

# Subdivided Module Catalogue for the Subject

# **Physics**

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

Examination regulations version: 2009 Responsible: Faculty of Physics and Astronomy



# **Course of Studies - Contents and Objectives**

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



# **Abbreviations used**

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

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:

# ASP02007

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

# 02-Sep-2010 (2010-48)

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



# The subject is divided into

Abbreviation	Module title	ECTS credits	Method of grading	page
Compulsory Courses (14	o ECTS credits)			
Experimental Physics (	46 ECTS credits)			
11-E1-072-m01	Experimental Physics 1 (Mechanics, Thermodynamics, Waves and Oscillations)	8	NUM	26
11-E2-072-m01	Experimental Physics 2 (Electrics and Magnetism)	8	NUM	27
11-E3-072-m01	Experimental Physics 3 (Optics, Quantum Phenomena, Introduction Atomic Physics)	8	NUM	28
11-E4-072-m01	Experimental Physics 4 (Introduction to Solid State Physics)	8	NUM	29
11-E5-072-m01	Experimental Physics 5 (Physics of Atoms and Molecules)	6	NUM	30
11-E6-072-m01	Nuclear and Elementary Particle Physics	4	NUM	31
11-E7-072-m01	Experimental Physics 7 (Solid State Phenomena [Semiconductor, Superconductivity, Magnetism])	4	NUM	32
Theoretical Physics (32	ECTS credits)		•	
11-T1-072-m01	Theoretical Physics 1 (Theoretical Mechanics)	8	NUM	46
11-T2-072-m01	Theoretical Physics 2 (Theoretical Electrostatics and Electrodynamics)	8	NUM	47
11-T3-072-m01	Theoretical Physics 3 (Theoretical Quantum Mechanics)	8	NUM	48
11-T3F-072-m01	Theoretical Physics 3 FOKUS (Theoretical Quantum Mechanics)	8	NUM	49
11-T4-072-m01	Theoretical Physics 4 (Theoretical Thermodynamics and Statistics)	8	NUM	50
Lab Course Physics (16	ECTS credits)		L	
11-PGA-PGR-072-m01	Basic Practical Course B for Students of Physics (Bachelor of Science and Teaching Degree)	6	B/NB	40
11-PGB-PGN-072-m01	Advanced Undergraduate Laboratory (Atomic Physics, Nuclear Physics, Basic Semiconductor Circuits)	4	B/NB	42
11-PFB-072-m01	Advanced Practical Course Bachelor	4	B/NB	38
11-PHS-072-m01	Main Seminar Experimental / Theoretical Physics	2	NUM	4:
Mathematics (34 ECTS				
11-MPl3-062-m01	Mathematics 3 for students of Physics and Engineering	8	NUM	34
10-M-PHY1-072-m01	Mathematics for Physicists 1	10	NUM	1
10-M-PHY2-072-m01	Mathematics for Physicists 2	8	NUM	16
11-MPI4-062-m01	Mathematics 4 for Students of Physics and Engineering	8	NUM	30
Module Comprehensive	e Tests (12 ECTS credits)		•	
11-PREP-072-m01	Oral Exam Experimental Physics (Physicists)	6	NUM	44
11-PRT-072-m01	Oral Exam Theoretical Physics	6	NUM	4:
Compulsory Electives (10	ECTS credits)			
Chemistry (10 ECTS cre	dits)			
08-CP1-072-m01	General Chemistry for Physics and Engineers	10	NUM	6
Computer Science (10 E	CTS credits)			
10-I-EIN-072-m01	Introduction to Computer Science for Students of all Faculties	10	NUM	8
Numerical Mathematics	s (10 ECTS credits)			
10-M-NM1-082-m01	Numerical Mathematics 1	8	NUM	1:
10-M-NM2-082-m01	Numerical Mathematics 2	5	NUM	13
nelor's with 1 major Physics (200	9) JMU Würzburg • generated 26-Aug-2024 • exa reg. data record Bachelor (180 ECTS) Physik - 20		pag	e 4 / 50



10-M-PRG-082-m01	Programming course for students of Mathematics and other subjects	3	B/NB	17
10-M-COM-082-m01	Computeroriented Mathematics	3	B/NB	9
Thesis (10 ECTS credits)				
11-BA-P-072-m01	Bachelor Thesis Physics	10	NUM	25
Subject-specific Key Skill	s (14 ECTS credits)			
11-PFR-072-m01	Measurements and Data Analysis	2	NUM	39
11-A1-072-m01	Computational Physics	6	NUM	19
11-A3-072-m01	Laboratory and Measurement Technology	6	NUM	21
11-A4-072-m01	Astrophysics	6	NUM	23
11-A2-081-m01	Electronics	6	NUM	20
11-MKS-082-m01	Introduction Course Mathematics	3	B/NB	33
11-MR-092-m01	Mathematical Methods of Physics	6	B/NB	37



Modul	e title		Abbreviation		
General Chemistry for Physics and Engineers			d Engineers		08-CP1-072-m01
Module coordinator				Module offered by	
lecturer of the course Institute of Inorganic			ic Chemistry		
ECTS	Meth	od of grading	Only after succ. co	mpl. of module(s)	
10	nume	rical grade			
Duration Module level Other prerequisites		5			
1 semester undergraduate					
Conto	ntc		<del></del>		

#### **Contents**

This module discusses the fundamental principles of both inorganic and organic chemistry. The lab course gives students the opportunity to learn essential methods and perform simple experiments.

# **Intended learning outcomes**

Students are able to explain the principles of the periodic table and to extract information from it. They are able to explain basic models of the structure of matter. They have developed the ability to use the language of chemical formulas to describe chemical reactions and to interpret them by identifying the type of reaction. They are able to identify fundamental problems in chemistry and perform experiments to solve them.

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

This module comprises 3 module components. Information on courses will be listed separately for each module component.

- 08-IOC-1-072: V (no information on SWS (weekly contact hours) and course language available)
- 08-CP1-1-072: V (no information on SWS (weekly contact hours) and course language available)
- 08-CP1-3-072: P (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component o8-IOC-1-072:** Organic Chemistry for students of medicine, biomedicine, dental medicine, engineering and natural science

- 3 ECTS, Method of grading: numerical grade
- written examination (approx. 60 minutes)

**Assessment in module component o8-CP1-1-072:** Basics of General an Inorganic Chemistry

- 5 ECTS, Method of grading: numerical grade
- written examination (60 minutes)

Assessment in module component o8-CP1-3-072: General and Analytical Chemistry (lab)

- 2 ECTS, Method of grading: (not) successfully completed
- for each experiment: Vortestate (pre-experiment exams, approx. 10 minutes each), assessment of practical performance (log, 2 to 5 pages), Nachtestate (post-experiment exams, approx. 10 minutes each)
- Assessment offered: once a year, summer semester
- Only after successful completion of module components: Successful completion of module component o8-CP1-1 is a prerequisite for participation in module component o8-CP1-3.

