

Module Catalogue

for the Subject

Nanostructure Technology

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

Examination regulations version: 2020 Responsible: Faculty of Physics and Astronomy

JMU Würzburg • generated 02-Aug-2025 • exam. reg. data record 88|224|-|-|H|2020

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

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(2020)

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The subject is divided into

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Learning Outcomes

German contents and learning outcome available but not translated yet.

Nach erfolgreichem Abschluss des Studiums verfügen die Absolventinnen und Absolventen über die folgenden Kompetenzen:

- Die Absolventen bzw. Absolventinnen besitzen hohes Abstraktionsvermögen, analytisches Denken, hohe Problemlösungskompetenz und die Fähigkeit, komplexe Zusammenhänge zu strukturieren.
- Die Absolventen bzw. Absolventinnen verfügen über einen breiten Überblick über die Teilgebiete der Nanostrukturtechnologie und interdisziplinäre Zusammenhänge.
- Sie verfügen über vertiefte Kenntnisse der physikalischen und technischen Grundlagen der Nanostrukturtechnik sowie fundiertes Wissen über die theoretischen und experimentellen Methoden zur Erlangung neuer Erkenntnisse.
- Sie sind in der Lage, ihre Fähigkeiten und Kenntnisse in eigenen Projekten umzusetzen und verfügen über Kenntnisse des aktuellen Forschungsstandes in mindestens einem Spezialgebiet der Nanowissenschaften.
- Sie sind in der Lage, sich anhand von Primärliteratur, insbesondere in englischer Sprache, in den aktuellen Forschungsstand eines Spezialgebiets einzuarbeiten und physikalische und technische Methoden selbstständig auf konkrete Aufgabenstellungen anzuwenden, Lösungswege zu entwickeln und die Ergebnisse zu interpretieren und zu bewerten.
- Sie sind in der Lage, auch bei unvollständigen Informationen Probleme der Nanostrukturtechnik wissenschaftlich und unter Beachtung der Regeln guter wissenschaftlicher Praxis selbstständig zu bearbeiten und die Ergebnisse und Folgen ihrer Arbeit darzustellen, zu bewerten und zu vertreten.
- Sie sind in der Lage, mit Fachvertretern auf dem aktuellen Stand der Forschung physikalische und technische Fragestellungen zu diskutieren und auch Nichtwissenschaftlern physikalische Fragen zu erläutern.
- Sie besitzen die Fähigkeit, als verantwortlicher Wissenschaftler bzw. verantwortliche Wissenschaftlerin in interdisziplinär und international zusammengesetzten Teams aus (Natur-) Wissenschaftlern bzw. (Natur-) Wissenschaftlerinnen und/oder Ingenieuren bzw. Ingenieurinnen in Forschung, Industrie und Wirtschaft mitzuwirken.

Wissenschaftliche Befähigung

- Die Absolventinnen und Absolventen verfügen über vertiefte Kenntnisse der physikalischen und technischen Grundlagen der Nanostrukturwissenschaften.
- Die Absolventinnen und Absolventen können ein fundiertes Wissen über die theoretischen und experimentellen Methoden zur Erlangung neuer Erkenntnisse abrufen.
- Die Absolventen bzw. Absolventinnen können auf einen breiten Überblick über das Gesamtgebiet der Nanostrukturwissenschaften zurückgreifen.
- Die Absolventen und Absolventinnen verfügen über einen Überblick über angrenzende Gebiete und interdisziplinäre Zusammenhänge.
- Die Absolventinnen und Absolventen besitzen Abstraktionsvermögen, analytisches Denken, hohe Problemlösungskompetenz und die Fähigkeit, komplexe Zusammenhänge zu strukturieren.
- Die Absolventinnen und Absolventen wenden ihre Fähigkeiten und Kenntnisse in eigenen Projekten an und verfügen über Kenntnisse des aktuellen Forschungsstandes in mindestens einem Spezialgebiet der Nanostrukturwissenschaften.
- Die Absolventinnen und Absolventen sind in der Lage, mit Fachvertretern auf dem aktuellen Stand der Forschung physikalische Fragestellungen zu diskutieren.
- Die Absolventinnen und Absolventen können, physikalische und mathematische Methoden selbstständig auf konkrete experimentelle oder theoretische physikalische Aufgabenstellungen

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anzuwenden, Lösungswege zu entwickeln und die Ergebnisse zu interpretieren und zu bewerten.

• Die Absolventinnen und Absolventen sind in der Lage, sich anhand von Primärliteratur, insbesondere in englischer Sprache, in den aktuellen Forschungsstand eines Spezialgebiets der Nanostrukturwissenschaften einzuarbeiten.

Befähigung zur Aufnahme einer Erwerbstätigkeit

- Die Absolventinnen und Absolventen sind in der Lage, auch bei unvollständigen Informationen physikalische und technische Probleme wissenschaftlich und unter Beachtung der Regeln guter wissenschaftlicher Praxis selbstständig zu bearbeiten und die Ergebnisse und Folgen ihrer Arbeit darzustellen, zu bewerten und zu vertreten.
- Die Absolventinnen und Absolventen besitzen die Fähigkeit, als verantwortlicher Wissenschaftler bzw. verantwortliche Wissenschaftlerin in interdisziplinär und international zusammengesetzten Teams aus (Natur-) Wissenschaftlern bzw. (Natur-) Wissenschaftlerinnen und/oder Ingenieuren bzw. Ingenieurinnen in Forschung, Industrie und Wirtschaft mitzuwirken.
- Die Absolventinnen und Absolventen sind in der Lage, physikalische und technische Methoden selbstständig auf konkrete Aufgabenstellungen anzuwenden, Lösungswege zu entwickeln und die Ergebnisse zu interpretieren und zu bewerten.
- Die Absolventinnen und Absolventen sind in der Lage, ihre Fähigkeiten und Kenntnisse in eigenen Projekten umzusetzen und verfügen über Kenntnisse des aktuellen Forschungsstandes in mindestens einem Spezialgebiet der Nanostrukturwissenschaften.

Persönlichkeitsentwicklung

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- Die Absolventinnen und Absolventen sind in der Lage, auch bei unvollständigen Informationen Probleme der Nanostrukturwissenschaften wissenschaftlich selbstständig zu bearbeiten und die Ergebnisse und Folgen ihrer Arbeit darzustellen, zu bewerten und zu vertreten.
- Die Absolventinnen und Absolventen kennen die Regeln guter wissenschaftlicher Praxis und beachten sie.

Befähigung zum gesellschaftlichen Engagement

- Die Absolventinnen und Absolventen können naturwissenschaftliche und technische 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 sind in der Lage auf dem aktuellen Stand der Forschung physikalische und technische Fragestellungen zu diskutieren und Nichtwissenschaftlern physikalische Fragen zu erläutern.
- 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

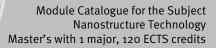
associated official publications (FSB (subject-specific provisions)/SFB (list of modules)):

14-Nov-2019 (2019-58)

09-Jun-2021 (2021-65)

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





Compulsory Electives

(60 ECTS credits)



Subfield Nanostructure Technology

(55 ECTS credits)



Advanced Laboratory Courses

(9 ECTS credits)

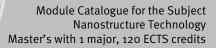
Module title				Abbreviation	
Advanced Laboratory Course Master Part 1				11-P-FM1-161-m01	
Module	coord	inator		Module offered by	
Managi	ng Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
3	(not) s	successfully completed			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate	Preparation and safe	ety briefing.	
Conten	ts				
stems, tic reso	proper nance	ties of solids, surfaces ar	nd interfaces. Experin ect - optical pumping	nents on the followir	emperatures and correlated sy- ng topics: X-rays - nuclear magne- n the field of optics - Hall effect -
Intende	ed learr	ning outcomes			
suing s experim experim	cientifi nental r nent an	c publications, applications, application methods. They are able to d to present and discuss	on of modern evaluat o work on a task on th their results in a scie	ion systems. The stu ne basis of publicati entific publication.	al results, basic knowledge of is- idents are familiar with modern ons, to conduct and evaluate an
Courses	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
P (3)					
		e ssment (type, scope, langua) le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
fic publ success regulati	ts must lication sfully co ions are	t successfully prepare, pe) an experiment to be co	nsidered to have suc s to be considered to tive module descript	cessfully completed have successfully co	lluate (in the form of a scienti- this experiment. Students must ompleted this module. Detailed
Allocati	ion of p	olaces			
Additio	nal info	ormation			
Worklo	ad				
90 h					
Teachir	ng cycle	e			
Referre	d to in	LPOI (examination regulations	s for teaching-degree progra	mmes)	
Module	Module appears in				
Master's degree (1 major) Physics (2016) Master's degree (1 major) Nanostructure Technology (2016) Master's degree (1 major) Nanostructure Technology (2020) Master's degree (1 major) Physics (2020) Master's degree (1 major) Quantum Technology (2021) exchange program Physics (2023)					

Module title				Abbreviation	
Advanced Laboratory Course Master Part 2					11-P-FM2-161-m01
Module coordinator				Module offered by	
Managi	ng Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
3	(not) s	successfully completed			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate	Preparation and safe	ety briefing.	
Conten	ts				
stems, tic reso	proper nance	ties of solids, surfaces ar	nd interfaces. Experin ect - optical pumping	nents on the followir	temperatures and correlated sy- ng topics: X-rays - nuclear magne- n the field of optics - Hall effect -
Intende	ed learr	ning outcomes			
suing s experim experim	cientifi nental n nent an	c publications, applications, application methods. They are able to d to present and discuss	on of modern evaluat o work on a task on th their results in a scie	ion systems. The stu ne basis of publicati entific publication.	al results, basic knowledge of is- idents are familiar with modern ons, to conduct and evaluate an
	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
P (3)					
		essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
fic publ success regulati	ts must ication sfully co ions are	t successfully prepare, pe) an experiment to be co	nsidered to have suc s to be considered to tive module descript	cessfully completed have successfully co	aluate (in the form of a scienti- this experiment. Students must ompleted this module. Detailed
Allocati	ion of p	olaces			
Additio	nal info	ormation			
Worklo	ad				
90 h					
Teachir	ng cycle	9			
	<u> </u>				
Referre	d to in	LPOI (examination regulations	s for teaching-degree progra	mmes)	
Module	Module appears in				
Master's degree (1 major) Physics (2016) Master's degree (1 major) Nanostructure Technology (2016) Master's degree (1 major) Nanostructure Technology (2020) Master's degree (1 major) Physics (2020) Master's degree (1 major) Quantum Technology (2021) exchange program Physics (2023)					

Module title				Abbreviation		
Advanced Laboratory Course Master Part 3				11-P-FM3-161-m01		
Module	coord	inator		Module offered by		
Managi	ng Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
3	(not) s	successfully completed		· · · · · · · · · · · · · · · · · · ·		
Duratio	n	Module level	Other prerequisites			
1 semes		graduate	Preparation and safe	ety briefing.		
Conten		3.444440				
stems, tic reso	Principles of Nuclear, Atomic and Molecular Physics, experiments on cryogenic temperatures and correlated sy- stems, properties of solids, surfaces and interfaces. Experiments on the following topics: X-rays - nuclear magne- tic resonance (NMR) - quantum Hall effect - optical pumping and spectroscopy in the field of optics - Hall effect - superconductivity - laser - solid-state optics					
Intende	ed learn	ning outcomes				
suing s experim	cientifi 1ental I	c publications, application	on of modern evaluat o work on a task on th	ion systems. The stu ne basis of publication	al results, basic knowledge of is- idents are familiar with modern ons, to conduct and evaluate an	
Courses	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
P (3)						
module is	creditab	le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
Student fic publ success regulati	ts mus lication sfully c ions ar) an experiment to be co	nsidered to have suce s to be considered to tive module descript	cessfully completed have successfully co	lluate (in the form of a scienti- this experiment. Students must ompleted this module. Detailed	
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
90 h						
Teachir	ng cycl	9				
	<u> </u>					
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)		
Module	Module appears in					
	Master's degree (1 major) Physics (2016)					
	-	ee (1 major) Nanostructur				
Master's degree (1 major) Nanostructure Technology (2020)						
	Master's degree (1 major) Physics (2020)					
	-	ee (1 major) Quantum Teo	hnology (2021)			
exchan	ge prog	gram Physics (2023)				

Module title				Abbreviation	
Advanced Laboratory Course Master Part 4			11-P-FM4-161-m01		
Module	coord	inator		Module offered by	
Managi	ng Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
3	(not) s	successfully completed			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate	Preparation and safe	ety briefing.	
Conten	ts				
stems, tic reso	proper nance	ties of solids, surfaces ar	nd interfaces. Experin ect - optical pumping	nents on the followir	emperatures and correlated sy- ng topics: X-rays - nuclear magne- n the field of optics - Hall effect -
Intende	ed learr	ning outcomes			
suing s experim experim	cientifi nental r nent an	c publications, applications, application methods. They are able to d to present and discuss	on of modern evaluat o work on a task on th their results in a scie	ion systems. The stu ne basis of publicati entific publication.	al results, basic knowledge of is- idents are familiar with modern ons, to conduct and evaluate an
Courses	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
P (3)					
		e ssment (type, scope, langua) le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
fic publ success regulati	ts must lication sfully co ions are	t successfully prepare, pe) an experiment to be co	nsidered to have suc s to be considered to tive module descript	cessfully completed have successfully co	lluate (in the form of a scienti- this experiment. Students must ompleted this module. Detailed
Allocati	ion of p	olaces			
Additio	nal info	ormation			
Worklo	ad				
90 h					
Teachir	ng cycle	e			
Referre	d to in	LPO I (examination regulations	for teaching-degree progra	mmes)	
Module	Module appears in				
Master's degree (1 major) Physics (2016) Master's degree (1 major) Nanostructure Technology (2016) Master's degree (1 major) Nanostructure Technology (2020) Master's degree (1 major) Physics (2020) Master's degree (1 major) Quantum Technology (2021) exchange program Physics (2023)					





Advanced Seminar

(5 ECTS credits)

Module	e title				Abbreviation
Advanc	ed Sen	ninar Nanostructure Te	chnology A		11-OSN-A-161-m01
Module	Module coordinator			Module offered by	I
Managi	ing Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	and Astronomy
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
Semina	ar on cu	irrent issues in Theoret	ical or Experimental Ph	ysics.	
Intende	ed learı	ning outcomes			
are abl	e to ext				ental or Theoretical Physics. They this knowledge and present it to
Course	S (type, n	number of weekly contact hour	s, language — if other than Ge	rman)	
		t in: German or English			
		GESSMENT (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	ot every semester, information on whether
		ussion (30 to 45 minute ssessment: German an			
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
150 h					
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module	e appea	ars in			
	-	ee (1 major) Nanostruct			
master	s aegr	ee (1 major) Nanostruct	ure lechnology (2020)		

Module	Module title Abbreviation						
Advanc	ed Sen	ninar Nanostructure Teo	hnology B		11-OSN-B-161-m01		
Module	e coord	inator		Module offered by			
Manag	ing Dire	ector of the Institute of A	Applied Physics	Faculty of Physics a	and Astronomy		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
5	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	ts						
Semina	ar on cu	ırrent issues in Theoreti	cal or Experimental Ph	iysics.			
Intende	ed lear	ning outcomes					
are abl	e to ext				ental or Theoretical Physics. They this knowledge and present it to		
Course	S (type, r	number of weekly contact hours	, language — if other than Ge	rman)			
		t in: German or English Sessment (type, scope, langu	lage — if other than German,	examination offered — if no	ot every semester, information on whether		
module is	s creditab	le for bonus)					
		ussion (30 to 45 minutes ssessment: German and					
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	ad						
150 h							
Teachi	ng cycl	е					
Referre	d to in	LPO I (examination regulation	ns for teaching-degree progra	ummes)			
Module	e appea	ars in					
	-	ee (1 major) Nanostructi ee (1 major) Nanostructi	•,				



Focus Nanostructure Technology

(ECTS credits)

Module title					Abbreviation	
Optical	l Prope	rties of Semiconductor	Nanostructures		11-HNS-161-m01	
Module	e coord	inator		Module offered by		
Manag	ing Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
6	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
or mach ging th tures of with a f of nove	Semiconductor nanostructures are frequently referred to as "artificial materials". In contrast to atoms, molecules or macroscopic crystals, their electronic, optical and magnetic properties can be systematically tailored by chan- ging their size. The lecture addresses technological challenges in the preparation of semiconductor nanostruc- tures of varying dimensions (2D, 1D, oD). It provides the basic theoretical concepts to describe their properties, with a focus on optical properties and light-matter coupling. Moreover, it discusses the challenges and concepts of novel optoelectronic and quantum photonic devices based on such nanostructures, including building blocks for quantum communication and quantum computing architectures.					
Intende	ed learr	ning outcomes				
knowle	dge of	the technological meth	inciples and characteri ods to fabricate such s knowledge to problems	structures, and of the	ir applications to no	
Course	S (type, n	umber of weekly contact hour	s, language — if other than Gei	rman)		
V (3) + Module		t in: German or English				
			guage — if other than German,	examination offered — if no	t every semester, informati	on on whether
 module is creditable for bonus) a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may 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. Language of assessment: German and/or English Assessment offered: In the semester in which the course is offered and in the subsequent semester 						
Allocat	ion of p	olaces				
Additio	nal info	ormation				
Worklo	ad					
180 h						
Teaching cycle						
Referre	ed to in	LPO I (examination regulati	ons for teaching-degree progra	immes)		
Module	 Module appears in					
Master's wi (2020)	ith 1 major	Nanostructure Technology		generated 02-Aug-2025 • exa r (120 ECTS) Nanostrukturtecl		page 19 / 114

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Master's degree (1 major) Mathematics (2016) Master's degree (1 major) Physics (2016) Master's degree (1 major) Nanostructure Technology (2016) Master's degree (1 major) Computational Mathematics (2016) Master's degree (1 major) Functional Materials (2016) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Master's degree (1 major) Computational Mathematics (2019) Master's degree (1 major) Mathematics (2019) Master's degree (1 major) Nanostructure Technology (2020) Master's degree (1 major) Physics (2020) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Master's degree (1 major) Quantum Technology (2021) Master's degree (1 major) Computational Mathematics (2022) Master's degree (1 major) Functional Materials (2022) Master's degree (1 major) Mathematics (2022) exchange program Physics (2023) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) Mathematics (2024) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Master's degree (1 major) Functional Materials (2025)

Module title			Abbreviation			
Semico	onducto	or Physics			11-HPH-201-m01	
Module	e coord	inator		Module offered by		
Manag	ing Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
6	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	Its					
structu tronic p studies lowere	re, lead propert s how tl d dime	als with the fundamending to methods for des ies of monolithic semic nese can be used to mo nsionality systems. Exa ning outcomes	cribing band structure onductors. It then turn odify and design optica	s. These form a basis s to examining semi l and electrical prop	s for discussing optic conductor heterostru erties, especially in t	cal and elec- uctures, and
					amintal atministrations arm	
and ba	nd stru	e student with a working ctures, as well as elect eted specially lectures i	rical and optical prope			
Course	S (type, r	number of weekly contact hours	s, language — if other than Gei	rman)		
V (3) + Module		t in: German or English				
		sessment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	ion on whether
 b) oral c) oral d) projection e) pression lf a write stead to a s	 a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may 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. Language of assessment: German and/or English Assessment offered: In the semester in which the course is offered and in the subsequent semester 					
Allocat	ion of _l	olaces				
Additio	onal inf	ormation				
Worklo	ad					
180 h						
	ng cycl	e				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
	e appea		-			
	-	ee (1 major) Nanostruct ee (1 major) Physics (20				
Master's w (2020)	ith 1 majo	r Nanostructure Technology		generated 02-Aug-2025 • ex r (120 ECTS) Nanostrukturtec	-	page 21 / 114

