for students of med	dicine, biomedicine, d	lental medicine and	08-0C-NF-152-m01	
natural	l scienc	es				
Module	e coord	inator		Module offered by	<u></u>	
lecture	roflect	ture "Organische Chemie	für Studierende der	Institute of Organic	Chemistry	
		iedizin, Zahnmedizin, Ing			Chemistry	
wissen		· · · · · ·				
ECTS	1	od of grading	Only after succ. com	nl of module(s)		
3	1	rical grade				
-						
Duratio		Module level	Other prerequisites			
1 seme		undergraduate				
Conten	ts					
This mo	odule p	rovides students with an	n overview of the theo	retical principles of	organic chemistry.	
Intende	ed lear	ning outcomes				
	-		- o fundamental princi	nlos of organis show	aictn.	
		e become familiar with th	· · · · · ·	-	•	
Course	s (type	, number of weekly conta	act hours, language —	 If other than Germa 	n)	
V (2)						
Method	d of ass	sessment (type, scope, la	anguage — if other tha	an German, examina	tion offered — if not e	every seme-
		on on whether module c				,
written	exami	nation (approx. 60 minut	tes)			
		ssessment: German and	-			
Langua	<u> </u>					
	ion of r	alacas				
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Bachelor's degree (1 major, 1 minor) Italian Studies (2010) Bachelor's degree (2 majors) Classical Archaeology (2013) Bachelor's degree (2 majors) Pedagogy (2013) Bachelor's degree (2 majors) Philosophy (2013) Bachelor's degree (2 majors) Special Education (2009) Bachelor's degree (2 majors) Digital Humanities (2012) Bachelor's degree (2 majors) Political and Social Studies (2011) Bachelor's degree (2 majors) Russian Language and Culture (2012) Bachelor's degree (2 majors) European Ethnology (2013) Magister Theologiae Catholic Theology (2013) First state examination for the teaching degree Grundschule English (2009) First state examination for the teaching degree Grundschule Biology (2009) First state examination for the teaching degree Grundschule Chemistry (2009) First state examination for the teaching degree Grundschule Geography (2009) First state examination for the teaching degree Grundschule Protestant Theology (2009) First state examination for the teaching degree Grundschule German (2009) First state examination for the teaching degree Grundschule History (2009) First state examination for the teaching degree Grundschule History (2015) First state examination for the teaching degree Grundschule Catholic Theology (2009) First state examination for the teaching degree Grundschule Mathematics (2009) First state examination for the teaching degree Grundschule Music (2009) First state examination for the teaching degree Grundschule Physics (2009) First state examination for the teaching degree Grundschule Social Science (2009) First state examination for the teaching degree Grundschule Science of Sport (2009) First state examination for the teaching degree Hauptschule English (2009) First state examination for the teaching degree Hauptschule Biology (2009) First state examination for the teaching degree Hauptschule Chemistry (2009) First state examination for the teaching degree Hauptschule Geography (2009) First state examination for the teaching degree Hauptschule Protestant Theology (2009) First state examination for the teaching degree Hauptschule German (2009) First state examination for the teaching degree Hauptschule History (2009) First state examination for the teaching degree Hauptschule Catholic Theology (2009) First state examination for the teaching degree Hauptschule Mathematics (2009) First state examination for the teaching degree Hauptschule Music (2009) First state examination for the teaching degree Hauptschule Physics (2009) First state examination for the teaching degree Hauptschule Social Science (2009) First state examination for the teaching degree Hauptschule Science of Sport (2009) First state examination for the teaching degree Realschule English (2009) First state examination for the teaching degree Realschule Biology (2009) First state examination for the teaching degree Realschule Chemistry (2009) First state examination for the teaching degree Realschule Geography (2009) First state examination for the teaching degree Realschule Protestant Theology (2009) First state examination for the teaching degree Realschule French Studies (2009) First state examination for the teaching degree Realschule German (2009) First state examination for the teaching degree Realschule History (2009) First state examination for the teaching degree Realschule Computer Science (2012) First state examination for the teaching degree Realschule Catholic Theology (2009) First state examination for the teaching degree Realschule Mathematics (2009) First state examination for the teaching degree Realschule Music (2009) First state examination for the teaching degree Realschule Physics (2009) First state examination for the teaching degree Realschule Science of Sport (2009) First state examination for the teaching degree Gymnasium English (2009) First state examination for the teaching degree Gymnasium Biology (2009) IMU Würzburg • generated 30-Mär-2024 • exam. reg. da-Bachelor's with 1 major Quantum Technology (2021) ta record Bachelor (180 ECTS) Quantentechnologie - 2021

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ta record Bachelor (180 ECTS) Quantentechnologie - 2021

Bachelor's degree (1 major, 1 minor) Philosophy (2015) Bachelor's degree (1 major, 1 minor) Pre- and Protohistoric Archaeology (2015) Bachelor's degree (1 major, 1 minor) Ancient World (2015) Bachelor's degree (1 major, 1 minor) Music Education (2015) Bachelor's degree (1 major, 1 minor) Philosophy and Religion (2015) Bachelor's degree (1 major, 1 minor) Theological Studies (2015) Bachelor's degree (1 major, 1 minor) Political and Social Studies (2015) Bachelor's degree (1 major, 1 minor) Russian Language and Culture (2015) Bachelor's degree (1 major, 1 minor) German Language and Literature (2015) Bachelor's degree (2 majors) Egyptology (2015) Bachelor's degree (2 majors) Pedagogy (2015) Bachelor's degree (2 majors) Protestant Theology (2015) Bachelor's degree (2 majors) Musicology (2015) Bachelor's degree (2 majors) Philosophy (2015) Bachelor's degree (2 majors) Special Education (2015) Bachelor's degree (2 majors) Pre- and Protohistoric Archaeology (2015) Bachelor's degree (2 majors) Latin Philology (2015) Bachelor's degree (2 majors) Music Education (2015) Bachelor's degree (2 majors) Philosophy and Religion (2015) Bachelor's degree (2 majors) Theological Studies (2015) Bachelor's degree (2 majors) Digital Humanities (2015) Bachelor's degree (2 majors) Political and Social Studies (2015) Bachelor's degree (2 majors) Russian Language and Culture (2015) Bachelor's degree (2 majors) Greek Philology (2015) Bachelor's degree (2 majors) European Ethnology (2015) Bachelor's degree (2 majors) Indology/South Asian Studies (2015) Bachelor's degree (2 majors) Ancient Near Eastern Studies (2015) First state examination for the teaching degree Grundschule English (2015) First state examination for the teaching degree Grundschule Biology (2015) First state examination for the teaching degree Grundschule Chemistry (2015) First state examination for the teaching degree Grundschule Geography (2015) First state examination for the teaching degree Grundschule German (2015) First state examination for the teaching degree Grundschule Catholic Theology (2015) First state examination for the teaching degree Grundschule Mathematics (2015) First state examination for the teaching degree Grundschule Pedagogy of Primary Education (2015) First state examination for the teaching degree Grundschule Physics (2015) First state examination for the teaching degree Grundschule Social Science (2015) First state examination for the teaching degree Grundschule Didactics in English (Primary School) (2015) First state examination for the teaching degree Grundschule Didactics in Biology (Primary School) (2015) First state examination for the teaching degree Grundschule Didactics in Chemistry (Primary School) (2015) First state examination for the teaching degree Grundschule Didactics in Geography (Primary School) (2015) First state examination for the teaching degree Grundschule Didactics in German (Primary School) (2015) First state examination for the teaching degree Grundschule Didactics in History (Primary School) (2015) First state examination for the teaching degree Grundschule Didactics in Catholic Theology (Primary School) (2015) First state examination for the teaching degree Grundschule Art Education in Primary School (2015) First state examination for the teaching degree Grundschule Didactics in Science of Sport (Primary School) (2015) First state examination for the teaching degree Grundschule Didactics in Mathematics (Primary School) (2015) First state examination for the teaching degree Grundschule Music Education in Primary School (2015) First state examination for the teaching degree Grundschule Didactics in Physics (Primary School) (2015) First state examination for the teaching degree Grundschule Didactics in Social Science (Primary School) (2015) First state examination for the teaching degree Grundschule Science of Sport (2015) First state examination for the teaching degree Realschule English (2015)

 Bachelor's with 1 major Quantum Technology (2021)
 JMU Würzburg • generated 30-Mär-2024 • exam. reg. data record Bachelor (180 ECTS) Quantentechnologie - 2021
 page 41 / 155

First state examination for the teaching degree Realschule Biology (2015) First state examination for the teaching degree Realschule Chemistry (2015) First state examination for the teaching degree Realschule Geography (2015) First state examination for the teaching degree Realschule Protestant Theology (2015) First state examination for the teaching degree Realschule French Studies (2015) First state examination for the teaching degree Realschule German (2015) First state examination for the teaching degree Realschule History (2015) First state examination for the teaching degree Realschule Computer Science (2015) First state examination for the teaching degree Realschule Catholic Theology (2015) First state examination for the teaching degree Realschule Mathematics (2015) First state examination for the teaching degree Realschule Physics (2015) First state examination for the teaching degree Realschule Science of Sport (2015) First state examination for the teaching degree Gymnasium English (2015) First state examination for the teaching degree Gymnasium Biology (2015) First state examination for the teaching degree Gymnasium Chemistry (2015) First state examination for the teaching degree Gymnasium Geography (2015) First state examination for the teaching degree Gymnasium French Studies (2015) First state examination for the teaching degree Gymnasium German (2015) First state examination for the teaching degree Gymnasium History (2015) First state examination for the teaching degree Gymnasium Greek Philology (2015) First state examination for the teaching degree Gymnasium Computer Science (2015) First state examination for the teaching degree Gymnasium Italian Studies (2015) First state examination for the teaching degree Gymnasium Catholic Theology (2015) First state examination for the teaching degree Gymnasium Latin Philology (2015) First state examination for the teaching degree Gymnasium Mathematics (2015) First state examination for the teaching degree Gymnasium Physics (2015) First state examination for the teaching degree Gymnasium Russian (2015) First state examination for the teaching degree Gymnasium Social Science (2015) First state examination for the teaching degree Gymnasium Spanish Studies (2015) First state examination for the teaching degree Gymnasium Science of Sport (2015) First state examination for the teaching degree Sonderpädagogik Pedagogy of Primary Education (2015) First state examination for the teaching degree Sonderpädagogik Didactics in German (Primary School) (2015) First state examination for the teaching degree Sonderpädagogik Didactics in Catholic Theology (Primary School) (2015)

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First state examination for the teaching degree Sonderpädagogik Didactics in Biology (Middle School) (2015) First state examination for the teaching degree Sonderpädagogik Didactics in Chemistry (Middle School) (2015) First state examination for the teaching degree Sonderpädagogik Didactics in Geography (Middle School) (2015) First state examination for the teaching degree Sonderpädagogik Didactics in Protestant Theology (Middle School) (2015)

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First state examination for the teaching degree Sonderpädagogik Art Education in Middle School (2015)

Bachelor's with 1 major Quantum Technology (2021)	JMU W
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First state examination for the teaching degree Sonderpädagogik Didactics in Science of Sport (Middle School) (2015) First state examination for the teaching degree Sonderpädagogik Didactics in Mathematics (Middle School) (2015) First state examination for the teaching degree Sonderpädagogik Music Education in Middle School (2015) First state examination for the teaching degree Sonderpädagogik Didactics in Physics (Middle School) (2015) First state examination for the teaching degree Sonderpädagogik Didactics in Social Science (Middle School) (2015) First state examination for the teaching degree Sonderpädagogik Teaching at the German Mittelschule (2015) First state examination for the teaching degree Mittelschule English (2015) First state examination for the teaching degree Mittelschule Biology (2015) First state examination for the teaching degree Mittelschule Chemistry (2015) First state examination for the teaching degree Mittelschule Geography (2015) First state examination for the teaching degree Mittelschule Protestant Theology (2015) First state examination for the teaching degree Mittelschule German (2015) First state examination for the teaching degree Mittelschule History (2015) First state examination for the teaching degree Mittelschule Catholic Theology (2015) First state examination for the teaching degree Mittelschule Mathematics (2015) First state examination for the teaching degree Mittelschule Physics (2015) First state examination for the teaching degree Mittelschule Social Science (2015) First state examination for the teaching degree Mittelschule Didactics in English (Middle School) (2015) First state examination for the teaching degree Mittelschule Ergonomics (Teaching at the German Mittelschule) (2015) First state examination for the teaching degree Mittelschule Didactics in Biology (Middle School) (2015) First state examination for the teaching degree Mittelschule Didactics in Chemistry (Middle School) (2015) First state examination for the teaching degree Mittelschule Didactics in Geography (Middle School) (2015) First state examination for the teaching degree Mittelschule Didactics in Protestant Theology (Middle School) (2015) First state examination for the teaching degree Mittelschule Didactics in German (Middle School) (2015) First state examination for the teaching degree Mittelschule Didactics in History (Middle School) (2015) First state examination for the teaching degree Mittelschule Didactics in Catholic Theology (Middle School) (2015) First state examination for the teaching degree Mittelschule Art Education in Middle School (2015) First state examination for the teaching degree Mittelschule Didactics in Science of Sport (Middle School) (2015) First state examination for the teaching degree Mittelschule Didactics in Mathematics (Middle School) (2015) First state examination for the teaching degree Mittelschule Music Education in Middle School (2015) First state examination for the teaching degree Mittelschule Didactics in Physics (Middle School) (2015) First state examination for the teaching degree Mittelschule Didactics in Social Science (Middle School) (2015) First state examination for the teaching degree Mittelschule Science of Sport (2015) First state examination for the teaching degree Mittelschule Teaching at the German Mittelschule (2015) Bachelor's degree (2 majors) Geography (2015) Bachelor's degree (2 majors) French Studies (2015) Bachelor's degree (2 majors) History (2015) Bachelor's degree (2 majors) Sport Science (Focus on health and Pedagogics in Movement) (2015) Bachelor's degree (2 majors) German Language and Literature (2015) Bachelor' degree (1 major) Mathematical Physics (2016) Bachelor's degree (2 majors) Theological Studies (2011) First state examination for the teaching degree Grundschule Protestant Theology (2015) First state examination for the teaching degree Grundschule Music (2015) First state examination for the teaching degree Grundschule Didactics in Protestant Theology (Primary School) (2015)First state examination for the teaching degree Realschule Music (2015) First state examination for the teaching degree Gymnasium Music (2015) Bachelor's with 1 major Quantum Technology (2021) JMU Würzburg • generated 30-Mär-2024 • exam. reg. dapage 43 / 155 ta record Bachelor (180 ECTS) Quantentechnologie - 2021

First state examination for the teaching degree Gymnasium Music Education, Advanced Studies (2015) First state examination for the teaching degree Sonderpädagogik Didactics in Protestant Theology (Primary School) (2015) First state examination for the teaching degree Mittelschule Music (2015) Bachelor's degree (1 major, 1 minor) French Studies (2016) Bachelor's degree (2 majors) French Studies (2016) Bachelor's degree (1 major, 1 minor) Italian Studies (2016) Bachelor's degree (2 majors) Italian Studies (2016) Bachelor's degree (1 major, 1 minor) Spanish Studies (2016) Bachelor's degree (2 majors) Spanish Studies (2016) Bachelor' degree (1 major) Romanic Languages (French/Italian) (2016) Bachelor' degree (1 major) Romanic Languages (French/Spanish) (2016) Bachelor' degree (1 major) Romanic Languages (Italian/Spanish) (2016) Bachelor' degree (1 major) Business Information Systems (2016) First state examination for the teaching degree Gymnasium French Studies (2016) First state examination for the teaching degree Gymnasium Italian Studies (2016) First state examination for the teaching degree Gymnasium Spanish Studies (2016) First state examination for the teaching degree Realschule French Studies (2016) Bachelor' degree (1 major) Games Engineering (2016) Bachelor's degree (1 major, 1 minor) English and American Studies (2016) Bachelor's degree (2 majors) English and American Studies (2016) First state examination for the teaching degree Grundschule English (2016) First state examination for the teaching degree Grundschule Didactics in English (Primary School) (2016) First state examination for the teaching degree Realschule English (2016) First state examination for the teaching degree Gymnasium English (2016) First state examination for the teaching degree Mittelschule English (2016) First state examination for the teaching degree Mittelschule Didactics in English (Middle School) (2016) First state examination for the teaching degree Sonderpädagogik Didactics in English (Middle School) (2016) Bachelor' degree (1 major) Media Communication (2016) Bachelor's degree (1 major, 1 minor) Digital Humanities (2016) Bachelor's degree (1 major, 1 minor) Geography (2017) Bachelor's degree (1 major, 1 minor) History of Medieval and Modern Art (2017) Bachelor's degree (2 majors) History of Medieval and Modern Art (2017) Bachelor's degree (2 majors) Comparative Indo-European Linguistics (2017) Bachelor' degree (1 major) Aerospace Computer Science (2017) Bachelor' degree (1 major) Modern China (2017) Bachelor's degree (1 major, 1 minor) Museology and material culture (2017) Bachelor' degree (1 major) Economathematics (2017) Bachelor' degree (1 major) Games Engineering (2017) Bachelor' degree (1 major) Computer Science (2017) First state examination for the teaching degree Gymnasium Greek Philology (2018) Bachelor' degree (1 major) Media Communication (2018) Bachelor' degree (1 major) Biomedicine (2018) Bachelor' degree (1 major) Human-Computer Systems (2018) Bachelor's degree (2 majors) Classical Archaeology (2018) Bachelor's degree (1 major, 1 minor) Classical Archaeology (2018) Bachelor's degree (1 major, 1 minor) Digital Humanities (2018) Bachelor's degree (2 majors) Digital Humanities (2018) First state examination for the teaching degree Grundschule Physics (2018) First state examination for the teaching degree Grundschule Didactics in Physics (Primary School) (2018) First state examination for the teaching degree Realschule Physics (2018) First state examination for the teaching degree Gymnasium Physics (2018) First state examination for the teaching degree Mittelschule Physics (2018) Bachelor's with 1 major Quantum Technology (2021) JMU Würzburg • generated 30-Mär-2024 • exam. reg. dapage 44 / 155

ta record Bachelor (180 ECTS) Quantentechnologie - 2021

First state examination for the teaching degree Sonderpädagogik Didactics in Physics (Middle School) (2018) First state examination for the teaching degree Mittelschule Didactics in Physics (Middle School) (2018) Bachelor' degree (1 major) Computer Science (2019) First state examination for the teaching degree Gymnasium Mathematics (2019) Bachelor's degree (1 major, 1 minor) English and American Studies (2019) Module studies (Bachelor) Chemistry (2019) Bachelor's degree (1 major, 1 minor) Indology/South Asian Studies (2019) Bachelor' degree (1 major) Indology/South Asian Studies (2019) Bachelor' degree (1 major) Business Information Systems (2019) Bachelor's degree (2 majors) Indology/South Asian Studies (2019) Bachelor' degree (1 major) Business Management and Economics (2019) Bachelor' degree (1 major) Modern China (2019) Module studies (Bachelor) Orientierungsstudien (2020) Bachelor' degree (1 major) Biomedicine (2020) Bachelor' degree (1 major) Pedagogy (2020) Bachelor' degree (1 major) Political and Social Studies (2020) Bachelor' degree (1 major) Business Information Systems (2020) Bachelor's degree (1 major, 1 minor) Political and Social Studies (2020) Bachelor's degree (2 majors) European Ethnology (2020) Bachelor's degree (2 majors) Political and Social Studies (2020) Bachelor's degree (2 majors) Special Education (2020) First state examination for the teaching degree Mittelschule Biology (2020 (Prüfungsordnungsversion 2015)) First state examination for the teaching degree Sonderpädagogik Didactics in Biology (Middle School) (2020 (Prüfungsordnungsversion 2015)) First state examination for the teaching degree Mittelschule Didactics in Biology (Middle School) (2020 (Prüfungsordnungsversion 2015)) First state examination for the teaching degree Mittelschule Chemistry (2020 (Prüfungsordnungsversion 2015)) First state examination for the teaching degree Mittelschule Didactics in Chemistry (Middle School) (2020 (Prüfungsordnungsversion 2015)) First state examination for the teaching degree Mittelschule German (2020 (Prüfungsordnungsversion 2015)) First state examination for the teaching degree Mittelschule Didactics in German (Middle School) (2020 (Prüfungsordnungsversion 2015)) First state examination for the teaching degree Mittelschule English (2020 (Prüfungsordnungsversion 2016)) First state examination for the teaching degree Mittelschule Didactics in English (Middle School) (2020 (Prüfungsordnungsversion 2016)) First state examination for the teaching degree Mittelschule Protestant Theology (2020 (Prüfungsordnungsversion 2015)) First state examination for the teaching degree Mittelschule Didactics in Protestant Theology (Middle School) (2020 (Prüfungsordnungsversion 2015)) First state examination for the teaching degree Mittelschule Geography (2020 (Prüfungsordnungsversion 2015)) First state examination for the teaching degree Mittelschule Didactics in Geography (Middle School) (2020 (Prüfungsordnungsversion 2015)) First state examination for the teaching degree Mittelschule History (2020 (Prüfungsordnungsversion 2015)) First state examination for the teaching degree Mittelschule Didactics in History (Middle School) (2020 (Prüfungsordnungsversion 2015)) First state examination for the teaching degree Mittelschule Catholic Theology (2020 (Prüfungsordnungsversion 2015)) First state examination for the teaching degree Mittelschule Didactics in Catholic Theology (Middle School) (2020 (Prüfungsordnungsversion 2015)) First state examination for the teaching degree Mittelschule Mathematics (2020 (Prüfungsordnungsversion 2015)) First state examination for the teaching degree Mittelschule Didactics in Mathematics (Middle School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Mittelschule Art Education in Middle School (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Mittelschule Science of Sport (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Mittelschule Didactics in Science of Sport (Middle School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Mittelschule Music (2020 (Prüfungsordnungsversion 2015)) First state examination for the teaching degree Mittelschule Music Education in Middle School (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Mittelschule Teaching at the German Mittelschule (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Didactics in English (Middle School) (2020 (Prüfungsordnungsversion 2016))

First state examination for the teaching degree Sonderpädagogik Didactics in Chemistry (Middle School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Didactics in Geography (Middle School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Didactics in Protestant Theology (Middle School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Didactics in German (Middle School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Didactics in History (Middle School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Didactics in Catholic Theology (Middle School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Art Education in Middle School (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Didactics in Science of Sport (Middle School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Didactics in Mathematics (Middle School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Music Education in Middle School (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Teaching at the German Mittelschule (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Art Education in Primary School (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Music Education in Primary School (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Didactics in Science of Sport (Primary School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Didactics in German (Primary School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Didactics in Mathematics (Primary School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Pedagogy of Primary Education (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Didactics in Protestant Theology (Primary School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Didactics in Catholic Theology (Primary School) (2020 (Prüfungsordnungsversion 2015))

Bachelor' degree (1 major) Physics (2020)

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

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

Bachelor' degree (1 major) Aerospace Computer Science (2020)

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Bachelor's with 1 major Quantum Technology (2021)	JMU Würzburg ● generated 30-Mär-2024 ● exam. reg. da-	page 46 / 155
	ta record Bachelor (180 ECTS) Quantentechnologie - 2021	

Bachelor's degree (1 major, 1 minor) Museology and material culture (2020) First state examination for the teaching degree Grundschule Didactics in Physics (Primary School) (2020) First state examination for the teaching degree Grundschule Physics (2020) First state examination for the teaching degree Gymnasium Physics (2020) First state examination for the teaching degree Realschule Physics (2020) First state examination for the teaching degree Sonderpädagogik Didactics in Physics (Middle School) (2020) First state examination for the teaching degree Mittelschule Didactics in Physics (Middle School) (2020) First state examination for the teaching degree Mittelschule Physics (2020) Bachelor's degree (1 major, 1 minor) Pedagogy (2020) Bachelor's degree (2 majors) Pedagogy (2020) First state examination for the teaching degree Grundschule Political and Social Studies (2020) First state examination for the teaching degree Grundschule Didactics in Political and Social Studies (Primary School) (2020) First state examination for the teaching degree Sonderpädagogik MS-Didaktik Career and Economics (2020) First state examination for the teaching degree Sonderpädagogik Didactics in Political and Social Studies (Secondary School) (2020) First state examination for the teaching degree Mittelschule MS-Didaktik Career and Economics (2020) First state examination for the teaching degree Mittelschule Didactics in Political and Social Studies (Secondary School) (2020) First state examination for the teaching degree Mittelschule Political and Social Studies (2020) First state examination for the teaching degree Gymnasium Political and Social Studies (2020) Bachelor' degree (1 major) Psychology (2020) Magister Theologiae Catholic Theology (2021) Bachelor's degree (2 majors) History (2021) Bachelor's degree (1 major, 1 minor) History (2021) First state examination for the teaching degree Grundschule History (2021) First state examination for the teaching degree Gymnasium History (2021) First state examination for the teaching degree Realschule History (2021) First state examination for the teaching degree Mittelschule History (2021) Bachelor' degree (1 major) Media Communication (2021) Bachelor's degree (2 majors) Theological Studies (2021) Bachelor's degree (1 major, 1 minor) Theological Studies (2021) Bachelor's degree (1 major, 1 minor) English and American Studies (2021) Bachelor's degree (2 majors) English and American Studies (2021) First state examination for the teaching degree Grundschule Pedagogy of Primary Education (2021) First state examination for the teaching degree Gymnasium English (2021) First state examination for the teaching degree Gymnasium Philosophy and Ethics (2021) Bachelor' degree (1 major) Computer Science und Sustainability (2021) Bachelor's degree (2 majors) Comparative Indo-European Linguistics (2021) Bachelor' degree (1 major) Quantum Technology (2021) Bachelor's degree (2 majors) Special Education (2021) Bachelor' degree (1 major) Business Information Systems (2021) Bachelor' degree (1 major) Economathematics (2021) Bachelor' degree (1 major) Business Management and Economics (2021) First state examination for the teaching degree Sonderpädagogik Pedagogy of Primary Education (2021) Bachelor' degree (1 major) Human-Computer Systems (2022) Bachelor's degree (1 major, 1 minor) Museology and material culture (2022) Bachelor' degree (1 major) Economathematics (2022) Bachelor' degree (1 major) Mathematical Data Science (2022) Bachelor' degree (1 major) Artificial Intelligence and Data Science (2022) First state examination for the teaching degree Gymnasium Philosophy and Ethics (2022) Bachelor's degree (2 majors) Ancient Near Eastern Archaeology (2022) Bachelor's degree (1 major, 1 minor) Ancient World (2022)

 Bachelor's with 1 major Quantum Technology (2021)
 JMU Würzburg • generated 30-Mär-2024 • exam. reg. data record Bachelor (180 ECTS) Quantentechnologie - 2021
 page 47 / 155

Bachelor's degree (2 majors) Ancient Near Eastern Studies (2022) Bachelor' degree (1 major) Franco-German studies: language, culture, digital competence (2022) Bachelor' degree (1 major) Midwifery (2022) First state examination for the teaching degree Gymnasium Russian (2023) First state examination for the teaching degree Gymnasium Mathematics (2023) First state examination for the teaching degree Gymnasium English (2023) First state examination for the teaching degree Realschule English (2023) First state examination for the teaching degree Grundschule English (2023) First state examination for the teaching degree Grundschule Didactics in English (Primary School) (2023) First state examination for the teaching degree Mittelschule English (2023) First state examination for the teaching degree Mittelschule Didactics in English (Middle School) (2023) First state examination for the teaching degree Sonderpädagogik Didactics in English (Middle School) (2023) First state examination for the teaching degree Gymnasium Geography (2023) First state examination for the teaching degree Realschule Geography (2023) First state examination for the teaching degree Grundschule Geography (2023) First state examination for the teaching degree Mittelschule Geography (2023) Bachelor' degree (1 major) European Law (2023) Bachelor's degree (1 major, 1 minor) English and American Studies (2023) Bachelor's degree (2 majors) English and American Studies (2023) Bachelor' degree (1 major) Artificial Intelligence and Data Science (2023) Bachelor' degree (1 major) Mathematics (2023) Bachelor' degree (1 major) Business Information Systems (2023) Bachelor' degree (1 major) Economathematics (2023) Bachelor's degree (1 major, 1 minor) History of Medieval and Modern Art (2023) Bachelor's degree (2 majors) History of Medieval and Modern Art (2023) Bachelor's degree (2 majors) Special Education (2023) Bachelor' degree (1 major) Business Management and Economics (2023) Bachelor' degree (1 major) Geography (2023) Bachelor's degree (2 majors) Geography (2023) Bachelor's degree (1 major, 1 minor) Geography (2023) Bachelor's degree (2 majors) European Ethnology/Empiric Cultural Studies (2023) First state examination for the teaching degree Grundschule German (2024) First state examination for the teaching degree Gymnasium German (2024) First state examination for the teaching degree Realschule German (2024) First state examination for the teaching degree Sonderpädagogik Didactics in German (Middle School) (2024) First state examination for the teaching degree Mittelschule Didactics in German (Middle School) (2024) First state examination for the teaching degree Grundschule Didactics in German (Primary School) (2024) First state examination for the teaching degree Sonderpädagogik Didactics in German (Primary School) (2024) First state examination for the teaching degree Mittelschule German (2024) Bachelor' degree (1 major) Mathematical Physics (2024) Bachelor's degree (2 majors) German Language and Literature (2024) Bachelor's degree (1 major, 1 minor) German Language and Literature (2024) Bachelor' degree (1 major) Music Education (2024) Bachelor's degree (2 majors) Music Education (2024) Bachelor's degree (1 major, 1 minor) Music Education (2024) First state examination for the teaching degree Grundschule Music Education in Primary School (2024) First state examination for the teaching degree Sonderpädagogik Music Education in Primary School (2024) First state examination for the teaching degree Mittelschule Music Education in Middle School (2024) First state examination for the teaching degree Sonderpädagogik Music Education in Middle School (2024) Bachelor' degree (1 major) Indology/South Asian Studies (2024) Bachelor's degree (2 majors) Indology/South Asian Studies (2024) Bachelor's degree (1 major, 1 minor) Indology/South Asian Studies (2024) Bachelor's degree (1 major, 1 minor) Ancient World (2024) Bachelor's with 1 major Quantum Technology (2021) JMU Würzburg • generated 30-Mär-2024 • exam. reg. dapage 48 / 155 ta record Bachelor (180 ECTS) Quantentechnologie - 2021

Bachelor's degree (2 majors) Digital Humanities (2024) Bachelor's degree (1 major, 1 minor) Digital Humanities (2024) Bachelor' degree (1 major) Midwifery (2024) Bachelor's degree (2 majors) Greek Philology (2024) Bachelor's degree (2 majors) Latin Philology (2024) First state examination for the teaching degree Gymnasium Latin Philology (2024) Bachelor' degree (1 major) Business Information Systems (2024) Bachelor' degree (1 major) Economathematics (2024) Bachelor' degree (1 major) Business Management and Economics (2024) Bachelor' degree (1 major) Artificial Intelligence and Data Science (2024) First state examination for the teaching degree Gymnasium English (2024) First state examination for the teaching degree Mittelschule MS-Didaktik Career and Economics (2024) First state examination for the teaching degree Sonderpädagogik MS-Didaktik Career and Economics (2024) First state examination for the teaching degree Grundschule History (2024) First state examination for the teaching degree Gymnasium History (2024) First state examination for the teaching degree Realschule History (2024) First state examination for the teaching degree Mittelschule History (2024) First state examination for the teaching degree Mittelschule Didactics in History (Middle School) (2024) First state examination for the teaching degree Sonderpädagogik Didactics in History (Middle School) (2024) First state examination for the teaching degree Grundschule Didactics in History (Primary School) (2024) First state examination for the teaching degree Gymnasium Greek Philology (2024) Bachelor' degree (1 major) Human-Computer-Interaction (2024)