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Allocation of places		
Additional information		
Workload		



# **Teaching cycle**

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

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# Module appears in

Bachelor' degree (1 major) Physics (2007)

Bachelor' degree (1 major) Physics (2009)

Bachelor' degree (1 major) Physics (2008)

Bachelor' degree (1 major) Nanostructure Technology (2008)

Bachelor' degree (1 major) Nanostructure Technology (2007)

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

No final examination Special study offering (2010)



Modul	e title		Abbreviation		
Introduction to Computer Science for Students of all Faculties			ies	10-I-EIN-072-m01	
Modul	e coord	inator		Module offered by	
Dean o	f Studi	es Informatik (Computer	Science)	Institute of Compu	ter Science
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
10	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ester	undergraduate	Admission prerequisite to assessment: academic requirements to be met		
			in exercises as spec	ified at the beginnir	ng of the course.
Conter	nts				
Foundations of computer science including representation of information and websites (HTML, XML, EBNF), databases, algorithms and data structures, programming (Java).					
Intended learning outcomes					
The students are familiar with the fundamentals of computer science, e.g. in the areas of representation of information and websites (HTML, XML, EBNF), databases, algorithms and data structures, programming in Java.					

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

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

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

a) written examination (approx. 90 minutes) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2: 30 minutes, groups of 3: 40 minutes)

### Allocation of places

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# **Additional information**

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# Workload

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# Teaching cycle

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

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# Module appears in

Bachelor' degree (1 major) Geography (2007)

Bachelor' degree (1 major) Geography (2008)

Bachelor' degree (1 major) Geography (2010)

Bachelor' degree (1 major) Physics (2007)

Bachelor' degree (1 major) Physics (2010)

Bachelor' degree (1 major) Physics (2009)

Bachelor' degree (1 major) Physics (2012)

Bachelor' degree (1 major) Physics (2008)

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

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

Bachelor's degree (1 major, 1 minor) Digital Humanities (Minor, 2009)

Bachelor's degree (2 majors) Digital Humanities (2009)



			Abbreviation	
roriented Mathematics		•	10-M-COM-082-m01	
Module coordinator Module offered				
tudies Mathematik (Mathem	atics)	Institute of Mathematics		
lethod of grading	Only after succ. con	Only after succ. compl. of module(s)		
not) successfully completed				
Module level	Other prerequisites			
1 semester undergraduate Admission prerequisite to assessment: regular attendance of example (attendance monitored, a maximum of one incident of unexcus		•		
	tudies Mathematik (Mathem lethod of grading not) successfully completed Module level	tudies Mathematik (Mathematics)  lethod of grading not) successfully completed  Module level other prerequisites or undergraduate  Admission prerequi	tudies Mathematik (Mathematics)  Institute of Mathematics  Only after succ. compl. of module(s)   Module level  Other prerequisites  and undergraduate  Admission prerequisite to assessment:  (attendance monitored, a maximum of other preservation)	

#### **Contents**

Introduction to modern mathematical software for symbolic computation (e. g. Mathematica or Maple) and numerical computation (e. g. Matlab) to supplement the basic modules in analysis and linear algebra ((10-M-ANA or 10-M-ANL) and 10-M-LNA). Computer-based solution of problems in linear algebra, geometry, analysis, in particular differential and integral calculus; visualisation of functions.

# **Intended learning outcomes**

The student learns the use of advanced modern mathematical software packages, and is able to assess their fields of application to solve mathematical problems.

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

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

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

project in the form of programming exercises (as specified at the beginning of the course)

Assessment offered: once a year, summer semester

Language of assessment: German, English if agreed upon with the examiner

# Allocation of places

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# **Additional information**

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# Workload

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### **Teaching cycle**

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

§ 73 (1) 5. Mathematik Angewandte Mathematik

# Module appears in

Bachelor' degree (1 major) Computer Science (2010)

Bachelor' degree (1 major) Mathematics (2008)

Bachelor' degree (1 major) Physics (2010)

Bachelor' degree (1 major) Physics (2009)

Bachelor' degree (1 major) Physics (2012)

Bachelor' degree (1 major) Physics (2008)

Bachelor' degree (1 major) Technology of Functional Materials (2009)

Bachelor' degree (1 major) Technology of Functional Materials (2010)

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

Bachelor' degree (1 major) Economathematics (2009)

Bachelor' degree (1 major) Economathematics (2008)



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

Bachelor' degree (1 major) Computational Mathematics (2009)

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

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

Master's degree (1 major) Technology of Functional Materials (2009)

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

Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008)

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



Module	title				Abbreviation
Numeric	al Ma	thematics 1			10-M-NM1-082-m01
Module coordinator Module offered by					
Dean of	Studie	es Mathematik (Mathe	matics)	Institute of Mathem	atics
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
8	nume	rical grade			
Duration	1	Module level	Other prerequisites	i	
1 semes	Duration Module level Certain prerequisites  Undergraduate Certain prerequisites must be met to qualify for admission to as sessment. The lecturer will inform students about the respective at the beginning of the course. Registration for the course will be sidered a declaration of will to seek admission to assessment. It dents have obtained the qualification for admission to assessment the course of the semester, the lecturer will put their registration sessment into effect. Students who meet all prerequisites will be ted to assessment in the current or in the subsequent semester. sessment at a later date, students will have to obtain the qualification to assessment anew.		nts about the respective details ion for the course will be consission to assessment. If sturadmission to assessment over will put their registration for astall prerequisites will be admites subsequent semester. For as-		

#### **Contents**

Solution of systems of linear equations and curve fitting problems, nonlinear equations and systems of equations, interpolation with polynomials, splines and trigonometric functions, numerical integration.

### **Intended learning outcomes**

The student is acquainted with the fundamental concepts and methods in numerical mathematics, applies them to practical problems and knows about their typical fields of application.