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Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

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

Master's degree (1 major) Computational Mathematics (2022)

Master's degree (1 major) Functional Materials (2022)

Master's degree (1 major) Mathematics (2022)

exchange program Physics (2023)

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

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

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Master's degree (1 major) Functional Materials (2025)

Module	Module title Abbreviation						
Quantu	m Tran	sport			11-QTR-201-m01		
Module	coordi	nator		Module offered by			
Managi	ng Dire	ctor of the Institute of	Applied Physics	Faculty of Physics a	nd Astronomy		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
6	numer	rical grade					
Duratio	n	Module level	Other prerequisites				
1 semes	ster	graduate					
Content	ts						
The lecture addresses the fundamental transport phenomena of electrons in solids where Electron-electron inter- action and the wave nature are the determining factors. This includes the diffusive and ballistic transport regime as well as the Coulomb blockade. Observations of electron interference effects, conductance quantization and the quantum Hall effect will be discussed. Thermoelectric properties of electronic system and the phenomenon of superconductivity will be examined as well.Low dimensional electron systems and its quantum mechanical description are the basis of this lecture. Relevant material systems are semiconductor heterostructures as well as topological insulators, topological semimetals, and topological superconductors. The content will be guided by actual research results.							
		ning outcomes					
		ledge of basic transpo ults critical.	rt experiments, its anal	ysis and its interpret	ation which enables	the student	
Courses	S (type, n	umber of weekly contact hour	s, language — if other than Gei	rman)			
V (3) + F Module		t in: German or English					
		essment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	on on whether	
b) oral e c) oral e d) proje e) prese lf a writ stead ta of asses nation o Langua	examin examin ect repo entation ten exa ake the ssment date at ge of a ment of	ation in groups (group ort (approx. 8 to 10 pag n/talk (approx. 30 min imination was chosen form of an oral examin is changed, the lectur the latest. ssessment: German ar ffered: In the semester	e each (approx. 30 minu s of 2, approx. 30 minu es) or utes). as method of assessme nation of one candidate er must inform student	tes per candidate) or ent, this may be char e each or an oral exar s about this by four v	nged and assessmer mination in groups. I weeks prior to the or	If the method iginal exami-	
Allocati	ion of p	laces					
Additio	nal info	ormation					
Worklo	ad						
180 h							
Teachin	ng cycle	9					
Referre	d to in	LPO I (examination regulati	ons for teaching-degree progra	immes)			
Module	appea	rs in					
Master's wit (2020)	th 1 major	Nanostructure Technology		generated 02-Aug-2025 • exa r (120 ECTS) Nanostrukturtech		page 23 / 114	

Master's degree (1 major) Nanostructure Technology (2020) Master's degree (1 major) Physics (2020) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

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

exchange program Physics (2023)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Module	title				Abbreviation		
Nano-O	ptics				11-NOP-161-m01		
Module	e coord	inator		Module offered by	e offered by		
Managi	ng Dire	ector of the Institute of Ap	oplied Physics	Faculty of Physics a	nd Astronomy		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
6	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	ts						
from th copy ar basis, c 2D, 1D a tennas.	e discu e discu quantu and o c	nveys theoretical fundan ission of the focusing of issed. In the following, th m emitters are introduce limensions are introduce	light. Based on this, t ne near-field optical n d and their light emis	he fundamentals of nicroscopy is introdu sion in nano-enviror	modern far-field opt uced and discussed. nments is derived. Pl	ical micros- As a further asmons in	
		ning outcomes					
		have specific and advanc les and application areas				th the theo-	
Courses	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)			
V (3) + I Module		t in: German or English					
		Sessment (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	t every semester, informati	on on whether	
 b) oral e c) oral e d) proje e) prese lf a writ stead ta of asse nation e Langua 	 a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes) If a written examination was chosen as method of assessment, this may be changed and assessment may 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. Language of assessment: German and/or English Assessment offered: In the semester in which the course is offered and in the subsequent semester 						
Allocat	ion of p	Diaces					
 Additio	nal inf	ormation					
Worklo	ad						
180 h							
Teachir	ıg cycl	e					
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	mmes)			
Module	e appea	ars in					
	-	ee (1 major) Physics (201 ee (1 major) Nanostructu					
	-	r Nanostructure Technology	JMU Würzburg •	generated 02-Aug-2025 • exa r (120 ECTS) Nanostrukturtecl		page 25 / 114	

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Master's degree (1 major) Nanostructure Technology (2020)

Master's degree (1 major) Physics (2020)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

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

exchange program Physics (2023)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Module	Module title Abbreviation						
Spintro	onics				11-SPI-161-m01		
Module	e coord	nator		Module offered by			
Manag	ing Dire	ector of the Institute of A	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							
1 seme	1 semester graduate						
Conten	ts						
This lecture covers the basic principles of spin transport, with a particular emphasis on the phenomena of giant magnetoresistance and tunnel magnetoresistance. As a last point, we discuss new phenomena from the field of spin dynamics and current-induced spin phenomena.							
Intend	ed learr	ing outcomes					
mation	techno	now the basic principl logy. They have gained sistance).					
Course	S (type, n	umber of weekly contact hours	, language — if other than Ger	man)			
V (3) + Module		t in: German or English					
	Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)						
 b) oral c) oral d) proje e) press lf a write stead t of asset nation Langua 	 a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may 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. Language of assessment: German and/or English Assessment offered: In the semester in which the course is offered and in the subsequent semester 						
Allocat	ion of p	laces					
Additio	onal info	ormation					
Worklo	ad						
180 h							
Teachi	ng cycle	9					
Referre	ed to in	LPOI (examination regulation	ons for teaching-degree progra	mmes)			
Module	e appea	rs in					
Master Master	's degre 's degre	ee (1 major) Mathemati ee (1 major) Physics (20 ee (1 major) Nanostruct ee (1 major) Computatio	16) ure Technology (2016)	6)			
Master's w (2020)	ith 1 major	Nanostructure Technology	-	generated 02-Aug-2025 • exa r (120 ECTS) Nanostrukturtech	-	page 27 / 114	

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Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Master's degree (1 major) Computational Mathematics (2019) Master's degree (1 major) Mathematics (2019) Master's degree (1 major) Nanostructure Technology (2020) Master's degree (1 major) Physics (2020) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Master's degree (1 major) Quantum Technology (2021) Master's degree (1 major) Computational Mathematics (2022) Master's degree (1 major) Mathematics (2022) exchange program Physics (2023) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) Mathematics (2024) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Module	e title				Abbreviation			
Image a	and Sig	nal Processing in Phy	sics		11-BSV-161-m01			
Module	e coord	inator		Module offered by				
Managi	ng Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	nd Astronomy			
ECTS	Metho	od of grading	Only after succ. cor	npl. of module(s)				
6	nume	rical grade						
Duratio	n	Module level	Other prerequisites	;				
1 seme	ster	graduate						
Conten	ts							
and ima convolu getic ol	Periodic and aperiodic signals; principles of discreet and exact Fourier transformation; principles of digital signal and image processing; discretisation of signals/sampling theorem (Shannon); homogeneous and linear filters, convolution product; tapering functions and interpolation of images; the Parsival theorem, correlation and ener- getic observation; statistical signals, image noise, moments, stationary signals; tomography: Hankel and Radon transformation.							
Intende	ed lear	ning outcomes						
les of ir	nage p	rocessing and are fami	dge of digital image an lliar with different meth em, especially in the fi	nods of signal proces				
Course	S (type, r	umber of weekly contact hour	s, language — if other than Ge	rman)				
V (2) + Module		t in: German or English						
		e essment (type, scope, lang le for bonus)	guage — if other than German,	examination offered — if no	t every semester, informati	ion on whether		
c) oral e d) proje e) prese If a writ stead ta of asse nation Langua	 a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may 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. Language of assessment: German and/or English 							
			in which the course is	offered and in the su	ibsequent semester			
Allocat	ion of p	Diaces						
 Additio	nal inf	ormation						
Worklo	ad							
180 h								
Teachir	ıg cycl	e						
Referre	d to in	LPOI (examination regulati	ons for teaching-degree progra	ammes)				
Module	appea	ers in						
	-	ee (1 major) Mathemati ee (1 major) Physics (20						
Master's wi (2020)	th 1 majo	Nanostructure Technology	-	e generated 02-Aug-2025 • ex. er (120 ECTS) Nanostrukturtec	-	page 29 / 114		

Master's degree (1 major) Nanostructure Technology (2016) Master's degree (1 major) Computational Mathematics (2016) Master's degree (1 major) Functional Materials (2016) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Master's degree (1 major) Computational Mathematics (2019) Master's degree (1 major) Mathematics (2019) Master's degree (1 major) Nanostructure Technology (2020) Master's degree (1 major) Physics (2020) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Master's degree (1 major) Quantum Technology (2021) Master's degree (1 major) Computational Mathematics (2022) Master's degree (1 major) Functional Materials (2022) Master's degree (1 major) Mathematics (2022) exchange program Physics (2023)

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

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

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Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Master's degree (1 major) Functional Materials (2025)

Module	e title				Abbreviation		
Physics	s of Ad	vanced Materials			11-PMM-161-m01		
Module	e coord	inator		Module offered by			
Manag	ing Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	nd Astronomy		
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)			
6	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	ts						
and su	percon	rties of various materia ductors; thin films, het imensional layer mater	erostructures and supe				
Intende	ed lear	ning outcomes					
The stu	dents l	know the properties an	d characterization met	hods of some moder	n materials.		
Course	S (type, r	number of weekly contact hours	s, language — if other than Gei	rman)			
V (3) + Module		t in: German or English					
		sessment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	on on whether	
e) pres If a writ stead t of asse nation Langua	 d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may 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. Language of assessment: German and/or English Assessment offered: In the semester in which the course is offered and in the subsequent semester 						
Allocat	ion of p	olaces					
Additio	onal inf	ormation					
	_						
Worklo	ad						
180 h							
Teachi	ng cycl	e					
Referre	d to in	LPO I (examination regulation	ons for teaching-degree progra	mmes)			
Module	e appea	nrs in					
Master Master Master Master Master	's degr 's degr 's degr 's degr 's teach	ee (1 major) Mathemati ee (1 major) Physics (20 ee (1 major) Nanostruct ee (1 major) Computatio ee (1 major) Functional ning degree Gymnasium	016) cure Technology (2016) onal Mathematics (201 Materials (2016) n MINT Teacher Educat				
Master's wi (2020)	iui i majoi	manostructure recrinology		generated 02-Aug-2025 • exa r (120 ECTS) Nanostrukturtecl	-	page 31 / 114	

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Master's degree (1 major) Computational Mathematics (2019) Master's degree (1 major) Mathematics (2019) Master's degree (1 major) Nanostructure Technology (2020) Master's degree (1 major) Physics (2020) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Master's degree (1 major) Quantum Technology (2021) Master's degree (1 major) Computational Mathematics (2022) Master's degree (1 major) Functional Materials (2022) Master's degree (1 major) Mathematics (2022) exchange program Physics (2023) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) Mathematics (2024) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Master's degree (1 major) Functional Materials (2025)

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Module	Module title Abbreviation					
Organi	c Semi	conductors			11-OHL-161-m01	
Module	e coord	inator		Module offered by		
Manag	ing Dire	ector of the Institute of A	pplied Physics	Faculty of Physics a	nd Astronomy	
ECTS	1	od of grading	Only after succ. con		,	
6		rical grade		· · · · ·		
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	Its	0	I			
Fundar ons.	nentals	of organic semiconduc	tors, molecular and po	olymer electronics ar	id sensor technology	y, applicati-
Intend	ed lear	ning outcomes	_			
		have advanced knowled	ge of organic semicor	ductors.		
		number of weekly contact hours,				
V (3) +	-					
		t in: German or English				
		Sessment (type, scope, langu le for bonus)	age — if other than German,	examination offered — if no	t every semester, informati	ion on whether
		mination (approx. 90 to				
		nation of one candidate		ıtes) or		
c) oral	examin	ation in groups (groups	of 2, approx. 30 minu		r	
		ort (approx. 8 to 10 page				
		n/talk (approx. 30 minu amination was chosen a		ant this may be char	and accessme	nt may in-
		e form of an oral examination				
		t is changed, the lecture			- ,	
		the latest.			·	-
-	-	ssessment: German and		offered and in the or		
		ffered: In the semester i	n which the course is	offered and in the st	ibsequent semester	
Allocat		Jiaces	-			
			_			
Additio	onal inf	ormation				
Worklo	ad					
180 h			_			
Teachi	ng cycl	e				
Referre	ed to in	LPO I (examination regulatio	ns for teaching-degree progra	immes)		
Module	e appea	urs in				
	-	ee (1 major) Physics (20				
	-	ee (1 major) Nanostructu				
	-	ee (1 major) Functional I				
		ning degree Gymnasium				016)
		y course MINT Teacher I			B) (2016)	
	-	ee (1 major) Nanostructı ee (1 major) Physics (20				
		r Nanostructure Technology		generated 02-Aug-2025 • exa	am, reg. da-	page 33 / 114
(2020)	inajo	and a structure rectinition by		r (120 ECTS) Nanostrukturtech	-	P050 337 114



Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Master's degree (1 major) Quantum Technology (2021) Master's degree (1 major) Functional Materials (2022)

exchange program Physics (2023)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Master's degree (1 major) Functional Materials (2025)

Module	e title				Abbreviation
Sensor	and Ac	ctor Materials - Functio	onal Ceramics and Mag	netic Particles	08-FU-SAM-161-m01
Module	e coord	inator		Module offered b	y
-	progra Matrieri		tionswerkstoffe (Func-	Chair of Chemical	Technology of Material Synthesis
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
5		rical grade		1 ()	
J Duratio		Module level	Other prerequisites		
1 seme		graduate			
Conten	Its				
					as piezoelectrics, shape memory ological fluids, magnetofluids.
Intend	ed lear	ning outcomes			
Studen	ts have	e developed fundamen	tal knowledge in the ar	ea of sensory and a	actuatory materials.
Course	S (type, r	number of weekly contact hour	rs, language — if other than Gei	rman)	
V (2) +	P (2)				
Metho	d of ass	sessment (type, scope, lang	guage — if other than German.	examination offered — if	not every semester, information on whether
		le for bonus)			,
P: cred	itable f	ffered: Once a year, su or bonus	mmer semester		
Allocat	ion of p	olaces			
Additio	onal inf	ormation			
Worklo	ad				
150 h			Y		
-	ng cycl	e			
Referre	ed to in	LPO I (examination regulation	ons for teaching-degree progra	immes)	
Module	e appea	urs in			
		ee (1 major) Physics (2	016)		
	-		ture Technology (2016)		
	-	ee (1 major) Functional			
	-	-	ture Technology (2020)		
	-	ee (1 major) Physics (2			
		ee (1 major) Physics Int			
	-	ee (1 major) Quantum I			
	-	ee (1 major) Quantum 1			
Master	's degr	ee (1 major) Quantum I	Engineering (2024)		
		ee (1 major) Physics Int			

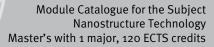
Module	e title				Abbreviation		
Ultrafa	st spec	troscopy and quantum	-control		08-PCM4-161-m01		
Module	e coord	inator		Module offered by	<u> </u>		
		seminar "Nanoskalige	Materialien"	-	l and Theoretical Ch	emistry	
-	1			· · · ·		Christiy	
ECTS		od of grading	Only after succ. co	ompl. of module(s)			
5		rical grade					
Duratio	on	Module level	Other prerequisit	es			
1 seme	ster	graduate	Prior completion c	of modules o8-PCM1a	and o8-PCM1b recor	nmended.	
Conten	Its						
		iscusses advanced top ime-resolved laser spe			control. It focuses o	n ultrashort	
		ning outcomes					
	-	able to describe the ge		lacor pulsos and to d	paractorico thom Th	0V can ox-	
plain tl	ne theo	ry of time-resolved lase applications of quant	er spectroscopy and r	•			
· ·		umber of weekly contact hour		German)			
S (2) +		under of weekly contact hour		Jermany			
• •	• •	t in: German or English					
		sessment (type, scope, lang		n exemination effected if a		ion on wheth	
		le for bonus)	uage — Ir other than Germa	n, examination offered — if n	ot every semester, informat	ion on whether	
		nination (approx. 90 m	ninutes) or				
		ation of one candidate		nutes) or			
		x. 30 minutes)		,			
Langua	ige of a	ssessment: German ar	id/or English				
Allocat	ion of p	olaces					
Additic	onal inf	ormation					
Worklo	hed						
	<u>au</u>						
150 h							
Teachi	ng cycl	8					
Referre	ed to in	LPO I (examination regulati	ons for teaching-degree pro	grammes)			
Modul	e appea	irs in					
Master	's degr	ee (1 major) Chemistry	(2016)				
		ee (1 major) Mathemati					
Master	's degr	ee (1 major) Physics (20	016)				
	-	ee (1 major) Nanostruc					
	-	ee (1 major) Computati					
		ning degree Gymnasiur				016)	
		y course MINT Teacher		e Network Bavaria (EN	В) (2016)		
	-	ee (1 major) Chemistry					
	-	ee (1 major) Computati		019)			
	-	ee (1 major) Mathemati ee (1 major) Nanostruci	-	o)			
Aaster's w	ith 1 maio	Nanostructure Technology	IMII Würzburg	g • generated 02-Aug-2025 • ex	am, reg. da-	page 36 / 11/	
				ster (120 ECTS) Nanostrukturted	-	P~50 J0 / 114	