Module title				Abbreviation		
Nanoscale Materials 08-PCM3-161-m01						
Module coordinator				Module offered by		
lecture	cturer of the seminar "Nanoskalige Materialien"			Institute of Physical	l and Theoretical Ch	emistry
ECTS	Metho	d of grading	Only after succ. con	npl. of module(s)		
5	numei	ical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	its					
		iscusses advanced topic aracterisation methods				es, fabricati-
Intende	ed learr	ing outcomes				
		ble to characterise nano noscale materials.	scale materials. They	v are able to name ar	alytical methods an	id applicati-
Course	s (type,	number of weekly conta	ict hours, language –	- if other than Germa	n)	
S (2) +		,				
		t in: German or English				
Metho	d of ass	essment (type, scope, la on on whether module ca			tion offered — if not	every seme-
a) writt	en exar	nination (approx. 90 min	utes) or b) oral exam	ination of one candi	date each (approx. 2	20 minutes)
		rox. 30 minutes)				
		ssessment: German and,	/or English			
	ble for					
Allocat	ion of p	laces				
Additio	onal info	ormation				
Worklo	ad					
150 h						
Teachi		.				
Teacini	ing cycli	-				
				۱		
Referre	ed to in	LPOI (examination regu	lations for teaching-o	degree programmes)		
Module	e appea	rs in				
	-	ee (1 major) Chemistry (2				
	-	ee (1 major) Mathematics				
	-	ee (1 major) Computation		6)		
	-	ee (1 major) Functional M				
		ning degree Gymnasium				016)
		y course MINT Teacher E		Network Bavaria (EN	B) (2016)	
	-	ee (1 major) Chemistry (2 ee (1 major) Computation		o)		
	-	ee (1 major) Mathematics		9)		
	-	ing degree Gymnasium	-	ion PLUS, Elite Netwo	ork Bavaria (FNB) (2)	020)
		y course MINT Teacher E				
		ree (1 major) Quantum Te				
	-	ee (1 major) Computation		2)		
Bachelor's	with 1 maj	or Quantum Technology (2021)	_	generated 30-Mär-2024 • exa or (180 ECTS) Quantentechno	-	page 50 / 155

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

Master's degree (1 major) Functional Materials (2022) Master's degree (1 major) Mathematics (2022) Master's degree (1 major) Chemistry (2024) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) Mathematics (2024)

Module title					Abbreviation	
Computational Mathematics					10-M-COM-152-m01	
Module coordinator				Module offered by		
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	atics	
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)		
4	(not) s	successfully completed				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	its					
merica and 10	l compi -M-LNA	o modern mathematical s utation (e.g. Matlab) to s -G). Computer-based solu egral calculus; visualisat	upplement the basic ution of problems in I	modules in analysis	and linear algebra (10-M-ANA-G
Intend	ed lear	ning outcomes				
		earns the use of advanced cation to solve mathematic		cal software package	es, and is able to ass	ess their
Course	s (type	, number of weekly conta	ct hours, language –	if other than Germa	n)	
V (1) +	Ü (2)					
		essment (type, scope, la on on whether module ca			tion offered — if not	every seme-
Assess	ment o	form of programming exe ffered: Once a year, winto ssessment: German and,	er semester	25 hours)		
Allocat	ion of p	olaces				
Additio	onal inf	ormation				
Worklo	ad					
120 h						
Teachi	ng cycl	e				
Referre	ed to in	LPOI (examination regu	lations for teaching-o	legree programmes)		
§ 22	Nr. 3 f)					
Module	e appea	urs in				
		ree (1 major) Mathematic	s (2015)			
	-	ree (1 major) Physics (202	-			
	-	ree (1 major) Nanostructu		1		
Bachel	or' deg	ree (1 major) Economathe	ematics (2015)			
Bachel	or' deg	ree (1 major) Mathematic	al Physics (2015)			
Bachel	or' deg	ree (1 major) Computatio	nal Mathematics (20 ⁻	15)		
Bachel	or' deg	ree (1 major) Functional N	Naterials (2015)			
First st	ate exa	mination for the teaching	g degree Gymnasium	Mathematics (2015)		
	-	ree (1 major) Mathematic	•			
	-	ree (1 major) Economathe				
		mination for the teaching	- ,	Mathematics (2019)		
	-	ree (1 major) Physics (202		N		
	-	ree (1 major) Nanostructu	ire Technology (2020)		
Bachelor's	with 1 ma	or Quantum Technology (2021)	-	generated 30-Mär-2024 • exa or (180 ECTS) Quantentechno	-	page 52 / 155

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

Bachelor' degree (1 major) Mathematical Physics (2020) Bachelor' degree (1 major) Functional Materials (2021) Bachelor' degree (1 major) Quantum Technology (2021) Bachelor' degree (1 major) Economathematics (2021) Bachelor' degree (1 major) Economathematics (2022) Bachelor' degree (1 major) Mathematical Data Science (2022) exchange program Mathematics (2023) First state examination for the teaching degree Gymnasium Mathematics (2023) Bachelor' degree (1 major) Mathematics (2023) Bachelor' degree (1 major) Mathematics (2023) Bachelor' degree (1 major) Economathematics (2023) Bachelor' degree (1 major) Economathematics (2024) Bachelor' degree (1 major) Economathematics (2024)

Module title				Abbreviation	
Numerical Ma	thematics 1 for students		10-M-NUM1af-152-n	n01	
Module coord	inator		Module offered by		
	es Mathematik (Mathem	atics)	Institute of Mathem	atics	
	od of grading	Only after succ. con		alles	
	rical grade				
Duration	Module level	Other prerequisites			
1 semester	undergraduate				
	undergraduate				
Contents					<u> </u>
ons, interpola	stems of linear equation tion with polynomials, s				s of equati-
Intended learn	ning outcomes				
	acquainted with the fur oblems and knows abou			rical mathematics, a	applies them
Courses (type	, number of weekly conta	act hours, language –	· if other than Germa	n)	
V (4) + Ü (2)	·				
Method of ass	essment (type, scope, la			tion offered — if not	every seme-
ster, informati	on on whether module o	an be chosen to earn	a bonus)		
	mination (approx. 90 to				ndidate each
	tes) or c) oral examinati		of 2, 10 to 15 minutes	5 per candidate)	
creditable for	ssessment: German and	i/or English			
Allocation of p		_			
Additional inf	ormation				
Workload					
300 h					
Teaching cycl	e				
	-				
Poforrad to in	LPOI (examination reg	ulations for toaching	logroo programmos)		
Keleneu to m					
Module appea					
-	ree (1 major) Computer S				
•	ree (1 major) Physics (20 ree (1 major) Nanostruct				
-	ree (1 major) Aerospace				
			115)		
-		_)17)		
-		•			
-					
-		-			
-	ree (1 major) Nanostruct)		
	ree (1 major) Aerospace				
Bachelor' deg	ree (1 major) Functional	Materials (2021)			
Bachelor' deg	ree (1 major) Computer S	Science und Sustainal	oility (2021)		
Bachelor' deg	ree (1 major) Quantum T	echnology (2021)			
Bachelor' deg Bachelor' deg Bachelor' deg Bachelor' deg Bachelor' deg		Computer Science (20 Science (2017) Science (2019) 920) ure Technology (2020)		



Bachelor' degree (1 major) Artificial Intelligence and Data Science (2022) Bachelor' degree (1 major) Artificial Intelligence and Data Science (2023) Bachelor' degree (1 major) Artificial Intelligence and Data Science (2024)

Modul				-	Abbreviation
Numer	ical Ma	thematics 2 for stude	nts of other subjects		10-M-NUM2af-152-m01
Module coordinator				Module offered by	
Dean c	of Studi	es Mathematik (Mathe	matics)	Institute of Mathen	natics
ECTS		od of grading	Only after succ. con		
10		rical grade			
Duratio		Module level	Other prerequisites		
1 seme		undergraduate			
Conter					
		oblome linear program	nming mothods for init	ial value problems f	or ordinany differential equation
		ie problems.	initing, includes for find	iai value problems n	or ordinary differential equations
		ning outcomes			
					nerical mathematics and knows on in different fields of natural
		ng sciences and econd		splittes of applicati	on in unerent news of natural
			ntact hours, language –	if other than Germ	an)
V (4) +		, number of weekly con			
	-		language if athenth		
			, language — if other th e can be chosen to earn		ation offered — if not every seme
-				-	comination of and condidate as
			ation in groups (groups		kamination of one candidate ead
		ssessment: German a		of 2, 10 to 15 minute	s per canalate)
	ible for				
Allocat	tion of	olaces			
∆dditid	nal inf	ormation			
Worklo	ad				
300 h					
-	ng cycl	e			
		-			
Doform	d to in	IDOL (overinetion	gulations for teaching	dograa programme -)
Releffe		LFUI (examination re	egulations for teaching-	legree programmes)
		•			
	e appea				
	-	ree (1 major) Physics (-	,	
	-		cture Technology (2015)		
	-		e Computer Science (20	015)	
	-	ree (1 major) Functiona			
	-		e Computer Science (20	017)	
		ree (1 major) Physics (、	
	-		cture Technology (2020		
	-		e Computer Science (20	020)	
	-	ree (1 major) Functiona			
	lar' daa	ree (1 major) Quantum			

Modul	e title				Abbreviation
Mathe	matics	1 for Students of Physics	and Quantum Techn	ology	10-M-PHY1-212-m01
Modul	e coord	inator		Module offered by	·
Dean o	of Studi	es Mathematik (Mathema	atics)	Institute of Mathen	natics
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
8	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ester	undergraduate			
Conter	nts				
		on numbers and functio aces, simple differential e		eries, differential an	d integral calculus in one varia-
Intend	ed lear	ning outcomes			
ple pro and is	blems able to	in natural and engineerin interpret the results.	g sciences, in particu	ular in the fields of p	s to apply these methods to sim- hysics and quantum technology,
Course	es (type	, number of weekly conta	ct hours, language –	- if other than Germa	an)
V (5) + Excerci	• •	German or English			
		essment (type, scope, la on on whether module ca			ation offered — if not every seme-
b) oral c) oral Langua	examir examin	mination (Usually chosen nation of one candidate e ation in groups (groups c ssessment: German and, bonus	ach (approx. 20 minu of 2, 15 minutes per c	utes) or	
Allocat	tion of p	olaces			
Additio	onal inf	ormation			
Worklo	bad				
240 h					
	ng cycl	e			
Referre	ed to in	LPOI (examination regu	lations for teaching-	degree programmes	
	e appea	ors in			
		ree (1 major) Quantum Te	chnology (2021)		
	-	gram Mathematics (2023)	•, ·		
	-3- p-0		,		

Module	e title				Abbreviation
Mathe	matics	2 for Students of Physics	s and Quantum Techr	nology	10-M-PHY2-212-m01
Module	e coord	inator		Module offered by	
Dean o	f Studi	es Mathematik (Mathem	atics)	Institute of Mathem	natics
ECTS		od of grading	Only after succ. con	npl. of module(s)	
8	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
		nd systems of linear equ variables, differential eq			y, differential and integral calcu-
Intend	ed lear	ning outcomes			
se met quantu	hods to m tech	simple problems in national notation of the second se	ural and engineering erpret the results.	sciences, in particul	tics. He/She learns to apply the- ar in the field of physics and
		, number of weekly conta	act hours, language –	- if other than Germa	an)
V (5) + Excerci	• •	German or English			
		sessment (type, scope, la on on whether module c			tion offered — if not every seme-
b) oral c) oral	examir examin Ige of a	mination (Usually chosen ation of one candidate e ation in groups (groups ssessment: German and bonus	each (approx. 20 minu of 2, 15 minutes per c	utes) or	
Allocat	ion of _l	olaces			
Additio	nal inf	ormation			
Worklo	ad				
240 h			_		
Teachi	ng cycl	e			
			-		
Referre	d to in	LPOI (examination regu	llations for teaching-	degree programmes)	
Module	e appea	urs in			
		ree (1 major) Quantum Te	echnology (2021)		
	-	gram Mathematics (2023			

Module title				Abbreviation		
Programming	course for students of M	athematics and othe	r subjects	10-M-PRG-152-m01		
	•					
Module coord			Module offered by			
	es Mathematik (Mathema	i	Institute of Mathem	natics		
	od of grading	Only after succ. com	pl. of module(s)			
	successfully completed					
Duration	Module level	Other prerequisites				
1 semester	undergraduate					
Contents						
Basics of a m	odern programming langı	uage (e.g.C).				
Intended lear	ning outcomes					
The student is	s able to work independe	ntly on small program	ming exercises and	standard programm	ing problems	
in mathemati		,				
Courses (type	, number of weekly conta		if other than Germa	n)		
P (2)	,,					
	sessment (type, scope, la	nguage — if other the	n German evamina	tion offered — if not	AVANI CAMA	
	ion on whether module c			ition onered — ii not	every seme-	
	form of programming exe					
	offered: Once a year, sum		25 110015)			
	assessment: German and					
Allocation of						
Additional in	ormation					
Workload		-				
90 h						
Teaching cyc	e					
Referred to in	LPOI (examination regu	lations for teaching-d	egree programmes			
§ 22 Nr. 3 f)						
Module appe		()				
	ree (1 major) Mathematic	-				
	ree (1 major) Physics (20	-				
	ree (1 major) Nanostructu					
	ree (1 major) Economath	-				
-	ree (1 major) Mathematic	,	-)			
	ree (1 major) Computatio		.5)			
	ree (1 major) Functional N		Mathamatics (ages)			
First state examination for the teaching degree Gymnasium Mathematics (2015)						
Bachelor' degree (1 major) Mathematical Physics (2016)						
	Bachelor' degree (1 major) Economathematics (2017)					
Bachelor' deg		degree Gymnacium	Mathomatice (2010)			
Bachelor' deg First state exa	mination for the teaching		Mathematics (2019)			
Bachelor' deg First state exa Bachelor' deg	mination for the teaching ree (1 major) Physics (20	20)				
Bachelor' deg First state exa Bachelor' deg Bachelor' deg	mination for the teaching ree (1 major) Physics (20 ree (1 major) Nanostructu	20) ure Technology (2020)				
Bachelor' deg First state exa Bachelor' deg Bachelor' deg Bachelor' deg	mination for the teaching ree (1 major) Physics (20 ree (1 major) Nanostructu ree (1 major) Mathematic	20) Ire Technology (2020) al Physics (2020)				
Bachelor' deg First state exa Bachelor' deg Bachelor' deg Bachelor' deg Bachelor' deg	mination for the teaching ree (1 major) Physics (20 ree (1 major) Nanostructu ree (1 major) Mathematic ree (1 major) Functional N	20) ure Technology (2020) al Physics (2020) Materials (2021)				
Bachelor' deg First state exa Bachelor' deg Bachelor' deg Bachelor' deg Bachelor' deg Bachelor' deg	mination for the teaching ree (1 major) Physics (20 ree (1 major) Nanostructu ree (1 major) Mathematic	20) are Technology (2020) al Physics (2020) Materials (2021) echnology (2021)			page 59 / 155	

Bachelor' degree (1 major) Economathematics (2021) Bachelor' degree (1 major) Economathematics (2022) Bachelor' degree (1 major) Mathematical Data Science (2022) exchange program Mathematics (2023) First state examination for the teaching degree Gymnasium Mathematics (2023) Bachelor' degree (1 major) Mathematics (2023) Bachelor' degree (1 major) Economathematics (2023) Bachelor' degree (1 major) Mathematical Physics (2024) Bachelor' degree (1 major) Economathematics (2024)

					Abbreviation	
Imagin	g Sens	ors in Infrared			11-ASI-152-m01	
Module coordinator				Module offered by		
Manag	ing Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	nd Astronomy	
ECTS		od of grading	Only after succ. con	npl. of module(s)		
3	nume	rical grade				
Duratio		Module level	Other prerequisites	;		
1 seme	I	undergraduate				
Conten						
range o up to n from bo sical o types o	of infrar nicrowa odies w ptics of of sensc	ras are important expe ed ranges from the visi ves and radiowaves wi ith ambient temperatu this spectral range and ors (bolometer, quantus plogical aspects.	ble spectrum, where th th artificial emitters. Th re in the infrared spect d discusses: Peculiariti	ne Sun is dominating nere is distinct and s rum. The lecture pro es of infrared camera	as the natural sourd ometimes dominatir vides an introduction as and thermal imag	ce of light, ng emission n to the phy- res, different
Intend	ed learr	ning outcomes				
		nave specific and adva and detector structures	•		ctral imaging. They k	now various
Course	s (type,	number of weekly con	tact hours, language –	- if other than Germa	n)	
V (2) Module	e taugh	t in: German or English				
		essment (type, scope,	·	an German, examina	tion offered — if not	every seme-
		on on whether module				,
or oral pages) If a wri stead t of asse nation Assess	examin or pres tten exa ake the essment date at ment o	nation (approx. 90 to 12 ation in groups (group entation/talk (approx. mination was chosen form of an oral examin t is changed, the lectur the latest. ffered: Once a year, su ssessment: German an	s of 2, approx. 30 minu 30 minutes). as method of assessm nation of one candidate er must inform studen mmer semester	ites per candidate) o ent, this may be chai e each or an oral exa	r project report (app nged and assessmer mination in groups.	rox. 8 to 10 nt may in- If the method
	ion of p					
Additio	onal info	ormation				
Worklo	ad					
90 h						
	ng cycl	9				
	<u> </u>					
Referre	ed to in	LPOI (examination reg	gulations for teaching-	degree programmes)		
			<u> </u>	<u> </u>		
Module	e appea	rs in				
		ree (1 major) Physics (2	.015)			
Bachel	or' deg	ree (1 major) Nanostruc	ture Technology (2015)		
	-	ree (1 major) Physics (2		、		
		ree (1 major) Nanostruc				
Bachelor's	with 1 maj	or Quantum Technology (2021)	-	generated 30-Mär-2024 • ex lor (180 ECTS) Quantentechno	-	page 61 / 155



Bachelor' degree (1 major) Quantum Technology (2021) exchange program Physics (2023)

chairperson of examination committee Faculty of ECTS Method of grading Only after succ. compl. of modeling 10 numerical grade Duration Module level Other prerequisites 1 semester undergraduate Contents Mostly independent processing of an experimental, theoretical or eng technology, especially according to known procedures and scientific a intended learning outcomes The students are able to independently work on an experimental, theoretical spects and to summarise their results in a final paper. Courses (type, number of weekly contact hours, language — if other the No courses assigned to module Method of assessment (type, scope, language — if other than German ster, information on whether module can be chosen to earn a bonus) Bachelor's thesis (approx. 25 pages) Language of assessment: German or English Allocation of places Additional information Time to complete: 12 weeks	Module title Abbreviation					
chairperson of examination committee Faculty of ECTS Meth→d of grading Only after succ. compl. of moderation 10 numerical grade Duration Module level Other prerequisites 1 semester undergraduate Contents Mostly independent processing of an experimental, theoretical or eng technology, especially according to known procedures and scientific a Intended learning outcomes The students are able to independently work on an experimental, theoretical or eng technology under the guidance of a supervisor, especially in scientific aspects and to summarise their results in a final paper. Courses (type, number of weekly contact hours, language — if other the No courses assigned to module Meth→d of assessment (type, scope, language — if other than German ster, information on whether module can be chosen to earn a bonus) Bachelor's thesis (approx. 25 pages) Language of assessment: German or English Allocation of places Additional information Time to complete: 12 weeks Workload 300 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree properse) </th <th>11-BA-N-212-m01</th>	11-BA-N-212-m01					
ECTS Method of grading Only after succ. compl. of models 10 numerical grade Duration Module level Other prerequisites 1 semester undergraduate Contents Mostly independent processing of an experimental, theoretical or eng technology, especially according to known procedures and scientific a linended learning outcomes The students are able to independently work on an experimental, theoretical spects and to summarise their results in a final paper. Courses (type, number of weekly contact hours, language — if other the No courses assigned to module Method of assessment (type, scope, language — if other than German ster, information on whether module can be chosen to earn a bonus) Bachelor's thesis (approx. 25 pages) Language of assessment: German or English Allocation of places Additional information Time to complete: 12 weeks Workload 300 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree program	Module offered by					
10 numerical grade Duration Module level Other prerequisites 1 semester undergraduate Contents Mostly independent processing of an experimental, theoretical or eng technology, especially according to known procedures and scientific a Intended learning outcomes The students are able to independently work on an experimental, theoretical or eng use their results in a final paper. Courses (type, number of weekly contact hours, language — if other the No courses assigned to module Method of assessment (type, scope, language — if other than German ster, information on whether module can be chosen to earn a bonus) Bachelor's thesis (approx. 25 pages) Language of assessment: German or English Allocation of places Additional information Time to complete: 12 weeks Workload 300 h Referred to in LPO I (examination regulations for teaching-degree proper	f Physics and Astronomy					
Duration Module level Other prerequisites 1 semester undergraduate Contents Mostly independent processing of an experimental, theoretical or eng technology, especially according to known procedures and scientific a Intended learning outcomes The students are able to independently work on an experimental, theoretically in scientific aspects and to summarise their results in a final paper. Courses (type, number of weekly contact hours, language — if other the No courses assigned to module Method of assessment (type, scope, language — if other than German ster, information on whether module can be chosen to earn a bonus) Bachelor's thesis (approx. 25 pages) Language of assessment: German or English Allocation of places Additional information Time to complete: 12 weeks Workload 300 h Referred to in LPO I (examination regulations for teaching-degree properties)	dule(s)					
1 semester undergraduate Contents Mostly independent processing of an experimental, theoretical or eng technology, especially according to known procedures and scientific as intended learning outcomes The students are able to independently work on an experimental, theoretical or eng structure technology under the guidance of a supervisor, especially in scientific aspects and to summarise their results in a final paper. Courses (type, number of weekly contact hours, language — if other the No courses assigned to module Method of assessment (type, scope, language — if other than German ster, information on whether module can be chosen to earn a bonus) Bachelor's thesis (approx. 25 pages) Language of assessment: German or English Allocation of places Additional information Time to complete: 12 weeks Workload 300 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree proper contact)						
Contents Mostly independent processing of an experimental, theoretical or eng technology, especially according to known procedures and scientific a Intended learning outcomes The students are able to independently work on an experimental, theoretical or eng structure technology under the guidance of a supervisor, especially in scientific aspects and to summarise their results in a final paper. Courses (type, number of weekly contact hours, language — if other the No courses assigned to module Method of assessment (type, scope, language — if other than German ster, information on whether module can be chosen to earn a bonus) Bachelor's thesis (approx. 25 pages) Language of assessment: German or English Allocation of places Additional information Time to complete: 12 weeks Workload 300 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree pro-						
Mostly independent processing of an experimental, theoretical or eng technology, especially according to known procedures and scientific a Intended learning outcomes The students are able to independently work on an experimental, theo structure technology under the guidance of a supervisor, especially in scientific aspects and to summarise their results in a final paper. Courses (type, number of weekly contact hours, language — if other the No courses assigned to module Method of assessment (type, scope, language — if other than German ster, information on whether module can be chosen to earn a bonus) Bachelor's thesis (approx. 25 pages) Language of assessment: German or English Allocation of places Additional information Time to complete: 12 weeks Workload 300 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree pro						
technology, especially according to known procedures and scientific a Intended learning outcomes The students are able to independently work on an experimental, theo structure technology under the guidance of a supervisor, especially in scientific aspects and to summarise their results in a final paper. Courses (type, number of weekly contact hours, language — if other the No courses assigned to module Method of assessment (type, scope, language — if other than German ster, information on whether module can be chosen to earn a bonus) Bachelor's thesis (approx. 25 pages) Language of assessment: German or English Allocation of places Additional information Time to complete: 12 weeks Workload 300 h Teaching cycle Referred to in LPO1 (examination regulations for teaching-degree pro-						
The students are able to independently work on an experimental, theo structure technology under the guidance of a supervisor, especially in scientific aspects and to summarise their results in a final paper. Courses (type, number of weekly contact hours, language — if other the No courses assigned to module Method of assessment (type, scope, language — if other than German ster, information on whether module can be chosen to earn a bonus) Bachelor's thesis (approx. 25 pages) Language of assessment: German or English Allocation of places Additional information Time to complete: 12 weeks Workload 300 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree prog						
structure technology under the guidance of a supervisor, especially in scientific aspects and to summarise their results in a final paper. Courses (type, number of weekly contact hours, language — if other the No courses assigned to module Method of assessment (type, scope, language — if other than German ster, information on whether module can be chosen to earn a bonus) Bachelor's thesis (approx. 25 pages) Language of assessment: German or English Allocation of places Additional information Time to complete: 12 weeks Workload 300 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree pro						
No courses assigned to module Method of assessment (type, scope, language — if other than German ster, information on whether module can be chosen to earn a bonus) Bachelor's thesis (approx. 25 pages) Language of assessment: German or English Allocation of places Additional information Time to complete: 12 weeks Workload 300 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree properties)						
Method of assessment (type, scope, language — if other than German ster, information on whether module can be chosen to earn a bonus) Bachelor's thesis (approx. 25 pages) Language of assessment: German or English Allocation of places Additional information Time to complete: 12 weeks Workload 300 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree prop	nan German)					
ster, information on whether module can be chosen to earn a bonus) Bachelor's thesis (approx. 25 pages) Language of assessment: German or English Allocation of places Additional information Time to complete: 12 weeks Workload 300 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree properties)						
Language of assessment: German or English Allocation of places Additional information Time to complete: 12 weeks Workload 300 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree property)	n, examination offered — if not every seme-					
Additional information Time to complete: 12 weeks Workload 300 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree prop						
Time to complete: 12 weeks Workload 300 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree prop						
Time to complete: 12 weeks Workload 300 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree prop						
Workload 300 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree prop 						
Workload 300 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree prop 						
Teaching cycle Referred to in LPO I (examination regulations for teaching-degree prop 						
Referred to in LPO I (examination regulations for teaching-degree pro-						
Referred to in LPO I (examination regulations for teaching-degree pro-						
	grammes)					
Module appears in						
Bachelor' degree (1 major) Quantum Technology (2021)						

Module title					Abbreviation	
Imagin	g Meth	ods at the Synchroton			11-BMS-152-m01	
Module	e coord	inator		Module offered by		
Managing Director of the Institute of Applied Physics			Applied Physics	Faculty of Physics and Astronomy		
ECTS				npl. of module(s)	,	
6	i	rical grade		• • • •		
Duratio	on	Module level	Other prerequisites	;		
1 seme	ster	undergraduate				
Conten	Its					
and im the cor energe	Periodic and aperiodic signals. Fundamentals of discrete and exact Fourier transform. Basics of digital signal and image processing. Discretisation of signals / sampling theorem (Shannon). Homogeneous and linear filter, the convolution product. Tapering functions and interpolation of images. The Parsival theorem, correlation and energetic aspects. Statistical signals, image noise, moments, stationary signals. Tomography: Hankel and Radon transform.					
Intend	ed learı	ning outcomes				
		know the principles of f different image proce				ctioning and
Course	s (type	, number of weekly con	tact hours, language –	- if other than Germa	ın)	
V (3) + Module		t in: German or English				
		e ssment (type, scope, on on whether module			tion offered — if not	every seme-
pages) If a writ stead t of asse nation Assess	or pres tten exa ake the essmen date at ment o	ation in groups (group entation/talk (approx. amination was chosen form of an oral examin t is changed, the lectur the latest. ffered: Once a year, su ssessment: German an	30 minutes). as method of assessm nation of one candidate er must inform studen mmer semester	ent, this may be chai e each or an oral exa	nged and assessme mination in groups.	nt may in- If the method
Allocat	ion of p	olaces				
Additio	onal inf	ormation				
Worklo	ad					
180 h						
Teachi	ng cycl	9				
Referre	ed to in	LPOI (examination reg	gulations for teaching-	degree programmes)		
Module appears in						
Bachel	or' deg	ree (1 major) Physics (2	-)		
	-	ree (1 major) Nanostruc ee (1 major) Functional)		
		ree (1 major) Physics (2				
	-	ree (1 major) Nanostruc)		
Bachel	or' deg	ree (1 major) Quantum	Technology (2021)			
Bachelor's	with 1 maj	or Quantum Technology (2021)	-	generated 30-Mär-2024 • ex or (180 ECTS) Quantentechno	-	page 64 / 155



Master's degree (1 major) Functional Materials (2022) exchange program Physics (2023)

Module title					Abbreviation	
Coating Technologies based on Vapour Deposition					11-BVG-202-m01	
Module coordinator				Module offered by		
	Managing Director of the Institute of Applied Physics			Faculty of Physics		
ECTS				ompl. of module(s)		
5						
Duratio		Module level	Other prerequisit	es		
1 semes		undergraduate				
Content	ts	•				
•			/D and CVD systems ar s on an industrial scale		eposition and layer characterizati-	
		ning outcomes				
The stu	dent h			nase deposition proce	esses and gains insights into their	
Courses	s (type	, number of weekly c	ontact hours, language	e — if other than Germ	nan)	
V (3) + F Module		t in: German or Engli	sh			
			e, language — if other le can be chosen to ea		nation offered — if not every seme-	
present If a writ stead ta of asses nation o credital	ation/ ten exa ake the ssmen date at ble for ge of a	e form of an oral exan t is changed, the lect the latest. bonus ssessment: German	utes). n as method of assess nination of one candida urer must inform stude	ate each or an oral ex	anged and assessment may in- amination in groups. If the method r weeks prior to the original exami	
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teachin	ıg cycl	e				
Referre	d to in	LPOI (examination	regulations for teachin	g-degree programme	s)	
Module	appea	ars in				
Bachelo Bachelo Master'	or' deg or' deg s degr	ree (1 major) Quantu ee (1 major) Function	ucture Technology (20 m Technology (2021)	20)		
exchange	ge prog	gram Physics (2023)				

Modul					Abbreviation	
Current Topics in Quantum Technology 11-BXN5-212-m01					11-BXN5-212-m01	
Module coordinator				Module offered by		
Manag	ing Dire	ector of the Institute of Ap	oplied Physics	Faculty of Physics a	and Astronomy	
ECTS	Meth	od of grading	Only after succ. com	npl. of module(s)		
5	5 numerical grade					
Duratio	on	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conter	ts					
	t topics abroad.		. Credited academic a	achievements, e.g. ir	n case of change of university or	
Intend	ed lear	ning outcomes				
comma and ev the lea	ands kr aluatio rnt. He	n methods which are nec /She knows about fields	d in Quantum Techno essary to acquire this of application.	s knowledge. He/Sh	es and insight into the measuring e is able to classify and to link	
Course	s (type	, number of weekly conta	ct hours, language —	- if other than Germa	ın)	
V (2) +	R (2)					
		sessment (type, scope, la ion on whether module ca			tion offered — if not every seme-	
Written examination (approx. 90 to 120 minutes) or oral examination of one candidate each (approx. 30 minu- tes) or oral examination in groups (groups of 2, 30 minutes per candidate) or report on practical course (approx. 8 to 10 pages) or presentation/talk (approx. 30 minutes). If a written examination was chosen as method of as- sessment, this may be changed and assessment may instead take the form of an oral examination of one can- didate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Language of assessment: German and/or English						
Allocat	ion of _l	places				
	-	ormation				
		examination committee	required.			
Worklo	ad					
150 h						
Teachi	ng cycl	e				
Referre	ed to in	LPOI (examination regu	lations for teaching-o	degree programmes)		
Modul	e appea	ars in				
		ars in ree (1 major) Quantum Te	echnology (2021)			