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

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

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

written examination (approx. 90 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes)

Language of assessment: German, English if agreed upon with the examiner

# Allocation of places

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# **Additional information**

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#### Workload

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# **Teaching cycle**

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

§ 73 (1) 5. Mathematik Angewandte Mathematik

# Module appears in

Bachelor' degree (1 major) Computer Science (2010)

Bachelor' degree (1 major) Mathematics (2008)

Bachelor' degree (1 major) Physics (2010)

Bachelor' degree (1 major) Physics (2009)



Bachelor' degree (1 major) Physics (2012)

Bachelor' degree (1 major) Physics (2008)

Bachelor' degree (1 major) Technology of Functional Materials (2009)

Bachelor' degree (1 major) Technology of Functional Materials (2010)

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

Bachelor' degree (1 major) Economathematics (2009)

Bachelor' degree (1 major) Economathematics (2008)

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

Bachelor' degree (1 major) Computational Mathematics (2009)

Bachelor' degree (1 major) Aerospace Computer Science (2009)

Bachelor' degree (1 major) Aerospace Computer Science (2011)

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

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

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

Master's degree (1 major) Technology of Functional Materials (2009)

Master's degree (1 major) Nanostructure Technology (2011)

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

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

Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008)

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



Module title				Abbreviation	
Numerical	Mathematics 2			10-M-NM2-082-m01	
Module coordinator Module offered by					
Dean of St	udies Mathematik (Mat	hematics)	Institute of Mathem	natics	
ECTS Me	ethod of grading	Only after succ. cor	mpl. of module(s)		
5 nu	merical grade				
Duration	Module level	Other prerequisites	5		
1 semester undergraduate		sessment. The lecturation at the beginning of sidered a declaration dents have obtained the course of the sessment into effect ted to assessment in the lecture.	Other prerequisites  Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for		

#### **Contents**

Solution methods and applications for eigenvalue problems, linear programming, initial value problems for ordinary differential equations, boundary value problems.

### **Intended learning outcomes**

The student is able to draw a distinction between the different concepts of numerical mathematics and knows about their advantages and limitations concerning the possibilities of application in different fields of natural and engineering sciences and economics.

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

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

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

written examination (approx. 90 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes)

Language of assessment: German, English if agreed upon with the examiner

# **Allocation of places**

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### **Additional information**

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#### Workload

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#### Teaching cycle

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

§ 73 (1) 5. Mathematik Angewandte Mathematik

# Module appears in

Bachelor' degree (1 major) Mathematics (2008)

Bachelor' degree (1 major) Physics (2010)

Bachelor' degree (1 major) Physics (2009)

Bachelor's with 1 major Physics (2009)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 13 / 50
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Bachelor' degree (1 major) Physics (2012)

Bachelor' degree (1 major) Physics (2008)

Bachelor' degree (1 major) Technology of Functional Materials (2009)

Bachelor' degree (1 major) Technology of Functional Materials (2010)

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

Bachelor' degree (1 major) Economathematics (2009)

Bachelor' degree (1 major) Economathematics (2008)

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

Bachelor' degree (1 major) Computational Mathematics (2009)

Bachelor' degree (1 major) Aerospace Computer Science (2009)

Bachelor' degree (1 major) Aerospace Computer Science (2011)

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

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

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

Master's degree (1 major) Technology of Functional Materials (2009)

Master's degree (1 major) Nanostructure Technology (2011)

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

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

Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008)

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



Modul	Module title Abbreviation					
Mathe	matics	for Physicists 1			10-M-PHY1-072-m01	
Modul	e coord	inator		Module offered by		
Dean of Studies Mathematik (Mathematics)			atics)	Institute of Mathem	natics	
ECTS	1	od of grading	Only after succ. con			
10	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ester	undergraduate				
Conter	Contents					
Basics on numbers and functions, sequences and series, differential and integral calculus in one variable, vector spaces, simple differential equations.						
Intend	ed lear	ning outcomes				
		ets acquainted with basion in natural sciences, in pa			s to apply these methods to sim- et the results.	
Course	<b>es</b> (type	, number of weekly conta	ıct hours, language –	- if other than Germa	ın)	
V + Ü (	no info	rmation on SWS (weekly	contact hours) and co	ourse language avail	able)	
		sessment (type, scope, la ion on whether module ca			ition offered — if not every seme-	
written	exami	nation (90 minutes)				
Allocat	tion of	places				
Additio	onal inf	ormation				
Worklo	oad					
Teachi	ng cycl	e				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Modul	Module appears in					
Bachel	lor' deg	ree (1 major) Physics (20	07)			
	_	ree (1 major) Physics (20	•			
Bachel	lor' deg	ree (1 major) Physics (20	08)			



Module	Module title Abbreviation					
Mather	natics	for Physicists 2			10-M-PHY2-072-m01	
Module	coord	inator		Module offered by		
Dean of Studies Mathematik (Mathematics)		Institute of Mathem	natics			
ECTS		od of grading	Only after succ. com		iatros	
8		rical grade		,		
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
		nd systems of linear equ variables, differential equ			y, differential and integral calcu-	
		ning outcomes	adions, rouner analy	313.		
		ets acquainted with fund problems in natural scie			tics. He/She learns to apply theto interpret the results.	
Course	<b>s</b> (type	, number of weekly conta	ct hours, language –	if other than Germa	n)	
V + Ü (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)	
		sessment (type, scope, la on on whether module ca			tion offered — if not every seme-	
written	exami	nation (90 minutes)				
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teachi	ng cycl	<u> </u>				
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module appears in						
Bachel	or' deg	ree (1 major) Physics (200	07)			
	_	ree (1 major) Physics (200	•			
	_	ree (1 major) Physics (200				
No fina	No final examination Special study offering (2010)					



Module	e title		Abbreviation		
Programming course for students of Mathematics and other subjects					10-M-PRG-082-m01
Module	e coord	linator		Module offered by	
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathematics	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
3	(not)	successfully completed			
Duratio	n	Module level	Other prerequisites		
1 semester undergraduate		Admission prerequisite to assessment: regular attendance (attendance			
			monitored, a maximum of one incident of unexcused absence).		
Conten	ıts	*	*		

Basics of a modern programming language (e. g. C or Fortran) taking into account the particular needs in mathe-

# **Intended learning outcomes**

The student is able to work independently on small programming exercises and standard programming problems in mathematics.