Master's degree (1 major) Physics (2020) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Master's degree (1 major) Physics International (2020) Master's degree (1 major) Quantum Engineering (2020) Master's degree (1 major) Quantum Technology (2021) Master's degree (1 major) Computational Mathematics (2022) Master's degree (1 major) Functional Materials (2022) Master's degree (1 major) Mathematics (2022) Master's degree (1 major) Quantum Engineering (2024) Master's degree (1 major) Physics International (2024) Master's degree (1 major) Computational Mathematics (2022) Master's degree (1 major) Mathematics (2024) Master's degree (1 major) Mathematics (2024) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) Mathematics (2024)

	e title				Abbreviation	
Electrochemical Energy Storage and Conversion			Conversion		08-FU-EEW-152-m01	
Module coordinator				Module offered by		
holder thesis	ofthe	Chair of Chemical Tech	nology of Material Syn-	-	echnology of Material Synthesi	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
5	1	rical grade				
Duratio		Module level	Other prerequisites			
1 seme	ester	undergraduate				
Conten			I			
um and cal dou (Si, CIS	d nicke uble lay S, CIGS,	l metal hydride, sodiun er capacitors, redox-flo GaAs, organic and dye	n sulphur, sodium nick	el chloride, lithium ic /stems (AFC, PEMFC,	ems such as lead, nickel cadmi on accumulators), electrochem DMFC, PAFC, SOFC), solar cells	
		ning outcomes	go of alactro chamical a	normu storess and a	anyorgian and are able to say	
		e developed a knowled ge to research problem:		energy storage and co	onversion and are able to apply	
			s, language — if other than Ge	rman)		
V (2) +						
			guage — if other than German	examination offered — if no	t every semester, information on whethe	
		le for bonus)	juage in other than contrart,			
weight	ed 7:3			actical assignments	ation talks approx. 15 minutes (2 to 4 random examinations);	
weighte Langua	ed 7:3 age of a sment o	ssessment: German ar ffered: Once a year, su	nd/or English	actical assignments		
weighte Langua Assess Allocat	ed 7:3 age of a sment o	ssessment: German ar ffered: Once a year, su	nd/or English	actical assignments		
weighte Langua Assess Allocat Additio	ed 7:3 age of a sment o tion of p	ssessment: German ar ffered: Once a year, su places	nd/or English	actical assignments		
weighte Langua Assess Allocat Additio Worklo	ed 7:3 age of a sment o tion of p	ssessment: German ar ffered: Once a year, su places	nd/or English	actical assignments		
weight Langua Assess Allocat Additio Worklo 150 h	ed 7:3 age of a ment o tion of p onal inf	issessment: German ar iffered: Once a year, su places ormation	nd/or English	actical assignments		
weighte Langua Assess Allocat Additio Worklo	ed 7:3 age of a ment o tion of p onal inf	issessment: German ar iffered: Once a year, su places ormation	nd/or English	actical assignments		
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weight Langua Assess Allocat Additio 150 h Teachin Referre Module	ed 7:3 age of a sment of tion of pnal inf pad ng cycl ed to in e appea	e LPOI (examination regulation ars in	nd/or English mmer semester	ummes)		
weight Langua Assess Allocat Additio 150 h Teachin Referre Bachel Master	ed 7:3 age of a sment of tion of p onal inf onal inf oad ad ed to in e appea or's de r's degr	e LPO I (examination regulation gree (1 major) Nanostru e (1 major) Physics (200	ons for teaching-degree progra ucture Technology (201)	ummes)		
weight Langua Assess Allocat Additio 150 h Teachin Referre Bachel Master Master	ed 7:3 age of a sment of tion of onal inf oad ng cycl ed to in e appea or's degr 's degr	e LPO I (examination regulati ars in gree (1 major) Nanostruc e (1 major) Nanostruc	nd/or English mmer semester ons for teaching-degree progra ucture Technology (201 016) ture Technology (2016)	ummes)		
weight Langua Assess Allocat Additio Worklo 150 h Teachin Referre Module Bachel Master Master Master	ed 7:3 age of a sment of tion of p onal inf oad ng cycl ed to in e appea lor's degr ''s degr	e LPO I (examination regulati ars in gree (1 major) Nanostruc e (1 major) Functional	nd/or English mmer semester ons for teaching-degree progra ucture Technology (201 016) ture Technology (2016) Materials (2016)	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
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weight Langua Assess Allocat Additio 150 h Teachin Referre Bachel Master Master Master Master Master	ed 7:3 age of a sment of tion of onal inf oad ad ad ad ad ad ad ad ad ad ad ad ad a	e LPO I (examination regulation gree (1 major) Nanostructor ee (1 major) Physics (2000) ee (1 major) Nanostructor ee (1 major) Nanostructor ee (1 major) Physics (2000)	ons for teaching-degree progra ucture Technology (2016) Materials (2016) ture Technology (2020) 020)	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
weight Langua Assess Allocat Additio 150 h Teachin Referre Bachel Master Master Master Master Master Master Master	ed 7:3 age of a sment of tion of onal inf oad ad ad ad ad ad ad ad ad ad ad ad ad a	e LPO I (examination regulation gree (1 major) Nanostructor e (1 major) Nanostructor e (1 major) Nanostructor e (1 major) Nanostructor e (1 major) Physics (20) e (1 major) Nanostructor e (1 major) Physics (20) e (1 ma	nd/or English mmer semester ons for teaching-degree progra ucture Technology (201) o16) ture Technology (2016) Materials (2016) ture Technology (2020) o20) ternational (2020)	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
weight Langua Assess Allocat Additio Yorklo 150 h Teachin Referre Module Bachel Master Master Master Master Master Master Master Master Master	ed 7:3 age of a sment of tion of p onal inf oad ad ad ad ad ad ad ad ad ad ad ad ad a	e LPO I (examination regulation gree (1 major) Nanostruction e (1 major) Physics (20) e	nd/or English mmer semester ons for teaching-degree progra ucture Technology (201) o16) ture Technology (2016) Materials (2016) ture Technology (2020) o20) ternational (2020)	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
weight Langua Assess Allocat Additio Worklo 150 h Teachin Referre Bachel Master Master Master Master Master Master Master Master Bachel	ed 7:3 age of a sment of tion of p onal inf onal inf oad ad ed to in e appea or's degr 's degr 's degr 's degr 's degr 's degr 's degr c's degr	e LPO I (examination regulation gree (1 major) Nanostruction e (1 major) Physics (20) e	nd/or English mmer semester ons for teaching-degree progra ucture Technology (2016) ture Technology (2016) Materials (2016) ture Technology (2020) 020) ternational (2020) Engineering (2020) ucture Technology (202	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	(2 to 4 random examinations);	





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

	e title				Abbreviation
Structu	ure and	Properties of Modern I	Materials: Experiments	s vs. Simulations	08-FU-MW-161-m01
Modul	e coord	inator		Module offered by	1
degree	e progra	mme coordinator Funkt	ionswerkstoffe (Func-	Chair of Chemical	Technology of Material Synthesis
	Matrier				<i>,</i>
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duratio		Module level	Other prerequisites		
1 seme	ester	graduate			
Conter		3.446410			
	al prop	erties of metals and cer	amics: correlation of s	tructure/property re	elations through experiments and
		••••••			
	-	ning outcomes		• •	uminium alloys and high-perfor-
mance	ceram pecial	cs. They are introduced	l to measuring method	s and calculation m	nethods using numerical simulat of materials and the resulting pro
Course	es (type, i	number of weekly contact hours	s, language — if other than Ge	rman)	
V (2) +	_				
Metho	d of as		uage — if other than German,	examination offered — if r	not every semester, information on whether
		le for bonus)			
b) oral c) oral	examir examir	x. 30 minutes) or nation of one candidate nation in groups (groups	· · ·	-	
langur	ana af a			tes total)	
-	-	ssessment: German an	d/or English	tes total)	
Assess	sment o	ssessment: German an ffered: Once a year, wir	d/or English	tes total)	
Assess	-	ssessment: German an ffered: Once a year, wir	d/or English	tes total)	
Assess Allocat	tion of	ssessment: German an ffered: Once a year, wir blaces	d/or English	tes total)	
Assess Allocat	tion of	ssessment: German an ffered: Once a year, wir	d/or English	tes total)	
Assess Allocat Additic	tion of ponal inf	ssessment: German an ffered: Once a year, wir blaces	d/or English	tes total)	
Assess Allocat Additic	tion of ponal inf	ssessment: German an ffered: Once a year, wir blaces	d/or English	tes total)	
Assess Allocat Additio Worklo	tion of ponal inf	ssessment: German an ffered: Once a year, wir blaces	d/or English	tes total)	
Assess Allocat Additic Worklc 150 h	tion of ponal inf	ssessment: German an ffered: Once a year, wir places ormation	d/or English	tes total)	
Assess Allocat Additic Worklc 150 h	onal inf	ssessment: German an ffered: Once a year, wir places ormation	d/or English	tes total)	
Assess Allocat Additio Worklo 150 h Teachi 	tion of p onal inf oad	ssessment: German an ffered: Once a year, wir places ormation	d/or English hter semester		
Assess Allocat Additio Worklo 150 h Teachi Referre	tion of p onal inf oad	ssessment: German an ffered: Once a year, wir places ormation e	d/or English hter semester		
Assess Allocat Additio Worklo 150 h Teachi Referro	tion of p onal inf oad	ssessment: German an ffered: Once a year, wir places ormation e LPOI (examination regulation	d/or English hter semester		
Assess Allocat Additio Worklo 150 h Teachi Referre Modulo	ion of ponal inf onal inf oad oad ed to in e appea	ssessment: German an ffered: Once a year, wir places ormation e LPOI (examination regulation	d/or English hter semester		
Assess Allocat Additio Worklo 150 h Teachi Referre Modulo	ion of ponal inf onal inf oad ed to in e appea	ssessment: German an ffered: Once a year, wir places ormation e LPOI (examination regulation ars in	d/or English hter semester	Immes)	
Assess Allocat Additio Worklo 150 h Teachi Referre Modulo Master Master	ed to in e appea r's degr	ssessment: German an ffered: Once a year, wir places ormation e (examination regulation ars in ee (1 major) Physics (200	d/or English hter semester ons for teaching-degree progra p16) ure Technology (2016)	Immes)	
Assess Allocat Additic Worklc 150 h Teachi Referre Module Master Master Master Master	ed to in e appea r's degr r's degr r's degr	ssessment: German an ffered: Once a year, wir places ormation e LPOI (examination regulation ars in ee (1 major) Physics (20 ee (1 major) Functional ee (1 major) Nanostruct ee (1 major) Nanostruct	d/or English hter semester ons for teaching-degree progra (2016) ure Technology (2016) Materials (2016) ure Technology (2020)	ımmes)	
Assess Allocat Additic Worklc 150 h Teachi Referre Master Master Master Master Master Master	ed to in e appea r's degr r's degr r's degr	ssessment: German an ffered: Once a year, wir places ormation e LPO I (examination regulation ars in ee (1 major) Physics (200 ee (1 major) Nanostruct ee (1 major) Nanostruct ee (1 major) Nanostruct ee (1 major) Physics (200	d/or English hter semester ons for teaching-degree progra p16) ure Technology (2016) Materials (2016) ure Technology (2020) p20)	ımmes)	
Assess Allocat Additio 150 h Teachi Referre Master Master Master Master Master Master Master	ed to in e appea r's degr r's degr r's degr r's degr r's degr	ssessment: German an ffered: Once a year, wir places ormation e LPO I (examination regulation ars in ee (1 major) Physics (20 ee (1 major) Nanostruct ee (1 major) Nanostruct ee (1 major) Physics (20 ee (1 major) Physics (20 ee (1 major) Physics (20 ee (1 major) Physics (20 ee (1 major) Physics (20	d/or English hter semester ans for teaching-degree progra b16) ure Technology (2016) Materials (2016) ure Technology (2020) b20) ernational (2020)	ımmes)	
Assess Allocat Additic Worklc 150 h Teachi Referre Master Master Master Master Master Master Master Master	ed to in e appea r's degr r's degr r's degr r's degr r's degr r's degr	ssessment: German an ffered: Once a year, wir places ormation e LPO I (examination regulation ars in ee (1 major) Physics (200 ee (1 major) Nanostruct ee (1 major) Nanostruct ee (1 major) Nanostruct ee (1 major) Physics (200	d/or English hter semester ons for teaching-degree progra o16) ure Technology (2016) Materials (2016) ure Technology (2020) o20) ernational (2020) ingineering (2020)	ımmes)	

Module title					Abbreviation
Current Topics in Nanostructure Technology			ology		11-EXN5-161-m01
Module coordinator				Module offered by	
chairpe	rson o	examination committee	_	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5		rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme		graduate	Approval from exam	ination committee re	equired.
Conten					
		in Experimental or Theor tudy abroad.	retical Physics. Credit	ed academic achiev	ements, e.g. in case of change of
Intende	ed learn	ning outcomes			
Theoret subdiso knowle	ical Ph cipline dge. Th	ysics of the Master's pro	gramme of Nanostruc nd the measuring and e subject-specific con	ture Technology. The l/or calculation methet ntexts and know the	of a module of Experimental or ey have knowledge of a current nods necessary to acquire this application areas.
V (2) +				~ /	
Method	l of ass		ge — if other than German, e	examination offered — if no	t every semester, information on whether
b) oral of c) oral of d) proje e) prese If a writ stead ta of asse nation of Langua	 a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may 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. Language of assessment: German and/or English 				
Allocat	ion of p	olaces			
Additio	nal info	ormation			
	- d				
Worklo	aa				
150 h		-			
Teachir	ig cycl	2			
 Poforro	d to in	LPO I (examination regulations	fortosching doges	mmoc)	
Module	appea	rs in			
		ee (1 major) Nanostructur	re Technology (2016)		
	Master's degree (1 major) Nanostructure Technology (2020)				

Module title					Abbreviation
Current Topics in Nanostructure Technology			ology		11-EXN6-161-m01
Module	coord	inator		Module offered by	
chairpe	rson o	f examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
6	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate	Approval from exam	ination committee re	equired.
Conten	ts				
		in Experimental or Theor tudy abroad.	etical Physics. Credit	ed academic achiev	ements, e.g. in case of change of
Intende	ed leari	ning outcomes			
Theoret subdisc knowle	ical Ph cipline dge. Th	ysics of the Master's pro of Physics and understar ney are able to classify th	gramme of Nanostruc nd the measuring and e subject-specific cor	ture Technology. Th /or calculation meth ntexts and know the	of a module of Experimental or ey have knowledge of a current nods necessary to acquire this application areas.
		umber of weekly contact hours, l	anguage — If other than Ger	man)	
V (3) + Mathad		accmont (the second s
			ge — If other than German, e	examination offered — If no	t every semester, information on whether
b) oral o c) oral o d) proje e) prese If a writ stead ta of asses nation o	 a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may 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. Language of assessment: German and/or English 				
Allocati	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
180 h					
Teachir	ng cycl	e			
Referre	d to in	LPO I (examination regulations	for teaching-degree progra	mmes)	
Module					
	-	ee (1 major) Nanostructur ee (1 major) Nanostructur	•, •		
master	5 4051		2.2020)		

Module title					Abbreviation
Current Topics in Nanostructure Technology			ology		11-EXN7-161-m01
Module coordinator				Module offered by	
chairpe	rson of	f examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
7	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate	Approval from exam	ination committee re	equired.
Conten					
	•	in Experimental or Theor tudy abroad.	etical Physics. Credit	ed academic achiev	ements, e.g. in case of change of
Intende	ed learr	ning outcomes			
Theoret subdiso knowle	ical Ph cipline dge. Th	ysics of the Master's pro of Physics and understar ney are able to classify th	gramme of Nanostruc nd the measuring and e subject-specific cor	cture Technology. Th I/or calculation meth ntexts and know the	of a module of Experimental or ey have knowledge of a current nods necessary to acquire this application areas.
		umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (3) + I					
		s essment (type, scope, langua; le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
b) oral of c) oral of d) proje e) prese If a writ stead ta of asse nation of Langua	 a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may 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. Language of assessment: German and/or English 				
Allocat	ion of p	olaces			
Additio	nal info	ormation			
Worklo	ad				
210 h					
Teachir	ng cycl	6			
	d 4 - 1				
		LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module	appea	irs in			
Master'	Module appears in Master's degree (1 major) Nanostructure Technology (2016) Master's degree (1 major) Nanostructure Technology (2020)				

Module title					Abbreviation	
Current Topics in Nanostructure Technology			ology		11-EXN8-161-m01	
Module coordinator				Module offered by		
chairpe	rson o	f examination committee		Faculty of Physics a	ind Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
8	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate	Approval from exam	ination committee re	equired.	
Conten						
		in Experimental or Theor tudy abroad.	etical Physics. Credit	ed academic achiev	ements, e.g. in case of change of	
Intende	ed learn	ning outcomes				
Theoret subdisc knowle	ical Ph cipline dge. Th	ysics of the Master's pro	gramme of Nanostruc nd the measuring and e subject-specific cor	ture Technology. Th l/or calculation meth ntexts and know the	of a module of Experimental or ey have knowledge of a current hods necessary to acquire this application areas.	
V (4) + I				ilidily		
	<u> </u>	essment (type, scope, langua	ge — if other than German, e	examination offered — if no	ot every semester, information on whether	
		le for bonus)				
b) oral e c) oral e d) proje e) prese If a writ stead ta of asse nation e	 a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may 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. Language of assessment: German and/or English 					
Allocati	ion of p	olaces				
 Additio	nal info	ormation				
 Worklo	ad					
240 h						
Teachir	ng cycl	e				
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)		
Module	appea	in and the second se				
	-	ee (1 major) Nanostructur	•, •			
Master'	Master's degree (1 major) Nanostructure Technology (2020)					

Module title					Abbreviation
Current Topics in Nanostructure Technology			ology		11-EXN6A-161-m01
Module coordinator				Module offered by	
chairpe	rson o	f examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
6	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate	Approval from exam	ination committee re	equired.
Conten					
	•	in Experimental or Theor tudy abroad.	retical Physics. Credit	ed academic achiev	ements, e.g. in case of change of
Intende	ed learn	ning outcomes			
Theoret subdisc knowle	ical Ph cipline dge. Th	ysics of the Master's pro of Physics and understar ney are able to classify th	gramme of Nanostruc nd the measuring and e subject-specific cor	ture Technology. Th /or calculation meth ntexts and know the	of a module of Experimental or ey have knowledge of a current nods necessary to acquire this application areas.
		umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (3) + I					
		s essment (type, scope, langua; le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
b) oral e c) oral e d) proje e) prese If a writ stead ta of asse nation o Langua	 a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may 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. Language of assessment: German and/or English 				
Allocati	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
180 h					
Teachir	ng cycl	6			
Keferre	a to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module	appea	irs in			
Master'	Module appears in Master's degree (1 major) Nanostructure Technology (2016) Master's degree (1 major) Nanostructure Technology (2020)				

	e title				Abbreviation		
Advanced Topics in Solid State Physics					11-CSFM-161-m01		
Module coordinator				Module offered by			
Managing Director of the Institute of Theoretical Physics and Astrophysics				Faculty of Physics and Astronomy			
ECTS	1	od of grading	Only after succ. cor	npl. of module(s)			
6	1	rical grade					
Duration Module level Other prerequisites							
1 semester graduate Approval from examination committee required.							
Conten					iquircu.		
vered i	n any c	vill enable the lecturers of the other modules. Th in the regular curriculur	nese topics may relate				
Intend	ed lear	ning outcomes					
		advance their knowled nsights into the connec			of Condensed Matt	er Physics	
Course	S (type,	number of weekly contact hour	s, language — if other than Ge	rman)			
V (3) +	R (1)						
		sessment (type, scope, lang ble for bonus)	guage — if other than German,	examination offered — if no	t every semester, informat	ion on whether	
stead t of asse nation	ake the essmen date a	amination was chosen e form of an oral exami it is changed, the lectur t the latest.	nation of one candidat	e each or an oral exa	mination in groups.		
Allocat		assessment: German ar		ts about this by four	weeks prior to the o		
Allocat		assessment: German ar		ts about this by four	weeks prior to the o		
	tion of	assessment: German ar		ts about this by four	weeks prior to the o		
 Additic	tion of onal inf	assessment: German ar places		ts about this by four	weeks prior to the o		
 Additic Workla	tion of onal inf	assessment: German ar places		ts about this by four	weeks prior to the o		
 Additic Worklo 180 h	tion of onal inf oad	assessment: German ar places Formation		ts about this by four	weeks prior to the o		
 Additic Workla	tion of onal inf oad	assessment: German ar places Formation			weeks prior to the o		
 Additic Worklo 180 h Teachi 	tion of pnal inf pad	assessment: German ar places Formation	nd/or English		weeks prior to the o		
 Additic Worklo 180 h Teachi 	tion of pnal inf pad	assessment: German ar places Formation	nd/or English		weeks prior to the o		
 Additio 180 h Teachi Referre	tion of onal inf oad ng cycl	assessment: German ar places formation e LPO I (examination regulation	nd/or English		weeks prior to the o		
 Additic 180 h Teachi Referre Module Master Supple Module	ed to in e appea ''s degr ''s teac ementa e studio	assessment: German ar places formation e LPO I (examination regulation ars in ree (1 major) Physics (2 ree (1 major) Nanostruc hing degree Gymnasiun ry course MINT Teachen es (Master) Physics (20)	ons for teaching-degree progra ons for teaching-degree progra 016) ture Technology (2016) m MINT Teacher Educat r Education PLUS, Elite 19)	ammes) ion PLUS, Elite Network Network Bavaria (EN	Drk Bavaria (ENB) (2	riginal exami	
 Additic 180 h Teachi Referre Master Master Master Supple Module Master	ed to in e appea 's degr 's teac ementa e studio 's degr	assessment: German ar places formation formation LPO I (examination regulation ars in ree (1 major) Physics (2 ree (1 major) Nanostruc hing degree Gymnasiun ry course MINT Teachen	nd/or English	ammes) ion PLUS, Elite Network Network Bavaria (EN	Drk Bavaria (ENB) (2 B) (2016)	riginal exami	