					Abbreviation	
Current Topics in Quantum Technology 11-BXN6-212-m01					11-BXN6-212-m01	
Module coordinator				Module offered by		
Manag	ging Dir	ector of the Institute of A	oplied Physics	Faculty of Physics a	and Astronomy	
ECTS						
6 numerical grade						
Durati		Module level	Other prerequisites			
1 seme	ester	undergraduate				
Conter	nts					
	t topics abroad.		. Credited academic a	achievements, e.g. iı	n case of change of university or	
Intend	ed lear	ning outcomes				
comma and ev	ands kr valuatio		d in Quantum Techno essary to acquire this		es and insight into the measuring e is able to classify and to link	
Course	es (type	, number of weekly conta	ict hours, language –	- if other than Germa	in)	
V (3) +	R (1)					
		sessment (type, scope, la ion on whether module c			tion offered — if not every seme-	
Written examination (approx. 90 to 120 minutes) or oral examination of one candidate each (approx. 30 minu- tes) or oral examination in groups (groups of 2, 30 minutes per candidate) or report on practical course (approx. 8 to 10 pages) or presentation/talk (approx. 30 minutes). If a written examination was chosen as method of as- sessment, this may be changed and assessment may instead take the form of an oral examination of one can- didate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Language of assessment: German and/or English						
Allocat	tion of		/or English		alesi.	
Allord		places	/or English			
		places	/or English		alesi.	
	onal inf	ormation	/or English		alesi.	
 Additio					alesi.	
 Additio	val from	ormation				
 Additic Approv	val from	ormation				
 Additio Approv Worklo 180 h	val from	ormation examination committee				
 Additio Approv Worklo 180 h	val from Dad	ormation examination committee				
 Additio Approv Worklo 180 h Teachi	val from bad ing cycl	ormation examination committee e	required.			
 Additio Approv Worklo 180 h Teachi	val from bad ing cycl	ormation examination committee	required.			
 Additio Approv Worklo 180 h Teachi Referro	val from bad ing cycl ed to in	ormation examination committee e LPOI (examination regu	required.			
 Additio Approv Worklo 180 h Teachi Referro Modul	val from pad ing cycl ed to in e appea	ormation examination committee e LPOI (examination regu	required. lations for teaching-c			

mouuld	e title				Abbreviation
Current	t Topics	s in Semiconductor Elect	ronics		11-BXN6A-152-m01
Module coordinator				Module offered by	
chairperson of examination committee			<u> </u>	Faculty of Physics a	and Astronomy
ECTS Method of grading Only after succ. compl. of module(s)					
6 numerical grade					
Duration Module level Other prerequisites					
1 seme	ster	unknown	Approval by examin	ation committee req	uired.
Conten	ts				
No info	rmatio	n on contents available.			
Intende	ed learı	ning outcomes			
No info	rmatio	n on intended learning o	utcomes available.		
Course	s (type	, number of weekly conta	act hours, language –	– if other than Germa	an)
V (3) +	R (1)				
		essment (type, scope, la on on whether module c			ation offered — if not every seme-
sentation If a writ	on/talk tten exa	(approx. 30 minutes). amination was chosen as	of 2, approx. 30 minu 5 method of assessm	utes) or project repor ent, this may be cha	didate each (approx. 30 minutes) t (approx. 8 to 10 pages) or pre- nged and assessment may in-
sentation If a write stead ta of asse nation	on/talk tten exa ake the ssmen date at	a (approx. 30 minutes). Amination was chosen as Form of an oral examina	of 2, approx. 30 minu s method of assessm tion of one candidate must inform student	ites) or project repor ent, this may be cha e each or an oral exa	t (approx. 8 to 10 pages) or pre-
sentation If a write stead ta of asse nation	on/talk tten exa ake the ssmen date at ge of a	a (approx. 30 minutes). Amination was chosen as form of an oral examina t is changed, the lecturer the latest. ssessment: German or E	of 2, approx. 30 minu s method of assessm tion of one candidate must inform student	ites) or project repor ent, this may be cha e each or an oral exa	t (approx. 8 to 10 pages) or pre- nged and assessment may in- mination in groups. If the method
sentation If a writt stead ta of asse nation Langua	on/talk tten exa ake the ssmen date at ge of a	a (approx. 30 minutes). amination was chosen as form of an oral examina t is changed, the lecturer the latest. ssessment: German or E	of 2, approx. 30 minu s method of assessm tion of one candidate must inform student	ites) or project repor ent, this may be cha e each or an oral exa	t (approx. 8 to 10 pages) or pre- nged and assessment may in- mination in groups. If the method
sentation If a writ stead ta of asse nation Langua Allocat	on/talk tten exa ake the ssmen date at ge of a ion of p	a (approx. 30 minutes). amination was chosen as form of an oral examina t is changed, the lecturer the latest. ssessment: German or E	of 2, approx. 30 minu s method of assessm tion of one candidate must inform student	ites) or project repor ent, this may be cha e each or an oral exa	t (approx. 8 to 10 pages) or pre- nged and assessment may in- mination in groups. If the method
sentation If a writ stead ta of asse nation Langua Allocat	on/talk tten exa ake the ssmen date at ge of a ion of p	a (approx. 30 minutes). Amination was chosen as form of an oral examina t is changed, the lecturer the latest. ssessment: German or E blaces	of 2, approx. 30 minu s method of assessm tion of one candidate must inform student	ites) or project repor ent, this may be cha e each or an oral exa	t (approx. 8 to 10 pages) or pre- nged and assessment may in- mination in groups. If the method
sentation If a writ stead ta of asse nation Langua Allocat	on/talk tten exa ake the ssmen date at ge of a ion of p nal inf	a (approx. 30 minutes). Amination was chosen as form of an oral examina t is changed, the lecturer the latest. ssessment: German or E blaces	of 2, approx. 30 minu s method of assessm tion of one candidate must inform student	ites) or project repor ent, this may be cha e each or an oral exa	t (approx. 8 to 10 pages) or pre- nged and assessment may in- mination in groups. If the method
sentation If a writ stead ta of assenation Langua Allocat Additio	on/talk tten exa ake the ssmen date at ge of a ion of p nal inf	a (approx. 30 minutes). Amination was chosen as form of an oral examina t is changed, the lecturer the latest. ssessment: German or E blaces	of 2, approx. 30 minu s method of assessm tion of one candidate must inform student	ites) or project repor ent, this may be cha e each or an oral exa	t (approx. 8 to 10 pages) or pre- nged and assessment may in- mination in groups. If the method
sentation If a writ stead ta of asse nation Langua Allocat Additio Worklo	on/talk tten exa ake the ssmen date at ge of a ion of p mal info	a (approx. 30 minutes). amination was chosen as a form of an oral examina t is changed, the lecturer the latest. ssessment: German or E blaces	of 2, approx. 30 minu s method of assessm tion of one candidate must inform student	ites) or project repor ent, this may be cha e each or an oral exa	t (approx. 8 to 10 pages) or pre- nged and assessment may in- mination in groups. If the method
sentation If a writ stead ta of assenation Langua Allocat Additio 180 h	on/talk tten exa ake the ssmen date at ge of a ion of p mal info	a (approx. 30 minutes). amination was chosen as a form of an oral examina t is changed, the lecturer the latest. ssessment: German or E blaces	of 2, approx. 30 minu s method of assessm tion of one candidate must inform student	ites) or project repor ent, this may be cha e each or an oral exa	t (approx. 8 to 10 pages) or pre- nged and assessment may in- mination in groups. If the method
sentation If a writ stead ta of assenation Langua Allocat Additio 180 h Teachin 	on/talk tten exa ake the ssmen date at ge of a ion of p mal inf ad	a (approx. 30 minutes). amination was chosen as a form of an oral examina t is changed, the lecturer the latest. ssessment: German or E blaces	of 2, approx. 30 minu s method of assessm tion of one candidate must inform student nglish	ites) or project repor ent, this may be cha e each or an oral exa ts about this by four	t (approx. 8 to 10 pages) or pre- nged and assessment may in- mination in groups. If the method weeks prior to the original exami-
sentation If a writ stead ta of assenation Langua Allocat Additio 180 h Teachin 	on/talk tten exa ake the ssmen date at ge of a ion of p mal inf ad	a (approx. 30 minutes). amination was chosen as form of an oral examina t is changed, the lecturer the latest. ssessment: German or E blaces	of 2, approx. 30 minu s method of assessm tion of one candidate must inform student nglish	ites) or project repor ent, this may be cha e each or an oral exa ts about this by four	t (approx. 8 to 10 pages) or pre- nged and assessment may in- mination in groups. If the method weeks prior to the original exami-
sentation If a writ stead ta of assenation Langua Allocat Additio 180 h Teachin 	on/talk tten exa ake the ssmen date at ge of a ion of p nal inf ad	a (approx. 30 minutes). amination was chosen as a form of an oral examina t is changed, the lecturer the latest. ssessment: German or E blaces brmation e LPO I (examination regulation)	of 2, approx. 30 minu s method of assessm tion of one candidate must inform student nglish	ites) or project repor ent, this may be cha e each or an oral exa ts about this by four	t (approx. 8 to 10 pages) or pre- nged and assessment may in- mination in groups. If the method weeks prior to the original exami-
sentation If a writ stead ta of asse nation of Langua Allocat Additio 180 h Teachin Referre Module	on/talk tten exa ake the ssmen date at ge of a ion of p onal info ad ng cyclo ed to in	a (approx. 30 minutes). amination was chosen as a form of an oral examina t is changed, the lecturer the latest. ssessment: German or E blaces brmation e LPO I (examination regulation)	of 2, approx. 30 minu s method of assessm tion of one candidate must inform student nglish	ites) or project repor ent, this may be cha e each or an oral exa ts about this by four degree programmes)	t (approx. 8 to 10 pages) or pre- nged and assessment may in- mination in groups. If the method weeks prior to the original exami-
sentation If a writ stead ta of assenation of Langua Allocat Additio Norklo 180 h Teachin Referre Bachelo Bachelo	on/talk tten exa ake the ssmen date at ge of a ion of p mal info ad ad ad ad ad ad ad ad ad ad ad ad ad	e LPOI (examination regu	of 2, approx. 30 minu s method of assessm tion of one candidate must inform student nglish ulations for teaching- ure Technology (2015) ure Technology (2020)	ites) or project repor ent, this may be cha e each or an oral exa ts about this by four degree programmes)	t (approx. 8 to 10 pages) or pre- nged and assessment may in- mination in groups. If the method weeks prior to the original exami-

					Abbreviation
Current Topics in Quantum Technology					11-BXN8-212-m01
Module coordinator				Module offered by	
Managing Director of the Institute of Applied Physics			plied Physics	Faculty of Physics a	nd Astronomy
ECTS		od of grading	Only after succ. com	pl. of module(s)	
8	nume	rical grade			
Duratio		Module level	Other prerequisites		
1 seme		undergraduate			
Conten	ts				
Current study a		in experimental physics.	Credited academic a	chievements, e.g. in	a case of change of university or
Intende	ed learı	ning outcomes			
Techno comma and eva the lea	logy or inds kn aluatior rnt. He,	n Bachelor's level. He/Sh owledge in a current field n methods which are nec /She knows about fields	e I in Quantum Techno essary to acquire this of application.	logy or Nanoscience s knowledge. He/She	ule in Nanosciences or Quantum s and insight into the measuring e is able to classify and to link
		, number of weekly conta	ct nours, language —	if other than Germa	n)
V (4) +					
ster, in	formati	on on whether module ca	an be chosen to earn	a bonus)	tion offered — if not every seme-
or oral 10 page If a writ stead t of asse nation	examin es) or p tten exa ake the ssmen date at	ation in groups (groups or resentation/talk (approx amination was chosen as form of an oral examina	of 2, 30 minutes per c . 30 minutes). method of assessme tion of one candidate must inform student	andidate) or report o ent, this may be char each or an oral exar	didate each (approx. 30 minutes) on practical course (approx. 8 to nged and assessment may in- mination in groups. If the method weeks prior to the original exami-
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Approv	al from	examination committee	required.		
Worklo	ad				
240 h					
Teachi	ng cycl	e			
Referre	d to in	LPOI (examination regu	lations for teaching-c	legree programmes)	
Module	e appea	ars in			
		ree (1 major) Quantum Te	chnology (2021)		
	-	es (Bachelor) Quantum Te			

Module title					Abbreviation	
Current Topics Physics					11-BXP5-152-m01	
Module coordinator				Module offered by		
chairperson of examination committee				Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	· · · · ·	
5						
Duratio	n	Module level	Other prerequisites			
1 semes	ster	undergraduate	Approval from exam	ination committee re	equired.	
Conten	ts					
	•	of Experimental and The versity or study abroad.	oretical Physics. Accr	edited academic ac	hievements, e.g. in case of	
Intende	ed lear	ning outcomes				
Theoret subdise	tical Ph cipline	ysics of the Bachelor's p	rogramme of Nanostr nd the measuring and	ucture Technology. ⁻ /or calculation meth	of a module of Experimental or They have knowledge of a current nods necessary to acquire this application areas.	
Courses	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)	
V (2) + I	R (2)					
ster, inf	formati	on on whether module ca	an be chosen to earn	a bonus)	tion offered — if not every seme- didate each (approx. 30 minutes)	
pages) If a writ stead ta of asses nation o	or pres ten exa ake the ssmen date at	entation/talk (approx. 30 amination was chosen as form of an oral examina	o minutes). method of assessme tion of one candidate must inform student	ent, this may be chai each or an oral exa	r project report (approx. 8 to 10 nged and assessment may in- mination in groups. If the method weeks prior to the original exami	
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teachir	ng cycl	e				
	-					
Referre	d to in	LPOI (examination regu	lations for teaching-c	legree programmes)		
Module	appea	urs in				
		ree (1 major) Nanostructu	re Technology (2015)			
	-	ree (1 major) Nanostructu				
	-					
Madula	Bachelor' degree (1 major) Quantum Technology (2021) Nodule studies (Bachelor) Quantum Technology (2021)					

					Abbreviation		
Current Topics in Physics 11-BXP6-152-m01							
Module coordinator				Module offered by			
chairperson of examination committee				Faculty of Physics a	nd Astronomy		
ECTS	ECTS Method of grading Only after succ. co			pl. of module(s)			
6	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 seme	ester	undergraduate	Approval from exam	ination committee re	equired.		
Conter	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					
Theore subdis knowle	tical Ph cipline edge. Th	nysics of the Bachelor's p of Physics and understar ney are able to classify th	rogramme of Nanosti nd the measuring and e subject-specific co	ructure Technology. I/or calculation methet ntexts and know the			
Course	es (type	, number of weekly conta	ct hours, language –	- if other than Germa	n)		
V (3) +	R (1)						
		s essment (type, scope, la ion on whether module ca	• •		tion offered — if not every seme-		
pages) If a wri stead t of asse nation Langua	or pres tten exa take the essmen date at	sentation/talk (approx. 30 amination was chosen as a form of an oral examina- t is changed, the lecturer the latest. Issessment: German and	o minutes). method of assessme tion of one candidate must inform student	ent, this may be chai e each or an oral exa	r project report (approx. 8 to 10 nged and assessment may in- mination in groups. If the method weeks prior to the original exami-		
Additio	onal inf	ormation					
Worklo	oad						
180 h							
Teachi	ng cycl	e					
Referred to in LPO I (examination regulations for teaching-degree programmes)							
	Module appears in						
	-	ree (1 major) Nanostructu					
		gree (1 major, 1 minor) Ph ree (1 major) Nanostructu	-)			
	-	gree (1 major, 1 minor) Ph)			
		ree (1 major) Quantum Te					
1	-	es (Bachelor) Quantum Te					

				Abbreviation	
		s in Physics			11-BXP8-152-m01
Modul	e coord	inator		Module offered by	
chairp	erson o	f examination committee		Faculty of Physics a	nd Astronomy
ECTS		od of grading	Only after succ. con	pl. of module(s)	
8	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ester	undergraduate	Approval from exam	ination committee re	equired.
Conter	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			
Theore subdis knowle	tical Ph cipline edge. Th	nysics of the Bachelor's p of Physics and understar ney are able to classify th	rogramme of Nanosti nd the measuring and e subject-specific co	ructure Technology. I/or calculation methet ntexts and know the	
		, number of weekly conta	ct hours, language –	- if other than Germa	n)
V (4) +					
		sessment (type, scope, la ion on whether module ca			tion offered — if not every seme-
or oral pages) If a wri stead t of asse nation Langua	examir or pres tten exa take the essmen date at	nation in groups (groups of sentation/talk (approx. 30 amination was chosen as a form of an oral examina t is changed, the lecturer the latest. ssessment: German and	of 2, approx. 30 minu o minutes). method of assessme tion of one candidate must inform student	tes per candidate) o ent, this may be chan e each or an oral exa	didate each (approx. 30 minutes) r project report (approx. 8 to 10 nged and assessment may in- mination in groups. If the method weeks prior to the original exami-
Additio	onal inf	ormation			
		· · · · · · · · · · · · · · · · · · ·			
Worklo	bad				
240 h					
Teachi	ng cycl	e			
Referre	ed to in	LPOI (examination regu	lations for teaching-o	degree programmes)	
Modul	e appea	ars in			
	-	ree (1 major) Nanostructu			
		gree (1 major, 1 minor) Ph	-)	
	-	ree (1 major) Nanostructu gree (1 major, 1 minor) Ph		J	
		ree (1 major) Quantum Te			
1	-	es (Bachelor) Quantum Te			

Module	title				Abbreviation				
Selected Topics in Energy and Material Science					11-CSEM6-152-m01				
Module coordinator				Module offered by					
chairpe	rson of	f examination committee		Faculty of Physics a	and Astronomy				
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)					
6	nume	rical grade							
Duration	n	Module level	Other prerequisites						
1 semes	ster	undergraduate	Approval from exam	ination committee re	equired.				
Content	s								
Selected	d topic	s of energy and material	s research.						
Intende	d learr	ning outcomes							
tion met	thods				stand the measuring and evalua- subject-specific contexts and				
Courses	s (type,	, number of weekly conta	ct hours, language —	if other than Germa	in)				
V (3) + R	R (1)								
		e ssment (type, scope, la on on whether module ca			tion offered — if not every seme-				
stead ta of asses nation d Languag	ake the ssment date at ge of a	form of an oral examina t is changed, the lecturer the latest. ssessment: German and,	tion of one candidate must inform student	each or an oral exa	nged and assessment may in- mination in groups. If the method weeks prior to the original exami-				
Allocati	on of p	olaces							
Addition	nal info	ormation							
Workloa	ad								
180 h									
Teachin	g cycl	9							
	-								
Referred	d to in	LPOI (examination regu	lations for teaching-c	legree programmes)					
Module	appea								
		irs in							
Bachelo	Bachelor' degree (1 major) Nanostructure Technology (2015)								
	-		•, • •						
Bachelo	or' degi	ree (1 major) Nanostructu	re Technology (2020						

Module	e title				Abbreviation
Selecte	ed Topi	cs in Solid State Physi	cs		11-CSF6-152-m01
Module	e coord	inator		Module offered by	
chairpe	erson o	f examination committ	ee	Faculty of Physics a	and Astronomy
ECTS		od of grading	Only after succ. con		,
6		rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate	Approval from exam	ination committee r	equired.
Conten	ts				
Selecte	d topic	s of Solid-State Physic			
		ning outcomes			
and eva	aluatio		o acquire this knowled		nd understand the measuring classify the subject-specific con-
Course	s (type	, number of weekly con	ntact hours, language —	if other than Germa	an)
V (3) +	R (1)				
			, language — if other tha e can be chosen to earn		ation offered — if not every seme-
nation Langua	date at ge of a	the latest. ssessment: German a		s about this by four	weeks prior to the original exami
Allocat	ion of p	places			
Additio	nal inf	ormation			
Worklo	ad				
180 h					
Teachir	ng cycl	e			
Referre	d to in	LPO I (examination re	gulations for teaching-o	legree programmes)	
Module	e appea	ars in			
		ree (1 major) Physics (2	2015)		
	-		cture Technology (2015))	
		es (Master) Physics (20			
	-	ree (1 major) Physics (2			
	-	ree (1 major) Nanostru	cture lechnology (2020	`	
Dachel	or deg	roo (a major) Ourantur)	
	-	ree (1 major) Quantum es (Master) Quantum T	Technology (2021))	

Module title					Abbreviation
Selected Topics in Quantum Technology					11-CSN6-212-m01
Module	e coord	inator		Module offered by	
Manag	ing Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	nd Astronomy
ECTS		od of grading	Only after succ. com	pl. of module(s)	
6	L	rical grade			
Duratio		Module level	Other prerequisites		
1 seme		undergraduate			
Conten	ts				
Current study a		in experimental physics.	Credited academic a	chievements, e.g. ir	n case of change of university or
Intende	ed learı	ning outcomes			
Techno comma and eva the lea	logy or inds kn aluatio rnt. He,	n Bachelor's level. He/Sh owledge in a current field n methods which are nec /She knows about fields	e d in Quantum Techno essary to acquire this of application.	logy or Nanoscience s knowledge. He/She	ule in Nanosciences or Quantum is and insight into the measuring e is able to classify and to link
		, number of weekly conta	ct hours, language —	if other than Germa	n)
V (3) +	R (1)				
ster, in Written or oral 10 page If a writ stead t of asse nation Langua	formati exami examin es) or p tten exa ake the ssmen date at ge of a	on on whether module canation (approx. 90 to 120 ation in groups (groups of resentation/talk (approx amination was chosen as form of an oral examina t is changed, the lecturer the latest. ssessment: German and	an be chosen to earn minutes) or oral exa of 2, 30 minutes per c . 30 minutes). method of assessme tion of one candidate must inform student	a bonus) mination of one can andidate) or report o ent, this may be char e each or an oral exam	tion offered — if not every seme- didate each (approx. 30 minutes) on practical course (approx. 8 to nged and assessment may in- mination in groups. If the method weeks prior to the original exami-
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Approv	al from	examination committee	required.		
Worklo	ad				
180 h					
Teachi	ng cycl	e			
Referre	d to in	LPO I (examination regu	lations for teaching-c	legree programmes)	
Module	e appea	irs in			
		ree (1 major) Quantum Te	chnology (2021)		
	-	es (Bachelor) Quantum Te			

Module	title				Abbreviation
Atoms and Molecules - Exercises					11-E-AA-202-m01
Module coordinator				Module offered by	
			plied Dhusics	F	nd Actronomy
ECTS		ector of the Institute of Ap od of grading	Only after succ. com	Faculty of Physics a	ind Astronomy
5		rical grade			
Duratio	L	Module level	Other prerequisites		
1 seme		undergraduate			
Conten	ts				
ture of nics of laser, n	atoms, the hyd nolecul	Experimental fundament	al laws of quantum p ternal fields, multi-el	physics, the Schrödin ectron atoms, optica	by 11-E-OAV. Among others Struc- nger equation, quantum mecha- al transitions and spectroscopy,
Studen phenor	ts have nena, a antum	e an understanding of the atomic and molecular phy	vsics. they will be abl	e to formulate physi	fundamental laws of quantum cal interrelationships of atomic hematical-physical tasks autono-
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)
Ü (2) Module	e taugh	t in: German or English			
		s essment (type, scope, la on on whether module ca			tion offered — if not every seme-
		nation (approx. 120 minu ssessment: German and,			
Allocat	-		U		
Additio	nal inf	ormation			
Worklo	ad				
150 h					
Teachir	ng cycl	e			
	_ ,				
Referre	d to in	LPOI (examination regu	lations for teaching-o	legree programmes)	
Module	e appea	irs in			
Bachel Bachel	or' deg or' deg	ree (1 major) Physics (202 ree (1 major) Nanostructu ree (1 major) Quantum Te gram Physics (2023)	re Technology (2020)	

mouule	e title			Abbreviation	
Princip	les of Image Processing		_	11-EBV-152-m01	
Module coordinator			Module offered by		
			· · ·	nd Astronomy	
ECTS	Method of grading	g Director of the Institute of Applied PhysicsFaculty of Physics and AstronomyMethod of gradingOnly after succ. compl. of module(s)			
3	numerical grade				
) Duratio		Other prorequisiter	-		
1 seme		Other prerequisites	5		
Conten					
transfo tic imaន្	iction to image processing. Pictu rm. Histogram equalisation (e.g ge recognition: Segmentation, c g). Three-dimensional images.	, image brightening)	and pixel connectivi	ty (e.g. noise reduction). Automa-	
Intende	ed learning outcomes				
and the le to inc	eory of signal processing for ima	ages and have corres e, they understand th	ponding knowledge he characteristics of i	ssing. They know the principles of image generation. They are ab- mage processing with commerci- imaging measuring methods.	
Course	s (type, number of weekly conta	act hours, language -	– if other than Germa	n)	
V (2)					
Module	e taught in: German or English				
	d of assessment (type, scope, la formation on whether module c			tion offered — if not every seme-	
			i a bonus)		
				didate each (approx. 30 minutes)	
written or oral	examination (approx. 90 to 120 examination in groups (groups (o minutes) or oral exa of 2, approx. 30 minu	amination of one can		
written or oral pages)	examination (approx. 90 to 120 examination in groups (groups o or presentation/talk (approx. 30	o minutes) or oral exa of 2, approx. 30 minu o minutes).	amination of one can utes per candidate) o	r project report (approx. 8 to 10	
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written or oral of pages) If a writ stead ta of asse nation of Assess Langua Allocat Additio 90 h	examination (approx. 90 to 120 examination in groups (groups of or presentation/talk (approx. 30 then examination was chosen as ake the form of an oral examina essment is changed, the lecturer date at the latest. ment offered: Once a year, wint age of assessment: German and ion of places	o minutes) or oral exa of 2, approx. 30 minu o minutes). s method of assessm tion of one candidat r must inform studen er semester	amination of one can utes per candidate) o ent, this may be cha e each or an oral exa	r project report (approx. 8 to 10 nged and assessment may in- mination in groups. If the method	
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written or oral o pages) If a writ stead ta of asse nation o Assess Langua Allocat Additio 90 h Teachir 	examination (approx. 90 to 120 examination in groups (groups of or presentation/talk (approx. 30 then examination was chosen as ake the form of an oral examina issment is changed, the lecturer date at the latest. ment offered: Once a year, wint ige of assessment: German and ion of places mal information	o minutes) or oral exa of 2, approx. 30 minu o minutes). s method of assessm tion of one candidat r must inform studen er semester /or English	amination of one can utes per candidate) o nent, this may be chan e each or an oral exa ts about this by four	r project report (approx. 8 to 10 nged and assessment may in- mination in groups. If the method weeks prior to the original exami	
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written or oral o pages) If a writ stead ta of asse nation o Assess Langua Allocat Additio 90 h Teachir Referre Module	examination (approx. 90 to 120 examination in groups (groups of or presentation/talk (approx. 30 then examination was chosen as ake the form of an oral examina ssment is changed, the lecturer date at the latest. ment offered: Once a year, wint age of assessment: German and ion of places mal information ad ad	o minutes) or oral exa of 2, approx. 30 minu o minutes). s method of assessm tion of one candidat r must inform studen er semester /or English	amination of one can utes per candidate) o nent, this may be chan e each or an oral exa ts about this by four	r project report (approx. 8 to 10 nged and assessment may in- mination in groups. If the method weeks prior to the original exami	
written or oral of pages) If a writ stead ta of asse nation of Assess Langua Allocat Additio 90 h Teachir Referre Bachelo	examination (approx. 90 to 120 examination in groups (groups of or presentation/talk (approx. 30 then examination was chosen as ake the form of an oral examina issment is changed, the lecturer date at the latest. ment offered: Once a year, wint ige of assessment: German and ion of places onal information ad ad ad appears in	o minutes) or oral exa of 2, approx. 30 minu o minutes). S method of assessm tion of one candidat r must inform studen er semester /or English	amination of one can utes per candidate) o eent, this may be chan e each or an oral exa ts about this by four degree programmes)	r project report (approx. 8 to 10 nged and assessment may in- mination in groups. If the method weeks prior to the original exami	
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written or oral o pages) If a writ stead ta of asse nation o Assess Langua Allocat Worklo 90 h Teachin Referre Bachelo Bachelo Bachelo Bachelo	examination (approx. 90 to 120 examination in groups (groups of or presentation/talk (approx. 30 then examination was chosen as ake the form of an oral examina issment is changed, the lecturer date at the latest. ment offered: Once a year, wint ge of assessment: German and ion of places mal information ad ad ad ad ad ad ad ad ad ad appears in or' degree (1 major) Physics (20 or' degree (1 major) Physics (20 or' degree (1 major) Physics (20	o minutes) or oral exa of 2, approx. 30 minu o minutes). s method of assessm tion of one candidat r must inform studen er semester /or English 	amination of one can utes per candidate) o pent, this may be chan e each or an oral exa ts about this by four degree programmes)	r project report (approx. 8 to 10 nged and assessment may in- mination in groups. If the method weeks prior to the original exami	



exchange program Physics (2023)

Modul	e title				Abbreviation	
Classic	cal Phys	sics 2 (Heat and Electron	nagnetism)		11-E-E-152-m01	
Modul	e coord	inator		Module offered by	<u> </u>	
		ector of the Institute of A	pplied Physics	Faculty of Physics a	nd Astronomy	
ECTS		od of grading	Only after succ. com		and Astronomy	
8		rical grade				
Duratio	·	Module level	Other prerequisites			
1 seme		undergraduate	Admission prerequisites	site to assessment:	completion of exerci	ses (annrox.
1 5000	.5001	undergraduate	13 exercise sheets p		•	
			approx. 50% of exer		,	•
			lecturer will inform s			
			of the semester.			
Conter	nts					
		amics (linked to 11-E-M);	temperature and qua	ntity of heat thermo	meter Kelvin scale	
		ction, heat transfer, diffu	• •		meter, Retvin Stale;	
		al theorems of thermody			demon;	
4. Heat	t engine	es, working diagrams, eff	ficiency, example: Stir	ling engine;		
		and liquids, states of ma			ooint, phase transitio	ons, critical
		palescence), coexistenc cs, basic concepts: Elect			ald concept field lin	or field of a
point c		ניס, שמסור נטוונפטוט: בופנו	incal charge, loices; e	iecult neid, leps. lie	eia concept, neia inf	es, neiù ui d
•	•	entence, related to Could	omb's law, definition o	of "river"; Gaussian s	surface, divergence t	heorem: spe-
		es; divergence and GS in		,	<i>,</i> 0	
8. Elec	trical po	otential, working in the E	-box, electric. potenti			
		surfaces; several import	ant examples: Sphere	e, hollow sphere, cap	pacitor plates, electr	ic dipole;
		egner wheel;		line and De		
		e E-field, charge in a hor c emission, dipole in hor				
		mirror charge, definition				
		acitor; electrical polarisa				
ectric o	displace	ement; electrolytic capac	titor; Piezoelectric effe	ect;		-
		introduction, current de				
		and conductivity, resist	ivity, temperature dep	pendence; Ohm's lav	w; realisations (resis	tive and non-
	, NTC, P		off's rules (mashes r	adac), internal raci	stance of a voltage c	0.11500 2000
-		ectrical networks, Kirchh Ients; Wheatstone bridg		ioues); internat resis	stance of a voltage s	ource, mea-
-		energy in the circuit; Ca		nic element; thermov	voltage;	
		echanisms, conduction i				es;
16. Ma	gnetost	atics, fundamental laws	; permanent magnet,	field properties, def		
-		mper's Law, analogous t	_			
		ential, formal derivation,	, analogous to electric	scalar potential; ca	Iculation of fields, ex	xamples,
	oltz coil ving ch	is; arge in the static magne	tic field current balan	ca lorentz forca ric	tht-hand rule alacte	c motor di
	-	vement paths, mass spe			-	
•		he magnetic field, effect				
		m; magn. moment of the			// F ···//F	,,
20. ind	luction,	Faraday's law of inducti	on, Lenz's rule, flux cl	nange, eddy electric	field, Waltenhofen's	s pendulum;
		lf-induction; application	_			
		displacement current, ch	noice of integration ar	ea, displacement cu	irrent; Maxwell's ext	ension, wave
		well equations; mentals, sinusoidal vibr	ations amplitude po	riod and phases now	er and RMS value of	hmic reci-
		itive & inductive resistor				
	•	tance; performance of th		nase shin and nequ	and acpendence, I	mpedunce.
-						
Bachelor's	with 1 maj	or Quantum Technology (2021)		generated 30-Mär-2024 • ex or (180 ECTS) Quantentechno	-	page 80 / 155
					10516 - 2021	

23. Resonant circuits, combinations of RLC; series and parallel resonant circuit; forced vibration, damped harmonic oscillator (related to 11-E-M);

24: Hertz dipole, characteristics of irradiation, near field, far field; Rayleigh scattering; accelerated charge, synchrotron radiation, X-rays; 25. Electromagnetic waves: Principles, Maxwell's determination to electromagnetism, radiation pressure (Poynting vector, radiation pressure).