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

P (no information on SWS (weekly contact hours) and course language available)

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

project in the form of programming exercises (as specified at the beginning of the course) Language of assessment: German, English if agreed upon with the examiner

#### Allocation of places

#### **Additional information**

#### Workload

#### **Teaching cycle**

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

§ 73 (1) 5. Mathematik Angewandte Mathematik

# Module appears in

Bachelor' degree (1 major) Mathematics (2008)

Bachelor' degree (1 major) Physics (2010)

Bachelor' degree (1 major) Physics (2009)

Bachelor' degree (1 major) Physics (2012)

Bachelor' degree (1 major) Physics (2008)

Bachelor' degree (1 major) Technology of Functional Materials (2009)

Bachelor' degree (1 major) Technology of Functional Materials (2010)

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

Bachelor' degree (1 major) Economathematics (2009)

Bachelor' degree (1 major) Economathematics (2008)

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

Bachelor' degree (1 major) Computational Mathematics (2009)

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

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

Master's degree (1 major) Technology of Functional Materials (2009)



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



Module title Abbreviation							
Computational Physics 11-A1-072-m01					11-A1-072-m01		
Modul	e coord	inator		Module offered by			
	ging Dire	ector of the Institute of Th sics	neoretical Physics	Faculty of Physics a	and Astronomy		
ECTS		od of grading	Only after succ. con	npl. of module(s)			
6	nume	rical grade					
Durati	on	Module level	Other prerequisites	i			
1 seme	ester	undergraduate					
Conte	nts						
		o two of the programming with computer program		for students of Phys	ics and Engineering, solving phy-		
Intend	ed lear	ning outcomes					
		have acquired the follow			of two programming languages, vsical problems.		
Course	<b>es</b> (type	, number of weekly conta	act hours, language –	- if other than Germa	an)		
V + Ü (	no info	rmation on SWS (weekly	contact hours) and co	ourse language avai	lable)		
		sessment (type, scope, la			ation offered — if not every seme-		
writter	n exami	nation (approx. 120 minu	ites)				
Alloca	tion of p	olaces					
Additi	onal inf	ormation					
 Workle	oad						
Teaching cycle							
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module appears in							

Bachelor' degree (1 major) Physics (2007)

Bachelor' degree (1 major) Physics (2009)

Bachelor' degree (1 major) Physics (2008)

Bachelor' degree (1 major) Nanostructure Technology (2008)

Bachelor' degree (1 major) Nanostructure Technology (2007)

Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008)



Module title Abbreviation					
Electro	nics				11-A2-081-m01
Module	e coord	inator		Module offered by	
Manag	Managing Director of the Institute of Applied Phys			Faculty of Physics and Astronomy	
<b>ECTS</b>	Meth	od of grading	Only after succ. con	r succ. compl. of module(s)	
6	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Contents					

Principles of passive and active electronic components and their application in analogous and digital circuit technology.

# **Intended learning outcomes**

The students have knowledge of the practical setup of electronic circuits from the field of analogous and digital circuit technology.

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

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

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

written examination (approx. 90 minutes)

# Allocation of places

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#### **Additional information**

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#### Workload

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#### **Teaching cycle**

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

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# Module appears in

Bachelor' degree (1 major) Physics (2009)

Bachelor' degree (1 major) Physics (2008)

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

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

Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010)

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

Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008)

No final examination Special study offering (2010)



Module tit	le			Abbreviation
Laboratory	and Measurement Tech	inology		11-A3-072-m01
Module co	ordinator		Module offered by	
Managing	Director of the Institute of	of Applied Physics	Faculty of Physics	and Astronomy
ECTS Me	ethod of grading	Only after succ. o	ompl. of module(s)	
6 nu	merical grade			
Duration	Module level	Other prerequisit	es	
		50% of exercises sion to assessme ve details at the be considered a considered at the course of the course of assessment into mitted to assessment at a light of the course of the cours	Certain prerequisites ont. The lecturer will information of the course declaration of will to set tained the qualification of the semester, the lecture of in the current or in the current or in the current or in the contents.	successful completion of approx. must be met to qualify for admisform students about the respective. Registration for the course will sek admission to assessment. If n for admission to assessment turer will put their registration for neet all prerequisites will be adnithe subsequent semester. For all have to obtain the qualification

#### Content

Introduction to electronic and optical measuring methods of physical metrology, vacuum technology and cryogenics, cryogenics, light sources, spectroscopic methods and measured value acquisition.

#### **Intended learning outcomes**

The students have acquired the following transferable skills: Electronic and optical measuring methods in physical metrology, cryogenics and vacuum technology, cryogenics, light sources, spectroscopic methods and measured value acquisition.

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

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

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

written examination (approx. 120 minutes)

#### Allocation of places

Only as part of pool of general key skills (ASQ): 15 places. Places will be allocated by lot.

# Additional information

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# Workload

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# Teaching cycle

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

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#### Module appears in

Bachelor' degree (1 major) Physics (2007)

Bachelor' degree (1 major) Physics (2010)

Bachelor' degree (1 major) Physics (2009)

Bachelor' degree (1 major) Physics (2012)

Bachelor' degree (1 major) Physics (2008)



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

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

Bachelor' degree (1 major) Nanostructure Technology (2008)

Bachelor' degree (1 major) Nanostructure Technology (2007)

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

Master's degree (1 major) Technology of Functional Materials (2009)

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

Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008)

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



Module title	9		Α	bbreviation
Astrophysic	CS .		1	1-A4-072-m01
Module coo	rdinator		Module offered by	
Managing D and Astroph		of Theoretical Physics	Faculty of Physics and	d Astronomy
ECTS Met	thod of grading	Only after succ. co	mpl. of module(s)	
6 nun	nerical grade			
Duration	Module level	Other prerequisite	S	
Duration     Module level       1 semester     undergraduate		50% of exercises. On sion to assessment we details at the beautiful beautifu	Certain prerequisites mut. The lecturer will informationing of the course. For claration of will to seek ained the qualification for the semester, the lecture fect. Students who meeter in the current or in the ter date, students will here.	ccessful completion of approx. ust be met to qualify for admism students about the respective legistration for the course will admission to assessment. If or admission to assessment er will put their registration for all prerequisites will be adhe subsequent semester. For ave to obtain the qualification

History of astronomy, coordinates and time measurement, the solar system, size scales in outer space, telescopes and detectors, stellar structure, stellar atmospheres, stellar evolution, final stages of stellar evolution, interstellar medium, structure of the Milky Way, local universe, expanding space-time, galaxies, active galactic nuclei, large-scale structure of the universe, Friedmann World Models, thermodynamics of the early universe, primordial nucleosynthesis, cosmic microwave background radiation, structure formation, inflation

# **Intended learning outcomes**

The students are familiar with the modern world view of Astrophysics. They know methods and tools for astrophysical observations and evaluations. They are able to use these methods to plan and analyse own observations. They know the structure of the universe, e.g. of stars and galaxies and understand the process of their development.

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

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

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

written examination (approx. 120 minutes)

# Allocation of places

Only as part of pool of general key skills (ASQ): 15 places. Places will be allocated by lot.