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

Master's degree (1 major) Physics (2020)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

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

Module studies (Master) Quantum Technology (2021)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Modul	e title			-	Abbreviation
Advan	ced Top	oics in Nanostructure Tec	hnology		11-CSNM-161-m01
Modul	e coord	linator		Module offered by	<u> </u>
Manag		ector of the Institute of Th	neoretical Physics	Faculty of Physics a	and Astronomy
ECTS	ECTS Method of grading Only after succ. compl. of module(s)				
6	nume	rical grade			
Durati	on	Module level	Other prerequisites	i	
1 seme	ester	graduate	Approval from exam	ination committee r	equired.
Conte	nts				
can no	ot be co		le. These lectures ma	y either reflect new o	ctures on advanced topics that developments in research or deal
Intend	ed lear	ning outcomes			
		advance their knowledge nts into the connections l			of nanostructure technology and
Course	es (type,	number of weekly contact hours,	language — if other than Ge	rman)	
V (3) +	R (1)				
			age — if other than German,	examination offered — if no	ot every semester, information on whether
		mination (approx. 90 to 1			
b) oral c) oral d) proj e) pres If a wri stead of asse nation	examin examin ect rep sentatio itten ex take tho essmen date a	nation of one candidate e nation in groups (groups ort (approx. 8 to 10 pages on/talk (approx. 30 minut amination was chosen as e form of an oral examina	each (approx. 30 minu of 2, approx. 30 minu s) or ees) s method of assessm tion of one candidate r must inform student	tes per candidate) o ent, this may be cha e each or an oral exa	r nged and assessment may in- mination in groups. If the method weeks prior to the original exami-
Alloca	tion of	places			
Additi	onal inf	ormation			
Workle	oad				
180 h					
Teachi	ing cycl	e			
Referr	ed to in	LPO I (examination regulation	s for teaching-degree progra	ammes)	
	e appe				
	-	ee (1 major) Nanostructu ee (1 major) Nanostructu			

Module title					Abbreviation
Advanced Topics in Physics					11-CSPM-161-m01
Module coordinator				Module offered by	
chairper	rson of	examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
6	numei	rical grade			
Duratior	n	Module level	Other prerequisites		
1 semes	ter	graduate	Approval from exam	ination committee re	equired.
Content	S				
	s. Thes	se topics may relate eithe			s not covered in any of the other subjects not included in the regu-
Intende	d learr	ning outcomes			
		advance their knowledge ts into the connections b			of nanostructure technology and
Courses	i (type, n	umber of weekly contact hours, la	anguage — if other than Ger	man)	
V (3) + R	2 (1)				
		e essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
b) oral e c) oral e d) projec e) prese If a writt stead ta of asses nation d	examin xamin ct repo ntatio cen exa ke the ssment late at	form of an oral examinat	ach (approx. 30 minu of 2, approx. 30 minut o) or es) method of assessme tion of one candidate must inform student	tes per candidate) or ent, this may be char e each or an oral exar	r nged and assessment may in- mination in groups. If the method weeks prior to the original exami-
Allocatio	on of p	olaces			
Addition	nal info	ormation			
Workloa	ad				
180 h					
Teaching	g cycl	e			
Referred	d to in	LPOI (examination regulations	s for teaching-degree progra	mmes)	
Module	appea	rs in			
Master's degree (1 major) Nanostructure Technology (2016) Master's degree (1 major) Nanostructure Technology (2020) Master's degree (1 major) Quantum Technology (2021) Module studies (Master) Quantum Technology (2021)					

(2020)

Module title					Abbreviation
Solid State Physics 2					11-FK2-201-m01
Module coordinator				Module offered by	
Managi	ng Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
8	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate	Approval from exam	ination committee re	equired.
Conten	ts				
a. Elect b. Block c. Elect 2. Semi a. Elect b. Ferm c. Elect d. Boltz 3. The c a. Macr b. Polar plasmo c. Ferro 4. Semi a. Chara b. Intrir c. Dope d. Phys e. Hetel 5. Magr a. Atom b. Dia- c. Ferro 6. Supe a. Phen b. Mode c. Tunn	rical ar h theor rons i-classi rical tra- crical tra-	cal models of dynamic pr ansport in partially and co ces; measurement technic ansport in external magne- equations of transport ic function and ferroelect c electrodynamics and m cy of solids, of lattices, of er-band transitions, Want tism ctors tics niconductors conductors applications of p-n junc tures and paramagnetism ramagnetism in metals tism uctivity	rocesses ompletely filled band ques etic fields trics icroscopic theory valence electrons an nier-Mott excitons		ns; optical phonons, polaritons,
			odels in advanced sol	id state physics. Far	niliarity with the theoretical prin-
ciples a	and wit	h applications of experim	iental methods.		
		umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (4) + I Module		t in: German or English			
Method	d of ass		ge — if other than German, e	examination offered — if no	t every semester, information on whether
b) oral (c) oral (d) proje	examin examin ect repo	nination (approx. 90 to 1 ation of one candidate e ation in groups (groups c ort (approx. 8 to 10 pages n/talk (approx. 30 minut	ach (approx. 30 minu of 2, approx. 30 minut) or		r

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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.

Language of assessment: German and/or English

Assessment offered: In the semester in which the course is offered and in the subsequent semester

Allocation of places

Additional information

--

Workload

240 h

Teaching cycle

--

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

Module appears in

Master's degree (1 major) Nanostructure Technology (2020)

Master's degree (1 major) Physics (2020)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

Master's degree (1 major) Quantum Technology (2021) Master's degree (1 major) Computational Mathematics (2022)

Master's degree (1 major) Computational Mathematics (202

Master's degree (1 major) Functional Materials (2022)

Master's degree (1 major) Mathematics (2022)

exchange program Physics (2023)

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

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

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Master's degree (1 major) Functional Materials (2025)

Module title				Abbreviation		
			11-FKS-161-m01			
Module coordinator			Module offered by			
Manag	ing Dire	ector of the Institute of <i>i</i>	f Applied Physics Faculty of Physics and Astronomy			
ECTS	Metho	od of grading	Only after succ. compl. of module(s)			
6	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
		any-particle pictures of -ray spectroscopy.	electrons in solids, lig	ht-matter interaction	, optical spectrosco	py, electron
Intend	ed leari	ning outcomes				
types o	of spect	nave specific and advar roscopy and their fields 5 in research.	-	•		
Course	S (type, n	umber of weekly contact hours	s, language — if other than Ger	man)		
V (3) + Module		t in: German or English				
		essment (type, scope, lang le for bonus)	uage — if other than German, o	examination offered — if no	t every semester, informati	on on whether
e) pres If a writ stead t of asse nation Langua	entatio tten exa ake the ssmen date at age of a	ort (approx. 8 to 10 pag n/talk (approx. 30 minu amination was chosen a form of an oral examinut is changed, the lecture the latest. ssessment: German an ffered: In the semester	utes) as method of assessme iation of one candidate er must inform student d/or English	e each or an oral exame s about this by four v	mination in groups. I weeks prior to the or	If the method iginal exami-
Allocat	ion of p	olaces				
Additio	onal inf	ormation				
Worklo	ad					
180 h						
Teachi	ng cycl	e				
Referre	ed to in	LPO I (examination regulation	ons for teaching-degree progra	mmes)		
Module	e appea	ars in				
Module appears inMaster's degree (1 major) Mathematics (2016)Master's degree (1 major) Physics (2016)Master's degree (1 major) Nanostructure Technology (2016)Master's degree (1 major) Computational Mathematics (2016)Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)					016)	
Master's w (2020)	ith 1 majoi	Nanostructure Technology	-	generated 02-Aug-2025 • exa r (120 ECTS) Nanostrukturtech	-	page 52 / 114

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

Master's degree (1 major) Computational Mathematics (2019)

Master's degree (1 major) Mathematics (2019)

Master's degree (1 major) Nanostructure Technology (2020)

Master's degree (1 major) Physics (2020)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

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

Master's degree (1 major) Computational Mathematics (2022)

Master's degree (1 major) Mathematics (2022)

exchange program Physics (2023)

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

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

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Module title				Abbreviation	
Topological E	ffects in Solid State Phys	ics		11-TEFK-201-m01	
Module coord	linator		Module offered by	<u> </u>	
	ector of the Institute of Th	eoretical Physics	Faculty of Physics a	and Astronomy	
and Astrophy					
	od of grading	Only after succ. con	npl. of module(s)		
8 nume	rical grade Module level	 Other prerequisites			
1 semester	graduate				
Contents	Sidduite				
 Time-revers Hall conduct Bulk-bound Graphene (Quantum S Z2 invarian 	ctance and Chern numbe lary correspondence as a topological insulato pin Hall insulators				
Intended lear	ning outcomes				
stems. Ability				sics related to solid state sy- e Department of Physics and	
Courses (type,	number of weekly contact hours, l	anguage — if other than Ge	rman)		
V (4) + R (1) Module taugh	t in: German or English				
Method of as module is credital		ge — if other than German,	examination offered — if no	ot every semester, information on whether	
 a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may 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. Language of assessment: German and/or English Assessment offered: In the semester in which the course is offered and in the subsequent semester 					
Allocation of	places				
Additional information					
Workload					
240 h Teaching cycl	0				
	C				

Module appears in

Master's degree (1 major) Nanostructure Technology (2020)

Master's degree (1 major) Physics (2020)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

Master's degree (1 major) Mathematical Physics (2020)

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

Master's degree (1 major) Computational Mathematics (2022)

Master's degree (1 major) Mathematics (2022)

Master's degree (1 major) Mathematical Physics (2022)

exchange program Physics (2023)

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

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

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

(2020)

Module title					Abbreviation	
Field Theory in Solid State Physics					11-FFK-201-m01	
Module	coord	inator		Module offered by		
Managi and Ast		ector of the Institute of T ics	heoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
8	numei	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate				
Content	ts					
This will usually be a course on quantum many particle physics approached by the perturbative methods using Green's functions An outline could be: 1. Single-particle Green's function 2. Review of second quantization 3. Diagrammatic method using many particle Green's functions at temperature T=0 4. Diagrammatic method for finite T 5. Landau theory of Fermi liquids 6. Superconductivity						
		ional systems and bosc iing outcomes				
Working knowledge of the methods of quantum field theory in a non-relativistic context. Ability to study proper- ties of Fermi liquids (and bosonic systems) beyond the one-particle picture. Acquisition of methods which are es- sential for the understanding the effects of interactions, including superconductivity and the Kondo effect. Courses (type, number of weekly contact hours, language – if other than German) V (4) + R (2) Module taught in: German or English						
-		essment (type, scope, langua	age — if other than German	examination offered — if no	t every semester informati	on on whether
		le for bonus)			every semester, mornal	
 a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may 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. Language of assessment: German and/or English Assessment offered: In the semester in which the course is offered and in the subsequent semester 						
Allocati	ion of p	olaces				
Additional information						
Workload						
240 h						
Teaching cycle						
Master's wit (2020)	th 1 major	Nanostructure Technology	-	generated 02-Aug-2025 • exa r (120 ECTS) Nanostrukturtecl	-	page 56 / 114

Module appears in

Master's degree (1 major) Nanostructure Technology (2020)

Master's degree (1 major) Physics (2020)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

Master's degree (1 major) Mathematical Physics (2020)

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

Master's degree (1 major) Computational Mathematics (2022)

Master's degree (1 major) Mathematics (2022)

Master's degree (1 major) Mathematical Physics (2022)

exchange program Physics (2023)

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

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

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Module	e title				Abbreviation	
Selecte	ed Topi	cs of Theoretical Solid	State Physics		11-AKTF-201-m01	
Module coordinator Module offered by						
		ector of the Institute of	Theoretical Physics	Faculty of Physics a	and Astronomy	
and As	-		medicileari nysies		and Astronomy	
ECTS	Metho	od of grading	Only after succ. cor	npl. of module(s)		
6	nume	rical grade				
Duratio	on	Module level	Other prerequisites	5		
1 seme	ster	graduate				
Conten	ts					
ments	to bring		ndensed matter theory with actual research to			
Intend	ed lear	ning outcomes				
theoret	ical po	int of view. This happe	condensed matter systems on the basis of analts to the next step of be	lytical and numerical	methods. Therefore	
Course	S (type, r	number of weekly contact hou	rs, language — if other than Ge	rman)		
V (3) + Module		t in: German or Englisl	1			
			guage — if other than German,	examination offered — if no	ot every semester, informa	tion on whether
		le for bonus)				
b) oral c) oral d) proje	examir examin ect repo	ation in groups (group ort (approx. 8 to 10 pag	e each (approx. 30 min os of 2, approx. 30 minu ges) or	-	r	
If a writ stead t of asse nation Langua	tten exa ake the ssmen date at ge of a	e form of an oral exami t is changed, the lectu the latest. ssessment: German a	as method of assessm nation of one candidat rer must inform studen nd/or English	e each or an oral exa ts about this by four	mination in groups. weeks prior to the c	If the method original exami-
			r in which the course is	offered and in the su	ubsequent semeste	r
Allocat	ion of j	Diaces				
	onal inf	ormation				
 Worklo	ad					
	au					
180 h Teachi i		0				
	is tyti					
Referred to in LPO I (examination regulations for teaching-degree programmes)						
				ummes <i>)</i>		
Module		urs in				
Master Master	's degr 's degr	ee (1 major) Nanostruc ee (1 major) Physics (2			orth Doversite (END) (
			m MINT Teacher Educat			
Master's w	ith 1 majo	r Nanostructure Technology		 generated 02-Aug-2025 ex er (120 ECTS) Nanostrukturtec 		page 58 / 114

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Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Master's degree (1 major) Mathematical Physics (2020) Master's degree (1 major) Quantum Technology (2021) Master's degree (1 major) Mathematical Physics (2022) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Module title					Abbreviation		
Magnet	Magnetism 11-MAG-161-m01						
Module	coord	inator		Module offered by			
Managi	ng Dire	ector of the Institute of <i>I</i>	Applied Physics	Faculty of Physics a	nd Astronomy		
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)			
6	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	ts						
Dia- and paramagnetism, exchange interaction, ferromagnetism, antiferromagnetism, anisotropy, domain struc- ture, nanomagnetism, superparamagnetism, experimental methods to measure magnetic properties, Kondo ef- fect.							
Intende	ed learı	ning outcomes					
experin ches ar	nents; i nd are a	know basic terms, conc they are skilled in simp able to apply them to ta of these areas; they are	le model building and sks in the stated areas	in the formulation of ; they have compete	mathematical-phys encies in independer	ical approa-	
Course	S (type, n	umber of weekly contact hours	, language — if other than Ger	rman)			
V (3) + Module	• •	t in: German or English					
		essment (type, scope, lang le for bonus)	uage — if other than German, o	examination offered — if no	t every semester, informati	ion on whether	
b) oral c c) oral c d) proje e) prese If a writ stead ta of asse nation	 a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may 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. Language of assessment: German and/or English 						
Allocat							
Additio	nal inf	ormation					
Worklo	ad						
180 h							
Teaching cycle							
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module	appea	urs in					
Master' Master'	s degr s degr	ee (1 major) Mathemati ee (1 major) Physics (2c ee (1 major) Nanostruct	16)				
Master's wi (2020)	th 1 majoi	Nanostructure Technology	-	generated 02-Aug-2025 • exa r (120 ECTS) Nanostrukturtech	-	page 60 / 114	
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Master's degree (1 major) Computational Mathematics (2016) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Master's degree (1 major) Computational Mathematics (2019) Master's degree (1 major) Mathematics (2019) Master's degree (1 major) Nanostructure Technology (2020) Master's degree (1 major) Physics (2020) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Master's degree (1 major) Quantum Technology (2021) Master's degree (1 major) Computational Mathematics (2022) Master's degree (1 major) Mathematics (2022) exchange program Physics (2023) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) Mathematics (2024) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Module title				Abbreviation		
Quantu	Quantum Mechanics II 11-QM2-161-m01					
Module	coordi	nator		Module offered by		
Managi and Ast	-	ctor of the Institute of ics	Theoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	d of grading	Only after succ. con	npl. of module(s)		
8	numer	rical grade				
Duratio	1	Module level	Other prerequisites			
1 semes		undergraduate				
		undergraduate				
Contents The contents of this lecture build upon and will be chosen in accordance with the topics of the Bachelor's degree course "Quantum Mechanics I". Topics might include: for QM: 1. Historical introduction 2. Single-particle states in a central potential 3. Principles of quantum mechanics 4. Spin and angular momentum 5. Approximations of energy eigenvalues 6. Approximations for time-dependent problems 7. Second quantisation 8. Potential scattering 9. General scattering theory 10. Canonical formalism 11. Charged particles in electromagnetic fields 12. Quantum theory of radiation						
		ntanglement iing outcomes				
The stu most of	dents a the the	acquire in-depth knowle eoretical Master's degr n of this course is high	ee courses in Astrophy			
_		umber of weekly contact hours	<u> </u>	rman)		
V (4) + F						
		t in: German or English				
Method	l of ass	essment (type, scope, lang	uage — if other than German,	examination offered — if no	t every semester, informati	ion on whether
			•			
a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may in- stead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original exami- nation date at the latest. Language of assessment: German and/or English Assessment offered: In the semester in which the course is offered and in the subsequent semester						
Allocation of places						
Additional information						
Master's wit (2020)	th 1 major	Nanostructure Technology	-	generated 02-Aug-2025 • exa r (120 ECTS) Nanostrukturtech	-	page 62 / 114

Workload

240 h

Teaching cycle

P

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

Module appears in

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

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

Master's degree (1 major) Nanostructure Technology (2016)

Master's degree (1 major) Mathematical Physics (2016)

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

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)

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

Master's degree (1 major) Computational Mathematics (2019)

Master's degree (1 major) Mathematics (2019)

Master's degree (1 major) Nanostructure Technology (2020)

Master's degree (1 major) Physics (2020)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

Master's degree (1 major) Mathematical Physics (2020)

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

Master's degree (1 major) Computational Mathematics (2022)

Master's degree (1 major) Mathematics (2022)

Master's degree (1 major) Mathematical Physics (2022)

exchange program Physics (2023)