Intended learning outcomes

The students understand the basic principles and contexts of thermodynamics, science of electricity and magnetism. They know relevant experiments to observe and measure these principles and contexts. They are able to apply mathematical methods to the formulation of physical contexts and autonomously apply their knowledge to the solution of mathematical-physical tasks.

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

V (4) + Ü (2)

Module taught in: Ü: German or English

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. 120 minutes)

Language of assessment: German and/or English

Allocation of places

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Additional information

Registration: If a student registers for the exercises and obtains the qualification for admission to assessment, this will be considered a declaration of will to seek admission to assessment pursuant to Section 20 Subsection 3 Sentence 4 ASPO (general academic and examination regulations). If the module coordinators subsequently find that the student has obtained the qualification for admission to assessment, they will put the student's registration for assessment into effect. Only those students that meet the respective prerequisites can successfully register for an assessment. Students who did not register for an assessment or whose registration for an assessment to whose not put into effect will not be admitted to the respective assessment. If a student takes an assessment to which he/she has not been admitted, the grade achieved in this assessment will not be considered.

Workload

240 h

Teaching cycle

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

§ 53 l Nr. 1 a)

§ 77 | Nr. 1 a)

Module appears in

Bachelor' degree (1 major) Physics (2015) Bachelor' degree (1 major) Nanostructure Technology (2015) Bachelor' degree (1 major) Mathematical Physics (2015) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2015) First state examination for the teaching degree Grundschule Physics (2015) First state examination for the teaching degree Realschule Physics (2015) First state examination for the teaching degree Gymnasium Physics (2015) First state examination for the teaching degree Mittelschule Physics (2015) First state examination for the teaching degree Gymnasium Physics (2015) Bachelor' degree (1 major) Mathematical Physics (2016) First state examination for the teaching degree Grundschule Physics (2018) First state examination for the teaching degree Realschule Physics (2018) First state examination for the teaching degree Gymnasium Physics (2018) First state examination for the teaching degree Gymnasium Physics (2018) First state examination for the teaching degree Mittelschule Physics (2018) First state examination for the teaching degree Mittelschule Physics (2018) First state examination for the teaching degree Mittelschule Physics (2018) First state examination for the teaching degree Mittelschule Physics (2018) First state examination for the teaching degree Mittelschule Physics (2018) First state examination for the teaching degree Mittelschule Physics (2018)

Bachelor's with 1 major Quantum Technology (2021)

Bachelor' degree (1 major) Nanostructure Technology (2020) Bachelor' degree (1 major) Mathematical Physics (2020) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2020) First state examination for the teaching degree Grundschule Physics (2020) First state examination for the teaching degree Gymnasium Physics (2020) First state examination for the teaching degree Realschule Physics (2020) First state examination for the teaching degree Mittelschule Physics (2020) First state examination for the teaching degree Mittelschule Physics (2020) Bachelor' degree (1 major) Functional Materials (2021) Bachelor' degree (1 major) Quantum Technology (2021) exchange program Physics (2023) Bachelor' degree (1 major) Mathematical Physics (2024)

Module	e title				Abbreviation	
Introdu	iction t	o Solid State Physics			11-E-F-152-m01	
Module coordinator				Module offered by		
Managi	ing Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	nd Astronomy	
ECTS		od of grading	Only after succ. com	pl. of module(s)		
8	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
Somme demanu 2. Cryst tice def tronic p 3. The r theory: 4. Struct electron 5. lattic branch exampl 6. Therm therma 7. Elect strongly on	Contents 1. The free-electron gas (FEG), free electrons; density of states; Pauli principle; Fermi-Dirac statistics; spec. heat, Sommerfeld coefficient; electrons in fields: Drude-Lorentz-Sommerfeld; electrical and thermal conductivity, Wiedemann-Franz law; Hall effect; limitations of the model 2. Crystal structure, periodic lattice; types of lattices; Bravais lattice; Miller indices; simple crystal structures; lattice defects; polycrystals; amorphous solids; group theoretical approaches, the importance of symmetry for electronic properties 3. The reciprocal lattice (RG), motivation: Diffraction; Bragg condition; definition; Brillouin zones; diffraction theory: Scattering; Ewald construction; Bragg equation; Laue's equation; structure and form factor 4. Structure determination, probes: X-ray, electron, neutron; methods: Laue, Debye-Scherrer, rotating crystal; electron diffraction, LEED 5. lattice vibrations (phonons), equations of motion; dispersion; group velocity; diatomic base: optical, acoustic branch; quantisation: Phonon momentum; optical properties in the infrared; dielectric function (Lorentz model); examples of dispersion curves (occ. Kramers-Kronig), measurement methods 6. Thermal properties of insulators, Einstein and Debye model; phonon density of states; anharmonicity and thermal expansion; thermal conductivity; Umklapp processes; crystal defects 7. Electrons in a periodic potential, Bloch theorem; band structure; approximation of nearly free electrons (NFE); strongly bound electrons (tight binding, LCAO); examples of band structures, Fermi surfaces, spin-orbit interaction 8. Superconductivity, BCS theory, pairing, coupling of bosonic and fermionic modes, band structure, many-par-					
Intende	ed learn	ning outcomes				
The stu dynami ture of Solid-S autono	dents (ics, the solids a tate Ph mously	understand the basic con rmal properties, principle and know the experiment ysics. They are able to ap apply their knowledge to	es of electronic prope tal methods and theo oply mathematical me the solution of math	rties (free electron g retical models for th ethods to the formul nematical-physical ta		
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)	
V (4) + Module	• • •	t in: Ü: German or English	1			
		e ssment (type, scope, la on on whether module ca			tion offered — if not every seme-	
		nation (approx. 120 minu ssessment: German and/				
Allocat	ion of p	olaces				
Additio	nal info	ormation				
Worklo	ad					

240 h

Teaching cycle

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

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Module appears in

Bachelor' degree (1 major) Mathematics (2015) Bachelor' degree (1 major) Physics (2015) Bachelor' degree (1 major) Nanostructure Technology (2015) Bachelor' degree (1 major) Mathematical Physics (2015) Bachelor' degree (1 major) Computational Mathematics (2015) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2015) Bachelor' degree (1 major) Mathematical Physics (2016) Bachelor' degree (1 major) Physics (2020) Bachelor' degree (1 major) Nanostructure Technology (2020) Bachelor' degree (1 major) Mathematical Physics (2020) Bachelor' degree (1 major, 1 minor) Physics (Minor, 2020) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2020) Bachelor' degree (1 major) Quantum Technology (2021) Bachelor' degree (1 major) Mathematics (2023) exchange program Physics (2023) Bachelor' degree (1 major) Mathematical Physics (2024)

Module title				Abbreviation			
Electronic Cir	rcuits			11-EL-152-m01			
Module coordinator			Module offered by				
Managing Dir	rector of the Institute of A	pplied Physics	Faculty of Physics a	nd Astronomy			
	od of grading	Only after succ. con	npl. of module(s)				
6 nume	erical grade						
Duration	Module level	Other prerequisites					
1 semester	undergraduate						
Contents							
coils and dio	Principles of electronic components and circuits. Analogous circuit technology: Passive (resistors, capacitors, coils and diodes) and active components (bipolar and field-effect transistors, operational amplifiers). Digital circuits: different types of gates and CMOS circuits. Microcontroller						
Intended lea	rning outcomes						
The students circuit techno	- ,	ractical setup of elect	ronic circuits from th	e field of analogous and digital			
Courses (type	e, number of weekly conta	act hours, language –	- if other than Germa	n)			
V (3) + R (1)							
Module taug	ht in: German or English						
	s essment (type, scope, la tion on whether module o			tion offered — if not every seme-			
of assessmen nation date a Assessment	nt is changed, the lecture It the latest. offered: Once a year, sum assessment: German and	r must inform student Imer semester		nination in groups. If the method weeks prior to the original exami-			
	places	_					
	6						
Additional in	formation						
		_					
Workload							
180 h							
Teaching cyc	le						
Referred to in	LPO I (examination reg	ulations for teaching-	degree programmes)				
 Module appe	ars in						
 Module appe Bachelor' des		915)					
Bachelor' deg	e ars in gree (1 major) Physics (2c gree (1 major) Nanostruct	-)				
Bachelor' deg Bachelor' deg	gree (1 major) Physics (20	ure Technology (2015))				
Bachelor' deg Bachelor' deg Bachelor's de	gree (1 major) Physics (2c gree (1 major) Nanostruct	ure Technology (2015) hysics (Minor, 2015))				
Bachelor' de Bachelor' de Bachelor's de Bachelor' de Bachelor' de	gree (1 major) Physics (2c gree (1 major) Nanostruct egree (1 major, 1 minor) P gree (1 major) Physics (2c gree (1 major) Nanostruct	ure Technology (2015) hysics (Minor, 2015) 920) ure Technology (2020					
Bachelor' des Bachelor' des Bachelor's des Bachelor' des Bachelor' des Bachelor's des	gree (1 major) Physics (20 gree (1 major) Nanostruct egree (1 major, 1 minor) P gree (1 major) Physics (20 gree (1 major) Nanostruct egree (1 major, 1 minor) P	ure Technology (2015) hysics (Minor, 2015) 120) ure Technology (2020) hysics (Minor, 2020)					
Bachelor' de Bachelor' de Bachelor's de Bachelor' de Bachelor' de Bachelor's de Bachelor's de	gree (1 major) Physics (20 gree (1 major) Nanostruct egree (1 major, 1 minor) P gree (1 major) Physics (20 gree (1 major) Nanostruct egree (1 major, 1 minor) P gree (1 major) Quantum T	ure Technology (2015) hysics (Minor, 2015) 120) ure Technology (2020) hysics (Minor, 2020)					
Bachelor' des Bachelor' des Bachelor's des Bachelor' des Bachelor' des Bachelor's des Bachelor's des exchange pro	gree (1 major) Physics (20 gree (1 major) Nanostruct egree (1 major, 1 minor) P gree (1 major) Physics (20 gree (1 major) Nanostruct egree (1 major, 1 minor) P	ure Technology (2015) hysics (Minor, 2015) 20) ure Technology (2020 hysics (Minor, 2020) echnology (2021)		ım. reg. da- page 85 / 155			

Module	e title				Abbreviation
Classic	al Phys	sics 1 (Mechanics)			11-E-M-152-m01
		• •			
Module coordinator				Module offered by	
Manag	ing Dire	ector of the Institute of	of Applied Physics	Faculty of Physics a	and Astronomy
ECTS		od of grading	Only after succ. co	mpl. of module(s)	
8	numerical grade				
Duratio	on	Module level	Other prerequisite	S	
1 seme	ster	undergraduate	Admission prerequ	isite to assessment:	completion of exercises (approx.
			13 exercise sheets	per semester). Stude	ents who successfully completed
			approx. 50% of exe	ercises will qualify for	admission to assessment. The
			lecturer will inform	students about the r	espective details at the beginning
			of the semester.		
Conton	+-				
Conten					
					nalysis, time / length / mass (de-
			SI), importance of metr		Jniform and constant accelerated
			r motion in polar coordi		Simonin and constant accelerated
					the pendulum, forces on an ato-
			c friction. Preparation of		
		nergy: (Kinetic) perfo			- ,
				momentum conserva	ation, surges in centre of mass
		ystem, rocket equation			
				al, potential energy; la	aw, weight scale, field strength
		of gravity (general rel			
					nergy, moment of inertia, analo-
-		potential;	ons, satellites (geostatio	onary and interstellar), escape velocities, trajectories
			rence systems annarer	nt forces. Four ault ne	ndulum, Coriolis force, centrifu-
gal for		. mertiat system, rere	ience systems, apparei	n loices, i oucuun pe	
		nsformation: Brief di	gression to Maxwell's e	quations, ether, Mich	elson interferometer, Einstein's
					ength contraction, relativistic im-
pulse;					
					nd -ellipsoid, principal axes and
	-		le of the elasticity tenso	or, physics of the bike	e; gyroscope: Precession and nu-
		th as a spinning top;	utan attal alta martian a		- Cristian Jamin - Classe adds Cam
mation		atic and dynamic fric	tion, stick-slip motion, i	folling friction, viscou	is friction, laminar flow, eddy for-
		Panrasantation by m	eans of complex e-funct	ion equation of moti	ion (DGL) on forces, torque and
			•	-	lum, physical pendulum, damped
			, aperiodic limit), forced		
					erministic vs. chaotic motion,
		namics and chaos;	- ,		
		-	-		nciple of superposition, reflection
	•	nd closed end, speed	of sound; interference,	Doppler effect; phas	e and group velocity, dispersion
relation					1
			lies: Elastic modulus, ge		
					le, capillary forces, steady flows, ssure, compressibility and com-
pressiv			, במש ומאשש, שמוטווופנוול וו	eigint ionniuta, an pie	source, compressibility and com-
•			id real gas, averages, di	stribution functions	equipartition theorem, Brownian
					s of freedom, specific heat
	,				

Intended learning outcomes

The students understand the basic contexts and principles of mechanics, vibration, waves and kinetic theory of gases. They are able to apply mathematical methods to the formulation of physical contexts and autonomously apply their knowledge to the solution of mathematical-physical tasks.

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

V (4) + Ü (2)

Module taught in: Ü: German or English

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. 120 minutes)

Language of assessment: German and/or English

Allocation of places

--

Additional information

Registration: If a student registers for the exercises and obtains the qualification for admission to assessment, this will be considered a declaration of will to seek admission to assessment pursuant to Section 20 Subsection 3 Sentence 4 ASPO (general academic and examination regulations). If the module coordinators subsequently find that the student has obtained the qualification for admission to assessment, they will put the student's registration for assessment into effect. Only those students that meet the respective prerequisites can successfully register for an assessment. Students who did not register for an assessment or whose registration for an assessment was not put into effect will not be admitted to the respective assessment. If a student takes an assessment to which he/she has not been admitted, the grade achieved in this assessment will not be considered.

Workload

240 h

Teaching cycle

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

§ 53 | Nr. 1 a) § 77 | Nr. 1 a)

Module appears in

Module appears in	
Bachelor' degree (1 major) Physics (2015)	
Bachelor' degree (1 major) Nanostructure Technology (2015)	
Bachelor' degree (1 major) Mathematical Physics (2015)	
Bachelor's degree (1 major, 1 minor) Physics (Minor, 2015)	
First state examination for the teaching degree Grundschule Physics (2015)	
First state examination for the teaching degree Realschule Physics (2015)	
First state examination for the teaching degree Gymnasium Physics (2015)	
First state examination for the teaching degree Mittelschule Physics (2015)	
Bachelor' degree (1 major) Mathematical Physics (2016)	
First state examination for the teaching degree Grundschule Physics (2018)	
First state examination for the teaching degree Realschule Physics (2018)	
First state examination for the teaching degree Gymnasium Physics (2018)	
First state examination for the teaching degree Mittelschule Physics (2018)	
Bachelor' degree (1 major) Physics (2020)	
Bachelor' degree (1 major) Nanostructure Technology (2020)	
Bachelor' degree (1 major) Mathematical Physics (2020)	
Bachelor's degree (1 major, 1 minor) Physics (Minor, 2020)	
First state examination for the teaching degree Grundschule Physics (2020)	
First state examination for the teaching degree Gymnasium Physics (2020)	
First state examination for the teaching degree Realschule Physics (2020)	
Bachelor's with 1 major Quantum Technology (2021) JMU Würzburg • generated 30-Mär-2024 • exam. reg. da- ta record Bachelor (180 ECTS) Quantentechnologie - 2021	page 87 / 155

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

First state examination for the teaching degree Mittelschule Physics (2020) Bachelor' degree (1 major) Functional Materials (2021) Bachelor' degree (1 major) Quantum Technology (2021) exchange program Physics (2023) Bachelor' degree (1 major) Mathematical Physics (2024)

Module title					Abbreviation		
Princip	les of E	nergy Technologies			11-ENT-152-m01		
Module	e coord	inator		Module offered by			
Manag	naging Director of the Institute of Applied Physics			Faculty of Physics and Astronomy			
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
6	nume	rical grade					
Duratio		Module level	Other prerequisites				
1 seme		graduate					
Conten							
as rene ting ma studen verters	Physical principles of energy conservation and energy conversion, energy transport and energy storage as well as renewable resources of energy. We also discuss aspects of optimising materials (e.g. nanostructured insula- ting materials, selective layers, highly activated carbons). The course is especially suitable for teaching degree students. Energy conservation via thermal insulation. Thermodynamic energy efficiency. Fossil fired energy con- verters. Nuclear power plants. Hydroelectricity. Wind turbines. Photovoltaics. Solar thermal: Heat. Solar thermal:						
		mass. Geothermal energ ning outcomes	Sy. Energy Storage. En	eigy transport			
		now the principles of di	fferent methods of en	ergy technology es	pecially energy conv	ersion, trans-	
		ge. They understand the					
Course	s (type	, number of weekly conta	act hours, language –	- if other than Germa	n)		
V (3) +	• •						
		t in: German or English					
		essment (type, scope, la on on whether module c			tion offered — if not	every seme-	
prox. 8 If a writ stead t of asse nation Assess	to 10 p tten exa ake the essmen date at ment o	al examination in groups ages) or e) presentation amination was chosen as form of an oral examina t is changed, the lecture the latest. ffered: Once a year, wint ssessment: German and	/talk (approx. 30 min s method of assessme ation of one candidate r must inform student eer semester	utes). ent, this may be chai e each or an oral exa	nged and assessmei mination in groups.	nt may in- If the method	
Allocat	ion of p	olaces					
Additio	onal info	ormation					
Worklo	bad						
180 h		_					
Teachi	ng cycl	2					
	d to in	LPOI (examination regu	lations for toaching	dograa programmac)			
§ 22				legiee programmes)			
§ 22 II § 22 II							
§ 22	Nr. 3 f)						
	e appea						
	-	ree (1 major) Physics (20	-				
	-	ree (1 major) Nanostruct mination for the teachin					
		or Quantum Technology (2021)	JMU Würzburg •	generated 30-Mär-2024 • ex	-	page 89 / 155	
			ta record Bachel	or (180 ECTS) Quantentechno	nogle - 2021		

UNIVERSITÄT WÜRZBURG

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

Module title					Abbreviation	
Optics and Waves - Exercises					11-E-OA-152-m01	
Module coordinator				Module offered by		
Managing Director of the Institute of Applied Physics			nlied Physics	Faculty of Physics and Astronomy		
			Only after succ. con			
5 numerical grade						
Duratio		Module level	Other prerequisites			
1 seme		undergraduate				
Contents						
tical pa films, i	ith, ligh nterfero	it in matter, polarization,	Geometrical Optics, action optical grating	Optical instruments, , Fresnel diffraction,	ncepts, Fermat's principle, op- , wave optics, interference, thin holography, wave packets, wave	
Intende	ed lear	ning outcomes				
to appl	y math		formulation of physic		nd quantum optics. They are able onomously apply their knowledge	
Course	s (type	, number of weekly conta	ct hours, language –	- if other than Germa	ın)	
Ü (2) Module	e taugh	t in: Ü: German or Englisł	ı			
Metho	d of ass	-	nguage — if other th		tion offered — if not every seme-	
		nation (approx. 120 minu				
		ssessment: German and,				
Allocat		-	0.1			
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teachi		•				
reaciiii	is tyti					
Deferre	d to in	IDOI (overinetion re-	lations for tooching	dogroo programmes)		
		LPOI (examination regu	lations for teaching-o	legree programmes)		
§ 53 N 8 77 N	-					
§ 77 Nr. 1 a) Module appears in						
Bachelor' degree (1 major) Physics (2015)						
Bachelor' degree (1 major) Nanostructure Technology (2015)						
		mination for the teaching	-	•		
		mination for the teaching	-	•		
		mination for the teaching		• -		
		mination for the teaching	-	Physics (2015)		
	-	ree (1 major) Physics (20: ree (1 major) Nanostructu)		
	-	ree (1 major) Nanostructu ree (1 major) Quantum Te		"		
	-	gram Physics (2023)	2021			
	3- 10					

Module	e title		Abbreviation			
Optics and Quantum Physics					11-E-OAV-152-m01	
Module	e coord	inator		Module offered by		
Managing Director of the Institute of Applied Physics				Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
6	nume	rical grade				
Duration Module level			Other prerequisites			
2 semester undergraduate						
Conten	Contents					
A. optio	A optics and quanta					

1. Light (linked to 11-E-E): basic concepts, the speed of light, Huygens-Fresnel principle: reflection, refraction. 2. Light in matter: propagation velocity in the medium; dispersion, complex and frequency-dependent dielectric constant; absorption, Kramers-Kronig relation, interfaces, Fresnel equations, polarization, generation by absorption, birefringence, optical activity (dipole)

3. Geometrical optics: basic concepts, Fermat's principle, optical path, planar interfaces, Snell's law, total reflection, optical tunneling, evanescent waves, prism; normal and anomalous dispersion, curved interfaces, thin and thick lenses, lens systems, lens grinder formula, aberrations, imaging errors (spherical & chromatic aberration, astigmatism, coma, distortion, correction approaches).

4. Optical instruments: characteristics; camera, eye, magnifying glass, microscope, telescope types, bundle beam vs. image construction (electron lenses, electron microscope), confocal microscopy.

5. Wave optics: spatial and temporal coherence, Young's double slit experiment, interference pattern (intensity profile), thin films, parallel layers, wedge-shaped layers, phase shift, Newton rings, interferometer (Michelson, Mach-Zender, Fabry-Perot).

6. Diffraction in the far field: Fraunhofer diffraction, , single slit, intensity distribution, apertures, resolving power, Rayleigh & Abbé criterion, Fourier optics, optical grating, n-fold slit, intensity distribution, grating spectrometer and resolution, diffraction off atomic lattices, convolution theorem.

7. Diffraction in the near field: Fresnel, near-field diffraction at circular apertures/disks, Fresnel zone plate, near-field microscopy, holography, Huygens-Fresnel concept; white light hologram.

8. Failure of classical physics I - from light wave to photon: black body radiation and Planck's quantum hypothesis; photoelectric effect and Einstein's explanation, Compton effect, light as a particle, wave-particle duality, , quantum structure of nature

9. Failure of classical physics II - particles as waves: de Broglie's matter wave concept; diffraction of particle waves (Davisson-Germer-experiment, double slit interference).

10. Wave mechanics: wave packets, phase and group velocity (recap of 11-EM), uncertainty principle, Nyquist-Shannon theorem, wave function as probability amplitude, probability of residence, measurement process in quantum mechanics (double-slit experiment & which-way information, collapse of the wave function, Schrödinger's cat).

11. Mathematical concepts of quantum mechanics: Schrödinger equation as wave equation, conceptual comparison to wave optics, free particle and particles in a potential, time-independent Schrödinger equation as eigenvalue equation, simple examples in 1D (potential step, potential barrier and tunnel effect, box potential and energy quantization, harmonic oscillator), box potential in higher dimensions and degeneracy, formal theory of QM (states, operators, observables).

B. atomic and molecular physics

 Structure of atoms: experimental evidence for the existence of atoms, size of the atom, charges and masses in the atom, isotopes, internal structure, Rutherford experiment, instability of the "classical" Rutherford atom
 Quantum mechanical foundations of atomic physics (short recap of part A.): light as particle beam, particles as waves, wave functions and probability interpretation, uncertainty relation and stability of the atom, energy quantization in the atom, Franck-Hertz experiment, atomic spectra, Bohr's model and its limitations, non-relativistic Schrödinger equation.

Bachelor's with 1 major Quantum Technology (2021)

UNIVERSITÄT WÜRZBURG

3. The non-relativistic hydrogen atom: hydrogen and hydrogen-like atoms, central-symmetric potential and angular momentum in QM, Schrödinger equation of the H-atom, atomic orbitals, radial and angular wave functions, quantum numbers, energy eigenvalues.

4. Atoms in external fields: orbital magnetic dipole moment, gyromagnetic ratio, magentic fields: normal Zeeman effect, electrical fields: Stark effect.

5. Fine and hyperfine structure: electronic spin and magnetic spin moment, Stern-Gerlach experiment, Einstein-de Haas effect, glimpse of the Dirac equation (spin as relativistic phenomenon and existence of antimatter), electron spin resonance (ESR), spin-orbit coupling, relativistic fine structure, Lamb shift (quantum electrodynamics), nuclear spin and hyperfine structure.

6. Multielectron atoms: helium atom as simplest example, indistinguishability of identical particles, (anti)symmetry with respect to particle exchange, fermions and bosons, relationship to spin, Pauli principle, orbital and spin wave function of two-particle systems (spin singlets and triplets), LS- and jj-coupling, periodic table of the elements, Aufbau principles and Hund's rules.

7. Light-matter interaction: time-dependent perturbation theory (Fermi's Golden Rule) and optical transitions, matrix elements and dipole approximation, selection rules and symmetry, line broadening (lifetime, Doppler effect, collision broadening), atomic spectroscopy.

8. LASER: elementary optical processes (absorption, spontaneous and stimulated emission), stimulated emission as light amplification, Einstein's rate equations, thermal equilibrium, non-equilibrium character of a laser: rate equations, population inversion, and laser condition, principle structure of a laser, optical pumping, 2-, 3- and 4-level lasers, examples (ruby laser, He-Ne laser, semiconductor laser).

9. Inner-shell excitations and x-ray physics: generation of x-ray radiation, Bremsstrahlung and characteristic spectrum, x-ray emission for elemental analysis (EDX), x-ray absorption and contrast formation in x-ray images, x-ray photoemission, non-radiative Auger processes, synchrotron radiation, application examples.

10. Molecules and chemical bonding: molecular hydrogen ion (H2+) as simplest example: rigid molecule approximation and LCAO approach, bonding and antibonding molecular orbitals, hydrogen molecule (H2): molecular orbital vs. Heitler-London approximation, biatomic heteronuclear molecules: covalent vs. ionic bonding, van der Waals bonds and Lennard-Jones potential, (time allowing: conjugated molecules).

11. Molecule rotations and vibrations: Born-Oppenheimer approximation, rigid rotator (symmetric and unsymmetrical molecules), centrifugal splitting/expansion, molecule as (an)harmonic oscillator, Morse potential, normal vibrational modes, vibrational-rotational interaction.

12. Molecular spectroscopy: transition matrix elements, vibrational spectroscopy: infrared spectroscopy and Raman effect, vibrational-rotational transitions: Fortrat diagram, electronic transitions: Franck-Condon principle.

Intended learning outcomes

The students understand the basic principles and contexts of radiation, wave and quantum optics and quantum phenomena as well as Atomic and Molecular Physics. They understand the theoretical concepts and know the structure and application of important optical instruments and measuring methods. They understand the ideas and concepts of quantum theory and Astrophysics and the relevant experiments to observe and measure quantum phenomena. They are able to discuss their knowledge and to integrate it into a bigger picture.