# Additional information

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# Workload

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# Teaching cycle

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

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#### Module appears in



Bachelor' degree (1 major) Physics (2007)

Bachelor' degree (1 major) Physics (2010)

Bachelor' degree (1 major) Physics (2009)

Bachelor' degree (1 major) Physics (2012)

Bachelor' degree (1 major) Physics (2008)

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

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

Bachelor' degree (1 major) Aerospace Computer Science (2011)

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

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

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

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

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

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

Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008)

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



Module title Abbreviation					Abbreviation
Bachel	or The	sis Physics			11-BA-P-072-m01
Module coordinator Module offered I					
chairpe	erson o	f examination committee		Faculty of Physics a	and Astronomy
ECTS		od of grading	Only after succ. com		,
10		rical grade		•	
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	its				
		endent processing of an e	xperimental or theor	etical task of Physics	s according to known procedures
Intende	ed lear	ning outcomes			
		are able to independently			ask from Physics, especially acesis.
Course	<b>s</b> (type	, number of weekly conta	ct hours, language –	· if other than Germa	ın)
no cou	rses as	signed			
ster, in written	format thesis	sessment (type, scope, la ion on whether module ca (approx. 25 pages) assessment: German or Er	an be chosen to earn		tion offered — if not every seme-
Allocat					
Additio	nal inf	ormation			
			,		
Worklo	ad				
Teachi	ng cvcl	<b>P</b>			
	is cyc				
Referre	d to in	IPOI (examination regu	lations for teaching.	legree programmes)	
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module appears in					
Bachelor' degree (1 major) Physics (2007)					
Bachelor' degree (1 major) Physics (2007) Bachelor' degree (1 major) Physics (2010)					
	Bachelor' degree (1 major) Physics (2009)				
	_	ree (1 major) Physics (20:	•		
Bachel	Bachelor' degree (1 major) Physics (2008)				



Module title Abbreviation							
Experimental Physics 1 (Mechanics, Thermodynamics, Waves and Oscillati-							
ons)	·						
Module	e coord	inator		Module offered by			
Manag	ing Dire	ector of the Institute of A	pplied Physics	Faculty of Physics a	and Astronomy		
ECTS	1	od of grading	Only after succ. con	npl. of module(s)			
8		rical grade					
Duratio		Module level	Other prerequisites				
1 seme	ster	undergraduate					
Conten	its						
Physica	al laws	of mechanics, vibrations	and waves, thermod	ynamics			
Intend	ed lear	ning outcomes					
The stu	ıdents	understand the basic co	ntexts and principles	of mechanics, vibrat	tion, waves and thermodynamics.		
Course	<b>s</b> (type	, number of weekly conta	act hours, language –	- if other than Germa	an)		
V + Ü (ı	no info	rmation on SWS (weekly	contact hours) and co	ourse language avail	lable)		
		sessment (type, scope, la ion on whether module c			ation offered — if not every seme-		
written	exami	nation (approx. 120 minu	ites)				
Allocat	ion of	olaces					
	-						
Additio	nal inf	ormation					
Worklo	ad						
	-		,				
Teachi	ng cycl	e					
Referre	ed to in	LPO I (examination regu	ulations for teaching-	degree programmes)			
Module appears in							
Bachel	Bachelor' degree (1 major) Physics (2007)						
Bachelor' degree (1 major) Physics (2009)							
	Bachelor' degree (1 major) Physics (2008)						
	_	ree (1 major) Nanostruct	•, .				
Bachel	Bachelor' degree (1 major) Nanostructure Technology (2007)						

Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008)



Module title					Abbreviation	
Experimental Physics 2 (Electrics and Magnetism)					11-E2-072-m01	
Module coordinator Module offered by						
Manag	ging Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	and Astronomy	
ECTS	Meth	od of grading	Only after succ. com		·	
8	nume	rical grade				
Durati	on	Module level	Other prerequisites			
1 seme	ester	undergraduate				
Conte	nts					
Physic	al laws	of the science of electrici	ty, magnetism, electi	romagnetic vibration	s and waves	
Intend	ed lear	ning outcomes				
		understand the basic cond waves.	texts and principles	of science of electric	ity, magnetism, electromagnetic	
Course	<b>es</b> (type	, number of weekly conta	ct hours, language –	- if other than Germa	ın)	
V + Ü (	no info	rmation on SWS (weekly o	contact hours) and co	ourse language avail	able)	
		sessment (type, scope, la ion on whether module ca			tion offered — if not every seme-	
writter	n exami	nation (approx. 120 minu	tes)			
Alloca	tion of	places				
Addition	onal inf	ormation				
Workle	oad					
Teachi	ing cycl	e				
Referr	ed to in	LPO I (examination regu	lations for teaching-c	degree programmes)		
Modul	Module appears in					
	Bachelor' degree (1 major) Physics (2007)					
	Bachelor' degree (1 major) Physics (2009)					
	Bachelor' degree (1 major) Physics (2008)					
l	Bachelor' degree (1 major) Nanostructure Technology (2008)					
	Bachelor' degree (1 major) Nanostructure Technology (2007)					
Bache	Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008)					



Module	e title		Abbreviation			
Experi	mental	Physics 3 (Optics, Quan	tum Phenomena, Int	roduction Atomic	11-E3-072-m01	
Physic	s)					
Module	e coord	inator		Module offered by		
Managing Director of the Institute of Applied Physics			pplied Physics	Faculty of Physics and Astronomy		
ECTS	Meth	od of grading	Only after succ. co	ompl. of module(s)		
8	nume	rical grade		•		
Duratio	on	Module level	Other prerequisites			
1 seme	ester	undergraduate				
Conten	nts		•			
Physical laws of optics, quantum phenomena, introduction to Atomic Physics.						
Intended learning outcomes						

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

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

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

The students have knowledge of the basic contexts and principles of optics, quantum phenomena and Atomic

written examination (approx. 120 minutes)

# Allocation of places

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### **Additional information**

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# Workload

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# **Teaching cycle**

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

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# Module appears in

Bachelor' degree (1 major) Mathematics (2008)

Bachelor' degree (1 major) Mathematics (2007)

Bachelor' degree (1 major) Physics (2007)

Bachelor' degree (1 major) Physics (2009)

Bachelor' degree (1 major) Physics (2008)

Bachelor' degree (1 major) Nanostructure Technology (2008)

Bachelor' degree (1 major) Nanostructure Technology (2007)

Bachelor' degree (1 major) Computational Mathematics (2009)

Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008)