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

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

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Module title				Abbreviation		
Theore	Theoretical Solid State Physics 11-TFK-161-m01					
Module	coord	inator		Module offered by		
Managi and Ast	-	ector of the Institute of sics	Theoretical Physics	Faculty of Physics a	and Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
8	nume	rical grade		-		
Duratio	n	Module level	Other prerequisites	;		
1 seme	ster	graduate				
Conten	ts					
The contents of this two-term course will depend on the choice of the lecturer, and may include parts of the syllabus which could alternatively be offered as "Quantum Many Body Physics" (11-QVTP). A possible syllabus may be: 1 Band structure (Sommerfeld theory of metals, Bloch theorem, k.p approach and effective Hamiltonians for to- pological insulators (TIs), bulk-surface correspondence, general properties of TIs) 2 Electron-electron interactions in solids (path integral method for weakly interacting fermions, mean field theo- ry, random phase approximation (RPA), density functional theory) 3 Application of mean field theory and the RPA to magnetism						
		of superconductivity				
sics, wh cepts a sics" ar Course V (4) +	nich are nd the nd "Qua s (type, n R (2)	o-semester lecture, the e addressed in classica methods of descriptior antum Mechanics". umber of weekly contact hours t in: German or English	l textbooks, and there n. The course builds up	by advance their known the courses "Exp	wledge of the under	rlying con-
Method	l of ass	s essment (type, scope, lang	uage — if other than German,	examination offered — if no	ot every semester, informat	ion on whether
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may 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. Language of assessment: German and/or English Assessment offered: In the semester in which the course is offered and in the subsequent semester Allocation of places Workload 240 h Teaching cycle						
Master's wi (2020)	th 1 majoi	Nanostructure Technology		generated 02-Aug-2025 • exe er (120 ECTS) Nanostrukturtec		page 64 / 114

Module appears in

module appears in
Master's degree (1 major) Mathematics (2016)
Master's degree (1 major) Physics (2016)
Master's degree (1 major) Nanostructure Technology (2016)
Master's degree (1 major) Mathematical Physics (2016)
Master's degree (1 major) Computational Mathematics (2016)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)
Master's degree (1 major) Computational Mathematics (2019)
Master's degree (1 major) Mathematics (2019)
Master's degree (1 major) Nanostructure Technology (2020)
Master's degree (1 major) Physics (2020)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)
Master's degree (1 major) Mathematical Physics (2020)
Master's degree (1 major) Quantum Technology (2021)
Master's degree (1 major) Computational Mathematics (2022)
Master's degree (1 major) Mathematics (2022)
Master's degree (1 major) Mathematical Physics (2022)
exchange program Physics (2023)
Master's degree (1 major) Computational Mathematics (2024)
Master's degree (1 major) Mathematics (2024)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Module coordinator Module offered by Managing Director of the Institute of Applied Physics and Managing Director of the Institute of Theoretical Physics and Astrophysics Faculty of Physics and Astronomy ECT3 Method of grading Only after succ. compl. of module(s) Image: Complexity of Physics and Astronomy 6 numerical grade - Duration Module level Other prerequisites 1 semester graduate - Contents Basic Properties of Superconductors and their Applications, Development of technological platforms, Methods of material science for calculating temperature profiles in superconductors. Overview of the phenomenology of con- ventional and unconventional superconductivity. Review of BCS theory and its applicability for different types of superconductors. Extension of Ginzburg-Landau theory to a quantum field theory formalism using Feynman dia- grams and functional integratis. Theoretical formalism of Ward identities and response functions. Goldstone mo- des, phase fluctuations, and coupling to the electromagnetic field. Interpretation of the Meissner effect in terms of the Higgs mechanism. Interplay of magnetism and conventional/unconventional superconductivity. Discussi- on of current research topics and perspective on room-temperature superconductivity. Interded learning outcomes Acquisition of basic knowledge about superconductivity as a macroscopic quantum phenomenon. Profound un- derstanding of unconventional superconductivity and its interplay with magnetism in the context of current rese- arch. Knowledge of BCS mean-field theory, t	Module title				Abbreviation	
Managing Director of the Institute of Applied Physics and Managing Director of the Institute of Theoretical Physics and Astrophysics Faculty of Physics and Astronomy ECTS Method of grading Only after succ. compl. of module(s) Image: Complexity of Theoretical Physics 6 numerical grade Complexity Complexity 9 graduate Complexity Complexity 2 graduate Complexity Complexity Complexity Basic Properties of Superconductors and their Applications, Development of technological platforms, Methods of material science for calculating temperature profiles in superconductors. Overview of the phenomenology of con- ventional and unconventional superconductivity. Review of BCS theory and its applicability for different types of superconductors. Extension of Ginzburg-Landau theory to a quantum field theory formalism using Feynman dia- grams and functional integrals. Theoretical formalism of Ward identities and response functions. Coldstoe mo on of current research topics and perspective on room-temperature superconductivity. Discussi- on of current research topics and perspective on room-temperature superconductivity. Intended learning outcomes Acquisition of basic knowledge about superconductivity as a macroscopic quantum phenomenon. Profound un- derstanding of unconventional superconductivity and its interplay with magnetism in the contexet of ECS theory, as well as the Meissner effect and the Higgs mechanism. Basic understanding of unconventional superconductivity	Phenomenology and Theory of Superconductivity				11-PTS-201-m01	
Managing Director of the Institute of Theoretical Physics and Astrophysics ECTS Method of grading Only after succ. compl. of module(s) 6 numerical grade Duration Module level Other prerequisites 1 semester graduate Contents Basic Properties of Superconductors and their Applications, Development of technological platforms, Methods of material science for calculating temperature profiles in superconductors. Overview of the phenomenology of conventional and unconventional superconductivity. Review of BCS theory and its applicability for different types of superconductors. Extension of Ginzburg-Landau theory to a quantum field theory formalism using Feynman diagrams and functional integrals. Theoretical formalism of Ward identifies and response functions. Goldstone modes, phase fluctuations, and coupling to the electromagnetic field. Interpretation of the Meissner effect in terms of the Higgs mechanism. Interplay of magnetism and conventional /unconventional superconductivity. Discussion of current research topics and perspective on room-temperature superconductivity. Intended Learning outcomes Intended Learning outcomes Acquisition of basic knowledge about superconductivity as a macroscopic quantum phenomenon. Profound understanding of unconventional superconductivity and its interplay with magnetism in the context of current research. Knowledge of BCS maen-field theory methods necessary to extend BCS theory, as well as the Meissner effect and the Higgs mechanism. Basic understanding of unconventional supercon	Module	coord	inator		Module offered by	
6 numerical grade Duration Module level Other prerequisites 1 semester graduate Contents Basic Properties of Superconductors and their Applications, Development of technological platforms, Methods of material science for calculating temperature profiles in superconductors. Overview of the phenomenology of conventional and unconventional superconductivity. Review of BCS theory and its applicability for different types of superconductors. Extension of Ginzburg-Landau theory to a quantum field theory formalism using feynman dia- grams and functional integrals. Theoretical formalism of Ward identities and response functions. Goldstone mo- des, phase fluctuations, and coupling to the electromagnetic field. Interpretation of the Meissner effect in terms of the Higgs mechanism. Interplay of magnetism and conventional/unconventional superconductivity. Discussi- on of current research topics and perspective on room-temperature superconductivity. Interded learning outcomes	Managi	ng Dire	ector of the Institute of Th		Faculty of Physics a	nd Astronomy
Duration Module level Other prerequisites 1 semester graduate Contents	ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
1 semester graduate Contents Basic Properties of Superconductors and their Applications, Development of technological platforms, Methods of material science for calculating temperature profiles in superconductors. Overview of the phenomenology of conventional and unconventional superconductivity. Review of BCS theory and its applicability for different types of superconductors. Extension of Ginzburg-Landau theory to a quantum field theory formalism using Feynman diagrams and functional integrals. Theoretical formalism of Ward identities and response functions. Goldstone modes, phase fluctuations, and coupling to the electromagnetic field. Interpretation of the Meissner effect in terms of the Higgs mechanism. Interplay of magnetism and conventional/unconventional superconductivity. Discussion on current research topics and perspective on room-temperature superconductivity. Intended learning outcomes Acquisition of basic knowledge about superconductivity as a macroscopic quantum phenomenon. Profound understanding of unconventional superconductivity and its interplay with magnetism in the context of current research. Knowledge of BCS mean-field theory, the quantum-field theory methods necessary to extend BCS theory, as well as the Meissner effect and the Higgs mechanism. Basic understanding of unconventional superconductors and their fascinating connection with competing magnetic phases. Courses (type, number of weekly contact hours, language – if other than German) V (3) + R (1) Module taught in: German or English Method of assessment (type, scope, language – if other than German) V (3) + R (1) Module camination (approx. 90 to 120 minutes) or c) oral examination in groups (groups of 2, appro	6	numei	rical grade			
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Basic Properties of Superconductors and their Applications, Development of technological platforms, Methods of material science for calculating temperature profiles in superconductors. Overview of the phenomenology of conventional and unconventional superconductivity. Review of BCS theory and its applicability for different types of superconductors. Extension of Ginzburg-Landau theory to a quantum field theory formalism using Feynman diagrams and functional integrals. Theoretical formalism of Ward identities and response functions. Goldstone modes, phase fluctuations, and coupling to the electromagnetic field. Interpretation of the Meissner effect in terms of the Higgs mechanism. Interplay of magnetism and conventional/unconventional superconductivity. Discussion of current research topics and perspective on room-temperature superconductivity. Intended learning outcomes Acquisition of basic knowledge about superconductivity as a macroscopic quantum phenomenon. Profound understanding of unconventional superconductivity and its interplay with magnetism in the context of current research. Knowledge of BCS mean-field theory, the quantum-field theory methods necessary to extend BCS theory, as well as the Meissner effect and the Higgs mechanism. Basic understanding of unconventional superconductors or to y (3) + R (1) Module taught in: German or English Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for honus) a) written examination (approx. 9 to 120 minutes) or b) or al examination in groups. (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 40 to pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may 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 thi	1 semes	ster	graduate			
material science for calculating temperature profiles in superconductors. Overview of the phenomenology of con- ventional and unconventional superconductivity. Review of BCS theory and its applicability for different types of superconductors. Extension of Ginzburg-Landau theory to a quantum field theory formalism using Feynman dia- grams and functional integrals. Theoretical formalism of Ward identities and response functions. Goldstone mo- des, phase fluctuations, and coupling to the electromagnetic field. Interpretation of the Meissner effect in terms of the Higgs mechanism. Interplay of magnetism and conventional/unconventional superconductivity. Discussi- on of current research topics and perspective on room-temperature superconductivity. Intended learning outcomes Acquisition of basic knowledge about superconductivity as a macroscopic quantum phenomenon. Profound un- derstanding of unconventional superconductivity and its interplay with magnetism in the context of current rese- arch. Knowledge of BCS mean-field theory, the quantum-field theory methods necessary to extend BCS theory, as well as the Meissner effect and the Higgs mechanism. Basic understanding of unconventional superconduc- tors and their fascinating connection with competing magnetic phases. Courses (type, number of weekly contact hours, language – if other than German) V (3) + R (1) Module taught in: German or English Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for horous) a) written examination (approx. 90 to 120 minutes) or b) oral examination in groups (groups of 2, approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) or c) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may in- stead take the form of an oral examination of one candidate each or an oral examinati	Conten	ts				
Acquisition of basic knowledge about superconductivity as a macroscopic quantum phenomenon. Profound un- derstanding of unconventional superconductivity and its interplay with magnetism in the context of current rese- arch. Knowledge of BCS mean-field theory, the quantum-field theory methods necessary to extend BCS theory, as well as the Meissner effect and the Higgs mechanism. Basic understanding of unconventional superconduc- tors and their fascinating connection with competing magnetic phases. Courses (type, number of weekly contact hours, language – if other than German) V (3) + R (1) Module taught in: German or English Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may in- stead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original exami- nation date at the latest. Language of assessment: German and/or English Assessment offered: In the semester in which the course is offered and in the subsequent semester Allocation of places Additional information 	materia vention superco grams a des, ph of the H	Il scien al and onducto and fun ase flu liggs m	ce for calculating temper unconventional supercon ors. Extension of Ginzbur ictional integrals. Theore ctuations, and coupling t echanism. Interplay of m	ature profiles in supenductivity. Review of g-Landau theory to a tical formalism of Wato the electromagnet agnetism and conve	erconductors. Overvi BCS theory and its a quantum field theor rd identities and res ic field. Interpretation ntional/unconventio	ew of the phenomenology of con- pplicability for different types of y formalism using Feynman dia- ponse functions. Goldstone mo- n of the Meissner effect in terms nal superconductivity. Discussi-
derstanding of unconventional superconductivity and its interplay with magnetism in the context of current rese- arch. Knowledge of BCS mean-field theory, the quantum-field theory methods necessary to extend BCS theory, as well as the Meissner effect and the Higgs mechanism. Basic understanding of unconventional superconduc- tors and their fascinating connection with competing magnetic phases. Courses (type, number of weekly contact hours, language – if other than German) V (3) + R (1) Module taught in: German or English Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination of one candidate each (approx. 30 minutes) pr c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may in- stead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original exami- nation date at the latest. Language of assessment: German and/or English Assessment offered: In the semester in which the course is offered and in the subsequent semester Allocation of places 	Intende	ed learr	ning outcomes			
V (3) + R (1) Module taught in: German or English Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may in- stead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original exami- nation date at the latest. Language of assessment: German and/or English Assessment offered: In the semester in which the course is offered and in the subsequent semester Allocation of places Additional information 	derstan arch. Kr as well	iding of nowled as the	f unconventional superco ge of BCS mean-field the Meissner effect and the I	onductivity and its inf ory, the quantum-fie Higgs mechanism. Ba	terplay with magnetis Id theory methods ne asic understanding o	sm in the context of current rese- ecessary to extend BCS theory,
Module taught in: German or English Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may 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. Language of assessment: German and/or English Assessment offered: In the semester in which the course is offered and in the subsequent semester Allocation of places	Courses	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	rman)	
module is creditable for bonus) a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may in- stead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original exami- nation date at the latest. Language of assessment: German and/or English Assessment offered: In the semester in which the course is offered and in the subsequent semester Allocation of places Additional information			t in: German or English			
b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may in- stead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original exami- nation date at the latest. Language of assessment: German and/or English Assessment offered: In the semester in which the course is offered and in the subsequent semester Allocation of places Additional information				ge — if other than German, o	examination offered — if no	t every semester, information on whether
Additional information	a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may in- stead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original exami- nation date at the latest. Language of assessment: German and/or English Assessment offered: In the semester in which the course is offered and in the subsequent semester					
	Additio	nal info	ormation			
Workload						
TTOINIDAU	Worklo	ad				
180 h	180 h					

Teaching cycle

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

Module appears in

Master's degree (1 major) Nanostructure Technology (2020)

Master's degree (1 major) Physics (2020)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

Master's degree (1 major) Mathematical Physics (2020)

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

Master's degree (1 major) Computational Mathematics (2022)

Master's degree (1 major) Mathematics (2022)

Master's degree (1 major) Mathematical Physics (2022)

exchange program Physics (2023)

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

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

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Module title				Abbreviation		
Advanced The	eory of Quantum Computi	ng and Quantum Info	ormation	11-QIC-201-m01		
Module coord	linator		Module offered by			
Managing Dir and Astrophy	ector of the Institute of Th sics	eoretical Physics	Faculty of Physics a	ind Astronomy		
ECTS Meth	od of grading	Only after succ. con	npl. of module(s)			
6 nume	rical grade					
Duration	Module level	Other prerequisites				
1 semester	graduate					
Contents						
 Quantum ti Composite Entangleme Quantum o Quantum g 	ary of classical information heory seen from the persp systems and the Schmidt ent measures perations, POVMs, and th ates and quantum compu- f the theory of decoheren	bective of informatior t decomposition ne theorems of Kraus uters				
·	ning outcomes					
depth unders cepts of quan herence.	tanding of the phenomen tum information theory. A	on of entanglement. Ability to assess the l	Knowledge of the fu imitations of quantu	ltipartite quantum systems. In- ndamental mathematical con- m computing arising from deco-		
	number of weekly contact hours, l	anguage — if other than Gei	rman)			
V (3) + R (1) Module taugh	it in: German or English					
	sessment (type, scope, langua	ge — if other than German,	examination offered — if no	ot every semester, information on whether		
 a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may 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. Language of assessment: German and/or English Assessment offered: In the semester in which the course is offered and in the subsequent semester 						
Allocation of	places					
Additional information						
Workload						
180 h						
180 h Teaching cyc	e					

Module appears in

Master's degree (1 major) Nanostructure Technology (2020)

Master's degree (1 major) Physics (2020)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

Master's degree (1 major) Mathematical Physics (2020)

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

Master's degree (1 major) Computational Mathematics (2022)

Master's degree (1 major) Mathematics (2022)

Master's degree (1 major) Mathematical Physics (2022)

exchange program Physics (2023)

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

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

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Module	title				Abbreviation
Advanced Magnetic Resonance Imaging					11-MRI-171-m01
Module	coord	inator		Module offered by	
Managi	ng Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
6	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate			
Conten	ts				
imaging fundam this cou 1) the N 2) the p and me 3) the c	Nuclear magnetic resonance (NMR) is a quantum mechanical phenomenon that, through magnetic resonance imaging (MRI), has played a major role in the revolution of medical imaging over the last 30 years. Based on the fundamental principles of nuclear magnetic resonance (resonance principle, relaxation times, chemical shift) this course covers: 1) the NMR signal theory and signal evolution (Bloch equations), 2) the principles of spatial encoding, magnetic resonance imaging (MRI) and corresponding imaging sequences and measurement parameters, 3) the concept of k-space and Fourier imaging, and 4) the physical, methodological and technical possibilities and limits of MRI. As a last point, exemplary applicati-				
		ning outcomes			
ging ma	agnetic		ation and processing		ysical principles of modern ima- overview of the field of modern
Courses	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (3) + I Module		t in: English			
		e essment (type, scope, langua) le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
 a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes) If a written examination was chosen as method of assessment, this may be changed and assessment may 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. Language of assessment: German and/or English Assessment offered: In the semester in which the course is offered and in the subsequent semester 					
Allocation of places					
Additional information					
Workload					
180 h					
Teachir	ng cycle	9			

Module appears in

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

Master's degree (1 major) Nanostructure Technology (2016)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)

Master's degree (1 major) Nanostructure Technology (2020)

Master's degree (1 major) Physics (2020)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

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

exchange program Physics (2023)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Module title			Abbreviation			
Surface Science 11-SSC-172-mo1						
Module	coord	inator		Module offered by		
Managi	ng Dire	ector of the Institute of Ap	oplied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
Atomic involvir experin couplin	structung surfa nental ng: Rasi	surfaces and interfaces, our and interfaces, our and aces. Thermodynamics of characterisation. Electror and affect and topologica	adsorbates, surface (f surfaces, adsorption nic structure of surfac	prientation and sym and desorption, eq es, chemical bondin	metries. Microscopic uilibria, thermodyna	processes mic phases,
		ning outcomes				
and cor	ntexts	nave gained an overview of physical peculiarities c hniques and their specif	of surfaces and interfa	aces. Additionally, th	ney know the most in	
Course	S (type, r	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V (3) + I Module		t in: English				
		s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, informati	on on whether
 a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes) If a written examination was chosen as method of assessment, this may be changed and assessment may 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. Language of assessment: German and/or English Assessment offered: In the semester in which the course is offered and in the subsequent semester 						If the method iginal exami-
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
180 h						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
	-	ee (1 major) Physics (201 ee (1 major) Nanostructui				
	-	Nanostructure Technology	JMU Würzburg •	generated 02-Aug-2025 • exa r (120 ECTS) Nanostrukturtecl		page 72 / 114