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

V (4) + V (4)

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)

oral examination of one candidate each (approx. 30 minutes) Language of assessment: German and/or English

Allocation of places

Additional information

Workload

180 h

Teaching cycle

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

Module appears in

Bachelor' degree (1 major) Physics (2015) Bachelor' degree (1 major) Nanostructure Technology (2015) Bachelor' degree (1 major) Physics (2020) Bachelor' degree (1 major) Nanostructure Technology (2020) Bachelor' degree (1 major) Quantum Technology (2021) exchange program Physics (2023)

Module title					Abbreviation	
Fit for Industry 11-FFI-202-m01					11-FFI-202-m01	
Module	e coord	inator		Module offered by		
Managing Director of the Institute of Applied Physics			plied Physics	Faculty of Physics a	nd Astronomy	
ECTS Method of grading Only after suc			Only after succ. con	npl. of module(s)		
3	(not) s	successfully completed				
Duratio	on	Module level	Other prerequisites			
1 seme	ester	undergraduate				
Conten	nts					
duct de	evelopn				he industrial environment. Pro- strategy and management. Lea-	
Intend	ed learı	ning outcomes				
		are aware of the requirem out their own profession		industry and can ma	ke a decision based on their	
Course	s (type)	, number of weekly conta	ct hours, language –	- if other than Germa	n)	
		t in: German or English				
V (1) + R (1) Module taught in: German or English Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus) a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 mi- nutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) or d) project report (approx. 8 to 10 pa- ges) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may in- stead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original exami- nation date at the latest. Language of assessment: German and/or English Assessment offered: Once a year, summer semester Allocation of places Additional information 						
Worklo 90 h						
-	ng cycl	e				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Modul	e appea	ars in				
Bachel	or' deg	ree (1 major) Physics (20:	20)			
	-	ree (1 major) Nanostructu)		
	-	ree (1 major) Quantum Te	chnology (2021)			
exchar	nge proរុ	gram Physics (2023)				

Module title					Abbreviation	
Solid State Physics 2 11-FK2B-202-m01						
Module	a coord	inator		Module offered by	<u> </u>	
[[and Dhusies			
	<u> </u>	ector of the Institute of A				
ECTS Method of grading Only after succ. compl. of module(s)						
8 numerical grade						
Duration Module level Other prerequisites						
1 semester undergraduate						
Contents						
		a periodic potential - th	e band structure			
		nd thermal transport				
b. Bloc		em				
c. Elect		cal models of dynamic p	rococcoc			
		ansport in partially and c		lc		
		ces; measurement techn		15		
		ansport in external magn	•			
		equations of transport				
-		ic function and ferroelec				
		c electrodynamics and m				
		ty of solids, of lattices, of		nd quasi-free electro	ns; optical phonons	, polaritons,
c. Ferro		er-band transitions, Wan	nier-mott excitons			
4. Sem	-					
a. Char						
		niconductors				
c. Dope	ed semi	conductors				
		l applications of p-n junc	tions			
e. Hete		tures				
5. Mag						
		and paramagnetism ramagnetism in metals				
c. Ferro		-				
6. Supe	-					
a. Pher		•				
b. Mod	els of s	uperconductivity				
c. Tunn	el expe	eriments und application	S			
Intende	ed leari	ning outcomes				
		effects, concepts and mo		lid state physics. Far	miliarity with the the	oretical prin-
		h applications of experin				
		, number of weekly conta	ect hours, language –	- if other than Germa	ın)	
V (4) +		t in: German or English				
			nguaga if athor th	an Carman, avamina	tion offered if not	aven como
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)						
		nination (approx. 90 to 1				
		al examination in groups		. 30 minutes) or d) p	roject report (approx	x. 8 to 10 pa-
-		entation/talk (approx. 3)		ont this may be al	nand and and are	nt m o · · · ·
		amination was chosen as e form of an oral examina		-	-	
		t is changed, the lecture				
		the latest.		.s about this by four		
			[AALI \A72].	noncontral on Advision	ana kao da	
Bachelor's	with 1 maj	or Quantum Technology (2021)		generated 30-Mär-2024 • ex or (180 ECTS) Quantentechno		page 96 / 155

Language of assessment: German and/or English

Assessment offered: in semester of module and following semester

Allocation of places

Additional information

Workload

240 h

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) Physics (2020) Bachelor' degree (1 major) Nanostructure Technology (2020) Bachelor' degree (1 major) Quantum Technology (2021) exchange program Physics (2023)

Module title					Abbreviation		
Semiconductor Lasers and Photonics 11-HLF-152-mo1							
Module	e coord	inator		Module offered by			
Manag	aging Director of the Institute of Applied Physics			Faculty of Physics and Astronomy			
ECTS							
6 numerical grade							
Duratio	on	Module level	Other prerequisites				
1 seme	1 semester graduate						
Conten	ts						
rent de model, hold co riers ar des, las ductor	This lecture discusses the principles of laser physics, based on the example of semiconductor lasers, and cur- rent developments regarding components. The principles of lasers are described on the basis of a general laser model, which will then be extended to special aspects of semiconductor lasers. Basic concepts such as thres- hold condition, characteristic curve and laser efficiency are derived from coupled rate equations for charge car- riers and photons. Other topics of the lecture are optical processes in semiconductors, layer and ridge wavegui- des, laser resonators, mode selection, dynamic properties as well as technology for the generation of semicon- ductor lasers. The lecture closes with current topics of laser research such as quantum dot lasers, quantum cas- cade lasers, terahertz lasers or high-performance lasers.						
Intende	ed learı	ning outcomes					
		nave advanced knowledg modern questions and k					
Course	s (type	, number of weekly conta	ct hours, language –	- if other than Germa	n)		
V (3) + Module		t in: German or English					
		essment (type, scope, la on on whether module ca			tion offered — if not	every seme-	
or oral pages) If a writ stead t of asse nation Assess	examin or pres tten exa ake the ssmen date at ment o	nation (approx. 90 to 120 ation in groups (groups of eentation/talk (approx. 30 amination was chosen as form of an oral examina t is changed, the lecturer the latest. ffered: Once a year, sum ssessment: German and,	of 2, approx. 30 minu o minutes). method of assessme tion of one candidate must inform student mer semester	tes per candidate) o ent, this may be chan e each or an oral exa	r project report (app nged and assessmen mination in groups.	rox. 8 to 10 nt may in- If the method	
Allocat			¥				
Additio	onal info	ormation					
Workload							
180 h							
Teaching cycle							
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module	e appea	irs in					
Bachel	or' deg	ree (1 major) Physics (203 ree (1 major) Nanostructu ee (1 major) Functional M	ire Technology (2015))			
		or Quantum Technology (2021)	JMU Würzburg •	generated 30-Mär-2024 • ex or (180 ECTS) Quantentechno	-	page 98 / 155	

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

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

Module title					Abbreviation	
	Fundamentals of Semiconductor Physics 11-HLP-152-m01					
Module	e coord	nator		Module offered by		
_	naging Director of the Institute of Applied Physics			Faculty of Physics and Astronomy		
ECTS						
6	<u> </u>	rical grade				
Duratio		Module level undergraduate	Other prerequisites			
1 seme		undergraduate				
Conten			_			
		roperties ation and electronic ba	nd structure			
3. Optio	cal exci	tations and their coupli				
		onon coupling				
		e-dependent transport µ netic semiconductors	properties			
		ing outcomes				
	-	are familiar with the prir	 ucinles of Semiconduc	tor Physics They un	derstand the structu	re of semi-
		d know their physical p				
Course	s (type,	number of weekly cont	act hours, language –	- if other than Germa	n)	
V (3) + Module		t in: German or English				
		essment (type, scope, l	 anguage — if other th	an German, examina	tion offered — if not	every seme-
		on on whether module				every serie
		nation (approx. 90 to 12				
		ation in groups (groups entation/talk (approx. g		tes per candidate) o	r project report (app	rox. 8 to 10
		imination was chosen a		ent. this may be chai	nged and assessmer	nt may in-
		form of an oral examin				
		is changed, the lecture	er must inform student	s about this by four	weeks prior to the or	riginal exami-
		the latest. ffered: Once a year, sun	amer comector			
		ssessment: German and				
Allocat						
Additio	onal info	ormation				
Worklo	ad					
180 h						
Teachi	ng cycl	9				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Bachel	or' degi	ree (1 major) Physics (20	015)			
	-	ee (1 major) Nanostruct)		
	-	ee (1 major) Physics (20)		
	-	ree (1 major) Nanostruct ree (1 major) Quantum T		J		
	-	or Quantum Technology (2021)	_,	generated 30-Mär-2024 • exa	am. reg. da-	page 100 / 155
	~,			or (180 ECTS) Quantentechno		



exchange program Physics (2023)

Crystal	e title				Abbreviation
Crystal Growth, thin Layers and Lithography					11-KDS-152-m01
Module coordinator				Module offered by	
Managing Director of the Institute of Applied Phy			· · ·	Faculty of Physics a	and Astronomy
ECTS Method of grading		Only after succ. con	npl. of module(s)		
6 numerical grade					
Duratio	on	Module level	Other prerequisites		
1 semester undergraduate					
Conten	ts				
Crystal	growth	, thin films, lithography.			
-	-	ning outcomes	-		
	-				
laborat	ory. Th		knowledge of the pro		Is to control crystal growth in the ation of thin layers and know
Course	s (type	, number of weekly conta	act hours, language –	- if other than Germa	an)
V (3) + I		· · · · · · · · · · · · · · · · · · ·	, , , , , , , , , , , , , , , , , , , ,		
		t in: German or English			
		_	anguage — if other th	an German, examina	ation offered — if not every seme-
		ion on whether module c			
written examination (approx. 90 to 120 minutes) or oral examination of one candidate each (approx. 30 minutes) or oral examination in groups (groups of 2, approx. 30 minutes per candidate) or project report (approx. 8 to 10 pages) or presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may in- stead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original exami- nation date at the latest. Assessment offered: Once a year, winter semester Language of assessment: German and/or English Allocation of places					
stead ta of asse nation Assess Langua	ake the ssmen date at ment o ge of a	amination was chosen as e form of an oral examina t is changed, the lecture t the latest. Iffered: Once a year, wint issessment: German and	s method of assessme tion of one candidate must inform student er semester	e each or an oral exa	mination in groups. If the method
stead ta of asse nation of Assess Langua Allocat	ake the ssmen date at ment o ge of a ion of j	amination was chosen as e form of an oral examina t is changed, the lecture t the latest. Iffered: Once a year, wint issessment: German and	s method of assessme tion of one candidate must inform student er semester	e each or an oral exa	mination in groups. If the method
stead ta of asse nation of Assess Langua Allocat	ake the ssmen date at ment o ge of a ion of p	amination was chosen as e form of an oral examina t is changed, the lectured the latest. Iffered: Once a year, wint issessment: German and places	s method of assessme tion of one candidate must inform student er semester	e each or an oral exa	mination in groups. If the method
stead ta of asse nation of Assess Langua Allocati Additio	ake the ssmen date at ment o ge of a ion of p	amination was chosen as e form of an oral examina t is changed, the lectured the latest. Iffered: Once a year, wint issessment: German and places	s method of assessme tion of one candidate must inform student er semester	e each or an oral exa	mination in groups. If the method
stead ta of asse nation of Assess Langua Allocati Additio Workloo 180 h	ake the ssmen date at ment o ge of a ion of p mal inf ad	amination was chosen as e form of an oral examina t is changed, the lecture t the latest. Iffered: Once a year, wint issessment: German and places	s method of assessme tion of one candidate must inform student er semester	e each or an oral exa	mination in groups. If the method
stead ta of asse nation of Assesse Langua Allocati Additio Worklo	ake the ssmen date at ment o ge of a ion of p mal inf ad	amination was chosen as e form of an oral examina t is changed, the lecture t the latest. Iffered: Once a year, wint issessment: German and places	s method of assessme tion of one candidate must inform student er semester	e each or an oral exa	mination in groups. If the method
stead ta of asse nation of Assess Langua Allocati Additio Worklo 180 h Teachir 	ake the ssmen date at ment o ge of a ion of p mal inf ad	amination was chosen as e form of an oral examina t is changed, the lecture t the latest. Iffered: Once a year, wint issessment: German and places	s method of assessme tion of one candidate must inform student er semester /or English	e each or an oral exa	mination in groups. If the method weeks prior to the original exami-
stead ta of asse nation of Assess Langua Allocati Additio Worklo 180 h Teachir 	ake the ssmen date at ment o ge of a ion of p mal inf ad	amination was chosen as e form of an oral examina t is changed, the lecture t the latest. Iffered: Once a year, wint issessment: German and places	s method of assessme tion of one candidate must inform student er semester /or English	e each or an oral exa	mination in groups. If the method weeks prior to the original exami-
stead ta of asse nation of Assess Langua Allocati Additio Worklo 180 h Teachir 	ake the ssmen date at ment o ge of a ion of p mal inf ad	amination was chosen as e form of an oral examina t is changed, the lecture t the latest. Iffered: Once a year, wint issessment: German and places formation e LPOI (examination regu	s method of assessme tion of one candidate must inform student er semester /or English	e each or an oral exa	mination in groups. If the method weeks prior to the original exami-
stead ta of asse nation of Assess Langua Allocati Morkloo 180 h Teachir Referre Bachelo	ake the ssmen date at ment o ge of a ion of p mal inf ad ad ed to in e appea or' deg	amination was chosen as e form of an oral examina t is changed, the lecture t the latest. Iffered: Once a year, wint issessment: German and places formation e LPO I (examination regu ars in ree (1 major) Physics (20	s method of assessme tion of one candidate must inform student er semester /or English ulations for teaching-o	e each or an oral exa s about this by four degree programmes)	mination in groups. If the method weeks prior to the original exami-
stead ta of asse nation of Assess Langua Allocati Additio Worklo 180 h Teachir Referre Bachelo Bachelo	ake the ssmen date at ment o ge of a ion of p mal inf ad ad ad ad ad ad ad ad ad ad ad ad ad	amination was chosen as e form of an oral examina t is changed, the lecture t the latest. Iffered: Once a year, wint issessment: German and places formation e LPOI (examination regu ars in ree (1 major) Physics (20 ree (1 major) Nanostructo	s method of assessme tion of one candidate must inform student er semester /or English ulations for teaching-out 15) ure Technology (2015)	e each or an oral exa s about this by four degree programmes)	mination in groups. If the method weeks prior to the original exami-
stead ta of asse nation of Assess Langua Allocat Additio 180 h Teachir Referre Bachelo Bachelo Bachelo	ake the ssmen date at ment o ge of a ion of p mal inf mad ng cycl ed to in e appea or' deg or' deg or' deg	amination was chosen as e form of an oral examina t is changed, the lecture t the latest. Iffered: Once a year, wint issessment: German and places formation e LPO I (examination regu ars in ree (1 major) Physics (20 ree (1 major) Physics (20 ree (1 major) Physics (20	s method of assessme tion of one candidate r must inform student er semester /or English ilations for teaching-o ure Technology (2015) 20)	e each or an oral exa is about this by four degree programmes)	mination in groups. If the method weeks prior to the original exami
stead ta of asse nation of Assess Langua Allocati Additio 180 h Teachir Referre Bachelo Bachelo Bachelo	ake the ssmen date at ment o ge of a ion of p mal inf ad ad ad ad ad ad ad ad ad ad ad ad ad	amination was chosen as e form of an oral examina t is changed, the lecture t the latest. Iffered: Once a year, wint issessment: German and places formation e LPO I (examination regu ars in ree (1 major) Physics (20 ree (1 major) Nanostructure ree (1 major) Nanostructure ree (1 major) Nanostructure	s method of assessme tion of one candidate must inform student er semester /or English lations for teaching-out 15) ure Technology (2015) 20) ure Technology (2020	e each or an oral exa is about this by four degree programmes)	mination in groups. If the method weeks prior to the original exami
stead ta of asse nation of Assess Langua Allocati Worklo 180 h Teachir Referre Bachelo Bachelo Bachelo Bachelo	ake the ssmen date at ment o ge of a ion of p mal inf ad ad ad ad ad ad ad ad ad ad ad ad ad	amination was chosen as e form of an oral examina t is changed, the lecture t the latest. Iffered: Once a year, wint issessment: German and places formation e LPO I (examination regu ars in ree (1 major) Physics (20 ree (1 major) Physics (20 ree (1 major) Physics (20	s method of assessme tion of one candidate must inform student er semester /or English lations for teaching-out 15) ure Technology (2015) 20) ure Technology (2020	e each or an oral exa is about this by four degree programmes)	mination in groups. If the method weeks prior to the original exami

Module title				Abbreviation		
Laboratory a	nd Measurement Techno	logy in Biophysics		11-LMB-152-m01		
Module coordinator			Module offered by			
Managing Director of the Institute of Applied Physics			Faculty of Physics and Astronomy			
ECTS Method of grading Only after succ. compl. of module			· · · · · ·	ind Astronomy		
6 numerical grade						
Duration Module level Other prerequisites						
1 semester graduate						
Contents						
The lecture covers relevant principles of molecular and cellular biology as well as the physical principles of bio- physical procedures for the examination and manipulation of biological systems. The main topics are optical measuring techniques and sensors, methods of single-particle detection, special microscoping techniques and methods of structure elucidation of biomolecules.						
Intended lear	rning outcomes					
sical procedu	know the principles of m tres for the examination a chniques and their applic 5.	and manipulation of b	iological systems. Th	ney have knowledge	of optical	
Courses (type	e, number of weekly conta	act hours, language –	- if other than Germa	n)		
V (3) + R (1) Module taugi	nt in: German or English					
Method of as	sessment (type, scope, la	anguage — if other th	an German, examina	tion offered — if not	everv seme-	
	tion on whether module o				, ,	
pages) or pre If a written ex stead take th of assessmen nation date a Assessment of	nation in groups (groups sentation/talk (approx. 3 camination was chosen a e form of an oral examina nt is changed, the lecture t the latest. offered: Once a year, sum assessment: German and	o minutes). s method of assessme ation of one candidate r must inform student mer semester	ent, this may be chan e each or an oral exa	nged and assessme mination in groups.	nt may in- If the methoo	
Allocation of	places					
Additional in	formation					
Workload						
180 h						
	le					
Teaching cyc						
	LPOI (examination reg	lations for teaching-	legree programmes)			
Module appe	ars in					
Bachelor' deg Master's deg Bachelor' deg	gree (1 major) Physics (20 gree (1 major) Nanostruct ree (1 major) Functional N gree (1 major) Physics (20 gree (1 major) Nanostruct	ure Technology (2015) Aaterials (2016) 120)				
	ajor Quantum Technology (2021)		generated 30-Mär-2024 • ex	am. reg. da-	page 103 / 155	
	2,		or (180 ECTS) Quantentechno	-		



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

Labora	e title			Abbreviation	
	tory and Measurement Technol		11-LMT-152-m01		
Madula and Marken					
Module coordinator			Module offered by		
Managing Director of the Institute of Applied Physics			Faculty of Physics a	nd Astronomy	
ECTS	Method of grading	Only after succ. cor	mpl. of module(s)		
6	numerical grade				
Duration Module level Other prerequisites					
1 semester undergraduate					
Conten	ts				
Introdu	ction to electronic and optical n	neasuring methods o	of physical metrology	, vacuum technology	/ and cryoge-
nics, cr	yogenics, light sources, spectro	scopic methods and	measured value acq	uisition.	
Intende	ed learning outcomes				
	dents have competencies in the n technology and cryogenics, cry on.				
Course	s (type, number of weekly conta	act hours, language -	– if other than Germa	n)	
V (3) +					
	e taught in: German or English				
Method	d of assessment (type, scope, la	anguage — if other th	an German, examina	tion offered — if not	everv seme-
	formation on whether module ca				,
stead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original exami- nation date at the latest. Assessment offered: Once a year, winter semester					
nation Assess	date at the latest. ment offered: Once a year, winte	r must inform studen er semester			
nation Assess Langua	date at the latest. ment offered: Once a year, wint ge of assessment: German and	r must inform studen er semester			If the method
nation Assess Langua	date at the latest. ment offered: Once a year, winte	r must inform studen er semester			If the method
nation Assess Langua Allocat	date at the latest. ment offered: Once a year, wint ge of assessment: German and ion of places	r must inform studen er semester			If the method
nation Assess Langua Allocat	date at the latest. ment offered: Once a year, wint ge of assessment: German and	r must inform studen er semester			If the method
nation Assess Langua Allocat Additio	date at the latest. ment offered: Once a year, winte ge of assessment: German and ion of places mal information	r must inform studen er semester			If the method
nation Assess Langua Allocat Additio Worklo	date at the latest. ment offered: Once a year, winte ge of assessment: German and ion of places mal information	r must inform studen er semester			If the method
nation of Assess Langua Allocat Additio Worklo 180 h	date at the latest. ment offered: Once a year, winte ge of assessment: German and ion of places mal information ad	r must inform studen er semester			If the method
nation of Assess Langua Allocat Additio Worklo 180 h	date at the latest. ment offered: Once a year, winte ge of assessment: German and ion of places mal information	r must inform studen er semester			If the method
nation of Assess Langua Allocat Additio Worklo 180 h	date at the latest. ment offered: Once a year, winte ge of assessment: German and ion of places mal information ad	r must inform studen er semester			If the method
nation of Assess Langua Allocat Additio Worklo 180 h Teachin 	date at the latest. ment offered: Once a year, winte ge of assessment: German and ion of places mal information ad	r must inform studen er semester /or English	ts about this by four		If the method
nation of Assess Langua Allocat Additio Worklo 180 h Teachin 	date at the latest. ment offered: Once a year, winte ge of assessment: German and, ion of places mal information ad	r must inform studen er semester /or English	ts about this by four		If the method
nation of Assess Langua Allocat Additio Worklo 180 h Teachir Referre 	date at the latest. ment offered: Once a year, winte ge of assessment: German and, ion of places mal information ad	r must inform studen er semester /or English	ts about this by four		If the method
nation of Assess Langua Allocat Worklo 180 h Teachin Referre Module	date at the latest. ment offered: Once a year, winte ge of assessment: German and, ion of places mal information ad ad ed to in LPO I (examination regu	r must inform studen er semester /or English 	ts about this by four		If the method
nation of Assess Langua Allocat Morklo 180 h Teachir Referre Bachelo	date at the latest. ment offered: Once a year, winte ge of assessment: German and, ion of places mal information ad ng cycle ed to in LPO I (examination regu	r must inform studen er semester /or English 	ts about this by four degree programmes)		If the method
nation of Assess Langua Allocat Additio Worklo 180 h Teachir Referre Bachelo Bachelo	date at the latest. ment offered: Once a year, winte- ige of assessment: German and, ion of places mal information ad ad ed to in LPO I (examination regu e appears in or' degree (1 major) Physics (200	r must inform studen er semester /or English 	ts about this by four degree programmes)		If the method
nation of Assess Langua Allocat Additio Worklo 180 h Teachin Referre Bachelo Bachelo Bachelo Bachelo	date at the latest. ment offered: Once a year, winte ge of assessment: German and ion of places mal information ad ad ad ad ad ad ad ad ad ad ad ad ad	r must inform studen er semester /or English 	ts about this by four degree programmes)		If the method
nation of Assess Langua Allocat Additio Worklo 180 h Teachin Referre Bachelo Bachelo Bachelo Bachelo	date at the latest. ment offered: Once a year, winte- ige of assessment: German and, ion of places mal information ad ad ad ad ad ad ad ad ad ad ad ad ad	r must inform studen er semester /or English 	ts about this by four degree programmes)		If the method
nation of Assess Langua Allocat Additio Worklo 180 h Teachir Referre Bachelo Bachelo Bachelo Bachelo Bachelo	date at the latest. ment offered: Once a year, winter ige of assessment: German and, ion of places mal information ad ad ad ad e appears in or' degree (1 major) Physics (200 or' degree (1 major) Nanostructu or's degree (1 major) Functional M or' degree (1 major) Physics (200 or' degree (1 major) Physics (200 or' degree (1 major) Nanostructu or's degree (1 major) Physics (200 or' degree (1 major) Physics (200 or' degree (1 major) Nanostructu	r must inform studen er semester /or English 	ts about this by four degree programmes)		If the method
nation of Assess Langua Allocat Morklo 180 h Teachin Referre Bachelo Bachelo Bachelo Bachelo Bachelo Bachelo	date at the latest. ment offered: Once a year, winte ge of assessment: German and, ion of places mal information ad ad ad ad ad ad ad ad ad ad ad ad ad	r must inform studen er semester /or English 	ts about this by four degree programmes)		If the method
nation of Assess Langua Allocat Additio Worklo 180 h Teachin Referre Bachelo Bachelo Bachelo Bachelo Bachelo Bachelo Bachelo Bachelo	date at the latest. ment offered: Once a year, winter ige of assessment: German and, ion of places mal information ad ad ad ad e appears in or' degree (1 major) Physics (200 or' degree (1 major) Nanostructu or's degree (1 major) Functional M or' degree (1 major) Physics (200 or' degree (1 major) Physics (200 or' degree (1 major) Nanostructu or's degree (1 major) Physics (200 or' degree (1 major) Physics (200 or' degree (1 major) Nanostructu	r must inform studen er semester /or English 	ts about this by four degree programmes)	weeks prior to the or	If the method



Master's degree (1 major) Functional Materials (2022) exchange program Physics (2023)

Module coordinator Module offered by Managing Director of the Institute of Applied Physics Faculty of Physics and Astronomy ECTS Method of grading Only after succ. compl. of module(s) 6 numerical grade Duration Module level Other prerequisites 1 semester graduate Contents The module comprises basic and advanced courses. The basic course "NI LabVIEW Basic 1" is the first level of each LabVIEW learning phase. LabVIEW Basic provides a systematic introduction to the functions and application fields of the development environment of LabVIEW. The students become acquainted with dataflow programing and with common LabVIEW architectures. They learn to develop LabVIEW applications for various application fields, from assessment and measurement applications up to data collection, device control, data recording and measurement analysis. In the advanced course "NI LabVIEW comment LabVIEW. The course builds upon LabVIEW Basic 1 and provides an introduction to the most common development technologies, in order to enable the students to successfully implement and distribute LabVIEW applications for different application fields. Course topics include techniques and procedures for the optimisation of application performance, e.g. through an optimised reuse of existing codes, usage of file 1/0 functions, principles of data management, event computing and methods of error handling. After finishing the course, the students have the ability to apply Lab-VIEW functions according to individual requirements, which enables a fast and productive applicati	Module title					Abbreviation
Managing Director of the Institute of Applied Physics Faculty of Physics and Astronomy ECTS Method of grading Only after succ. compl. of module(s) Duration Module level Other prerequisites 1 semester graduate Contents Contents The module comprises basic and advanced courses. The basic course "NLLabVIEW Basic 1" is the first level of each LabVIEW learning phase. LabVIEW Basic provides a systematic introduction to the functions and application fields of the development environment of LabVIEW. The students become acquainted with dataflow programing and with Common LabVIEW architectures. They learn to develop LabVIEW applications for various application fields, from assessment and measurement applications up to data collection, device control, data recording and measurement analysis. In the advanced course "NL LabVIEW applications for various application fields. Course topics include techniques and procedures for the optimisation of application fordifferent application fields. Course topics include techniques and procedures for the optimisation of application feed formance, e.g. through an optimised ruse of existing codes, usage of file 1/0 functions, principles of data management, event computing and methods of error handling. After finishing the course, the students have the ability to apply LabVIEW functions according to individual requirements, which enables a fast and productive application development. Intended learning outcomes Intended learning outcomes Courses (type, number of weekly contact hours, language — if other than Ge	Introduction to Labview 11-LVW-152-mo1					
ECTS Method of grading Only after succ. compl. of module(s) 6 numerical grade Duration Module level Other prerequisites 1 semester graduate Contents Contents Contents Contents Contents Contents Contents Contents Contents	Module	e coordi	nator		Module offered by	
6 numerical grade Duration Module level Other prerequisites 1 semester graduate Contents The module comprises basic and advanced courses. The basic course "NI LabVIEW Basic 1" is the first level of each LabVIEW learning phase. LabVIEW Basic provides a systematic introduction to the functions and application fields of the development environment to LabVIEW. The students become acquainted with dataflow programming and with common LabVIEW architectures. They learn to develop LabVIEW applications for various application of fields, from assessment and measurement applications up to data collection, device control, data recording and measurement analysis. In the advanced course "NI LabVIEW ore 2", the students become of explainted techniques and provides an introduction to the most commonent technologies, in order to enable the students to successfully implement and distribute LabVIEW application for different application fields. Course topics include techniques and procedures for the optimisation of application periodes an introduction on the most common development technologies, in order to enable the students to successfully implement set of the optimisation of application development. VIEW functions according to individual requirements, which enables a fast and productive application development. Intended learning outcomes The students have specific and advanced knowledge in the application field of LabVIEW. They know the principles of working with LabVIEW and are able to develop applications, e.g. for recording and analysing measuring data. Courses (type, number of weekly contact hours		ing Dire	ctor of the Institute of Ap	plied Physics	Faculty of Physics and Astronomy	
Duration Module level Other prerequisites 1 semester graduate Contents The module comprises basic and advanced courses. The basic course "NL LabVIEW Basic 1" is the first level of each LabVIEW learning phase. LabVIEW Basic provides a systematic introduction to the functions and application fields of the development environment of LabVIEW. The students become acquainted with datallow programing and with common LabVIEW architectures. They learn to develop LabVIEW applications for various application fields, from assessment and measurement applications up to data collection, device control, data recording and measurement analysis. In the advanced course "NL LabVIEW applications for different application is enable the students to successfully implement and distribute LabVIEW applications for different application fields. Course topics include techniques and procedures for the optimisation of application development. Introde hearning outcomes	ECTS				npl. of module(s)	
1 semester graduate		<u> </u>	-			
Contents The module comprises basic and advanced courses. The basic course "NI LabVIEW Basic 1" is the first level of each LabVIEW learning phase. LabVIEW Basic provides a systematic introduction to the functions and application of fields of the development environment of LabVIEW. The students become acquainted with dataflow programming and with common LabVIEW architectures. They learn to develop LabVIEW applications for various application on fields of the development analysis. In the advanced course 'NI LabVIEW Core 2", the students learn to develop comprehensive standalone applications, including the graphical development environment LabVIEW. The course builds upon LabVIEW Basic 1 and provides an introduction to the most common development technologies, in order to enable the students to successfully implement and distribute LabVIEW applications for different application fields. Course topics include techniques and procedures for the optimisation of application performance, e.g. through an optimised reuse of existing codes, usage of file I/O functions, principles of data management, event computing and methods of error handling. After finishing the course, the students have the ability to apply LabVIEW functions according to individual requirements, which enables a fast and productive application development. Intended learning outcomes The students have specific and advanced knowledge in the application field of LabVIEW. They know the principles of working with LabVIEW and are able to develop applications, e.g. for recording and analysing measuring data. Courses (type, number of weekly contact hours, language — if other than German) V (1) + R (3) Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information whether module can be chosen to earn a bon		· · · · · · · · · · · · · · · · · · ·		Other prerequisites		
The module comprises basic and advanced courses. The basic course "NI LabVIEW Basic 1" is the first level of each LabVIEW learning phase. LabVIEW Basic provides a systematic introduction to the functions and application on fields of the development environment of LabVIEW. The students become acquainted with dataflow programming and with common LabVIEW architectures. They learn to develop LabVIEW applications for various application of fields. from assessment and measurement applications up to data collection, device control, data recording and measurement analysis. In the advanced course "NI LabVIEW core 2", the students learn to develop comprehensive standalone applications, including the graphical development environment LabVIEW. The course builds upon LabVIEW Basic 1 and provides an introduction to the most common development technologies, in order to enable the students to successfully implement and distribute LabVIEW applications for different application fields. Course topics include techniques and procedures for the optimisation of application performance, e.g. through an optimised reuse of existing codes, usage of file I/O functions, principles of data management, event computing and methods of error handling. After finishing the course, the students have the ability to apply LabVIEW functions according to individual requirements, which enables a fast and productive application development. Intended learning outcomes The students have specific and advanced knowledge in the application field of LabVIEW. They know the principles of working with LabVIEW and are able to develop applications, e.g. for recording and analysing measuring data. Courses (type, number of weekly contact hours, language — if other than German) V(1) + R (3) Module taught in: German or English Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus) written examination (approx. 9 to 120 minutes) or oral examination of						
V (1) + R (3) Module taught in: German or English Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus) written examination (approx. 9 to 120 minutes) or oral examination of one candidate each (approx. 30 minutes) or oral examination in groups (groups of 2, approx. 30 minutes per candidate) or project report (approx. 8 to 10 pages) or presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may in- stead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original exami- nation date at the latest. Assessment offered: Once a year, winter semester Language of assessment: German and/or English Allocation of places 	Contents The module comprises basic and advanced courses. The basic course "NI LabVIEW Basic 1" is the first level of each LabVIEW learning phase. LabVIEW Basic provides a systematic introduction to the functions and application fields of the development environment of LabVIEW. The students become acquainted with dataflow programming and with common LabVIEW architectures. They learn to develop LabVIEW applications for various application fields, from assessment and measurement applications up to data collection, device control, data recording and measurement analysis. In the advanced course "NI LabVIEW Core 2", the students learn to develop comprehensive standalone applications, including the graphical development environment LabVIEW. The course builds upon LabVIEW Basic 1 and provides an introduction to the most common development technologies, in order to enable the students to successfully implement and distribute LabVIEW applications for different application fields. Course topics include techniques and procedures for the optimisation of application performance, e.g. through an optimised reuse of existing codes, usage of file I/O functions, principles of data management, event computing and methods of error handling. After finishing the course, the students have the ability to apply LabVIEW functions according to individual requirements, which enables a fast and productive application development. Intended learning outcomes The students have specific and advanced knowledge in the application field of LabVIEW. They know the princip-					
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ster, information on whether module can be chosen to earn a bonus) written examination (approx. 90 to 120 minutes) or oral examination of one candidate each (approx. 30 minutes) or oral examination in groups (groups of 2, approx. 30 minutes per candidate) or project report (approx. 8 to 10 pages) or presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may in- stead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original exami- nation date at the latest. Assessment offered: Once a year, winter semester Language of assessment: German and/or English Allocation of places Moditional information Workload 180 h			t in: German or English			
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Additional information Workload 180 h	written examination (approx. 90 to 120 minutes) or oral examination of one candidate each (approx. 30 minutes) or oral examination in groups (groups of 2, approx. 30 minutes per candidate) or project report (approx. 8 to 10 pages) or presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Assessment offered: Once a year, winter semester					
 Workload 180 h	Allocat	tion of p	laces			
 Workload 180 h						
180 h	Additio	onal info	ormation			
180 h						
	Worklo	ad				
Teaching cycle	180 h					
	Teachi	ng cycle	9			