					Abbreviation	
Experi	mental	Physics 4 (Introduction t	o Solid State Physic	s)	11-E4-072-m01	
Modul	e coord	inator		Module offered by		
Manag	ing Dire	ector of the Institute of A	oplied Physics	Faculty of Physics a	and Astronomy	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
8	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ester	undergraduate				
Conter	nts					
		of solids: Bonding and s lectron gas).	tructure, lattice dyna	mics, thermal prope	rties, principles of electronic pro-	
Intend	ed lear	ning outcomes				
		have knowledge of the barring properties, principles of		•	nding and structure, lattice dyna-	
Course	es (type	, number of weekly conta	act hours, language –	- if other than Germa	ın)	
V + Ü (	no info	rmation on SWS (weekly	contact hours) and co	ourse language avail	able)	
		sessment (type, scope, la ion on whether module c			ntion offered — if not every seme-	
written	exami	nation (approx. 120 minu	ites)			
Allocat	tion of <sub>I</sub>	places				
Additio	onal inf	ormation				
			1			
Worklo	oad					
Teachi	ng cycl	e				
Referre	ed to in	LPO I (examination regu	lations for teaching-	degree programmes)		
Module appears in						
Bachelor' degree (1 major) Mathematics (2008)						
Bachelor' degree (1 major) Mathematics (2007)						
	Bachelor' degree (1 major) Physics (2007)					
Bachel	Bachelor' degree (1 major) Physics (2009)					
Doobal	On the level decrease (consists) Non a structure Tank and a service and					

Bachelor' degree (1 major) Nanostructure Technology (2007)



Module title					Abbreviation	
Experin	nental	Physics 5 (Physics of Ato	oms and Molecules)		11-E5-072-m01	
Module	coord	inator		Module offered by		
		ector of the Institute of Ap	pplied Physics	Faculty of Physics a	nd Astronomy	
ECTS		od of grading	Only after succ. con		,	
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	undergraduate				
Conten	ts					
Physica	ıl laws	of Atomic and Molecular	Physics.			
Intende	d lear	ning outcomes				
Quantu	m med	hanical atom model, one	/multi-electron atom	ıs, electronic dipole t	d Molecular Physics (atoms: transitions, atoms in B field as tions, electronic excitations)	
Courses	<b>s</b> (type	, number of weekly conta	ct hours, language –	- if other than Germa	n)	
V + Ü (n	ıo infoi	rmation on SWS (weekly o	contact hours) and co	ourse language avail	able)	
		sessment (type, scope, la ion on whether module ca			tion offered — if not every seme-	
written	exami	nation (approx. 120 minu	tes)			
Allocati	ion of <sub>I</sub>	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teachir	ıg cycl	e				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
	Bachelor' degree (1 major) Physics (2007)					
	Bachelor' degree (1 major) Physics (2009)					
Bachelo	Bachelor' degree (1 major) Nanostructure Technology (2007)					



Module title					Abbreviation
Nuclea	r and E	lementary Particle Physi	cs		11-E6-072-m01
Modul	e coord	inator		Module offered by	
Manag	ing Dir	ector of the Institute of Ap	oplied Physics	Faculty of Physics a	and Astronomy
ECTS		od of grading	Only after succ. con		,
4	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ester	undergraduate			
Conter	ıts				
Physic	al laws	of Nuclear and Elementa	ry Particle Physics.		
Intend	ed lear	ning outcomes			
The stu	udents	have knowledge of the ba	asic contexts and prir	nciples of Nuclear an	d Elementary Particle Physics.
Course	es (type	, number of weekly conta	ct hours, language –	- if other than Germa	ın)
V + Ü (	no info	rmation on SWS (weekly o	contact hours) and co	ourse language avail	able)
ster, in	format	sessment (type, scope, la ion on whether module ca nation (approx. 120 minu	an be chosen to earn		tion offered — if not every seme-
	tion of				
Additio	onal inf	ormation			
Worklo	oad				
Teachi	ng cycl	e			
Referre	ed to in	LPO I (examination regu	lations for teaching-o	degree programmes)	
Modul	Module appears in				
Bachel Bachel	Bachelor' degree (1 major) Physics (2007) Bachelor' degree (1 major) Physics (2009) Bachelor' degree (1 major) Physics (2008) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008)				



Module	Module title Abbreviation							
Experin	Experimental Physics 7 (Solid State Phenomena [Semiconductor, Supercon-							
ductivi	ductivity, Magnetism])							
Module	coord	inator		Module offered by				
Managi	ing Dire	ector of the Institute of Ap	oplied Physics	Faculty of Physics a	and Astronomy			
ECTS		od of grading	Only after succ. con	npl. of module(s)				
4	nume	rical grade						
Duratio	n	Module level	Other prerequisites					
1 seme	ster	undergraduate						
Conten	ts							
Physica	al laws	of solid-state phenomen	a (semiconductors, s	uperconductivity, m	agnetism)			
Intende	ed lear	ning outcomes						
	gical n				erfaces; superconductivity: pheno- mean field description of magne-			
Course	<b>s</b> (type	, number of weekly conta	ct hours, language –	- if other than Germa	an)			
V + Ü (r	no info	rmation on SWS (weekly	contact hours) and co	ourse language avail	lable)			
		sessment (type, scope, la ion on whether module c			ation offered — if not every seme-			
written	exami	nation (approx. 120 minu	tes)					
Allocat	ion of p	places						
Additio	nal inf	ormation						
Worklo	ad							
Teaching cycle								
Referred to in LPO I (examination regulations for teaching-degree programmes)								
Module	Module appears in							
Docksland dogges (4 major) Dhusics (2007)								

Bachelor' degree (1 major) Physics (2007)

Bachelor' degree (1 major) Physics (2009)

Bachelor' degree (1 major) Physics (2008)

Bachelor' degree (1 major) Nanostructure Technology (2008)

Bachelor' degree (1 major) Nanostructure Technology (2007)

Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008)



Modul	e title			Abbreviation			
Introd	uction (	Course Mathematics		-	11-MKS-082-m01		
Modul	e coord	inator		Module offered by			
Managing Director of the Institute of Applied Physics				Faculty of Physics and Astronomy			
ECTS	Metho	od of grading	Only after succ. cor	ıpl. of module(s)			
3	(not)	successfully completed					
Duration Module level		Other prerequisites					
1 semester		undergraduate					
Conter	nts						
Principles of mathematics and basic calculation methods beyond the school curriculum, especially for the introduction to and preparation of the modules of Theoretical Physics and Experimental Physics.							
Intended learning outcomes							
The students have knowledge of the principles of mathematics and elementary calculation methods which are required in Theoretical and Experimental Physics.							
<b>Courses</b> (type, number of weekly contact hours, language — if other than German)							