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Master's degree (1 major) Nanostructure Technology (2020)

Master's degree (1 major) Physics (2020)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

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

exchange program Physics (2023)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Module title				Abbreviation	
Visiting	Resea	rch			11-FPA-161-m01
Module	coord	inator		Module offered by	
chairpe	rson of	examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
10	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1-2 sem	ester	graduate	Approval from exam	ination committee re	equired.
Conten	ts				
tific exp	erimer		d documentation of t		hysics. Implementation of scien- y in the context of research visits
Intende	d learr	ning outcomes			
		are able to independently nalyse scientific experim			imental or Theoretical Physics, to
Courses	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
R (o)					
module is	creditab	le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
	•	(10 to 20 pages) ssessment: German and/	or English		
Allocati	ion of p	olaces			
Additio	nal info	ormation			
Worklo	ad				
300 h					
Teachin	ıg cycl	9			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module	appea	rs in			
Master' Master' Suppler Master' Master' Master'	s degre s teach mentar s degre s degre s teach	ee (1 major) Physics (2010 ee (1 major) Nanostructur ning degree Gymnasium / y course MINT Teacher Ec ee (1 major) Nanostructur ee (1 major) Physics (202 ning degree Gymnasium / y course MINT Teacher Ec	re Technology (2016) MINT Teacher Educati ducation PLUS, Elite N re Technology (2020) o) MINT Teacher Educati	Network Bavaria (ENI on PLUS, Elite Netwo	3) (2016) ork Bavaria (ENB) (2020)
Master' Master'	s degre s teach	, ee (1 major) Quantum Tec ning degree Gymnasium I y course MINT Teacher Ec	:hnology (2021) MINT Teacher Educati	on PLUS, Elite Netwo	ork Bavaria (ENB) (2025)

Module title Abbreviati					Abbreviation	
Current	Topics	s in Physics			11-EXP5-161-m01	
Module	coord	inator		Module offered by		
chairpe	rson of	f examination committee		Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate	Approval from exam	ination committee re	equired.	
Conten	ts					
	•	in Experimental or Theor tudy abroad.	etical Physics. Credit	ed academic achiev	ements, e.g. in case of change of	
Intende	ed learr	ning outcomes				
Theoret subdise	ical Ph cipline	ysics of the Master's prog	gramme of Nanostruc nd the measuring and	ture Technology. The loss of t	of a module of Experimental or ey have knowledge of a current nods necessary to acquire this application areas.	
Courses	5 (type, n	umber of weekly contact hours, la	anguage — if other than Ger	man)		
V (2) + I	R (2)					
a) writte b) oral e c) oral e d) proje e) prese If a writ stead ta of asse nation e Langua	Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may in- stead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original exami- nation date at the latest. Language of assessment: German and/or English					
Allocati	ion of p	olaces				
	nalist	ormation				
Auditio						
Worklo	ad					
150 h						
Teachin	ng cycle	۹				
	<u>15 cyck</u>	-				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	appea	rs in				
Master' Master' Master'	Module appears in Master's degree (1 major) Nanostructure Technology (2016) Master's degree (1 major) Nanostructure Technology (2020) Master's degree (1 major) Quantum Technology (2021) Module studies (Master) Quantum Technology (2021)					

Module title Abbreviation						
Current Topics in Physics 11-EXP6-161-m01						
Module	e coordin	ator		Module offered by		
chairpe	erson of e	examination committe	ee	Faculty of Physics a	nd Astronomy	
ECTS	Method	l of grading	Only after succ. compl. of module(s)			
6	numerio	cal grade				
Duratio	on /	Nodule level	Other prerequisites			
1 seme	ester g	graduate	Approval from exam	ination committee re	equired.	
Conten	nts					
	•	n experimental or the udy abroad.	oretical physics. Credit	ed academic achieve	ements, e.g. in case	of change of
Intend	ed learni	ng outcomes				
Theore subdis knowle	tical Phy cipline o edge. The	sics of the Master's p f Physics and underst y are able to classify	encies corresponding t rogramme of Nanostrue and the measuring and the subject-specific co s, language – if other than Ger	cture Technology. Th I/or calculation meth ntexts and know the	ey have knowledge o nods necessary to ac	of a current
	_	inder of weekly contact nour	, language — Il other than Ger	llidil)		
V (3) +						
	d of asse s creditable		uage — if other than German,	examination offered — if no	t every semester, informati	on on whether
d) proje e) pres If a writ stead t of asse nation	ect repor entation tten exan take the f essment i date at t	t (approx. 8 to 10 pag /talk (approx. 30 min nination was chosen orm of an oral examir	utes) as method of assessmo nation of one candidate er must inform student	ent, this may be char e each or an oral exa	nged and assessmer mination in groups.	If the method
Allocat	tion of pla	aces				
Additio	onal infor	rmation				
Worklo	ad					
180 h						
Teachi	ng cycle					
Referre	ed to in L	POI (examination regulation	ons for teaching-degree progra	mmes)		
		-				
Module	e appear	s in				
Master's degree (1 major) Physics (2016) Master's degree (1 major) Nanostructure Technology (2016) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Module studies (Master) Physics (2019) Master's degree (1 major) Nanostructure Technology (2020)						
(2020)	nai i major N			r (120 ECTS) Nanostrukturtech	-	page 76 / 114

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

Master's degree (1 major) Physics (2020)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

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

Module studies (Master) Quantum Technology (2021)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Module title					Abbreviation	
Current Topics in Physics					11-EXP7-161-m01	
Module	coord	inator		Module offered by		
chairpe	rson of	examination committee		Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
7	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate	Approval from exam	ination committee re	equired.	
Content	ts					
		of Experimental and The versity or study abroad.	oretical Physics. Accr	edited academic acl	hievements, e.g. in case of	
Intende	d learr	ning outcomes				
Theoret subdisc	ical Ph ipline	ysics of the Master's prog	gramme of Nanostruc nd the measuring and	ture Technology. The location mether the second s	of a module of Experimental or ey have knowledge of a current nods necessary to acquire this application areas.	
Courses	5 (type, n	umber of weekly contact hours, la	anguage — if other than Ger	man)		
V (3) + F	R (1)					
a) writte b) oral e c) oral e d) proje e) prese If a writ stead ta of asses nation o Langua	Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may in- stead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original exami- nation date at the latest. Language of assessment: German and/or English					
Allocati	ion of p	olaces				
Additio	nat info	ormation				
 Worklo	a d					
	au					
210 h		-				
Teachin	ig cycli	e				
 Deferme	Referred to in LPO I (examination regulations for teaching-degree programmes)					
Keleffe		LFUI (examination regulations	s for teaching-degree progra	mmes)		
Module	annea	rs in				
Master' Master' Master'	Module appears in Master's degree (1 major) Nanostructure Technology (2016) Master's degree (1 major) Nanostructure Technology (2020) Master's degree (1 major) Quantum Technology (2021) Module studies (Master) Quantum Technology (2021)					

Module title					Abbreviation
Current Topics in Physics					11-EXP8-161-m01
Module	coord	inator		Module offered by	
chairpe	rson of	examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
8	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate	Approval from exam	ination committee re	equired.
Conten	ts				
		of Experimental and The versity or study abroad.	oretical Physics. Accr	edited academic acl	hievements, e.g. in case of
Intende	ed learr	ing outcomes			
Theoret subdise	ical Ph cipline	ysics of the Master's prog	gramme of Nanostruc Id the measuring and	ture Technology. Th /or calculation meth	of a module of Experimental or ey have knowledge of a current nods necessary to acquire this application areas.
Courses	5 (type, n	umber of weekly contact hours, la	anguage — if other than Ger	man)	
V (4) + I	R (2)				
module is a) writte b) oral e c) oral e	creditab en exar examin examin	essment (type, scope, language le for bonus) nination (approx. 90 to 1 ation of one candidate es ation in groups (groups o ort (approx. 8 to 10 pages	20 minutes) or ach (approx. 30 minu If 2, approx. 30 minut	tes) or	t every semester, information on whether
If a writ stead ta of asse nation o	ten exa ake the ssment date at	form of an oral examinat	method of assessme tion of one candidate must inform student	each or an oral exam	nged and assessment may in- mination in groups. If the method weeks prior to the original exami-
Allocati	ion of p	laces			
Additio	nal info	ormation			
Worklo	ad				
240 h					
Teachir	ng cycl	9			
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module	appea	rs in			
Master' Master'	Module appears in Master's degree (1 major) Nanostructure Technology (2016) Master's degree (1 major) Nanostructure Technology (2020) Master's degree (1 major) Quantum Technology (2021) Module studies (Master) Quantum Technology (2021)				

Module title Abbreviation						
Curren	t Topics in Physics				11-EXP6A-161-m01	
Module	e coordinator			Module offered by		
chairpe	erson of examination	i committee	2	Faculty of Physics a	nd Astronomy	
ECTS	Method of grading		Only after succ. com	pl. of module(s)		
6	numerical grade					
Duratio	on Module leve	l	Other prerequisites			
1 seme	ster graduate		Approval from exam	ination committee re	equired.	
Conten	Contents					
	t topics in Experimer sity or study abroad.	ntal or Theo	retical Physics. Credit	ed academic achiev	ements, e.g. in case	of change of
Intend	ed learning outcome	S				
Theore subdis knowle	tical Physics of the A cipline of Physics an edge. They are able to	Aaster's pro d understa o classify th	ncies corresponding t gramme of Nanostruc nd the measuring and he subject-specific con	cture Technology. Th I/or calculation meth ntexts and know the	ey have knowledge nods necessary to ac	of a current
		contact hours,	language — if other than Ger	man)		
V (3) +						
	d of assessment (type s creditable for bonus)	, scope, langua	age — if other than German, e	examination offered — if no	t every semester, informat	ion on whether
d) proje e) pres If a writ stead t of asse nation	ect report (approx. 8 entation/talk (appro tten examination wa ake the form of an o	to 10 pages x. 30 minut s chosen as ral examina the lecture	tes) s method of assessme tion of one candidate r must inform student	ent, this may be char e each or an oral exa	nged and assessmen mination in groups.	If the method
Allocat	ion of places					
	,					
Additio	onal information					
Worklo	ad					
180 h			_			
Teachi	ng cycle					
Referre	ed to in LPO I (examina	ation regulation	s for teaching-degree progra	mmes)		
Module	e appears in					
Master Master Supple Module Master	Master's degree (1 major) Physics (2016) Master's degree (1 major) Nanostructure Technology (2016) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Module studies (Master) Physics (2019) Master's degree (1 major) Nanostructure Technology (2020)					
Master's w (2020)	ith 1 major Nanostructure Tec	chnology	_	generated 02-Aug-2025 • exa r (120 ECTS) Nanostrukturtecl	-	page 80 / 114
(_0_0)						

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

Master's degree (1 major) Physics (2020)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

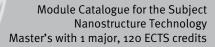
Master's degree (1 major) Quantum Technology (2021)

Module studies (Master) Quantum Technology (2021)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Module title					Abbreviation	
Scanni	Scanning Probe Technologies				11-SPT-211-m01	
Module	e coord	inator		Module offered by		
Manag	ing Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	ind Astronomy	
ECTS	Metho	od of grading	Only after succ. cor	npl. of module(s)		
6	nume	rical grade				
Duratio	on	Module level	Other prerequisites	;		
1 seme	ster	graduate				
Conten	Its					
surface engine basic p lock-in	e scienc ering; r orinciple , phase	e; tip-sample interacti neasurement modes, e	ing force, tunneling, ar ons; design principles e.g., contact and non-co resenting microcopy da	and material conside ontact, Kelvin probe,	erations; fundament friction force micros	als of control copy, etc;
			in scanning probe mic	croscopy. He/she kno	ows the basic theore	tical princip-
les, is a	aware c	of basic design principl	es, knows pros and co and their application. I	ns of various materia	ls, and is familiar of	measure-
Course	S (type, r	number of weekly contact hour	s, language — if other than Ge	rman)		
V (3) + Module		t in: German or English				
		sessment (type, scope, lang le for bonus)	guage — if other than German,	examination offered — if no	ot every semester, informat	ion on whether
a) writt	en exa	mination (approx. 90 to	o 120 minutes) or			
			e each (approx. 30 mini			
		ation in groups (group ort (approx. 8 to 10 pag	s of 2, approx. 30 minu res) or	ites per candidate) o	r	
	•	n/talk (approx. 30 min				
			as method of assessm			
			nation of one candidate rer must inform studen			
nation	date at	the latest.			·····	
		ssessment: German ar	nd/or English in which the course is	offered and in the c	ubcoquent competer	
	ion of j			onereu anu în the st	insequent semester	
		Jaces				
Additic	nal inf	ormation				
Worklo	ad					
180 h						
Teachi	ng cycl	e				
		e: annually, after anno	uncement			
				ammes)		
	Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module	e appea	urs in				
Master	's degr		ture Technology (2020) 020)			
·		r Nanostructure Technology		generated 02-Aug-2025 • ex	am. reg. da-	page 82 / 114
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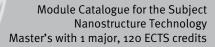




Master's degree (1 major) Quantum Technology (2021) exchange program Physics (2023)

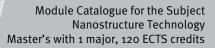
Module title Abbreviation					
Electron and Ion Microscopy 11-EIM-211-mo1					
Module coordinator	Module offered by	Module offered by			
Managing Director of the Institute of Applied Physics	anaging Director of the Institute of Applied Physics Faculty of Physics and Astronomy				
ECTS Method of grading Only after succ. co	npl. of module(s)				
6 numerical grade					
Duration Module level Other prerequisite	5				
1 semester graduate					
Contents					
Theoretical Foundations. Electron and ion sources, optics of trons and charged particles, detectors, measurement princ ced contrast mechanisms: EBSD, EELS, EDS, cathodolumin	iples: SEM, STEM, TE				
Intended learning outcomes					
The student has specific and immersed knowledge in elect and instrumental basics and principles of detectors and co electron microscopy and their applications. He/she knows	ntrast mechanisms. I	He/she knows differ			
${f Courses}$ (type, number of weekly contact hours, language $-$ if other than Ge	rman)				
V (3) + R (1) Module taught in: German or English					
Method of assessment (type, scope, language - if other than German,	examination offered — if no	t every semester, informati	ion on whether		
module is creditable for bonus)					
 a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minute) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment stead take the form of an oral examination of one candidate of assessment is changed, the lecturer must inform studen nation date at the latest. Language of assessment: German and/or English Assessment offered: In the semester in which the course is 	ites per candidate) of ent, this may be char e each or an oral exai ts about this by four y	nged and assessmer mination in groups. I weeks prior to the or	If the method riginal exami-		
Allocation of places					
Additional information					
Workload					
180 h					
Teaching cycle					
Teaching cycle: annually, after announcement					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module appears in					
Master's degree (1 major) Nanostructure Technology (2020) Master's degree (1 major) Physics (2020) Master's degree (1 major) Quantum Technology (2021) Master's degree (1 major) Functional Materials (2022)					
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exchange program Physics (2023) Master's degree (1 major) Functional Materials (2025)





Subfield Non-technical Minor

(ECTS credits)

Module title					Abbreviation
Advanced Analysis					10-M-VAN-152-m01
Module	e coord	inator		Module offered by	
Dean of	fStudie	es Mathematik (Mathema	ntics)	Institute of Mathem	atics
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
7	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
Continu	uation of	of analysis in several vari	ables, integration the	eorems.	
		ning outcomes			
The stu	dent is	-			of the Lesbegue integral, he or
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (4) +					
Method	l of ass	s essment (type, scope, langua; le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
c) oral e	examin ge of a	ation of one candidate e ation in groups (groups c ssessment: German and/ bonus	of 2, 10 to 15 minutes	-	
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
210 h					
Teachir	ng cvcl	6			
	<u> </u>				
Referre	d to in	LPO I (examination regulations	for teaching-degree progra	mmes)	
	<u></u>				
Module	appea	in in			
Bachel	or's deg	i rs in gree (1 major) Mathemati gree (1 major) Mathemati			
			,	015)	
	Bachelor's degree (1 major) Computational Mathematics (2015) Bachelor's degree (1 major) Mathematical Physics (2016)				
	Master's degree (1 major) Physics (2016)				
	Master's degree (1 major) Nanostructure Technology (2016)				
	-	ee (1 major) Nanostructur			
	-	ee (1 major) Physics (202			
	-	ee (1 major) Physics Inter ee (1 major) Quantum Eng			
	-	ee (1 major) Quantum Eng			
	-	gree (1 major) Mathemati			

Module title Abbreviation						
Discrete Mathematics 10-M=VDIM-161-m01)1	
Module	e coord	inator		Module offered by		
Dean o	f Studi	es Mathematik (Mathem	atics)	Institute of Mathem	atics	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts		4			
graph t	heory o	thods and results in a se or combinatorics) d previous knowledge:	elected field of discret	e mathematics (e. g.	coding theory, crypt	tography,
		lge of the contents of th	e module "Introductio	n to Discrete Mather	natics" is required.	
Intende	ed lear	ning outcomes				
The stu	dent is	acquainted with advan	ced results in a select	ed topic in discrete r	nathematics.	
		umber of weekly contact hours,		•		
V (3) +	Ü (1)	t in: German and/or Eng				
		sessment (type, scope, langu le for bonus)	age — if other than German,	examination offered — if no	t every semester, informati	ion on whether
b) oral c) oral Langua	examir examin ge of a ment o	mination (approx. 60 to nation of one candidate ation in groups (groups ssessment: German or E ffered: In the semester i bonus	each (approx. 15 minu of 2, approx. 10 minu English	tes) or tes per candidate)	ıbsequent semester	
Allocat	ion of _l	olaces				
Additio	onal inf	ormation				
Worklo	ad					
150 h						
Teachi	ng cycl	e				
	<u> </u>	-				
Poforro	d to in	LPO I (examination regulation		ummoc)		
Keleffe						
Module	appea	urs in				
		ee (1 major) Mathematic	s (2016)			
	-	ee (1 major) Physics (20				
Master	's degr	ee (1 major) Nanostructu	ıre Technology (2016)			
	-	ee (1 major) Economathe				
	-	ee (1 major) Mathematic	•			
		ning degree Gymnasium				016)
		y course MINT Teacher I		Network Bavaria (ENI	B) (2016)	
	-	ee (1 major) Mathematic	-			
		ee (1 major) Nanostructu		generated 02-Aug-2025 • exa	am reg da	page 88 / 114
(2020)	ian i maju			r (120 ECTS) Nanostrukturtech		puge 00 / 114

Master's degree (1 major) Physics (2020) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Master's degree (1 major) Mathematical Physics (2020) Master's degree (1 major) Quantum Technology (2021) Master's degree (1 major) Economathematics (2021) Master's degree (1 major) Computational Mathematics (2022) Master's degree (1 major) Mathematics (2022) Master's degree (1 major) Mathematical Physics (2022) Master's degree (1 major) Economathematics (2022) exchange program Mathematics (2023) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) Mathematics (2024) Master's degree (1 major) Economathematics (2024) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Master's degree (1 major) Mathematical Data Science (2025) Master's degree (1 major) Economathematics (2025)