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

Module appears in

Bachelor' degree (1 major) Physics (2015) Bachelor' degree (1 major) Nanostructure Technology (2015) Bachelor' degree (1 major) Physics (2020) Bachelor' degree (1 major) Nanostructure Technology (2020) Bachelor' degree (1 major) Quantum Technology (2021) exchange program Physics (2023)

Module	e title				Abbreviation	
Mathe Equation		3 for Students of Physics	and related Discipli	ines (Differential	11-M-D-152-m01	
Module	e coord	inator		Module offered by	,	
Managing Director of the Institute of Theoretical Physics and Astrophysics				Faculty of Physics	and Astronomy	
ECTS	Metho	od of grading	Only after succ. cor	npl. of module(s)		
8	nume	rical grade				
Duratio	on	Module level	Other prerequisites	5		
1 seme	ster	undergraduate				
Conten	Its					
Ordina Fundar 1. Ordiı	ry diffe nentals nary dif	nary differential equation rential equations and sys of function theory. ferential equations		equations.		
		ethods				
		and uniqueness theorem f differential equations	l			
		iction for inhomogeneou	s problems			
		e DGL, Legendre DGL				
2.1 Cor 2.2 Diff 2.3 Sin 2.4 Cor 2.5 Lau 2.6 Ana 2.7 gar 2.8 Diff 2.9 Sac	ferentia gulariti mplex i urent se alytical nma, b ferentia ddle po	eory unctions ition, holomorphic functi es in the complex ntegration and the Cauch ries, residual theorem, F continuation, meromorp eta, hypergeometric func il equations in the compl int method ar differential equations	ny integral theorem ourier transformatior hic functions, whole tions, sets of Weiers ex, Bessel differentia	functions trasse and Mittag-Le	effler	
Intend	ed lear	ning outcomes				
on met	hods fo	as basic knowledge of m or ordinary differential ec ne required computing te	uations as well as th	-	-	
Course	s (type	, number of weekly conta	ect hours, language -	– if other than Germ	an)	
V (4) + Module		t in: Ü: German or Englis	h			
		s essment (type, scope, la on on whether module c			ation offered — if not eve	ery seme-
		nation (approx. 120 minu ssessment: German and				
Allocat	tion of p	olaces				
Additio	onal inf	ormation				
Worklo	ad					
240 h						
	with 1 ma	or Quantum Technology (2021)	JMU Würzburg	• generated 30-Mär-2024 • e	xam. reg. da- pa	ige 109 / 155
			_	lor (180 ECTS) Quantentechr		

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 (2015)

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

Bachelor' degree (1 major) Functional Materials (2015)

Bachelor' degree (1 major) Physics (2020)

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

Bachelor' degree (1 major) Functional Materials (2021)

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

Module lille	Module title Abbreviation					
Mathematics 4 for Students of Phys	11-M-F-152-m01					
ysis)						
Module coordinator	N	Nodule offered by				
Managing Director of the Institute or and Astrophysics	f Theoretical Physics F	aculty of Physics a	and Astronomy			
ECTS Method of grading	Only after succ. comp	l. of module(s)				
8 numerical grade						
Duration Module level	Other prerequisites					
1 semester undergraduate						
Contents						
 quantum mechanics and the representation as a wave function generated by basic states form an important element of the formal framework of quantum mechanics with the so-called bracket formalism by Dirac. Fundamentals of partial differential equations in physics and systems of differential equations. Part I: functional analysis Linear vector spaces Metric, standardized spaces Linear operators Function space, completion, Lebesgue integral, Hilbert space Linear operators on the Hilbert space Matrix representation of operators The Dirac delta function and its different representations Part II: differential equations Part II: differential equations Part II: differential equations Linear partial differential equations of 2nd order 2. 1 D and 3D wave equation 						
2.3 Helmholtz equation and potenti 2.4 Parabolic differential equations						
Intended learning outcomes						
The student has basic knowledge of as knowledge of solution methods f techniques.						
Courses (type, number of weekly co	ntact hours, language — i	f other than Germa	in)			
V (4) + Ü (2) Module taught in: Ü: German or Eng	lish					
Method of assessment (type, scope ster, information on whether modul			tion offered — if not every seme-			
written examination (approx. 120 m Language of assessment: German a						
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 (2015)

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

Bachelor' degree (1 major) Physics (2020)

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

Bachelor' degree (1 major) Functional Materials (2021)

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

Module title Abb					Abbreviation	
Mathematical Methods of Physics					11-M-MR-202-m01	
Module coordinator Module offered by						
				Module offered by		
Managing Director of the Institute of Theoretical PhysicsFaculty of Physics and Astronomyand AstrophysicsFaculty of Physics and Astronomy						
ECTS		od of grading	Only after succ. cor	npl. of module(s)		
6	(not) s	successfully completed				
Duratio	on	Module level	Other prerequisites	5		
2 seme	ester	undergraduate				
Conten	Its					
Germa	n conte	nts available but not trar	nslated yet.			
		er Mathematik und eleme ′orbereitung auf die Mod				
Intend	ed lear	ning outcomes				
Germa	n inten	ded learning outcomes a	vailable but not trans	slated yet.		
		erende verfügt über die K Iche in der Theoretischer				ren Rechen-
Course	s (type	, number of weekly conta	ict hours, language –	– if other than Germa	n)	
		V (2) + Ü (2)				
Module	e taugh	t in: German or English	-			
		sessment (type, scope, la ion on whether module c			tion offered — if not	every seme-
		cessful completion of ap 15 minutes)	prox. 50% of approx	. 13 exercise sheets)	or	
Allocat	ion of _l	olaces				
Additio	onal inf	ormation				
Worklo	ad					
180 h						
	ng aval	0				
Teachi	ing Lycl	C				
		LPOI (examination regu	liations for teaching-	degree programmes)		
§ 53 N § 77 N						
Module		ars in				
		ree (1 major) Physics (20	20)			
	-	ree (1 major) Nanostructu))		
	-	ree (1 major) Mathematic				
	-	gree (1 major, 1 minor) Pł	•			
		mination for the teaching		-		
		mination for the teaching		-		
		mination for the teaching				
First st	ate exa	mination for the teaching	g degree Mittelschule	e Physics (2020)		
Bachelor's	with 1 ma	jor Quantum Technology (2021)	JMU Würzburg•	• generated 30-Mär-2024 • ex	am. reg. da-	page 113 / 155
			-	lor (180 ECTS) Quantentechno	-	



Bachelor' degree (1 major) Quantum Technology (2021) exchange program Physics (2023) Bachelor' degree (1 major) Mathematical Physics (2024)

Module title					Abbreviation				
Nanoai	Nanoanalytics 11-NAN-152-mo1								
Module	e coord	inator		Module offered by	·				
		ector of the Institute of A		Faculty of Physics a	nd Astronomy				
ECTS									
6	L	rical grade							
Duratio		Module level	Other prerequisites						
	1 semester graduate Contents								
Princip level u of X-ray py. Sca crosco	Principles of analytic procedures in the field of nanostructure physics, imaging techniques from a microscopic level up to an atomic level, examination of chemical composition, spectroscopy of electronic properties, usage of X-ray methods Physics and material systems on the nanoscale Scanning probes: Atomic force microscopy. Scanning tunneling microscopy Electron probes: Scanning electron microscope. Transmission electron microscope Secondary ions - mass spectrometry - X-ray methods: Synchrotron spectroscopy. Photoemission. X-ray absorption								
Intend	ed learı	ning outcomes							
vel. The pic me	ey knov	nave basic knowledge of microscoping procedur or the determination of e ds.	es that are used in pr	actice in labs and th	e industry as well as	s spectrosco-			
Course	s (type	number of weekly conta	act hours, language –	- if other than Germa	n)				
V (3) + Module		t in: German or English							
		essment (type, scope, la			tion offered — if not	every seme-			
written or oral pages) If a writ stead t of asse nation Assess	examin examin or pres tten exa ake the essmen date at ment o	on on whether module c nation (approx. 90 to 120 ation in groups (groups) entation/talk (approx. 3 mination was chosen as form of an oral examina t is changed, the lecture the latest. ffered: Once a year, wint ssessment: German and	o minutes) or oral exa of 2, approx. 30 minu o minutes). 5 method of assessme tion of one candidate r must inform student er semester	mination of one can ites per candidate) o ent, this may be cha e each or an oral exa	r project report (app nged and assessmen mination in groups.	rox. 8 to 10 nt may in- If the method			
Allocat	ion of p	olaces							
Additio	onal info	ormation							
Worklo	ad								
180 h									
Teachi	ng cycl	9							
Referred to in LPO I (examination regulations for teaching-degree programmes)									
Module	e appea	rs in							
Bachel	or' deg	ree (1 major) Physics (20 ree (1 major) Nanostructı ee (1 major) Functional N	ure Technology (2015))					
Bachelor's	with 1 maj	or Quantum Technology (2021)		generated 30-Mär-2024 • ex or (180 ECTS) Quantentechno	-	page 115 / 155			

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

Bachelor' degree (1 major) Physics (2020) Bachelor' degree (1 major) Nanostructure Technology (2020) Bachelor' degree (1 major) Quantum Technology (2021) exchange program Physics (2023)

General Competences for Students of Quantum Technology Module coordinator Managing Director of the Institute of Applied Physics ECTS Method of grading Only after succ. cor 5 numerical grade Duration Module level Other prerequisites 1 semester undergraduate Contents General Qualifications for students in Quantum Technology Intended learning outcomes The students have general competencies corresponding to of the Bachelor's programme. They have knowledge of a cu quired understanding of this topic. They are able to classify on areas. Courses (type, number of weekly contact hours, language – V (2) + R (2) Method of assessment (type, scope, language — if other th ster, information on whether module can be chosen to earr	Module offered by Faculty of Physics and Astronomy mpl. of module(s) s /. the requirements of a module in Quantum Technology irrent subdiscipline of quantum technology and the re- / the subject-specific contexts and know the application					
Managing Director of the Institute of Applied Physics ECTS Method of grading Only after succ. cor 5 numerical grade Duration Module level Other prerequisites 1 semester undergraduate Contents Contents General Qualifications for students in Quantum Technology Intended learning outcomes The students have general competencies corresponding to of the Bachelor's programme. They have knowledge of a cu quired understanding of this topic. They are able to classify on areas. Courses (type, number of weekly contact hours, language – V (2) + R (2) V (2) + R (2) Method of assessment (type, scope, language – if other th ster, information on whether module can be chosen to earr	Faculty of Physics and Astronomy mpl. of module(s) s /. the requirements of a module in Quantum Technology irrent subdiscipline of quantum technology and the re- / the subject-specific contexts and know the applicati					
Managing Director of the Institute of Applied Physics ECTS Method of grading Only after succ. cor 5 numerical grade Duration Module level Other prerequisites 1 semester undergraduate Contents Contents General Qualifications for students in Quantum Technology Intended learning outcomes The students have general competencies corresponding to of the Bachelor's programme. They have knowledge of a cu quired understanding of this topic. They are able to classify on areas. Courses (type, number of weekly contact hours, language – V (2) + R (2) V (2) + R (2) Method of assessment (type, scope, language – if other th ster, information on whether module can be chosen to earr	Faculty of Physics and Astronomy mpl. of module(s) s /. the requirements of a module in Quantum Technology irrent subdiscipline of quantum technology and the re- / the subject-specific contexts and know the applicati					
ECTS Method of grading Only after succ. cor 5 numerical grade Duration Module level Other prerequisites 1 semester undergraduate Contents Contents General Qualifications for students in Quantum Technology Intended learning outcomes The students have general competencies corresponding to of the Bachelor's programme. They have knowledge of a cu quired understanding of this topic. They are able to classify on areas. Courses (type, number of weekly contact hours, language – V (2) + R (2) Method of assessment (type, scope, language – if other th ster, information on whether module can be chosen to earr	mpl. of module(s) s /. the requirements of a module in Quantum Technolog irrent subdiscipline of quantum technology and the re / the subject-specific contexts and know the applicati					
5 numerical grade Duration Module level Other prerequisites 1 semester undergraduate Contents General Qualifications for students in Quantum Technology Intended learning outcomes The students have general competencies corresponding to of the Bachelor's programme. They have knowledge of a cu quired understanding of this topic. They are able to classify on areas. Courses (type, number of weekly contact hours, language – V (2) + R (2) Method of assessment (type, scope, language — if other th ster, information on whether module can be chosen to earr	s /. the requirements of a module in Quantum Technolog irrent subdiscipline of quantum technology and the re / the subject-specific contexts and know the applicati					
1 semester undergraduate Contents General Qualifications for students in Quantum Technology Intended learning outcomes The students have general competencies corresponding to of the Bachelor's programme. They have knowledge of a cu quired understanding of this topic. They are able to classify on areas. Courses (type, number of weekly contact hours, language – V (2) + R (2) Method of assessment (type, scope, language – if other th ster, information on whether module can be chosen to earr	/. the requirements of a module in Quantum Technolog rrent subdiscipline of quantum technology and the re y the subject-specific contexts and know the applicati					
Contents General Qualifications for students in Quantum Technology Intended learning outcomes The students have general competencies corresponding to of the Bachelor's programme. They have knowledge of a cu quired understanding of this topic. They are able to classify on areas. Courses (type, number of weekly contact hours, language – V (2) + R (2) Method of assessment (type, scope, language – if other th ster, information on whether module can be chosen to earn	the requirements of a module in Quantum Technolog rrent subdiscipline of quantum technology and the re y the subject-specific contexts and know the applicati					
General Qualifications for students in Quantum Technology Intended learning outcomes The students have general competencies corresponding to of the Bachelor's programme. They have knowledge of a cu quired understanding of this topic. They are able to classify on areas. Courses (type, number of weekly contact hours, language – V (2) + R (2) Method of assessment (type, scope, language – if other th ster, information on whether module can be chosen to earn	the requirements of a module in Quantum Technolog rrent subdiscipline of quantum technology and the re y the subject-specific contexts and know the applicati					
Intended learning outcomes The students have general competencies corresponding to of the Bachelor's programme. They have knowledge of a cu quired understanding of this topic. They are able to classify on areas. Courses (type, number of weekly contact hours, language – V (2) + R (2) Method of assessment (type, scope, language – if other th ster, information on whether module can be chosen to earn	the requirements of a module in Quantum Technolog rrent subdiscipline of quantum technology and the re y the subject-specific contexts and know the applicati					
The students have general competencies corresponding to of the Bachelor's programme. They have knowledge of a cu quired understanding of this topic. They are able to classify on areas. Courses (type, number of weekly contact hours, language – V (2) + R (2) Method of assessment (type, scope, language – if other th ster, information on whether module can be chosen to earn	rrent subdiscipline of quantum technology and the re y the subject-specific contexts and know the applicati					
of the Bachelor's programme. They have knowledge of a cu quired understanding of this topic. They are able to classify on areas. Courses (type, number of weekly contact hours, language – V (2) + R (2) Method of assessment (type, scope, language – if other th ster, information on whether module can be chosen to earn	rrent subdiscipline of quantum technology and the re y the subject-specific contexts and know the applicati					
V (2) + R (2) Method of assessment (type, scope, language — if other th ster, information on whether module can be chosen to earr						
Method of assessment (type, scope, language — if other th ster, information on whether module can be chosen to earn						
Written examination (approx. 90 to 120 minutes) or oral exa or oral examination in groups (groups of 2, 30 minutes per	n a bonus) amination of one candidate each (approx. 30 minutes					
10 pages) or presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessm stead take the form of an oral examination of one candidat of assessment is changed, the lecturer must inform studen nation date at the latest. Language of assessment: German and/or English	e each or an oral examination in groups. If the metho					
Allocation of places						
Additional information						
Approval from examination committee required.						
Workload						
150 h						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-	degree programmes)					
Module appears in						
Bachelor' degree (1 major) Quantum Technology (2021)						

Module title Abbreviation					Abbreviation	
Introdu	ction t	o Quantum Technology			11-N-EIN-212-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)		
7	L	rical grade				
Duratio		Module level	Other prerequisites		a sular attan dan sa (mininguna	
2 seme	ster	undergraduate	85% of sessions).	site to assessment: i	regular attendance (minimum	
Conten	ts					
Introdu	ction to	o the principles of produc	ing, characterising a	nd applying in quan	tum technology.	
Intende	ed leari	ning outcomes				
		nave knowledge of the fu m technology.	ndamental properties	s, technologies, chai	racterising methods and functi-	
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)	
V (2) + S Module		t in: German or English				
		e ssment (type, scope, la on on whether module ca			tion offered — if not every seme-	
		5 minutes) with discussi ssessment: German and,		mination (approx. 12	20 minutes)	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
this wil 3 Sente find tha gistratio ly regist sessme	Registration: If a student registers for the exercises and obtains the qualification for admission to assessment, this will be considered a declaration of will to seek admission to assessment pursuant to Section 20 Subsection 3 Sentence 4 ASPO (general academic and examination regulations). If the module coordinators subsequently find that the student has obtained the qualification for admission to assessment, they will put the student's registration for assessment into effect. Only those students that meet the respective prerequisites can successfully register for an assessment. Students who did not register for an assessment or whose registration for an assessment was not put into effect will not be admitted to the respective assessment. If a student takes an assessment to which he/she has not been admitted, the grade achieved in this assessment will not be considered.					
Worklo	ad					
210 h						
Teachir	ıg cycl	e				
Referre	d to in	LPOI (examination regu	lations for teaching-c	legree programmes)		
Module	e appea	in a state of the				
Module studies (Bachelor) Orientierungsstudien (2020) Bachelor' degree (1 major) Quantum Technology (2021) exchange program Physics (2023)						

Module title					Abbreviation	
Seminar Quantum Technology					11-N-HS-212-m01	
Modul	e coord	inator		Module offered by		
		ectors of the Institute of A		Faculty of Physics a	nd Astronomy	
	1	f Theoretical Physics and				
ECTS		od of grading rical grade	Only after succ. con	ipl. of module(s)		
5 Duratio		Module level	Other prerequisites			
1 seme		undergraduate			regular attendance (minimum	
Conter	nts					
Curren	t questi	ons on advanced topics	of quantum technolo	gy.		
Intend	ed lear	ning outcomes				
		nave in-depth knowledge acquire this knowledge ar			n technology. They are able to in- າ	
Course	es (type	, number of weekly conta	ct hours, language –	- if other than Germa	n)	
S (2) Module	e taugh	t in: German or English				
		s essment (type, scope, la on on whether module ca			tion offered — if not every seme-	
		5 minutes) with discussi ssessment: German and,		amination (approx. 12	20 minutes)	
Allocat	tion of p	olaces				
Additio	onal inf	ormation				
this wi 3 Sente find the gistrati ly regis sessme	ll be co ence 47 at the s ion for a ster for a ent was	nsidered a declaration of ASPO (general academic tudent has obtained the assessment into effect. O an assessment. Students not put into effect will n	will to seek admission and examination reg qualification for adm nly those students the who did not register ot be admitted to the	on to assessment pu ulations). If the mod ission to assessmen at meet the respecti for an assessment o respective assessm	n for admission to assessment, rsuant to Section 20 Subsection ule coordinators subsequently t, they will put the student's re- ve prerequisites can successful- or whose registration for an as- ent. If a student takes an as- sessment will not be considered	
Worklo	bad					
150 h						
Teachi	ng cycl	e				
Referre	ed to in	LPOI (examination regu	lations for teaching-o	degree programmes)		
		•				
	e appea					
		ree (1 major) Quantum Te gram Physics (2023)	chnology (2021)			

Module title					Abbreviation		
Industrial Internship Quantum Technology					11-N-IP-212-m01		
Module	e coord	inator		Module offered by			
Manag	ing Dire	ector of the Institute of Ap	oplied Physics	Faculty of Physics a	nd Astronomy		
ECTS	1	od of grading	Only after succ. com	pl. of module(s)			
10	nume	rical grade					
Duratio		Module level	Other prerequisites				
1 seme	ster	undergraduate					
Conten	ts						
		ndustrial methods, work report and an oral prese		production method	s. Summary of own experiences		
Intende	ed lear	ning outcomes					
					istrial technologies with relevan- rt and an oral presentation.		
Course	s (type	, number of weekly conta	ct hours, language —	· if other than Germa	n)		
P (o) +		, , , , , , , , , , , , , , , , , , , ,	, <u> </u>		,		
		essment (type, scope, la	nguage — if other tha	an German, examina	tion offered — if not every seme-		
		on on whether module ca					
		actical course (approx. 1 ssessment: German and,		entation/talk (appro	x. 45 minutes). Weighted: 1:4		
Allocat	ion of p	olaces					
Additio	onal inf	ormation					
Additional information Registration: If a student registers for the exercises and obtains the qualification for admission to assessment, this will be considered a declaration of will to seek admission to assessment pursuant to Section 20 Subsection 3 Sentence 4 ASPO (general academic and examination regulations). If the module coordinators subsequently find that the student has obtained the qualification for admission to assessment, they will put the student's re- gistration for assessment into effect. Only those students that meet the respective prerequisites can successful- ly register for an assessment. Students who did not register for an assessment or whose registration for an as- sessment was not put into effect will not be admitted to the respective assessment. If a student takes an as- sessment to which he/she has not been admitted, the grade achieved in this assessment will not be considered.							
Worklo	ad						
300 h							
Teachi	ng cycl	e					
Referre	ed to in	LPOI (examination regu	lations for teaching-o	legree programmes)			
Module	e appea	ars in					
	Bachelor' degree (1 major) Quantum Technology (2021)						

Module title	Abbreviation							
Nanotechnology in Energy Research	Nanotechnology in Energy Research 11-NTE-152-mo1							
Module coordinator		Module offered by						
Managing Director of the Institute of A	oplied Physics	Faculty of Physics a	nd Astronomy					
ECTS Method of grading	Only after succ. con	pl. of module(s)						
6 numerical grade								
Duration Module level	Other prerequisites							
1 semester graduate								
Contents								
Nanotechnology is of great significance for energy research. Energy efficiency can be heightened in numerous processes or applications by using special functional materials. This module covers special materials, surfaces and structures that have optimised properties due to effects of nanotechnology. It explains the underlying physical contexts. It uses specific materials and components as examples, such as thermal insulation materials, heat accumulators, functional nanoscale layer and particle systems with spectral selective properties, nanoporous vacuum insulations and electrode materials.								
Intended learning outcomes								
The students have specific and advance research. They know methods of nanot They are able to apply their knowledge	echnology to influen	ce the properties of I						
Courses (type, number of weekly conta	ict hours, language –	if other than Germa	n)					
V (3) + R (1) Module taught in: German or English								
Method of assessment (type, scope, la ster, information on whether module c			tion offered — if not	every seme-				
or oral examination in groups (groups pages) or presentation/talk (approx. 3) If a written examination was chosen as stead take the form of an oral examina of assessment is changed, the lecturer nation date at the latest.	Assessment offered: Once a year, summer semester							
Allocation of places								
Additional information								
Workload								
180 h								
Teaching cycle								
Referred to in LPO I (examination regu	lations for teaching-o	legree programmes)						
Module appears in								
Bachelor' degree (1 major) Nanostructu Bachelor' degree (1 major) Nanostructu Bachelor' degree (1 major) Quantum Te Master's degree (1 major) Functional N	ure Technology (2020 echnology (2021)							
Bachelor's with 1 major Quantum Technology (2021)	-	generated 30-Mär-2024 • exa or (180 ECTS) Quantentechno	-	page 121 / 155				



Module title					Abbreviation		
Novel T	Novel Transport Phenomena 11-NTP-152-m01						
Module	e coordi	nator		Module offered by			
Managi	ng Dire	ctor of the Institute of Ap	oplied Physics	Faculty of Physics a	nd Astronomy		
ECTS		d of grading	Only after succ. com	pl. of module(s)			
6	numei	ical grade					
Duratio	n	Module level	Other prerequisites				
1 seme	ster	undergraduate	-				
Conten	ts						
Current	resear	ch topics and application	ns of novel transport	phenomena.			
Intende	ed learr	ning outcomes					
ly in the to acqu	e field o ire this	of novel transport phenor knowledge. They are ab	nena, and understan le to classify the subj	d the measuring and ect-specific contexts	blogy or nano sciences, especial- d evaluation methods necessary and know the application areas.		
		number of weekly conta	ct nours, language —	in other than Gernia	11)		
V (3) + Module		t in: German or English					
Method	l of ass				tion offered — if not every seme-		
or oral o pages) If a writ stead ta of asse nation Langua	examin or pres ten exa ake the ssment date at ge of a	ation in groups (groups of entation/talk (approx. 30 mination was chosen as form of an oral examina- t is changed, the lecturer the latest. ssessment: German and	of 2, approx. 30 minuto o minutes). method of assessme tion of one candidate must inform student	tes per candidate) of ent, this may be char e each or an oral exar	didate each (approx. 30 minutes) r project report (approx. 8 to 10 nged and assessment may in- mination in groups. If the method weeks prior to the original exami-		
Allocat	ion of p	laces					
Additio	nal info	ormation					
Worklo	ad						
180 h							
Teachir	ng cyclo	9					
Referre	d to in	LPOI (examination regu	lations for teaching-d	legree programmes)			
Module	Module appears in						
Bachel	or' degi	ee (1 major) Nanostructu	re Technology (2015)				
	-	ee (1 major) Nanostructu)			
Bachel	Bachelor' degree (1 major) Quantum Technology (2021)						

Module title				Abbreviation		
Data and Erro	r Analysis			11-P-FR1-152-m01		
			Module offered by			
Managing Director of the Institute of Applied Physics Faculty of Physics and Astronomy						
	od of grading successfully completed	Only after succ. con	ipl. of module(s)			
	r					
Duration 1 semester	Module level undergraduate	Other prerequisites	site to assessment: (completion of everci	ses (annroy	
		13 exercise sheets p approx. 50% of exer	per semester). Studen rcises will qualify for students about the re	nts who successfully admission to asses	y completed sment. The	
Contents						
Types of error and standard	s, error approximation an deviation.	id propagation, graph	nic representations, l	linear regression, m	ean values	
Intended lear	ning outcomes					
	are able to evaluate mean to draw, present and dis			gation and of the pri	nciples of	
Courses (type	e, number of weekly conta	act hours, language –	- if other than Germa	n)		
V (1) + Ü (1) Module taugł	ıt in: Ü: German or Englisl	h				
	sessment (type, scope, la ion on whether module c			tion offered — if not	every seme-	
	nation (approx. 120 minu assessment: German and					
Allocation of		,				
Additional inf	formation					
this will be co 3 Sentence 4 find that the s gistration for ly register for sessment was	If a student registers for t onsidered a declaration of ASPO (general academic student has obtained the assessment into effect. O an assessment. Students s not put into effect will n which he/she has not bee	f will to seek admission and examination reg qualification for adm only those students the s who did not register ot be admitted to the	on to assessment pu ulations). If the mod ission to assessmen nat meet the respecti for an assessment of respective assessm	rsuant to Section 20 ule coordinators sub it, they will put the s ive prerequisites car or whose registratior ent. If a student tak	o Subsection osequently itudent's re- n successful- n for an as- es an as-	
Workload						
60 h						
Teaching cyc	le					
Referred to in	LPOI (examination regu	llations for teaching-o	degree programmes)			
§ 53 Nr. 1 c) § 77 Nr. 1 d)						
Module appe	ars in					
Bachelor' deg Bachelor' deg	gree (1 major) Mathematic gree (1 major) Physics (20 gree (1 major) Nanostructu	15))			
Bachelor's with 1 ma	chelor's with 1 major Quantum Technology (2021) JMU Würzburg • generated 30-Mär-2024 • exam. reg. da- ta record Bachelor (180 ECTS) Quantentechnologie - 2021 page 124 / 155					

UNIVERSITÄT WÜRZBURG

Bachelor' degree (1 major) Mathematical Physics (2015) Bachelor' degree (1 major) Computational Mathematics (2015) Bachelor' degree (1 major) Aerospace Computer Science (2015) Bachelor' degree (1 major) Functional Materials (2015) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2015) First state examination for the teaching degree Grundschule Physics (2015) First state examination for the teaching degree Realschule Physics (2015) First state examination for the teaching degree Gymnasium Physics (2015) First state examination for the teaching degree Mittelschule Physics (2015) Bachelor' degree (1 major) Mathematical Physics (2016) Bachelor' degree (1 major) Aerospace Computer Science (2017) First state examination for the teaching degree Grundschule Physics (2018) First state examination for the teaching degree Realschule Physics (2018) First state examination for the teaching degree Gymnasium Physics (2018) First state examination for the teaching degree Mittelschule Physics (2018) Bachelor' degree (1 major) Physics (2020) Bachelor' degree (1 major) Nanostructure Technology (2020) Bachelor' degree (1 major) Mathematical Physics (2020) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2020) Bachelor' degree (1 major) Aerospace Computer Science (2020) First state examination for the teaching degree Grundschule Physics (2020) First state examination for the teaching degree Gymnasium Physics (2020) First state examination for the teaching degree Realschule Physics (2020) First state examination for the teaching degree Mittelschule Physics (2020) Bachelor' degree (1 major) Functional Materials (2021) Bachelor' degree (1 major) Quantum Technology (2021) Bachelor' degree (1 major) Mathematics (2023) exchange program Physics (2023) Bachelor' degree (1 major) Mathematical Physics (2024)

Module title				Abbreviation
Advanced and	Computational Data Ana	alysis		11-P-FR2-152-m01
Module coord	inator		Module offered by	
	ector of the Institute of A	oplied Physics	Faculty of Physics a	nd Astronomy
	od of grading	Only after succ. com	· · · ·	
	successfully completed			
Duration	Module level	Other prerequisites		
1 semester	undergraduate			mplete module 11-P-FR1 prior to
		completing module	11-P-FR2.	
Contents				
	hods of data analysis an data analysis.	nd error calculation. D	istribution function,	significance tests, modelling.
Intended learn	ning outcomes			
	ls of computerised data			error calculation. They have ma- tained measuring data and to
Courses (type,	, number of weekly conta	act hours, language —	if other than Germa	n)
V (1) + Ü (1)				
ster, informati	on on whether module c	an be chosen to earn	a bonus)	tion offered — if not every seme-
	cessful completion of ap ffered: Once a year, sum		10 exercise sheets)	
Allocation of p	olaces			
Additional info	ormation			
		-		
Workload				
60 h				
Teaching cycl	e			
Referred to in	LPOI (examination regu	llations for teaching-o	legree programmes)	
Module appea	ars in			
Bachelor' deg	ree (1 major) Physics (20	15)		
Bachelor' deg	ree (1 major) Nanostructu	ure Technology (2015))	
-	ree (1 major) Mathematic			
-	ree (1 major) Mathematic			
•	ree (1 major) Physics (20		N N	
-	ree (1 major) Nanostructu		J	
-	ree (1 major) Mathematic ree (1 major) Functional I			
-	ree (1 major) Punctional T ree (1 major) Quantum Te			
	gram Physics (2023)	2021)		
	ree (1 major) Mathematic	al Physics (2024)		