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every seme-

written examination (approx. 120 minutes)

# Allocation of places

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# **Additional information**

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# Workload

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# Teaching cycle

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

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

ster, information on whether module can be chosen to earn a bonus)

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# Module appears in

Bachelor' degree (1 major) Physics (2009)

Bachelor' degree (1 major) Physics (2008)

Bachelor' degree (1 major) Nanostructure Technology (2008)

Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008)



Mathematics 3 for students of Physics and Engineering  Module coordinator  Managing Director of the Institute of Theoretical Physics and Astrophysics	Module offered by  Faculty of Physics and Astronomy								
Managing Director of the Institute of Theoretical Physics									
	Faculty of Physics and Astronomy								
and Astronhysics	Faculty of Physics and Astronomy								
and Astrophysics									
	Only after succ. compl. of module(s)								
8 numerical grade									
	Other prerequisites								
	Admission prerequisite to assessment: successful completion of approx.								
I I I I I I I I I I I I I I I I I I I	50% of exercises. Certain prerequisites must be met to qualify for admis-								
	sion to assessment. The lecturer will inform students about the respecti-								
	ve details at the beginning of the course. Registration for the course will								
	considered a declaration of will to seek admission to assessment. If								
	students have obtained the qualification for admission to assessme								
	over the course of the semester, the lecturer will put their registratio								
	effect. Students who meet all prerequisites will be ad-								
	nent in the current or in the subsequent semester. For								
	ater date, students will have to obtain the qualification								
for admission to	assessment anew.								
Contents									
Ordinary and partial differential equations in Physics.									
Intended learning outcomes									
The students have basic mathematical knowledge of dyn partial differential equations.	amic equations and solution methods for common and								
Courses (type, number of weekly contact hours, language	e — if other than German)								
V + Ü (no information on SWS (weekly contact hours) and									
<b>Method of assessment</b> (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)									
written examination (approx. 120 minutes)									
Allocation of places									
Additional information									
Workload									
Teaching cycle									

# Module appears in

Bachelor' degree (1 major) Physics (2007)

Bachelor' degree (1 major) Physics (2009)

Bachelor' degree (1 major) Physics (2008)

Bachelor' degree (1 major) Technology of Functional Materials (2009)

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

Bachelor' degree (1 major) Technology of Functional Materials (2010)

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



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

Bachelor' degree (1 major) Nanostructure Technology (2008)

Bachelor' degree (1 major) Nanostructure Technology (2007)

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

Bachelor' degree (1 major) Technology of Functional Materials (2006)



Modul	e title		Abbreviation						
Mathe	matics	4 for Students of Physic	11-MPI4-062-m01						
				Module offered by					
	ging Dir strophy	ector of the Institute of T sics	neoretical Physics	Faculty of Physics and Astronomy					
ECTS	CTS Method of grading Only after su			compl. of module(s)					
8	nume	erical grade							
Duration		Module level	Other prerequisites						
1 semester undergradi		undergraduate							
Conte	Contents								
Functional analysis and complex analysis.									
	Intended learning outcomes								
The students have basic knowledge of mathematics of Hilbert space and the theory of functions of a complex variable as well as the required calculation methods.									
Course	es (type	, number of weekly conta	act hours, language –	- if other than Germa	an)				
	V + Ü (no information on SWS (weekly contact hours) and course language available)								
<b>Method of assessment</b> (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)									
writter	ı exami	nation (approx. 120 minu	utes)						
Alloca	tion of	places							
Addition	onal in	formation							
Workle	oad								
Teachi	ing cyc	le							
Referred to in LPO I (examination regulations for teaching-degree programmes)									
Module appears in									
I	Bachelor' degree (1 major) Physics (2007)								
Bachelor' degree (1 major) Physics (2009)									
Bachelor' degree (1 major) Physics (2008)									
Bachelor' degree (1 major) Nanostructure Technology (2010)									
l	Bachelor' degree (1 major) Nanostructure Technology (2012)								
	Bachelor' degree (1 major) Nanostructure Technology (2008)								
Bache	Bachelor' degree (1 major) Nanostructure Technology (2007)								



Module appears in

Bachelor' degree (1 major) Physics (2009)

Modul	e title				Abbreviation		
Mathe	matica	l Methods of Physics			11-MR-092-m01		
Modul	e coord	linator		Module offered by			
	ging Dire	ector of the Institute of Th sics	neoretical Physics	Faculty of Physics a	and Astronomy		
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)			
6	(not)	successfully completed					
Durati	on	Module level	Other prerequisites	1			
2 sem	ester	undergraduate					
Conter	nts						
		mathematics and basic ca			rriculum, especially for the intro- or Experimental Physics.		
Intend	led lear	ning outcomes					
		have knowledge of the preectical and Experiment		tics and elementary	calculation methods which are		
Course	<b>es</b> (type	, number of weekly conta	ct hours, language –	- if other than Germa	an)		
Mathe hour),  Metho ster, ir  This m 1. Topi 1)): 0 2. Topi 2)):	matisch once a od of ass nformat nodule h ics cove exercise ics cove exercise	year (summer semester) sessment (type, scope, lation on whether module contact the following assessment in lectures and exerces or talk (approx. 15 min ered in lectures and exerces or talk (approx. 15 min ered in lectures and exerces or talk (approx. 15 min ered)	inguage — if other than be chosen to earn nent components ises in part 1 (Mathe utes, usually chosen ises in part 2 (Mathe utes, usually chosen	an German, examina a bonus) matische Rechenme ) or written examinat matische Rechenme ) or written examina	ation offered — if not every semethoden 1 (Mathematical Methods tion (approx. 60 minutes) ethoden 2 (Mathematical Methods tion (approx. 60 minutes) or admission to assessment com-		
Studer		d 2. st register for assessment nodule, students must pa	•				
Alloca	tion of	places					
		<u> </u>					
Additio	onal inf	ormation					
Workle	Workload						
	WOINLORG						
Teachi	ing cycl	Δ					
	s cycl						
Doform	Referred to in LPO I (examination regulations for teaching-degree programmes)						
Kererr	eu to in	LFUI (examination regu	lations for teaching-	uegree programmes)			



Module title Abbre					Abbreviation	
Advanced Practical Course Bachelor				_	11-PFB-072-m01	
Modul	e coord	inator		Module offered by		
Managing Director of the Institute of Applied			pplied Physics	Faculty of Physics and Astronomy		
ECTS	Meth	od of grading	Only after succ. compl. of module(s)			
4	(not)	successfully completed	11-E1, 11-E2			
Duratio	on	Module level	Other prerequisite	5		
1 seme	ester	undergraduate	11-A3			
Contents						
Principles of Nuclear, Atomic and Molecular Physics, experiments on cryogenic temperatures and correlated systems, properties of solids, surfaces and interfaces.						