Module title Abbreviation							
Analysis and Design of Programs 10-I=PA-161-m01							
Module	e coord	inator		Module offered by			
holder	of the (Chair of Computer Scie	nce II	Institute of Computer Science			
ECTS		od of grading	F	nly after succ. compl. of module(s)			
5	1	rical grade					
Duration Module level Other prerequisites							
	1 semester graduate						
Conten							
			software engineering, p	orogram quality, test	of programs, proces	s models.	
Intend	ed lear	ning outcomes					
The stu quality		are able to analyse pro	grams, to use testing fr	ameworks and metri	cs as well as to judg	e program	
Course	S (type, r	number of weekly contact hour	s, language — if other than Ger	man)			
V (2) +	Ü (2)						
		sessment (type, scope, lang	guage — if other than German, e	examination offered — if no	t every semester, informati	ion on whether	
module is	s creditab	le for bonus)					
lf anno examir prox. 19 Langua	unced nation c 5 minut age of a	of one candidate each (es per candidate). ssessment: German ar	eginning of the course, (approx. 20 minutes) or				
credita							
Allocat	ion of p	olaces					
Additio	onal inf	ormation					
Focuse SE,IS,E		able for students of the	e Master's programme li	nformatik (Computer	r Science, 120 ECTS o	credits):	
Worklo	ad						
150 h							
Teachi	ng cycl	e					
Deferre				`			
Referre		LFUT (examination regulation	ons for teaching-degree progra	mmes)			
Module							
	-	ee (1 major) Computer					
	-	ee (1 major) Mathemat					
Master's degree (1 major) Physics (2016)							
Master's degree (1 major) Nanostructure Technology (2016) Master's degree (1 major) Computational Mathematics (2016)							
Master's degree (1 major) Computational Mathematics (2016) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)							
			Education PLUS, Elite I				
		ee (1 major) Computer			_) (_0_0)		
	-	ee (1 major) Computer					
	-		onal Mathematics (201	9)			
Master	's degr	ee (1 major) Mathemat	ics (2019)				
Master's w (2020)	ith 1 majo	r Nanostructure Technology	-	generated 02-Aug-2025 • ex r (120 ECTS) Nanostrukturtec	-	page 90 / 114	

Master's degree (1 major) Information Systems (2019) Master's degree (1 major) Nanostructure Technology (2020) Master's degree (1 major) Physics (2020) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Master's degree (1 major) Physics International (2020) Master's degree (1 major) Quantum Engineering (2020) Master's degree (1 major) Quantum Technology (2021) Master's degree (1 major) Computational Mathematics (2022) Master's degree (1 major) Mathematics (2022)

Module title Abbreviation							
Advanc	ed Pro	gramming			10-I-APR-172-m01		
Module	e coord	inator		Module offered by			
holder	of the (Chair of Computer Scier	nce II	Institute of Comput	er Science		
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	e				
Conten	ts						
grams. and cod	lf more de dup nsible	ledge of basic program complex problems are licates occur. In this lec structure. Also, further	to be tackled, subopti ture, further knowledg	mal results like long e is to be conveyed o	, incomprehensible on how to give progr	functions ams and co-	
Intende	ed leari	ning outcomes					
then im allel pro sing.	ipleme ocessir	n advanced programmin nted in multiple langua ng concepts are introdu	ges and their efficienc ced culminating in the	y measured using sta use of GPU architect	andard metrics. In a	ddition, par-	
		umber of weekly contact hours	, language — if other than Ger	rman)			
V (2) +	Ü (2)						
		essment (type, scope, lang le for bonus)	uage — if other than German, o	examination offered — if no	t every semester, informati	on on whether	
lf annoi examin prox. 15	unced l ation o 5 minut ge of a	nation (approx. 60 to 12 by the lecturer at the be of one candidate each (a res per candidate). ssessment: German an bonus	eginning of the course, approx. 20 minutes) or				
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	ad						
150 h							
Teachir	ıg cycl	e					
Referre	d to in	LPO I (examination regulation	ons for teaching-degree progra	immes)			
§ 22	Vr. 3 b)						
Module	e appea	irs in					
Bacheld Module Master Master Supple	Module appears in Bachelor's degree (1 major) Computer Science (2017) Bachelor's degree (1 major) Computer Science (2019) Module studies (Bachelor) Computer Science (2019) Master's degree (1 major) Nanostructure Technology (2020) Master's degree (1 major) Physics (2020) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Master's with 1 major Nanostructure Technology Mu Würzburg • generated 02-Aug-2025 • exam. reg. da- ta record Master (120 ECTS) Nanostrukturtechnik - 2020						

Bachelor's degree (1 major) Business Information Systems (2020) Master's degree (1 major) Physics International (2020) Master's degree (1 major) Quantum Engineering (2020) Bachelor's degree (1 major) Computer Science and Sustainability (2021) Master's degree (1 major) Quantum Technology (2021) Bachelor's degree (1 major) Business Information Systems (2021) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023) Bachelor's degree (1 major) Business Information Systems (2023) Master's degree (1 major) Quantum Engineering (2024) Master's degree (1 major) Physics International (2024) Bachelor's degree (1 major) Business Information Systems (2024) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024) Bachelor's degree (1 major) Digital Business & Data Science (2024) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Bachelor's degree (1 major) Games Engineering (2025) Bachelor's degree (1 major) Computer Science (2025) First state examination for the teaching degree Realschule Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025) Bachelor's degree (1 major) Computer Science and Sustainability (2025)

Module title				Abbreviation		
Operating Systems 10-I-BS-191-m01						
Module	e coord	inator		Module offered by		
holder of the Chair of Computer Science II			nce II	Institute of Comput	er Science	
ECTS Method of grading Only after succ. compl. of module(s)						
	1	rical grade				
5 Duratio		Module level	Other prerequisites			
	-					
	1 semester undergraduate					
Conten						
sing in	operat	ing systems, processes	evelopment of operatin and threads, CPU sche agement, operating sys	eduling, synchronisa		
Intend	ed lear	ning outcomes				
The stu	udents (oossess knowledge an	d practical skills in buil	ding and using esse	ntial parts of operati	ing systems.
Course	S (type, r	umber of weekly contact hour	s, language — if other than Gei	man)		
V (2) +	Ü (2)					
		t in: English				
		e ssment (type, scope, lang le for bonus)	guage — if other than German,	examination offered — if no	t every semester, informati	ion on whether
credita	ible for					
Additio	onal inf	ormation				
Worklo	ad					
150 h	-		i			
	ng cycl	e				
		-				
Poforra	ad to in	IPOL (avamination regulation	ons for teaching-degree progra	mmoc)		
Kelent				inines)		
Madul		va in				
	e appea					
		gree (1 major) Compute	-			
1	Master's degree (1 major) Nanostructure Technology (2020) Master's degree (1 major) Physics (2020)					
	Bachelor's degree (1 major) Physics (2020) Bachelor's degree (1 major) Business Information Systems (2020)					
		ee (1 major) Physics Inf	•	<pre></pre>		
1	-	ee (1 major) Quantum I				
Bachel	or's de	gree (1 major) Aerospa	ce Computer Science (2	2020)		
			er Science and Sustaina	ability (2021)		
		ee (1 major) Quantum T		, .		
Bachel	or's de	gree (1 major) Busines	s Information Systems (2021)		
Master's w (2020)	vith 1 majo	Nanostructure Technology		generated 02-Aug-2025 • exa r (120 ECTS) Nanostrukturtecl		page 94 / 114

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023) Bachelor's degree (1 major) Mathematics (2023) Bachelor's degree (1 major) Business Information Systems (2023) Master's degree (1 major) Quantum Engineering (2024) Master's degree (1 major) Physics International (2024) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024)

Module title					Abbreviation		
Artificial Intelligence 1					10-l=Kl1-161-m01		
Module	e coord	inator		Module offered by	e offered by		
holder of the Chair of Computer Science VI Institute				ute of Computer Science			
ECTS Method of grading Only after succ. compl. of module(s)							
5	1	rical grade					
Duration Module level Other prerequisites							
1 semester graduate Contents							
		nte uninformed and h		int problem colving	coorch with portial	information	
		ents, uninformed and he and predicate logic and				inionnation,	
Intende	ed lear	ning outcomes					
		possess theoretical and gic and are able to asse			gence in the area of	agents,	
Course	S (type, r	number of weekly contact hours	, language — if other than Ge	rman)			
V (2) +	Ü (2)						
Method	d of ass	sessment (type, scope, lang	uage — if other than German,	examination offered — if no	t every semester, informati	ion on whether	
		le for bonus)	.		, ,		
lf anno examin prox. 1	unced ation o 5 minut age of a	nation (approx. 60 to 12 by the lecturer at the be of one candidate each (a tes per candidate). ssessment: German an bonus	eginning of the course, approx. 20 minutes) or				
Allocat							
Additio	nal inf	ormation					
	s avail	able for students of the	Master's programme I	nformatik (Computer	Science, 120 ECTS o	credits):	
Worklo							
150 h							
Teachi		Δ					
-		e: every year, winter ser	nostor				
				``````````````````````````````````````			
Referre		LPO I (examination regulation	ons for teaching-degree progra	immes)			
 Modula		are in					
Module		ee (1 major) Computer S	Science (2016)				
	-						
Master's degree (1 major) Mathematics (2016) Master's degree (1 major) Physics (2016)							
	-	ee (1 major) Nanostruct					
	-	ee (1 major) Computatio					
Master	's teac	hing degree Gymnasium	n MINT Teacher Educat	ion PLUS, Elite Netwo	ork Bavaria (ENB) (20	016)	
		ry course MINT Teacher		Network Bavaria (EN	B) (2016)		
	-	ee (1 major) Computer S					
	-	ee (1 major) Computer S					
Master	's degr	ee (1 major) Computatio	onal Mathematics (201	9)		ļ	
Master's wi (2020)	ith 1 majo	r Nanostructure Technology	-	generated 02-Aug-2025 • exa r (120 ECTS) Nanostrukturtecl	-	page 96 / 114	

Master's degree (1 major) Mathematics (2019) Master's degree (1 major) Information Systems (2019) Master's degree (1 major) Nanostructure Technology (2020) Master's degree (1 major) Physics (2020) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Master's degree (1 major) Aerospace Computer Science (2020) Master's degree (1 major) Physics International (2020) Master's degree (1 major) Quantum Engineering (2020) Master's degree (1 major) Quantum Technology (2021)

Module title				Abbreviation	
Introduction to Law for Economists				02-EReWi-G-161-m01	
Module	e coord	inator		Module offered by	
Dean of	f the Fa	culty of Law		Faculty of Law	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
	ry, lega				ypes of laws, organization of the 1 (private law, public law, crimi-
Intende	ed learr	ning outcomes			
		as knowledge of the nation n and consequences of c			ormation and content as well as ture of legal systems.
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (3) +	Ü (2)				
		s <b>essment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
		nation (approx. 120 minu ffered: Usually once a yea			
Allocat	ion of p	olaces			
chelor's other su the nun dents o lows: S tial con	s stude ubjects nber of of other tudents siderat	nts with the minor Privat . 10 of these will be alloc available places exceed subjects. Should there b s applying after not havir	recht (Private Law). A ated to students of th the number of applic the more than 10 appli g successfully complete s will be allocated by	total of 20 places w ne Master's degree p ations, the remainir cations, the remaini leted assessment in	issenschaft (Law) as well as Ba- ill be allocated to students of programme Economics. Should ag places may be allocated to stu- ng places will be allocated as fol- past years will be given preferen- ill be maintained and places re-
Additio	nal inf	ormation			
Worklo	ad				
150 h					
Teachir	ng cycl	e			
Referre	d to in	LPOI (examination regulations	s for teaching-degree progra	mmes)	
Module					
	-	ee (1 major) Nanostructur	•, · ·		
	-	ee (1 major) Nanostructur ee (1 major) Quantum Teo			
Master's degree (1 major) Quantum Technology (2021)					

Module title					Abbreviation
Trade Mark Law					02-N-P-W06-182-m01
Module	coord	inator		Module offered by	
Dean of	Studie	es Faculty of Law		Faculty of Law	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
3	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	undergraduate			
Conten	ts				
cept an pean Co al regul	d prote ommur ations	ection of trademarks und nity Trademark under the	er the German Trader Community Tradema v are discussed, e.g.	nark Act, the require rk Regulation will be business names, geo	dition to the basics of the con- ments and effects of the Euro- discussed. Furthermore, speci- ographical indications of source
Intende	d learr	ning outcomes			
Studen	ts will I	be able to analyze traden	nark law issues from	the perspective of G	erman and European law.
Courses	<b>5</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (2)					
		<b>essment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
b) oral (	examin	mination (approx. 120 mi ation (approx. 15 minute ffered: Usually once a yea	s)		
Allocati	ion of p	olaces			
Rechtsw well as dents o will be two sen	vissens Bachel f other allocat nesters	schaft (Law) pursuing the lor's students with the mi subjects. Should there b ed as follows: Students a	e degree Erste Juristis inor Privatrecht (Priva be more than 10 appli applying after not hav Il consideration. The	che Staatsprüfung (f ite Law). A total of 10 cations from studen ing successfully con remaining places wi	ents of the degree programme first state examination in law) as p places will be allocated to stu- ts of other subjects, these places apleted assessment in the past II be allocated by lot. A waiting
Additio	nal inf	ormation			
Worklo	ad				
90 h					
Teachir	Teaching cycle				
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module					
Bachelo Master'	Bachelor's degree (1 major, 1 minor) Private Law (Minor, 2018) Bachelor's degree (1 major, 1 minor) Private Law (Minor, 2019) Master's degree (1 major) Nanostructure Technology (2020) Master's degree (1 major) Quantum Technology (2021)				

Module title		Abbreviation			
Copyright Law 02-N-P-W07-182-m01					
Module coord	inator		Module offered by		
Dean of Studi	es Faculty of Law		Faculty of Law		
ECTS Metho	od of grading	Only after succ. con	npl. of module(s)		
2 nume	rical grade				
Duration	Module level	Other prerequisites			
1 semester	undergraduate				
Contents					
				er the protection of works under patent and utility model law will	
Intended lear	ning outcomes				
	e acquired basic knowled from these areas in the c			ight law. They will be able to clas- ns.	
Courses (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)		
V (1)					
Method of ass module is creditab		ge — if other than German, o	examination offered — if no	t every semester, information on whether	
b) oral examir	mination (approx. 120 mi nation (approx. 15 minute ffered: Usually once a ye	s)			
Allocation of	places				
Rechtswissen well as Bache dents of other will be allocat two semester	schaft (Law) pursuing the lor's students with the m r subjects. Should there b ed as follows: Students a	e degree Erste Juristis inor Privatrecht (Priva be more than 10 appli applying after not hav al consideration. The	che Staatsprüfung (f ate Law). A total of 10 cations from studen ring successfully con remaining places wil	ents of the degree programme first state examination in law) as p places will be allocated to stu- ts of other subjects, these places npleted assessment in the past II be allocated by lot. A waiting	
Additional inf	ormation				
Workload					
60 h					
Teaching cycl	Teaching cycle				
Referred to in	LPOI (examination regulation	s for teaching-degree progra	mmes)		
Module appea	ars in				
Bachelor's degree (1 major, 1 minor) Private Law (Minor, 2018) Bachelor's degree (1 major, 1 minor) Private Law (Minor, 2019) Master's degree (1 major) Nanostructure Technology (2020) Master's degree (1 major) Quantum Technology (2021)					

Module title				Abbreviation	
Commercial and Business Law for Economists				02-G&Hre-G-161-m01	
Module	coord	inator		Module offered by	
Dean of	f the Fa	culty of Law		Faculty of Law	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme		undergraduate			
Conten					
		rovides an introduction t	o German and Europe	ean corporate and co	ommercial law.
		ning outcomes			
tation,	liability				mpany forms, power of represen- the law of commercial transacti-
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (3) + I	Ü (2)				
		s <b>essment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, information on whether
		nation (approx. 120 minu ffered: Usually once a yea			
Allocat	ion of p	olaces			
chelor's other su the nun dents o lows: S tial con	s stude ubjects nber of f other tudents siderat	nts with the minor Privat . 10 of these will be alloc available places exceed subjects. Should there b s applying after not havir	recht (Private Law). A ated to students of th the number of applic the more than 10 appli g successfully comp is will be allocated by	total of 20 places w ne Master's degree p ations, the remainin cations, the remainin leted assessment in	issenschaft (Law) as well as Ba- ill be allocated to students of programme Economics. Should ng places may be allocated to stu- ng places will be allocated as fol- past years will be given preferen- ill be maintained and places re-
Additio	nal inf	ormation			
Worklo	ad				
150 h					
Teachir	ng cycl	e			
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)					
Module	appea	in and the second se			
Master's degree (1 major) Nanostructure Technology (2016) Bachelor's degree (1 major) Computer Science (2017) Bachelor's degree (1 major) Computer Science (2019) Master's degree (1 major) Nanostructure Technology (2020) Master's degree (1 major) Quantum Technology (2021)					

Module title			Abbreviation				
Astrophysics			11-AP-152-m01				
Module	coord	inator		Module offered by	Module offered by		
Managing Director of the Institute of Theoretical Physics and Astrophysics			Theoretical Physics	Faculty of Physics and Astronomy			
ECTS Method of grading Only after succ. compl. of module(s)							
6	nume	rical grade	cal grade				
Duratio	n	Module level	Other prerequisites	i			
1 semes	ster	undergraduate					
Conten	ts						
telesco um, mo	pes an leculai	d detectors, stellar stru	nd time measurement, f ucture and atmosphere ne milky way, the local cosmology.	s, stellar evolution a	nd end stages, inter	stellar medi-	
Intende	d lear	ning outcomes					
physica	lobse	rvations and evaluatio	odern world view of Ast ns. They are able to use cs and development of	e these methods to p	lan and analyse owr	n observati-	
Courses	<b>5</b> (type, n	umber of weekly contact hour	s, language — if other than Ge	rman)			
V (2) + F Module		t in: German or English	I				
			guage — if other than German,	examination offered — if no	t every semester, informat	ion on whether	
		le for bonus)	• • >				
b) oral e c) oral e d) proje e) prese lf a writ stead ta of asse nation o	examin examin ect repo entatio ten exa ake the ssment date at	ation in groups (group ort (approx. 8 to 10 pag n/talk (approx. 30 min amination was chosen 1 form of an oral examin	e each (approx. 30 minu s of 2, approx. 30 minu ges) or utes) as method of assessm nation of one candidate rer must inform student	tes per candidate) of ent, this may be char e each or an oral exa	nged and assessmen mination in groups.	If the method	
Allocati	on of p	olaces					
Additio	nal inf	ormation					
Worklo	ad						
180 h							
Teaching cycle							
		LPOI (examination regulati	ons for teaching-degree progra	ammes)			
§ 22    N § 22    N § 22    N	lr. 2 f)						
§ 22    N Module	-	urs in					
Master's wit (2020)	th 1 major	Nanostructure Technology		generated 02-Aug-2025 • exa r (120 ECTS) Nanostrukturtecl		page 102 / 114	

Bachelor's degree (1 major) Physics (2015) Bachelor's degree (1 major) Mathematical Physics (2015) Bachelor's degree (1 major) Aerospace Computer Science (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 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) Bachelor's degree (1 major) Mathematical Physics (2016) Master's degree (1 major) Nanostructure Technology (2016) Bachelor's degree (1 major) Aerospace Computer Science (2017) 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) Master's degree (1 major) Nanostructure Technology (2020) Bachelor's degree (1 major) Physics (2020) Bachelor's degree (1 major) Mathematical Physics (2020) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2020) Bachelor's degree (1 major) Aerospace Computer Science (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) Master's degree (1 major) Quantum Technology (2021) exchange program Physics (2023) Bachelor's degree (1 major) Mathematical Physics (2024) Bachelor's degree (1 major) Aerospace Computer Science (2025)