Module	e title				Abbreviation
Project	t Manaş	gement in Practice			11-PMP-152-m01
Module	e coord	inator		Module offered by	
Manag	Managing Director of the Institute of Applied Physics		nnlied Physics	Faculty of Physics a	and Astronomy
ECTS		od of grading	Only after succ. co		
3		successfully completed			
Duratio		Module level	Other prerequisite	5	
1 seme		graduate		•	
Conten		0	1		
project porting	t sched g, confli	ule, kick-off and stakeho	lder, teams and reso	ources, milestones ar	Il errors in project management, nd planning, visualisation and re- greement, balanced score cards,
Intende	ed lear	ning outcomes			
		have knowledge of techn rs and are able to define,			ar with different methods and
Course	es (type	, number of weekly conta	act hours, language	— if other than Germa	an)
V (1) +		· · · · ·			
Module	e taugh	t in: German or English			
Metho	d of ass	sessment (type, scope, la	anguage — if other th	nan German, examina	ation offered — if not every seme-
ster, in written or oral pages)	formati examin examir or pres	ion on whether module c nation (approx. 90 to 120 nation in groups (groups sentation/talk (approx. 30	an be chosen to ear o minutes) or oral ex of 2, approx. 30 min o minutes).	n a bonus) amination of one can utes per candidate) c	didate each (approx. 30 minutes) or project report (approx. 8 to 10
ster, in written or oral pages) If a writ stead t of asse nation Assess	formati examin or pres tten exa take the essmen date at sment o	ion on whether module c nation (approx. 90 to 120 nation in groups (groups of sentation/talk (approx. 30 amination was chosen as e form of an oral examina t is changed, the lecturer t the latest. Iffered: In the semester ir	an be chosen to ear o minutes) or oral ex- of 2, approx. 30 min o minutes). 5 method of assessm tion of one candidat r must inform studer	n a bonus) amination of one can utes per candidate) o nent, this may be cha te each or an oral exa nts about this by four	didate each (approx. 30 minutes) or project report (approx. 8 to 10 nged and assessment may in- mination in groups. If the methoo weeks prior to the original exami
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ster, in written or oral pages) If a writ stead t of asse nation Assess	formati examin examir or pres tten exa take the essmen date at sment o age of a	ion on whether module c nation (approx. 90 to 120 nation in groups (groups sentation/talk (approx. 30 amination was chosen as a form of an oral examina t is changed, the lecturer t the latest. offered: In the semester in assessment: German and	an be chosen to ear o minutes) or oral ex- of 2, approx. 30 min o minutes). 5 method of assessm tion of one candidat r must inform studer	n a bonus) amination of one can utes per candidate) o nent, this may be cha te each or an oral exa nts about this by four	didate each (approx. 30 minutes) or project report (approx. 8 to 10 nged and assessment may in- mination in groups. If the methoo weeks prior to the original exami
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ster, in written or oral pages) If a writ stead t of asse nation Assess Langua Allocat	formati examin examin or pres tten exa take the essmen date at sment o age of a tion of p	ion on whether module contain (approx. 90 to 120 mation in groups (groups of sentation/talk (approx. 30 amination was chosen as the form of an oral examina t is changed, the lecturer the latest. offered: In the semester in the sessment: German and places	an be chosen to ear o minutes) or oral ex- of 2, approx. 30 min o minutes). 5 method of assessm tion of one candidat r must inform studer	n a bonus) amination of one can utes per candidate) o nent, this may be cha te each or an oral exa nts about this by four	didate each (approx. 30 minutes) or project report (approx. 8 to 10 nged and assessment may in- mination in groups. If the methoo weeks prior to the original exami
ster, in written or oral pages) If a writ stead t of asse nation Assess Langua Allocat Additio	formati examin examin or pres tten exa take the essmen date at sment o age of a tion of p	ion on whether module contain (approx. 90 to 120 mation in groups (groups of sentation/talk (approx. 30 amination was chosen as the form of an oral examina t is changed, the lecturer the latest. offered: In the semester in the sessment: German and places	an be chosen to ear o minutes) or oral ex- of 2, approx. 30 min o minutes). 5 method of assessm tion of one candidat r must inform studer	n a bonus) amination of one can utes per candidate) o nent, this may be cha te each or an oral exa nts about this by four	didate each (approx. 30 minutes) or project report (approx. 8 to 10 nged and assessment may in- mination in groups. If the methoo weeks prior to the original exami
ster, in written or oral pages) If a writ stead t of asse nation Assess Langua Allocat Additio Worklo 90 h	formati examin examin or pres tten exa take the essmen date at sment o age of a tion of p onal inf	ion on whether module contain (approx. 90 to 120 nation in groups (groups of sentation/talk (approx. 30 amination was chosen as a form of an oral examina t is changed, the lecturer the latest. Iffered: In the semester in assessment: German and places	an be chosen to ear o minutes) or oral ex- of 2, approx. 30 min o minutes). 5 method of assessm tion of one candidat r must inform studer	n a bonus) amination of one can utes per candidate) o nent, this may be cha te each or an oral exa nts about this by four	didate each (approx. 30 minutes) or project report (approx. 8 to 10 nged and assessment may in- mination in groups. If the methoo weeks prior to the original exami
ster, in written or oral pages) If a writ stead t of asse nation Assess Langua Allocat Additio	formati examin examin or pres tten exa take the essmen date at sment o age of a tion of p onal inf	ion on whether module contain (approx. 90 to 120 nation in groups (groups of sentation/talk (approx. 30 amination was chosen as a form of an oral examina t is changed, the lecturer the latest. Iffered: In the semester in assessment: German and places	an be chosen to ear o minutes) or oral ex- of 2, approx. 30 min o minutes). 5 method of assessm tion of one candidat r must inform studer	n a bonus) amination of one can utes per candidate) o nent, this may be cha te each or an oral exa nts about this by four	didate each (approx. 30 minutes) or project report (approx. 8 to 10 nged and assessment may in- mination in groups. If the method weeks prior to the original exami
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ster, in written or oral pages) If a writ stead t of asse nation Assess Langua Allocat Additio Worklo 90 h Teachin 	iformati examin examin or prese tten exa take the essmen date at ment o age of a tion of p onal inf	ion on whether module contain (approx. 90 to 120 nation in groups (groups of sentation/talk (approx. 30 amination was chosen as a form of an oral examina t is changed, the lecturer the latest. Iffered: In the semester in assessment: German and places	an be chosen to ear o minutes) or oral ex- of 2, approx. 30 min o minutes). 5 method of assessm tion of one candidat r must inform studer n which the course is /or English	n a bonus) amination of one can utes per candidate) o nent, this may be cha te each or an oral exa nts about this by four s offered and in the s	didate each (approx. 30 minutes) or project report (approx. 8 to 10 nged and assessment may in- mination in groups. If the method weeks prior to the original exami ubsequent semester
ster, in written or oral pages) If a writ stead t of asse nation Assess Langua Allocat Additio Worklo 90 h Teachin 	iformati examin examin or prese tten exa take the essmen date at sment o age of a tion of p onal inf oad	ion on whether module contain (approx. 90 to 120 nation in groups (groups of sentation/talk (approx. 30 amination was chosen as a form of an oral examinat is changed, the lecturer it the latest. Iffered: In the semester ir issessment: German and places	an be chosen to ear o minutes) or oral ex- of 2, approx. 30 min o minutes). 5 method of assessm tion of one candidat r must inform studer n which the course is /or English	n a bonus) amination of one can utes per candidate) o nent, this may be cha te each or an oral exa nts about this by four s offered and in the s	didate each (approx. 30 minutes) or project report (approx. 8 to 10 nged and assessment may in- mination in groups. If the method weeks prior to the original exami ubsequent semester
ster, in written or oral pages) If a writ stead t of asse nation Assess Langua Allocat Additio Worklo 90 h Teachin Referre Module	iformati examin examin or prese tten exa cake the essmen date at sment o age of a tion of p onal inf onal inf oad age to in e appea	ion on whether module contain (approx. 90 to 120 to	an be chosen to ear o minutes) or oral ex- of 2, approx. 30 min o minutes). s method of assessm tion of one candidat r must inform studer n which the course is /or English	n a bonus) amination of one can utes per candidate) o nent, this may be cha te each or an oral exa nts about this by four s offered and in the s	didate each (approx. 30 minutes) or project report (approx. 8 to 10 nged and assessment may in- mination in groups. If the method weeks prior to the original exami ubsequent semester
ster, in written or oral pages) If a writ stead t of asse nation Assess Langua Allocat Additio Worklo 90 h Teachin Referre Bachel	iformati examin examin or prese tten exa cake the essmen date at ment o age of a tion of j onal inf onal inf oad ed to in e appea lor' deg	ion on whether module contain (approx. 90 to 120 nation in groups (groups of sentation/talk (approx. 30 amination was chosen as a form of an oral examinat is changed, the lecturer it the latest. Iffered: In the semester ir issessment: German and places	an be chosen to ear o minutes) or oral ex- of 2, approx. 30 min o minutes). S method of assessm tion of one candidat r must inform studer n which the course is /or English	n a bonus) amination of one can utes per candidate) of nent, this may be cha te each or an oral exa nts about this by four s offered and in the s	didate each (approx. 30 minutes) or project report (approx. 8 to 10 nged and assessment may in- mination in groups. If the method weeks prior to the original exami ubsequent semester
ster, in written or oral pages) If a writ stead t of asse nation Assess Langua Allocat Additio Worklo 90 h Teachil Referre Bachel Bachel	iformati examin examin or prese tten exa take the essmen date at ment o age of a tion of p onal inf onal inf oad ad ed to in e appea lor' deg lor' deg	ion on whether module contain (approx. 90 to 120 to	an be chosen to ear o minutes) or oral ex- of 2, approx. 30 min o minutes). 5 method of assessm tion of one candidat r must inform studer n which the course is /or English /or English ulations for teaching 15) ure Technology (2019	n a bonus) amination of one can utes per candidate) of nent, this may be cha te each or an oral exa nts about this by four s offered and in the s	didate each (approx. 30 minutes) or project report (approx. 8 to 10 nged and assessment may in- mination in groups. If the method weeks prior to the original exami ubsequent semester
ster, in written or oral pages) If a writ stead t of asse nation Assess Langua Allocat Worklo 90 h Teachin Referre Bachel Bachel Bachel	iformati examin examin or prese tten exa cake the essmen date at sment o age of a tion of p onal inf onal inf oad age of or deg lor' deg lor' deg lor' deg	ion on whether module contain (approx. 90 to 120 to	an be chosen to ear o minutes) or oral ex- of 2, approx. 30 min o minutes). 5 method of assessm tion of one candidat r must inform studer n which the course is /or English 	n a bonus) amination of one can utes per candidate) of nent, this may be cha te each or an oral exa ts about this by four s offered and in the s -degree programmes) 5)	didate each (approx. 30 minutes) or project report (approx. 8 to 10 nged and assessment may in- mination in groups. If the method weeks prior to the original exami ubsequent semester

Module					Abbreviation
Labora cuits)	tory Co	ourse Quantum Technolo	gy B (Classical Physi	cs, Electricity, Cir-	11-P-NB-212-m01
Module	Module coordinator			Module offered by	
Manag	ing Dir	ector of the Institute of A	pplied Physics	Faculty of Physics a	and Astronomy
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
4	(not)	successfully completed			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate		recommended to co eting module 11-P-N	mplete modules 11-P-PA and 11- B.
Conten	ts				
Physica	al laws	of optics, vibrations and	waves, science of el	ectricity and circuits	with electric components.
		ning outcomes			
the me	asuren	nent results in a measure	ment protocol. He/SI	he is able to evaluate	on with others, and to document e the measurement result using nd to discuss theses conclusi-
Course	s (type	, number of weekly conta	act hours, language –	- if other than Germa	in)
P (2)					
		sessment (type, scope, la ion on whether module c			tion offered — if not every seme-
Prepari cessful can be candid	ng, pe ly com repeat ate's u	pleted if a Testat (exam) ed once. After completion	record of readings or is passed. Exactly on n of all experiments, ics-related contents	e experiment that wa talk (with discussion of the module. Talks	riments will be considered suc- as not successfully completed a; approx. 30 minutes) to test the that were not successfully com- uccessfully completed.
Allocat	ion of	places			
Additio	nal inf	ormation			
Worklo	ad				
120 h					
Teachi	ng cvcl	e			
Referre	d to in	LPOI (examination regu	llations for teaching-	degree programmes)	
		U			
Module	e appea	ars in			
		ree (1 major) Quantum Te	schnology (2021)		
			2021)		

Module	e title				Abbreviation
		oratory Course Quantum	Technology C (Mod	ern Physics, Compu-	11-P-NC-212-m01
		eriments)			
Module	e coord	inator		Module offered by	
Manag		ector of the Institute of Ap	oplied Physics	Faculty of Physics a	nd Astronomy
ECTS		od of grading	Only after succ. cor	npl. of module(s)	
4	(not)	successfully completed			
Duratio		Module level	Other prerequisites		
1 seme	ster	undergraduate			mplete module 11-P-NB prior to
			completing module	11-P-NC.	
Conten	ts				
		of wave optics, Molecula ised devices with examp			n measuring methods using spe
Intend	ed lear	ning outcomes			
record using e	measu error pr	ring results in a structure	d manner, even in ca They are able to eva	ase of huge data traff	erimental setups. They are ableto ic, and to analyse the resultsby conclusions and to present and
Course	s (type	, number of weekly conta	ect hours, language –	– if other than Germa	n)
P (2)		· · · · ·			·
		sessment (type, scope, la ion on whether module c			tion offered — if not every seme-
Prepari cessful can be candid	ng, pe ly com repeat ate's u	pleted if a Testat (exam) ed once. After completion	record of readings on is passed. Exactly on n of all experiments, ics-related contents	e experiment that wa talk (with discussion of the module. Talks	riments will be considered suc- as not successfully completed ; approx. 30 minutes) to test the that were not successfully com- uccessfully completed.
Allocat	ion of	places			
Additio	onal inf	ormation			
Worklo	ad				
120 h					
Teachi	ng cycl	e			
Referre	ed to in	LPOI (examination regu	lations for teaching-	degree programmes)	
Module	e appea	ars in			
Bachel	or aeg	ree (1 major) Quantum Te	echnology (2021)		

Module	e title				Abb	previation
Labora	tory Cou	rse Physics A (Mechani	ics, Heat, Electromag	gnetism)	11-F	P-PA-152-m01
Module	Module coordinator			Module offere	ed by	
Managing Director of the Institute of Applied Physics			onlied Physics	Faculty of Phy	•	Astronomy
ECTS		d of grading	Only after succ. cor	· · ·		Stronomy
3		a ccessfully completed			3)	
Duratio	<u> </u>	Module level	Other prerequisites	•		
1 seme		undergraduate		•		
Conten						
Measu rents, ł stant, c	rement t heat cap drafting c	acity, calorimetry, densi of graphics and drafting	ity of bodies, dynami	ic viscosity, ela		urement of voltages and face tension, spring con
Intende	ed learni	ng outcomes				
le to in		ently plan and conduct e				ting techniques. They are document the results in
Course	es (type,	number of weekly conta	ict hours, language –	– if other than (German)	
P (2)						
Metho	d of asse	essment (type, scope, la	nguage — if other th	an German, ex	amination	offered — if not every se
		n on whether module ca				,
				e experiment t	hat was no	nts will be considered su ot successfully completed
can be candid pleted	repeate ate's un	d once. After completior derstanding of the phys epeated once. Both com	n of all experiments, ics-related contents	e experiment t talk (with discu of the module.	hat was no ussion; ap Talks that	ot successfully completed prox. 30 minutes) to test were not successfully co
can be candid pleted	repeated ate's und can be re	d once. After completior derstanding of the phys epeated once. Both com	n of all experiments, ics-related contents	e experiment t talk (with discu of the module.	hat was no ussion; ap Talks that	ot successfully completed prox. 30 minutes) to test were not successfully co
can be candid pleted Allocat	repeated ate's und can be re	d once. After completior derstanding of the phys epeated once. Both com aces	n of all experiments, ics-related contents	e experiment t talk (with discu of the module.	hat was no ussion; ap Talks that	ot successfully completed prox. 30 minutes) to test were not successfully co
can be candid pleted Allocat	repeated ate's und can be re tion of pl	d once. After completior derstanding of the phys epeated once. Both com aces	n of all experiments, ics-related contents	e experiment t talk (with discu of the module.	hat was no ussion; ap Talks that	ot successfully completed prox. 30 minutes) to test were not successfully co
can be candid pleted Allocat Additio	repeated ate's und can be ro tion of pl	d once. After completior derstanding of the phys epeated once. Both com aces	n of all experiments, ics-related contents	e experiment t talk (with discu of the module.	hat was no ussion; ap Talks that	ot successfully completed prox. 30 minutes) to test were not successfully co
can be candid pleted Allocat Additio Worklo	repeated ate's und can be ro tion of pl	d once. After completior derstanding of the phys epeated once. Both com aces	n of all experiments, ics-related contents	e experiment t talk (with discu of the module.	hat was no ussion; ap Talks that	ot successfully completed prox. 30 minutes) to test were not successfully co
can be candid pleted Allocat Additio Worklo 90 h	repeated ate's und can be re tion of pl	d once. After completior derstanding of the phys epeated once. Both com aces rmation	n of all experiments, ics-related contents	e experiment t talk (with discu of the module.	hat was no ussion; ap Talks that	ot successfully completed prox. 30 minutes) to test were not successfully co
can be candid pleted Allocat Additio Worklo 90 h	repeated ate's und can be ro tion of pl	d once. After completior derstanding of the phys epeated once. Both com aces rmation	n of all experiments, ics-related contents	e experiment t talk (with discu of the module.	hat was no ussion; ap Talks that	ot successfully completed prox. 30 minutes) to test were not successfully co
can be candid pleted Allocat Additio 90 h Teachin 	repeated ate's und can be re tion of pl onal infor oad	d once. After completion derstanding of the phys epeated once. Both com aces rmation	n of all experiments, ics-related contents nponents of the asse	e experiment t talk (with discu of the module. ssment have to	hat was no ission; ap Talks that b be succe	ot successfully completed prox. 30 minutes) to test were not successfully co
can be candid pleted Allocat Additio 90 h Teachin 	repeated ate's und can be re tion of pl onal infor oad	d once. After completior derstanding of the phys epeated once. Both com aces rmation	n of all experiments, ics-related contents nponents of the asse	e experiment t talk (with discu of the module. ssment have to	hat was no ission; ap Talks that b be succe	ot successfully completed prox. 30 minutes) to test were not successfully co
can be candid pleted Allocat Additio 90 h Teachin Referre	repeated ate's und can be re tion of pl onal infor oad ng cycle ed to in L	d once. After completion derstanding of the phys epeated once. Both com aces rmation POI (examination regu	n of all experiments, ics-related contents nponents of the asse	e experiment t talk (with discu of the module. ssment have to	hat was no ission; ap Talks that b be succe	ot successfully completed prox. 30 minutes) to test were not successfully co
can be candid pleted Allocat Additio Worklo 90 h Teachin Referre Module	repeated ate's und can be re tion of pl onal info oad ng cycle ed to in L	d once. After completion derstanding of the phys epeated once. Both com aces rmation POI (examination regu s in	n of all experiments, ics-related contents nponents of the asse	e experiment t talk (with discu of the module. ssment have to	hat was no ission; ap Talks that b be succe	ot successfully completed prox. 30 minutes) to test were not successfully co
can be candid pleted Allocat Additio Worklo 90 h Teachin Referre Bachel	repeated ate's und can be re tion of pl onal info oad ng cycle ed to in L e appear or' degree	d once. After completion derstanding of the phys epeated once. Both com aces rmation POI (examination regu s in ee (1 major) Mathematic	n of all experiments, ics-related contents ponents of the asse	e experiment t talk (with discu of the module. ssment have to	hat was no ission; ap Talks that b be succe	ot successfully completed prox. 30 minutes) to test were not successfully co
can be candid pleted Allocat Additio 90 h Teachin Referre Bachel Bachel Bachel	repeated ate's und can be re tion of pl onal infor oad ng cycle ed to in L e appear or' degree	d once. After completion derstanding of the phys epeated once. Both com aces rmation POI (examination regu s in ee (1 major) Mathematic ee (1 major) Physics (201	n of all experiments, ics-related contents ponents of the asse lations for teaching- (2015) 15)	e experiment t talk (with discu of the module. ssment have to degree progran	hat was no ission; ap Talks that b be succe	ot successfully completed prox. 30 minutes) to test were not successfully co
can be candid pleted Allocat Additio Worklo 90 h Teachin Referre Bachel Bachel Bachel Bachel	repeated ate's und can be re tion of pl onal infor oad ng cycle ed to in L e appear or' degre or' degre	d once. After completion derstanding of the phys epeated once. Both com aces rmation POI (examination regu s in ee (1 major) Mathematic ee (1 major) Physics (20) ee (1 major) Nanostructu	n of all experiments, ics-related contents ponents of the asse lations for teaching- (2015) 15) ure Technology (2015)	e experiment t talk (with discu of the module. ssment have to degree progran	hat was no ission; ap Talks that b be succe	ot successfully completed prox. 30 minutes) to test were not successfully co
can be candid pleted Allocat Additio Worklo 90 h Teachin Referre Bachel Bachel Bachel Bachel Bachel	repeated ate's und can be re- tion of pl onal infor oad ng cycle ed to in L e appear or' degree or' degree or' degree	d once. After completion derstanding of the phys epeated once. Both com aces rmation POI (examination regu s in ee (1 major) Mathematic ee (1 major) Nanostructu ee (1 major) Mathematic	n of all experiments, ics-related contents ponents of the asse lations for teaching- (2015) (2015) (2015) (2015) (2015) (2015) (2015)	e experiment ti talk (with discu of the module. ssment have to degree program	hat was no ission; ap Talks that b be succe	ot successfully completed prox. 30 minutes) to test were not successfully co
can be candid pleted Allocat Additio Worklo 90 h Teachin Referre Bachel Bachel Bachel Bachel Bachel Bachel	repeated ate's und can be re tion of pl onal infor oad ng cycle ed to in L e appear or' degre or' degre or' degre or' degre	d once. After completion derstanding of the phys epeated once. Both com aces rmation POI (examination regu s in ee (1 major) Mathematic ee (1 major) Computatio	n of all experiments, ics-related contents ipponents of the asse allations for teaching- is (2015) 15) ure Technology (2015) nal Mathematics (20	e experiment ti talk (with discu of the module. ssment have to degree program	hat was no ission; ap Talks that b be succe	ot successfully completed prox. 30 minutes) to test were not successfully co
can be candid pleted Allocat Additio 90 h Teachin Referre Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel	repeated ate's und can be re tion of pl onal infor oad ng cycle ed to in L e appear or' degre or' degre or' degre or' degre or' degre	d once. After completion derstanding of the phys epeated once. Both com aces rmation POI (examination regu s in ee (1 major) Mathematic ee (1 major) Nanostructu ee (1 major) Nanostructu ee (1 major) Computatio ee (1 major) Aerospace (1	n of all experiments, ics-related contents aponents of the asse lations for teaching- (2015)	e experiment ti talk (with discu of the module. ssment have to degree program	hat was no ission; ap Talks that b be succe	ot successfully completed prox. 30 minutes) to test were not successfully co
can be candid pleted Allocat Additio 90 h Teachin Referre Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel	repeated ate's und can be re tion of pl onal infor oad ng cycle ed to in L e appear or' degre or' degre or' degre or' degre or' degre or' degre	d once. After completion derstanding of the phys epeated once. Both com aces rmation POI (examination regu s in ee (1 major) Mathematic ee (1 major) Aerospace (ee (1 major) Mathematic ee (1 major) Mathematic	n of all experiments, ics-related contents ipponents of the asse allations for teaching- is (2015) 15) ure Technology (2015) nal Mathematics (20 Computer Science (20 al Physics (2016)	e experiment ti talk (with discu of the module. ssment have to degree program)) (15) (015)	hat was no ission; ap Talks that b be succe	ot successfully completed prox. 30 minutes) to test were not successfully co
can be candid pleted Allocat Additio Worklo 90 h Teachin Referre Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel	repeated ate's und can be re tion of pl onal infor oad ng cycle ed to in L e appear or' degre or' degre or' degre or' degre or' degre or' degre or' degre or' degre or' degre	d once. After completion derstanding of the phys epeated once. Both com aces rmation POI (examination regu s in ee (1 major) Mathematic ee (1 major) Aerospace (ee (1 major) Mathematic ee (1 major) Mathematic	n of all experiments, ics-related contents ponents of the asse allations for teaching- is (2015) 15) ure Technology (2015) nal Mathematics (20 Computer Science (20 cal Physics (2016) Computer Science (20 computer Science (20)	e experiment ti talk (with discu of the module. ssment have to degree program)) (15) (015)	hat was no ission; ap Talks that b be succe	ot successfully completed prox. 30 minutes) to test were not successfully co
can be candid pleted Allocat Additio Worklo 90 h Teachin Referre Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel	repeated ate's und can be re- tion of pl onal infor oad ng cycle ed to in L e appear or' degree or' degree	d once. After completion derstanding of the phys epeated once. Both com aces rmation POI (examination regu s in ee (1 major) Mathematic ee (1 major) Aerospace (ee (1 major) Mathematic ee (1 major) Mathematic	n of all experiments, ics-related contents ponents of the asse allations for teaching- is (2015) 15) ure Technology (2015) nal Mathematics (20) Computer Science (20) Computer Science (20) Computer Science (20) Computer Science (20) Computer Science (20) Computer Science (20)	e experiment ti talk (with discu of the module. ssment have to degree program) (15) (015) (017)	hat was no ission; ap Talks that b be succe	ot successfully completed prox. 30 minutes) to test were not successfully co
can be candid pleted Allocat Additio Worklo 90 h Teachin Referre Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel	repeated ate's und can be re tion of pl onal infor onal infor or or degre or' degre	d once. After completion derstanding of the phys epeated once. Both com aces rmation POI (examination regu s in ee (1 major) Mathematic ee (1 major) Mathematic ee (1 major) Mathematic ee (1 major) Mathematic ee (1 major) Aerospace (ee (1 major) Physics (20)	n of all experiments, ics-related contents ipponents of the asse interval of the asset interval of the asset inte	e experiment ti talk (with discu of the module. ssment have to degree program) (15) (015) (017)	hat was no ussion; ap Talks that be succe	ot successfully completed prox. 30 minutes) to test were not successfully co ssfully completed.

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

Bachelor' degree (1 major) Mathematical Physics (2020) Bachelor' degree (1 major) Aerospace Computer Science (2020) Bachelor' degree (1 major) Quantum Technology (2021) Bachelor' degree (1 major) Mathematics (2023) exchange program Physics (2023) Bachelor' degree (1 major) Mathematical Physics (2024)

Module title					Abbreviation
Laboratory Course Physical Technology of Material Synthe				sis	11-PPT-212-m01
Module	Module coordinator			Module offered by	
Manag	ing Dire	ector of the Institute of Ap	oplied Physics	Faculty of Physics a	nd Astronomy
ECTS		od of grading	Only after succ. con	npl. of module(s)	
5	(not) s	successfully completed			
Duratio		Module level	Other prerequisites		
1 seme	ster	undergraduate	Students of Funktion recommended to ta		onal Materials, Bachelor's) are
Conten	ts				
Physica nologie		rial properties, growth ar	nd coating procedure	s, methods of charac	cterisation and structuring tech-
Intende	ed learı	ning outcomes			
The stu terial sy			ractical basics of mat	erial characterisatio	n and physical technology for ma-
Course	s (type	, number of weekly conta	ict hours, language –	- if other than Germa	n)
P (5) Modula	taugh	t in: German or English			
			if other the	an Corman, oxamina	tion offered — if not every seme-
		on on whether module ca			tion offered — If not every serile-
minute if a Tes sessme en suco ted. Assess	s) is pa tat (exa ent can cessfull ment o	ssed. Performing and ev m) is passed. An experir be repeated once in the	aluating the experime nent log (approx. 8 p respective semester. semester will the mo er semester	ents will be consider ages) must be prepa Only if both compor	e-experiment oral test (approx. 15 red successfully completed if a ured. Each component of the as- nents of the assessment have be- considered successfully comple-
Allocat					
	-				
Additio	nal inf	ormation			
Worklo	ad				
150 h					
Teachi	ng cycl	e			
Referre	d to in	LPOI (examination regu	lations for teaching-o	legree programmes)	
Module	e appea	in in			
	-	ree (1 major) Functional N			
	-	ree (1 major) Quantum Te	echnology (2021)		
exchan	ge prog	gram Physics (2023)			

Module	title				Abbreviation	
MINT P	repara	tory Course Mathematica	al Methods of Physic	S	11-P-VKM-202-m01	
Module	coord	inator		Module offered by		
			poorotical Dhusias		and Actronomy	
and Ast		ector of the Institute of Th sics	leoretical Physics	Faculty of Physics a	ind Astronomy	
ECTS	Metho	od of grading	Only after succ. cor	npl. of module(s)		
3	(not) s	successfully completed				
Duratio	n	Module level	Other prerequisites	;		
1 seme	ster	undergraduate				
Conten	ts					
introdu 1. Basic	ction a geom	basics and elementary c nd preparation for the m etry and algebra, 2. differ coordinate systems, 6. co	odules of experiment rential calculus and s	tal and theoretical pl	nysics.	·
Intende	ed learı	ning outcomes				
		n command of knowledg successful start into the				ulus as re-
Course	s (type	, number of weekly conta	ict hours, language –	– if other than Germa	n)	
V (1) + ĺ		,				
• • •	• •	t in: German or English				
		s essment (type, scope, la on on whether module ca			tion offered — if not	every seme-
a) exer	cises (s	successful completion of	approx. 50% of appr	ox. 6 exercise sheets	5) or b) talk (approx.	15 minutes)
Assess	ment o	ffered: Once a year, wint	er semester			
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
90 h						
Teachir		٥				
			actor			
		e: every year, winter sem				
		LPOI (examination regu	lations for teaching-	degree programmes)		
§ 22 § 22	,					
§ 22	-					
Module		urs in				
		ree (1 major) Physics (20:	20)			
	-	ree (1 major) Nanostructu))		
	-	ree (1 major) Mathematic		-,		
	-	gree (1 major, 1 minor) Ph				
		mination for the teaching	•	e Didactics in Physics	s (Primary School) (2	020)
		mination for the teaching				
First sta	ate exa	mination for the teaching	g degree Gymnasium	Physics (2020)		
		mination for the teachinន		-		
		mination for the teaching	,		•	
First sta	ate exa	mination for the teachinន្	g degree Mittelschule	e Didactics in Physics	s (Middle School) (20)20)
Bachelor's	with 1 mai	or Quantum Technology (2021)	IMU Würzburg •	generated 30-Mär-2024 • ex	am. reg. da-	page 133 / 155
		0, ()	_	lor (180 ECTS) Quantentechno	-	



First state examination for the teaching degree Mittelschule Physics (2020) Bachelor' degree (1 major) Quantum Technology (2021) Bachelor' degree (1 major) Mathematical Physics (2024)

Module	-				Abbreviation	
Introdu	ction t	o Quantum Computing a	nd Quantum Informa	tion	11-QUI-202-m01	
Module	coord	inator		Module offered by		
Managi and Ast	-	ector of the Institute of Th	eoretical Physics	Faculty of Physics a	and Astronomy	
ECTS	<u> </u>	od of grading	Only after succ. con	npl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
by dens ment, a of quar	sity ope and ent atum st	s of quantum theory and erators. Theory of the mea anglement measures. Qu ates. Introduction to qua putation and error correc	asurement process. \ iantum channels, Kra ntum teleportation a	/on Neumann entrop ius operators and St	oy, bipartite systems inespring theorem. [, entangle- Decoherence
Intende	ed learı	ning outcomes				
of spec possibl	ific pro le appli	the basic principles of qu perties of quantum syste ications of quantum infor bject in the Master's stud	ems such as entangle mation theory. The a	ment. Overview of th	ne most important th	neorems and
Course	s (type	, number of weekly conta	ct hours, language –	- if other than Germa	n)	
V (3) + Module		t in: German or English				
		sessment (type, scope, la on on whether module ca			tion offered — if not	every seme-
nutes) o prox. 8 If a writ stead ta of asse nation o Langua	or c) or to 10 p ten exa ake the ssmen date at ge of a	mination (approx. 90 to 1 al examination in groups bages) or e) presentation, amination was chosen as e form of an oral examina t is changed, the lecturer the latest. ssessment: German and, ffered: In the semester in	(groups of 2, approx /talk (approx. 30 min method of assessme tion of one candidate must inform student /or English	. 30 minutes per car utes). ent, this may be cha e each or an oral exa is about this by four	ndidate) or d) project nged and assessme mination in groups. weeks prior to the o	t report (ap- nt may in- If the methoo riginal exami
Allocat		-			absequent semester	
Additio	nal inf	ormation				
Worklo	ad					
180 h						
Teachir	ng cycl	e				
Referre	d to in	LPOI (examination regu	lations for teaching-o	degree programmes)		
Module	appea	urs in				
Bachel	or' deg	ree (1 major) Physics (202 ree (1 major) Nanostructu ree (1 major) Mathematic	ıre Technology (2020)		
		jor Quantum Technology (2021)	JMU Würzburg •	generated 30-Mär-2024 • ex or (180 ECTS) Quantentechno	-	page 135 / 155



Bachelor' degree (1 major) Quantum Technology (2021) exchange program Physics (2023) Bachelor' degree (1 major) Mathematical Physics (2024)

Module					Abbreviation	
Introdu	Introduction to Relativistic Physics and Classical Field Th			ory	11-RRF-202-m01	
Module	Module coordinator			Module offered by		
		ector of the Institute of Th	neoretical Physics	Faculty of Physics a	and Astronomy	
-	trophys		,	, , ,	,	
ECTS		od of grading	Only after succ. con	npl. of module(s)		
6		rical grade				
Duratio		Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
basic c Theory	oncept , Conse	he special theory of relat s of classical field theory rvation Quantities, Curre foundations of the gene	using the example onts and Noether Theo	f the scalar field. Ele prem. Elements of re	ectrodynamics as Rel lativistic hydrodynar	ativistic Field
		ning outcomes			-	
in cova basics	riant re of gene	the principles of special presentation. Safe hand eral relativity. The studen program.	ling of classical relati	vistic field theories	as well as a rough ov	verview of the
Course	s (type	, number of weekly conta	ect hours, language –	- if other than Germa	nn)	
V (3) +						
		t in: German or English				
ster, in	format	eessment (type, scope, la on on whether module c mination (approx. 90 to 1	an be chosen to earn	a bonus)		
prox. 8 If a writ stead t of asse nation Langua Assess	to 10 p tten exa take the essmen date at age of a ment o	al examination in groups bages) or e) presentation, amination was chosen as e form of an oral examina t is changed, the lecturer the latest. ssessment: German and ffered: Once a year, sum	/talk (approx. 30 min s method of assessme tion of one candidate must inform student /or English	utes). ent, this may be cha e each or an oral exa	nged and assessmei mination in groups.	nt may in- If the metho
Allocat	lon of	Diaces				
 • • • • • • •	nel !=f	ormation				
		ormation				
 Workla	ad					
workio 180 h	au					
1 × 0 h						
Teachi	ng cycl	e				
Teachi 						
Teachi 		e LPOI (examination regu	llations for teaching-	degree programmes)		
Teachin Referre 	ed to in	LPOI (examination regu	llations for teaching-o	degree programmes)		
Teachi Referre Module	ed to in e appea	LPO I (examination regu		degree programmes)		
Teachin Referre Bachel Bachel Bachel Bachel	ed to in e appea or' deg or' deg or' deg	LPO I (examination regunned Irs in ree (1 major) Physics (20 ree (1 major) Nanostructure ree (1 major) Mathematic	20) ure Technology (2020 :al Physics (2020)			
Teachi Referre Bachel Bachel Bachel Bachel Bachel	ed to in e appea or' deg or' deg or' deg or' deg or' deg	LPO I (examination regunstration regunstrated by the second structure of the	20) ure Technology (2020 cal Physics (2020) echnology (2021)			page 137 / 155



exchange program Physics (2023) Bachelor' degree (1 major) Mathematical Physics (2024)

Module	title			Abbreviation	
Statisti	ics, Data Analysis and Compute	r Physics		11-SDC-152-m01	
		•		11 500 152 1101	
Module coordinator			Module offered by		
Managi	ng Director of the Institute of A	oplied Physics	Faculty of Physics a	nd Astronomy	
ECTS	ECTS Method of grading Only after succ. compl. of module(s)				
4	numerical grade				
Duratio	n Module level	Other prerequisites			
1 seme	ster graduate				
Conten	ts				
	cs, data analysis and computer	nhysics			
	·	physics.			
	ed learning outcomes		<u></u>		
The stu Physics	dents have specific and advanc 5.	ced knowledge in the	field of statistics, da	ita analysis and Con	nputational
Course	s (type, number of weekly conta	act hours, language –	· if other than Germa	n)	
V (2) +					
	taught in: German or English				
Method	l of assessment (type, scope, la	anguage — if other th	an German, examina	tion offered — if not	everv seme-
	formation on whether module c				,
written	examination (approx. 90 to 120	minutes) or oral exa	mination of one can	didate each (approx	. 30 minutes)
	examination in groups (groups				
	or presentation/talk (approx. 3				
	ten examination was chosen as				
	ake the form of an oral examina			e 1	
	ssment is changed, the lecturer date at the latest.	must morm student	s about this by four	weeks phor to the o	nginal exami-
	ment offered: Once a year, wint	er semester			
	ge of assessment: German and				
Allocat	ion of places				
Additio	nal information				
Worklo	ad				
120 h					
Teachir	ng cycle				
Poforro	d to in LPO I (examination regu	lations for toaching	logroo programmac)		
Kelelle			legiee programmes)		
	e appears in	<u>``</u>			
	or' degree (1 major) Physics (20	-			
	or' degree (1 major) Nanostructu				
	or' degree (1 major) Mathematic	, , ,			
	or' degree (1 major) Mathematic				
	or' degree (1 major) Physics (20 or' degree (1 major) Nanostructi)		
	or' degree (1 major) Nanostructu or' degree (1 major) Mathematic		J		
	or' degree (1 major) Mathematic or' degree (1 major) Quantum Te				
	ge program Physics (2023)	cimulogy (2021)			
CACHAIL	50 program i mysics (2023)				
Bachelor's	with 1 major Quantum Technology (2021)	_	generated 30-Mär-2024 • exa	-	page 139 / 155
		ta record Bachel	or (180 ECTS) Quantentechno	ologie - 2021	



Bachelor' degree (1 major) Mathematical Physics (2024)

Module title	_		Abbreviation		
Physics of Se	miconductor Devices		11-SPD-152-m01		
Module coord	inator		Module offered by		
Managing Dire	ector of the Institute of Ap	oplied Physics	Faculty of Physics 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 semester	undergraduate				
Contents					
technologies a amples. The b levant semico effects based into the metho technology. It ponents, inter diodes, IMPAT JFET, Thyristor	fundamentals of Semicol and discusses the main of pasic part introduces the onductors. The following p on the charge carrier der ods of production of sem discusses the way of fun fface components and ap IT, Baritt- and Gunn diodor p Diac, Triac, Schottky dio rrier systems for technolo	components in the fie crystal structures and part discusses the pri- nsity of the thermal ed- iconductor materials actioning of the follow oplication fields: Rect es, photodiode, solar ode, MOSFET, MESFE	elds of electronics and l band and phonon of inciples of charge tra quilibrium. The part of and presents the mo- ving components, so ifier diodes, Zener d cell, LED, semicond T, HFET. It highlights	Id photonics on the dispersions of techn insport involving nor on technology gives ost important metho rted according to vo iodes, varistor, vara- uctor injection laser the importance of lo	basis of ex- ologically re- n-equilibrium an insight ds of planar lume com- ctor, tunnel , transistor, ow-dimensio-
	ning outcomes				
	know the characteristics	of semiconductors t	hev have gained an o	overview of the elect	ronic and
ties. They kno the solution o miliar with the ding of compo electronics (d patt, Baritt or injection lase	structures of important s w the principles of charg f questions. They have ga t theories of planar techn onent production. They un iode, transistor, field-effe Gunn diode) and of opto r), they know the realisat ctors and their technolog	e transport as well as ained insights into th ology and recent dev nderstand the structu ect transistor, thyristo electronics (photo div ion possibilities of lo	the Poisson, Boltzm e methods of semico velopments in this fie ure and way of functio or, diac, triac), of mic ode, solar cell, light- w-dimensional charg	nann and continuity onductor production eld, they have a basi oning of the main co rowave applications emitting diode, sem ge carrier systems or	equation for and are fa- ic understan- imponents of (tunnel, Im- iconductor in the basis
Courses (type	, number of weekly conta	ict hours, language –	- if other than Germa	ın)	
V (3) + R (1) Module taugh	t in: German or English				
	sessment (type, scope, la ion on whether module c			tion offered — if not	every seme-
ster, information on whether module can be chosen to earn a bonus) written examination (approx. 90 to 120 minutes) or oral examination of one candidate each (approx. 30 minutes or oral examination in groups (groups of 2, approx. 30 minutes per candidate) or project report (approx. 8 to 10 pages) or presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may in- stead take the form of an oral examination of one candidate each or an oral examination in groups. If the metho of assessment is changed, the lecturer must inform students about this by four weeks prior to the original exam nation date at the latest. Assessment offered: Once a year, summer semester Language of assessment: German and/or English Allocation of places					
Additional inf	ormation				
Bachelor's with 1 ma	jor Quantum Technology (2021)	_	generated 30-Mär-2024 • ex or (180 ECTS) Quantentechno	-	page 141 / 155

Workload

180 h

Teaching cycle

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

Module appears in

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

Module title			Abbreviation		
Electrodynamics			11-T-E-152-m01		
Module coordinator		Module offered by			
	haaratical Dhuciac		and Astronomy		
Managing Director of the Institute of T and Astrophysics	neoretical Physics	Faculty of Physics a	ind Astronomy		
ECTS Method of grading	Only after succ. cor	npl. of module(s)			
8 numerical grade		• • • •			
Duration Module level	Other prerequisites	•			
1 semester undergraduate					
Contents					
 Contents o. Mathematical tools: Gradient, divergence, curl; curve, surface, volume integrals; Stokes and Gaussian sentence; Delta function; Fourier transform; full functional systems; solving PDEs; 1. Maxwell equations; 2. Electrostatics: Coulomb's law; electrostatic potential; charged interface; electrostatic field energy (capacitor); multipole expansion; Boundary value problems; numerical solution; Image charges; Green's functions; development according to orthogonal functions; 3. Magnetostatics: Current density; continuity equation; vector potential; Biot-Savart law; magnetic moment; analogies to electrostatics; 4. Maxwell equations in matter: Electrical and magnetic susceptibility; interfaces; 5. Dynamics of electromagnetic fields: Faraday induction; RCL-circuits; field energy and pulse; potentials; plane waves; wave packets; plane waves in matter; cavity resonators and wave guides; inhomogeneous wave equation; temporally oscillating sources and dipole radiation; accelerated point charges; 6. Special Theory of Relativity: Lorentz transform; simultaneity; length contraction and time dilation; light cone; effect, energy and momentum; co- and contra-variant tensors; covariant classical mechanics; 7. Covariant electrodynamics: Field strength tensor and Maxwell's equations; transformation of the fields; Doppler effect; Lorentz force 					
Intended learning outcomes		The eventional Dhusine "			
The students have advanced knowled retical electrodynamics. They are fami pendently apply them to the description	liar with the correspo	nding mathematical			
Courses (type, number of weekly cont	act hours, language –	- if other than Germa	in)		
V (4) + Ü (2) Module taught in: Ü: German or Englis	h				
Method of assessment (type, scope, l ster, information on whether module of			tion offered — if not every seme-		
written examination (approx. 120 minu Language of assessment: German and					
Allocation of places					
Additional information					
Workload					
240 h					
Teaching cycle					
Referred to in LPO I (examination reg	ulations for teaching-	degree programmes)			
Module appears in					

Bachelor' degree (1 major) Mathematics (2015) Bachelor' degree (1 major) Nanostructure Technology (2015) Bachelor' degree (1 major) Computational Mathematics (2015) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2015) Bachelor' degree (1 major) Nanostructure Technology (2020) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2020) Bachelor' degree (1 major) Quantum Technology (2021) Bachelor' degree (1 major) Mathematics (2023) exchange program Physics (2023)

Module title					Abbreviation	
Theoret	tical M	echanics			11-T-M-152-m01	
Module	e coord	inator		Module offered by		
Managing Director of the Institute of Theoretical Physics Faculty of Physics and Astrophysics				nd Astronomy		
ECTS	<u> </u>	od of grading	Only after succ. con	npl. of module(s)		
8		rical grade				
Duratio	n	Module level	Other prerequisites	6		
1 seme	ster	undergraduate		site to assessment:	completion of exerci	ses (approx.
			13 exercise sheets p	oer semester). Stude	nts who successfully	completed
			approx. 50% of exe	rcises will qualify for	admission to assess	sment. The
			lecturer will inform	students about the re	espective details at t	the beginning
			of the semester.			
Conten	ts					
2. Lagra ons, me system 3. Hami Poissor Liouvill 4. Appli electron ring, cro 5. Relat mics: S Intende The stu miliar w dently a to inter Courses V (4) + I Module	angian echanic s and a iltoniar h brack e theor ication magnet oss sec tivistic tability ed learr dents h vith the apply th pret the s (type, Ü (2) e taugh	nservation; Harmonic osc formulation: Variational cal gauge transformation apparent forces; in formulation: Legendre t ets, canonical transforma- rem; Hamilton-Jacobi forr s: Central-force problems tic field; rigid bodies, tore tion [optional]; dynamics: Lorentz Transfor- theory; KAM theory [opt hing outcomes nave gained first experien- e principles of theoretical ne acquired mathematicate e results. They have espec- number of weekly conta	principles, Euler-Lag ; symmetries, Noether ransformation, phas ations; generator of s nulation [optional]; s; mechanical similar que and inertia tenso formation; Minkowsk ional]; deterministic nces concerning the mechanics and their al methods and techr ecially acquired know for hours, language –	range equation; conservation; conservation; conservation; cyclic conservation; cyclic conservation; conservation; virial theorem; nor, centrifugal and Euties (and Euties) (and Euties) (and Euties) (and Euties) (basic (and Euties)) (basic (a	straints; coordinate to ordinates; accelerate nction, canonical eq ation laws; minimal ninor vibrations; par ler equations [option f motion; 6. Non-line Theoretical Physics. ns. They are able to olems of Theoretical ematical concepts. n)	ed reference juations; coupling; ticles in an nal]; scatte- ear dyna- They are fa- indepen- Physics and
		s essment (type, scope, la on on whether module ca			tion offered — if not	every seme-
		nation (approx. 120 minu ssessment: German and,				
Allocat	ion of p	olaces				
		ormation				
Registration: If a student registers for the exercises and obtains the qualification for admission to assessment this will be considered a declaration of will to seek admission to assessment pursuant to Section 20 Subsecti 3 Sentence 4 ASPO (general academic and examination regulations). If the module coordinators subsequently find that the student has obtained the qualification for admission to assessment, they will put the student's re gistration for assessment into effect. Only those students that meet the respective prerequisites can successf ly register for an assessment. Students who did not register for an assessment or whose registration for an as- sessment was not put into effect will not be admitted to the respective assessment. If a student takes an as- sessment to which he/she has not been admitted, the grade achieved in this assessment will not be consider					Subsection osequently tudent's re- o successful- o for an as- es an as-	
Bachelor's	with 1 maj	or Quantum Technology (2021)	_	generated 30-Mär-2024 • ex. or (180 ECTS) Quantentechno	-	page 145 / 155

Workload

240 h

Teaching cycle

п

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

Module appears in

Bachelor' degree (1 major) Mathematics (2015) Bachelor' degree (1 major) Physics (2015) Bachelor' degree (1 major) Nanostructure Technology (2015) Bachelor' degree (1 major) Mathematical Physics (2015) Bachelor' degree (1 major) Computational Mathematics (2015) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2015) Bachelor' degree (1 major) Physics (2020) Bachelor' degree (1 major) Nanostructure Technology (2020) Bachelor' degree (1 major) Mathematical Physics (2020) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2020) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2020) Bachelor' degree (1 major, 1 minor) Physics (Minor, 2020) Bachelor' degree (1 major, 2020) Bachelor' degree (1 major) Mathematical Physics (2023) Bachelor' degree (1 major) Mathematics (2023) exchange program Physics (2023) Bachelor' degree (1 major) Mathematical Physics (2024)

Module title			Abbreviation		
Quantum Mechanics - Exercises				11-T-QA-152-m01	
Module coordinator			Module offered by		
	ector of the Institute of Th	neoretical Physics	Faculty of Physics a	and Astronomy	
and Astrophy					
ECTS Meth	od of grading	Only after succ. con	npl. of module(s)		
5 nume	rical grade				
Duration Module level		Other prerequisites			
1 semester	undergraduate	13 exercise sheets p approx. 50% of exer	isite to assessment: completion of exercises (appro per semester). Students who successfully complete prcises will qualify for admission to assessment. The students about the respective details at the beginning		
Contents					
dinger equati spin-1/2 syste	on (SG), formalisation of	QM, eigenvalue equa , central potential, hy	tions, postulates of drogen atom, mover	thers Wave function and Schrö- QM, one-dimensional problems, nent in the electromagnetic field, trons, etc.	
Intended lear	ning outcomes				
				s and are able to independently to interpret the results in a physi-	
Courses (type	, number of weekly conta	act hours, language –	- if other than Germa	an)	
Ü (2)	ıt in: Ü: German or Englis				
	sessment (type, scope, la ion on whether module c			tion offered — if not every seme-	
	nation (approx. 120 minu assessment: German and				
Allocation of	places				
Additional inf	ormation				
this will be co 3 Sentence 4 find that the s gistration for ly register for sessment was	nsidered a declaration of ASPO (general academic student has obtained the assessment into effect. C an assessment. Students s not put into effect will n	f will to seek admissi and examination reg qualification for adm only those students th s who did not register ot be admitted to the	on to assessment pu ulations). If the mod lission to assessmen nat meet the respect for an assessment of respective assessm	n for admission to assessment, ursuant to Section 20 Subsection ule coordinators subsequently nt, they will put the student's re- ive prerequisites can successful- or whose registration for an as- tent. If a student takes an as- ssessment will not be considered.	
Workload					
150 h					
Teaching cycl	e				
Referred to in	LPOI (examination regu	llations for teaching-	degree programmes)		
Module appe	ars in				
module appe					

Bachelor' degree (1 major) Nanostructure Technology (2015) Bachelor' degree (1 major) Nanostructure Technology (2020) Bachelor' degree (1 major) Quantum Technology (2021) exchange program Physics (2023)

Module title					Abbreviation		
Quantum Mechanics and Statistical Physics					11-T-QS-152-m01		
Module coordinator				Module offered by			
Module coordinator Managing Director of the Institute of Theoretical Physics			Theoretical Physics	Faculty of Physics a	and Astronomy		
and As	-		medicular rilysics		แน กระเบทบแบ		
ECTS	<u> </u>	od of grading	Only after succ. co	mpl. of module(s)			
6		rical grade					
Duration Module level			Other prerequisites	Other prerequisites			
2 semester undergraduate		undergraduate					
Conten	ts						
to quar 2. Wave pulse n tionary 3. Form space a 4. Post certain 5. One- try prop 6. Spin two-lev 7. Angu solutio 8. Cent 9. Moti mentur motion 10. Spi 11. Add 12. App time-de 13. Ato mic stru B. Stati	ntum m e functi neasure solutio nalisatio and Dir ulates ty; -1/2 sy rel syst ular mo n of the ral pote on in a m; Gau of a fre n-1/2 s lition of proxima epende ms with ucture	echanics (QM); ion and Schrödinger ec ement; correspondenc ons of SG on of QM: Eigenvalue e ac notation; represent of QM (and their interp sional problems: The h stems I: Theoretical de ems (qubits); mentum: Commutation e eigenvalue equation ential - hydrogen atom n electromagnetic field ge transformation; Aha ee electron in a magne ystems II: Formulation f angular momenta; ation methods: Station nt perturbation theory n several electrons: Ide and Hund's rules; Physics and thermodyr	quation (SG): SG for fre- e principles: postulate equations; Physical sig ations in state space; to pretation): state; measu harmonic oscillator; por escription in Dirac notation in polar coordinates (c : Bonding states in 3D; d; Hamiltonian operato aronov-Bohm effect; Sc tic field; using angular moment ary perturbation theory; entical particles; helium hamics:	e particles; superpos s of QM; Ehrenfest the nificance of the eiger ensor products of sta arement; chronologic tential level; potentia tion; Spin 1/2 in the l values of the angular oncrete); Coulomb potential; r; Normal Zeeman eff hrödinger, Heisenber tum algebra; v (with examples); va n atom; Hartree and H	al development; energy-time un- Il barrier; potential well; symme- nomogeneous magnetic field; momentum operators (abstract); fect; canonical and kinetic mo- rg and interaction representation riational method; WKB method; Hartree-Fock approximation; ato-		
cro-sta 1. Stati closed 2. Idea 3. Stati ralised 4. Ther thermo 5. Ideal se-Eins 6. Syst	tes; pro stical P and op l syster stical F forces; modyn dynam l Syster stein co ems of ulation	bability space (condit hysics: Entropy and pr en systems (with ener ns: Spin systems; line Physics and thermodyn the second and third amics: Thermodynamic ic machines (Carnot en ns II, quantum statisti- ndensation; grids and	ional probability, statis robability theory; entro gy and / or particle exc ar oscillators; ideal gas amics: The 1st law; qu law; reversibility; trans c fundamentals relation ngine and efficiency); c cs: Systems of identica normal modes: Phono Approximation methods	stical independence) py in classical physic hange); s; asi-static processes; sition from Statistical nship; thermodynam hemical potential; Il particles; ideal Fern ns; s (mean-field theory,	s; thermodynamic equilibrium ir entropy and temperature; gene- Physics to thermodynamics; ic potentials; changes of state; ni gas; ideal Bose gas and Bo- Sommerfeld expansion); compu		

 7. Critical phenomena: Scaling laws, critical slowing down, fast variable as Bad (electron-phonon interaction and BCS superconductivity); magnetism (quantum criticality at low temperatures, quantum phase transitions at T = o); problems of the thermodynamic limit

Intended learning outcomes

The students have knowledge of the methods of Theoretical Physics. They know the principles of mechanics, Statistical Physics and thermodynamics. They are able to discuss the acquired theoretical concepts and to attribute them to bigger physical contexts.

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

V (4) + V (4)

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)

oral examination of one candidate each (approx. 30 minutes) Language of assessment: German and/or English

Allocation of places

Additional information

--

Workload

180 h

Teaching cycle

--

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

--

Module appears in

Bachelor' degree (1 major) Nanostructure Technology (2015) Bachelor' degree (1 major) Nanostructure Technology (2020) Bachelor' degree (1 major) Quantum Technology (2021) exchange program Physics (2023)

Module title					Abbreviation
Statistical Physics - Exercises					11-T-SA-152-m01
Module coordinator				Module offered by	<u> </u>
Managing Director of the Institute of Theoretical Physics			Theoretical Physics	Faculty of Physics a	and Astronomy
and As	-		incoreticat inysics		
ECTS	<u> </u>	od of grading	Only after succ. co	mpl. of module(s)	
5	nume	rical grade			
Duratio	Duration Module level		Other prerequisites	5	
1 semester undergraduate					
Conten	ts				
Among potenti	others als, qu	Principles of statistics	s, Statistical Physics, id i and Bose gas, system	leal systems, fundan	e content of 11 T-SEV content. nental theorems, thermodynamic cles, approximation methods,
Intende	ed lear	ning outcomes			
and are to inter	e able t pret th	o independently apply e results in a physical	them to the descriptio manner.	on and solution of pro	dynamics and Statistical Physics blems of Statistical Physics and
Course	s (type	, number of weekly cor	ntact hours, language -	– if other than Germa	an)
Ü (2)					
	_	t in: Ü: German or Engl			
			, language — if other th e can be chosen to earr		ation offered — if not every seme
		nation (approx. 120 mi			
-		ssessment: German a	nd/or English		
Allocat	ion of _l	olaces			
Additio	nal inf	ormation			
Worklo	ad				
150 h					
Teachi	ng cycl	e			
Referre	d to in	LPOI (examination re	gulations for teaching-	degree programmes	
Module	e appea	ars in			
Bachel	or' deg	ree (1 major) Physics (2	2015)		
	-		cture Technology (2015	5)	
	-	ree (1 major) Mathema			
	-	ree (1 major) Mathema			
	-	ree (1 major) Physics (: ree (1 major) Nanostru	2020) cture Technology (2020	o)	
	-	ree (1 major) Mathema		.,	
Bachel	5	· (= ·····			
	or' deg	ree (1 major) Quantum	•		
Bachel	-		•		

Module Managin	es of Two- and Three-Dimensi			Abbreviation	
Managin ECTS		onal Röntgen Imaging	S	11-ZDR-152-m01	
Managin ECTS	en ordinator				
ECTS			Module offered by		
	ng Director of the Institute of A		Faculty of Physics a	nd Astronomy	
6 i	Method of grading	Only after succ. con	npl. of module(s)		
L	numerical grade				
Duration Module level Other prerequisites					
1 semest	ter graduate				
Contents	S	_			
ton abso projectic traction,	of X-ray generation (X-ray tube orption, scattering), physics of on, Fourier reconstruction, iter visualisation,). Applicatior erisation, metrology, biology, .	X-ray detection. Matl ative methods). Imag ns of X-ray imaging in	nematics of reconstru e processing (image the industrial sector	iction algorithms (fi data pre-processing (component testing	ltered rear g, feature ex- , material
Intended	d learning outcomes				
	lents know the principles of goust set and the principles of goust set and the set of the principle set of the				
	(type, number of weekly cont				
V (3) + R					
	taught in: German or English				
	of assessment (type, scope, l ormation on whether module o			tion offered — if not	every seme-
stead tal of asses nation d Assessm	en examination was chosen a ke the form of an oral examina sment is changed, the lecture ate at the latest. nent offered: Once a year, sum ge of assessment: German and	ation of one candidate r must inform studen nmer semester	e each or an oral exa	mination in groups.	If the method
	on of places				
	· · · · · · · · · · · · · · · · · · ·				
	al information				
Addition					
Addition					
	d				
	d				
 Workloa 180 h					
 Workloa					
 Workloa 180 h Teaching	g cycle	ulations for teaching-	degree programmes)		
 Workloa 180 h Teaching		ulations for teaching-	degree programmes)		
 Workloa 180 h Teaching Referred 	g cycle I to in LPO I (examination reg	ulations for teaching-	degree programmes)		
 Workloa 180 h Teaching Referred Module a	g cycle I to in LPO I (examination reg appears in		degree programmes)		
 Workloa 180 h Teaching Referred Module a Bachelo	g cycle I to in LPO I (examination reg appears in r' degree (1 major) Physics (20	015)			
 Workloa 180 h Teaching Referred Module a Bachelon Bachelon	g cycle I to in LPO I (examination reg appears in r' degree (1 major) Physics (20 r' degree (1 major) Nanostruct	015) ure Technology (2015			
 Workloa 180 h Teaching Referred Module a Bachelon Master's	g cycle I to in LPO I (examination reg appears in r' degree (1 major) Physics (20	015) ure Technology (2015 Aaterials (2016)			
 Workloa 180 h Teaching Referred Bachelon Bachelon Master's Bachelon	g cycle I to in LPO I (examination reg appears in r' degree (1 major) Physics (2c r' degree (1 major) Nanostruct 5 degree (1 major) Functional N	015) ure Technology (2015 Aaterials (2016) 020))		
 Workloa 180 h Teaching Referred Bachelon Bachelon Master's Bachelon Bachelon Bachelon	g cycle I to in LPO I (examination reg appears in r' degree (1 major) Physics (20 r' degree (1 major) Nanostruct s degree (1 major) Functional N r' degree (1 major) Physics (20	015) ure Technology (2015 Aaterials (2016) 020) ure Technology (2020)		



Master's degree (1 major) Functional Materials (2022) exchange program Physics (2023)

Module title	9			Abbreviation		
Methods of	Non-Destructive Material 1	esting	-	11-ZMB-152-m01		
Module coordinator			Module offered by	-		
Managing Director of the Institute of Applied		anlied Dhusies				
1		Only after succ. con	Faculty of Physics a	ind Astronomy		
	hod of grading nerical grade	Unity after Succ. con				
· .	-					
Duration Module level Other prerequisites 1 semester undergraduate						
•	f non-destructive material a Optical testing, laser. Imag		ng. Thermography. N	eutron radiography.	X-ray testing.	
Intended lea	arning outcomes					
on (heat, X- thods for the problems of	s have basic knowledge of ray, terahertz), particles (ne e detection of radiation typ f material testing and chara	eutrons) or ultrasoun es, particles and ultr cterisation.	d waves with materia asound waves and a	als. They know the a re able to apply ther	pplied me-	
	pe, number of weekly conta	ci nours, language –	- II other than Germa	lll <i>)</i>		
V(2) + R(1) Module taux	ght in: German or English					
	issessment (type, scope, la	nguaga if other th	an Corman, ovamina	tion offered if not	ovoru como	
	ation on whether module ca			lition onered — if not	every seme-	
pages) or pr If a written e stead take t of assessme nation date Assessment	nination in groups (groups of resentation/talk (approx. 30 examination was chosen as he form of an oral examina ent is changed, the lecturer at the latest. t offered: Once a year, winto f assessment: German and,	o minutes). method of assessm tion of one candidate must inform student er semester	ent, this may be cha e each or an oral exa	nged and assessmen mination in groups.	nt may in- If the method	
Allocation o	f places					
Additional information						
Workload						
120 h						
Teaching cy	cle					
Referred to	in LPO I (examination regu	lations for teaching-	degree programmes)			
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
	egree (1 major) Physics (20:	15)				
Bachelor' de Master's de Bachelor' de Bachelor' de Bachelor' de	egree (1 major) Physics (22) egree (1 major) Functional M egree (1 major) Physics (20) egree (1 major) Nanostructu egree (1 major) Quantum Te gree (1 major) Functional M	ire Technology (2015) aterials (2016) 20) ire Technology (2020) echnology (2021)				
	major Quantum Technology (2021)		generated 30-Mär-2024 • ex	am. reg. da-	page 154 / 155	
	-, - ,	_	or (180 ECTS) Quantentechno	-		