	Module title						
Method	ds of O	bservational Astronomy	y		11-ASM-161-m01		
Module	e coord	inator		Module offered by			
		ector of the Institute of 1	Theoretical Physics	Faculty of Physics ar	nd Astronomy		
and Ast	-						
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)			
6	nume	rical grade					
Duratio	on	Module level	Other prerequisites	;			
1 seme	ster	graduate					
Conten	ts						
		oservational astronomy		netic spectrum. Evalu	uation of observationa	al data	
		tical, X-ray and gamma	-ray telescopes.				
		ning outcomes					
		ne methods used in obs					
		-ray and gamma-ray ene luct astronomical obser		principles and applica	ations of these metho	as and	
		number of weekly contact hours		rman)			
V (3) + I		amber of weekly contact nours					
	• •	t in: German or English					
Method	d of ass	sessment (type, scope, langi	uage — if other than German,	examination offered — if not	every semester, information	on whether	
		le for bonus)					
		mination (approx. 90 to					
		nation of one candidate					
		ation in groups (groups ort (approx. 8 to 10 page		ites per candidate) 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-					
		amination was chosen a		ent. this may be chan	ged and assessment	mav in-	
<b>-f</b>	ake the	amination was chosen a e form of an oral examin	as method of assessm				
or asse			as method of assessm ation of one candidate	e each or an oral exan	nination in groups. If I	the method	
	ssmen	e form of an oral examin	as method of assessm ation of one candidate	e each or an oral exan	nination in groups. If I	the method	
nation ( Langua	ssmen date at ge of a	e form of an oral examin t is changed, the lecture the latest. ssessment: German an	as method of assessm lation of one candidate er must inform studen d/or English	e each or an oral exan ts about this by four w	nination in groups. If t veeks prior to the orig	the method	
nation Langua Assess	ssmen date at ge of a ment o	e form of an oral examin t is changed, the lecture the latest. ssessment: German an ffered: In the semester	as method of assessm lation of one candidate er must inform studen d/or English	e each or an oral exan ts about this by four w	nination in groups. If t veeks prior to the orig	the method	
nation ( Langua	ssmen date at ge of a ment o	e form of an oral examin t is changed, the lecture the latest. ssessment: German an ffered: In the semester	as method of assessm lation of one candidate er must inform studen d/or English	e each or an oral exan ts about this by four w	nination in groups. If t veeks prior to the orig	the method	
nation o Langua Assessi Allocat	ssmen date at ge of a ment o ion of J	e form of an oral examin t is changed, the lecture t the latest. ssessment: German an ffered: In the semester <b>places</b>	as method of assessm lation of one candidate er must inform studen d/or English	e each or an oral exan ts about this by four w	nination in groups. If t veeks prior to the orig	the method	
nation o Langua Assessi Allocat	ssmen date at ge of a ment o ion of J	e form of an oral examin t is changed, the lecture the latest. ssessment: German an ffered: In the semester	as method of assessm lation of one candidate er must inform studen d/or English	e each or an oral exan ts about this by four w	nination in groups. If t veeks prior to the orig	the method	
nation o Langua Assessi Allocati  Additio	ssmen date at ge of a ment o ion of p nal inf	e form of an oral examin t is changed, the lecture t the latest. ssessment: German an ffered: In the semester <b>places</b>	as method of assessm lation of one candidate er must inform studen d/or English	e each or an oral exan ts about this by four w	nination in groups. If t veeks prior to the orig	the method	
nation o Langua Assessi Allocat	ssmen date at ge of a ment o ion of p nal inf	e form of an oral examin t is changed, the lecture t the latest. ssessment: German an ffered: In the semester <b>places</b>	as method of assessm lation of one candidate er must inform studen d/or English	e each or an oral exan ts about this by four w	nination in groups. If t veeks prior to the orig	the method	
nation o Langua Assessi Allocati  Additio	ssmen date at ge of a ment o ion of p nal inf	e form of an oral examin t is changed, the lecture t the latest. ssessment: German an ffered: In the semester <b>places</b>	as method of assessm lation of one candidate er must inform studen d/or English	e each or an oral exan ts about this by four w	nination in groups. If t veeks prior to the orig	the method	
nation of Langua Assessi Allocati  Additio  Worklo	ssmen date at ge of a ment o ion of p nal inf ad	e form of an oral examin t is changed, the lecture t he latest. ssessment: German an ffered: In the semester places	as method of assessm lation of one candidate er must inform studen d/or English	e each or an oral exan ts about this by four w	nination in groups. If t veeks prior to the orig	the method	
nation of Langua Assessi Allocati  Additio  Worklo 180 h	ssmen date at ge of a ment o ion of p nal inf ad	e form of an oral examin t is changed, the lecture t he latest. ssessment: German an ffered: In the semester places	as method of assessm lation of one candidate er must inform studen d/or English	e each or an oral exan ts about this by four w	nination in groups. If t veeks prior to the orig	the method	
nation of Langua Assessi Allocati  Additio  Worklo 180 h Teachir 	ssmen date at ge of a ment o ion of p nal inf ad	e form of an oral examin t is changed, the lecture t he latest. ssessment: German an ffered: In the semester places	as method of assessm lation of one candidate er must inform studen d/or English in which the course is	e each or an oral exan ts about this by four w offered and in the sul	nination in groups. If t veeks prior to the orig	the method	
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nation of Langua Assessi Allocati  Additio  Worklo 180 h Teachir  Referre 	ssmen date at ge of a ment o ion of p nal inf ad ng cycl	e form of an oral examin t is changed, the lecture t the latest. ssessment: German an ffered: In the semester places ormation e LPO I (examination regulation	as method of assessm lation of one candidate er must inform studen d/or English in which the course is	e each or an oral exan ts about this by four w offered and in the sul	nination in groups. If t veeks prior to the orig	the method	
nation of Langua Assessi Allocati  Worklo 180 h Teachir  Referre  Module	ssmen date at ge of a ment o ion of j mal inf ad ng cycl	e form of an oral examin t is changed, the lecture t the latest. Issessment: German an iffered: In the semester places ormation e LPO I (examination regulation ars in	as method of assessm lation of one candidate er must inform student d/or English in which the course is	e each or an oral exan ts about this by four w offered and in the sul	nination in groups. If t veeks prior to the orig	the method	
nation of Langua Assessi Allocati  Worklo 180 h Teachir  Referre  Module Master	ssmen date at ge of a ment o ion of p nal inf ad ad ed to in e appea	e form of an oral examin t is changed, the lecture t the latest. ssessment: German an ffered: In the semester places ormation e LPOI (examination regulation ars in ee (1 major) Mathemation	as method of assessm lation of one candidate er must inform student d/or English in which the course is 	e each or an oral exan ts about this by four w offered and in the sul	nination in groups. If t veeks prior to the orig	the method	
nation of Langua Assessi Allocati  Additio  Worklo 180 h Teachir  Referre  Module Master Master	ssmen date at ge of a ment o ion of p onal inf ad ad ad ad ad ad ad ad ad ad ad ad ad	e form of an oral examin t is changed, the lecture t is changed, the lecture t is changed, the lecture t is changed, the lecture seessment: German an iffered: In the semester places ormation e e LPO I (examination regulation ars in ee (1 major) Mathemation ee (1 major) Physics (20	as method of assessm lation of one candidate er must inform student d/or English in which the course is ons for teaching-degree progra	e each or an oral exan ts about this by four w offered and in the sul	nination in groups. If t veeks prior to the orig	the method	
nation of Langua Assessi Allocati  Worklo 180 h Teachir  Referre  Module Master' Master'	ssmen date at ge of a ment o ion of p onal inf ad ad ad ad ad ad ad ad ad ad ad ad ad	e form of an oral examin t is changed, the lecture t the latest. ssessment: German an ffered: In the semester places ormation e LPO I (examination regulation ars in ee (1 major) Mathemation	as method of assessm lation of one candidate er must inform student d/or English in which the course is ons for teaching-degree progra cs (2016) on6) ure Technology (2016)	e each or an oral exan ts about this by four w offered and in the sul	nination in groups. If t veeks prior to the orig	the method	
nation of Langua Assessi Allocati  Additio  Worklo 180 h Teachir  Referre  Master' Master' Master'	ssmen date at ge of a ment o ion of p mal inf ad ad ad ad ad ad ad ad ad ad ad ad ad	e form of an oral examin t is changed, the lecture t is changed, the lecture t the latest. Issessment: German an iffered: In the semester places ormation e LPO I (examination regulation ars in ee (1 major) Mathematic ee (1 major) Physics (20 ee (1 major) Nanostruct	as method of assessm lation of one candidate er must inform student d/or English in which the course is ons for teaching-degree progra cs (2016) onal Mathematics (201	e each or an oral exan ts about this by four w offered and in the sul	nination in groups. If t veeks prior to the orig	the method	

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Master's degree (1 major) Computational Mathematics (2019) Master's degree (1 major) Mathematics (2019) Master's degree (1 major) Nanostructure Technology (2020) Master's degree (1 major) Physics (2020) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Master's degree (1 major) Quantum Technology (2021) Master's degree (1 major) Computational Mathematics (2022) Master's degree (1 major) Mathematics (2022) exchange program Physics (2023) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) Mathematics (2024) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Module title				Abbreviation		
					11-ASP-161-m01	
Module	coordi	nator		Module offered by		
Managing Director of the Institute of Theoretical Physics F and Astrophysics			Faculty of Physics and Astronomy			
ECTS	S Method of grading Only after succ. compl. of module(s)					
6	5 numerical grade					
Duratio	n	Module level	Other prerequisites			
1 semester graduate						
Content	ts					
3. Elem 4. The s 5. Accel	mics of ents of sun and leratior	f charged particles in m space physics I heliosphere a and transport of energ to measure energetic	etic particles in the he	eliosphere		
Intende	d learr	ning outcomes				
mics of	charge	acquire basic knowledg ed particles in space an ding measuring metho	d the heliosphere. The			
Courses	<b>5</b> (type, n	umber of weekly contact hours	, language — if other than Ger	rman)		
V (3) + F Module		t in: German or English				
		essment (type, scope, lang	uage — if other than German,	examination offered — if no	t every semester, informati	on on whether
		le for bonus)				
b) oral e c) oral e d) proje e) prese If a writt stead ta of asses nation o Languag	examin examin ect repo entation ten exa ake the ssment date at ge of a ment of	nination (approx. 90 to ation of one candidate ation in groups (groups ort (approx. 8 to 10 page n/talk (approx. 30 minu mination was chosen a form of an oral examin : is changed, the lecture the latest. ssessment: German an ffered: In the semester	each (approx. 30 minu of 2, approx. 30 minu es) or ittes). is method of assessmo ation of one candidate er must inform student d/or English	tes per candidate) or ent, this may be char e each or an oral exar is about this by four v	nged and assessmer mination in groups. I weeks prior to the or	If the method iginal exami-
Allocati	ion of p	laces				
Additio	nal info	ormation				
			_			
Workloa	ad					
180 h						
Teachin	ig cycle	2				
Referre	d to in	LPOI (examination regulation	ns for teaching-degree progra	ammes)		
Module	appea	rs in				
Master's wit (2020)	th 1 major	Nanostructure Technology		generated 02-Aug-2025 • exa r (120 ECTS) Nanostrukturtech		page 106 / 114

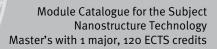
Master's degree (1 major) Mathematics (2016) Master's degree (1 major) Physics (2016) Master's degree (1 major) Nanostructure Technology (2016) Master's degree (1 major) Computational Mathematics (2016) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Master's degree (1 major) Computational Mathematics (2019) Master's degree (1 major) Mathematics (2019) Master's degree (1 major) Nanostructure Technology (2020) Master's degree (1 major) Physics (2020) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Master's degree (1 major) Quantum Technology (2021) Master's degree (1 major) Computational Mathematics (2022) Master's degree (1 major) Mathematics (2022) exchange program Physics (2023) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) Mathematics (2024) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Module title					Abbreviation
Additional Qualifications					11-EXZ5-161-m01
Module	coord	inator		Module offered by	
chairpe	erson of	f examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate	Approval from exam	ination committee re	equired.
Conten	ts				
Additio abroad		lls for engineers. Accredit	ted academic achieve	ements, e.g. in case	of change of university or study
Intende	ed learr	ning outcomes			
gree pro	ogramr	•	, .	•	of a module of the Master's de- for an occupation in the industry
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (2) +	R (2)				
a) writte b) oral e c) oral e d) proje e) prese If a writ stead ta of asse	Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes) If a written examination was chosen as method of assessment, this may be changed and assessment may in- stead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original exami- nation date at the latest.				
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
150 h					
Teachir	ng cycl	e			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module	e appea	irs in			
	-	ee (1 major) Nanostructur			
	-	ee (1 major) Nanostructur	•, ·		
Master's degree (1 major) Quantum Technology (2021)					

Module title				Abbreviation	
Additional Qualifications					11-EXZ6-161-m01
Module	coord	inator		Module offered by	
chairpe	erson of	f examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
6	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate	Approval from exam	ination committee re	equired.
Conten	ts				
Additio abroad	nal ski	lls for engineers. Accredi	ted academic achieve	ements, e.g. in case	of change of university or study
Intende	ed learr	ning outcomes			
gree pr	ogramr				of a module of the Master's de- for an occupation in the industry
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (3) +	R (1)				
a) writte b) oral ( c) oral ( d) proje e) prese If a writ stead ta of asse	<ul> <li>Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)</li> <li>a) written examination (approx. 90 to 120 minutes) or</li> <li>b) oral examination of one candidate each (approx. 30 minutes) or</li> <li>c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or</li> <li>d) project report (approx. 8 to 10 pages) or</li> <li>e) presentation/talk (approx. 30 minutes)</li> <li>If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest.</li> </ul>				
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
180 h					
Teachir	ng cycl	e			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module	e appea	ars in			
	-	ee (1 major) Nanostructur			
	-	ee (1 major) Nanostructur	•, · ·		
Master's degree (1 major) Quantum Technology (2021)					

Module title				Abbreviation	
Non-technical Minor Subject				11-EXNT6-161-m01	
Module	coord	inator		Module offered by	
chairpe	rson o	f examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
6	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate	Approval from exam	ination committee re	equired.
Conten	ts				
Non-teo	hnical	minor. Crediting for acad	lemic achievements,	e.g. from university	change or study abroad
Intende	ed learr	ning outcomes			
					ond to the requirements of a mo- law, business sciences).
Courses	<b>5</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (3) + I	R (1)				
		e <b>ssment</b> (type, scope, langua) le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
c) oral e d) proje e) prese If a writ stead ta of asse nation o	examin ect repo entatio ten exa ake the ssment date at	form of an oral examinat	of 2, approx. 30 minut ) or es). method of assessme tion of one candidate must inform student	tes per candidate) or ent, this may be char each or an oral exam	r 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				
180 h					
Teachir	ng cycl	e			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module	appea	irs in			
	-	ee (1 major) Nanostructur			
	-	ee (1 major) Nanostructur	•, · ·		
Master's degree (1 major) Quantum Technology (2021)					





# **Thesis** (60 ECTS credits)

Modul	e title				Abbreviation		
Profes	sional S	Specialization Nanostruc	ture Technology		11-FS-N-161-m01		
Modul	e coord	inator		Module offered by			
chairperson of examination committee				Faculty of Physics and Astronomy			
ECTS	Method of grading Only after suc			ucc. compl. of module(s)			
15	(not) s	successfully completed					
Duratio	on	Module level	Other prerequisites	ites			
1 seme	ester	graduate					
Conter	nts						
Introduction to current experimental or theoretical questions of a subdiscipline of nanostructure technology with special relevance to the planned topic of the Master's thesis. Summary of the required fundamental topics in a seminar presentation.							
Intend	ed lear	ning outcomes					
The students have advanced scientific knowledge of the principles of a current experimental, theoretical or en- gineering subdiscipline of nanostructure technology with special relevance to the intended topic of the Master's thesis and are able to summarise their knowledge in an oral presentation.							
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ge	rman)			
S (4) Module taught in: German or English							
<b>Method of assessment</b> (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)							
talk with discussion (30 to 45 minutes) Language of assessment: German and/or English							
Allocat	tion of p	olaces					
Additio	onal inf	ormation					
Worklo	ad						
450 h							
Teachi	ng cycl	e					
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module appears in							
Master's degree (1 major) Nanostructure Technology (2016)							
Master's degree (1 major) Nanostructure Technology (2020)							

Modul	e title		Abbreviation					
Scient	ific Met	hods and Project Manag	11-MP-N-161-m01					
Modul	e coord	inator		Module offered by				
chairperson of examination committee				Faculty of Physics and Astronomy				
ECTS								
15	(not) s	successfully completed						
Duratio	on	Module level	Other prerequisites	requisites				
1 semester graduate		graduate						
Conter	nts							
Introduction to the methods of scientific work, taking into account methods of project planning. Application to theoretical, experimental or engineering questions of nanostructure technology. Writing of a scientific project plan for the planned Master's thesis.								
		ning outcomes						
planning of a current experimental, theoretical or engineering subdiscipline of nanostructure technology with special relevance to the intended topic of the Master's thesis and are able to develop a project plan for the Master's thesis, to plan the required work and to summarise their knowledge in an oral presentation. <b>Courses</b> (type, number of weekly contact hours, language — if other than German)								
R (4)				inany				
	e taugh	t in: German or English						
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)								
		ussion (30 to 45 minutes) ssessment: German and						
Allocat	tion of p	olaces						
Additio	onal inf	ormation						
Worklo	ad							
450 h								
Teachi	ng cycl	e						
Referred to in LPO I (examination regulations for teaching-degree programmes)								
Module appears in								
Master's degree (1 major) Nanostructure Technology (2016)								
Master's degree (1 major) Nanostructure Technology (2020)								

Module	e title		Abbreviation				
Master	Thesis	Nanostructure Technolo	gy		11-MA-N-161-m01		
Module	e coord	inator		Module offered by			
chairpe	erson o	f examination committee		Faculty of Physics and Astronomy			
ECTS	Metho	od of grading	Only after succ. compl. of module(s)				
30	nume	rical grade					
Duration		Module level	Other prerequisites				
1 semester graduate							
Conten	ts						
Mostly independent processing of an experimental, theoretical or engineering task in the field of nanostructure technology, especially according to known procedures and scientific aspects; writing of the thesis.							
Intende	ed lear	ning outcomes					
The students are able to independently work on an experimental, theoretical and engineering task from nano- structure technology, especially in accordance with known methods and scientific aspects and to summarise their results in a final paper.							
<b>Courses</b> (type, number of weekly contact hours, language — if other than German)							
No courses assigned to module							
<b>Method of assessment</b> (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)							
Master's thesis (750 to 900 hours total) Language of assessment: German and/or English							
Allocation of places							
Additio	nal inf	ormation					
Time to complete: 6 months.							
Workload							
900 h							
Teaching cycle							
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module appears in							
	Master's degree (1 major) Nanostructure Technology (2016)						
Master's degree (1 major) Nanostructure Technology (2020)							