# Intended learning outcomes

The students have knowledge of conducting an experiment and of analysing and documenting the experimental results. They have basic knowledge of issuing a scientific publication and of using modern evaluation systems. They are able to work on a task based on publications and to acquire practical experimental methods.

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

Fortgeschrittenen-Praktikum Bachelor Theorie (Advanced Practical Course Bachelor Theory): S (1 weekly contact hour)

Fortgeschrittenen-Praktikum Bachelor Praxis (Advanced Practical Course Bachelor Practice): P (3 weekly contact hours)

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

This module has the following assessment components

- 1. Seminar: talk (with discussion) demonstrating the students' understanding of the physics-related aspects of the experiments to be prepared (approx. 30 minutes)
- 2. Lab course: Preparing, performing and evaluating the experiments will be considered successfully completed if a Testat (exam) is passed. Students must prepare an experiment log (8 to 10 pages).

Students must register for assessment components 1 and 2 online (details to be announced).

To pass this module, students must pass both assessment component 1 and assessment component 2.

# Allocation of places **Additional information** Workload

## Teaching cycle

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

#### Module appears in

Bachelor' degree (1 major) Physics (2007)

Bachelor' degree (1 major) Physics (2009)

Bachelor' degree (1 major) Physics (2008)

Bachelor' degree (1 major) Nanostructure Technology (2008)

Bachelor' degree (1 major) Nanostructure Technology (2007)



Module	e title				Abbreviation
Measurements and Data Analysis					11-PFR-072-m01
Module	e coord	inator		Module offered by	
Managing Director of the Institute of Applied Physics			oplied Physics	Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
2	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semester undergraduate					
Contents					
Types of error error approximation and propagation, graphs, linear regression, average values and standard de-					

lypes of error, error approximation and propagation, graphs, linear regression, average values and staviation, distribution functions, significance tests, writing of lab reports and publications.

#### **Intended learning outcomes**

In this module, the students acquire subject-specific transferable skills. They have knowledge of practical experimental work, error propagation and the principles of statistics.

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

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

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

written examination (approx. 120 minutes)

## Allocation of places

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#### **Additional information**

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## Workload

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#### **Teaching cycle**

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

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## Module appears in

Bachelor' degree (1 major) Mathematics (2008)

Bachelor' degree (1 major) Mathematics (2007)

Bachelor' degree (1 major) Physics (2007)

Bachelor' degree (1 major) Physics (2009)

Bachelor' degree (1 major) Physics (2008)

Bachelor' degree (1 major) Nanostructure Technology (2008)

Bachelor' degree (1 major) Nanostructure Technology (2007)

Bachelor' degree (1 major) Computational Mathematics (2009)

Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008)



Module	e title		Abbreviation		
Basic F	Basic Practical Course B for Students of Physics (Bachelor of Science and Tea-				11-PGA-PGR-072-m01
ching I	Degree)				,
Modul	e coord	inator		Module offered by	
Manag	Managing Director of the Institute of Applied Physics			Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
6	(not)	successfully completed			
Duratio	Duration Module level		Other prerequisites		
1 seme	1 semester undergraduate		Recommended: 11-PFR		

#### **Contents**

Physical laws of mechanics, thermodynamics, optics, science of electricity, vibrations and waves.

## **Intended learning outcomes**

The students have knowledge and skills of physical measuring instruments and experimental techniques. They are able to independently plan and conduct experiments in cooperation with others, and to document the results in a measurement protocol.

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

Beispiele aus Mechanik, Wärmelehre und Elektrik (Examples from Mechanics, Thermodynamics and Electricity, BAM): P (2 weekly contact hours)

Klassische Physik (Classical Physics, KLP): P (2 weekly contact hours)

Elektrizitätslehre und Schaltungen (Electricity and Circuits, ELS): P (2 weekly contact hours)

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

This module has the following assessment components

- 1. Lab course in part 1: a) Preparing, performing and evaluating the experiments will be considered successfully completed if a Testat (exam) is passed. b) Talk (with discussion) to test the students' understanding of the physics-related contents of the course (approx. 30 minutes).
- 2. Lab course in part 2: a) Preparing, performing and evaluating the experiments will be considered successfully completed if a Testat (exam) is passed. b) Talk (with discussion) to test the students' understanding of the physics-related contents of the course (approx. 30 minutes).
- 3. Lab course in part 3: a) Preparing, performing and evaluating the experiments will be considered successfully completed if a Testat (exam) is passed. b) Talk (with discussion) to test the students' understanding of the physics-related contents of the course (approx. 30 minutes).

Students must register for assessment components 1 through 3 online (registration deadline to be announced). Students will be offered one opportunity to retake element a) and/or element b). To pass an assessment component, they must pass both elements a) and b).

To pass this module, students must successfully complete each of the three courses.

To pass this module, students must pass each of the assessment components 1 through 3.

To pass this module, students must successfully complete two out of the three courses.

To pass tills illoudic, students illust	successibility complete two out of the three courses.	
Allocation of places		
Additional information		
Workload		
Teaching cycle		
Referred to in LPO I (examination re	egulations for teaching-degree programmes)	
Bachelor's with 1 major Physics (2009)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 40 / 50



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M	Nd	ш	ρ	а	n	n	ea	rs	in

Bachelor' degree (1 major) Physics (2007)

Bachelor' degree (1 major) Physics (2009)

Bachelor' degree (1 major) Physics (2008)



Module	e title		Abbreviation			
Advand	ed Un	dergraduate Laboratory (	Atomic Physics, Nucl	ear Physics, Basic	11-PGB-PGN-072-m01	
Semico	onducto	or Circuits)			,	
Module	e coord	inator		Module offered by		
Manag	Managing Director of the Institute of Applied Physics			Faculty of Physics and Astronomy		
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
4	(not)	successfully completed	11-PFR			
Duration Module level		Other prerequisites				
1 semester undergraduate		Recommended: 11-PGA-PGR				

#### **Contents**

Physical laws of Atomic Physics, Nuclear Physics and wave optics. Basic measuring methods using computers and storage oscilloscopes.

#### **Intended learning outcomes**

The students have knowledge and skills of physical measuring instruments and experimental techniques. They are able to independently plan and conduct experiments in cooperation with others, and to document the results in a measurement protocol.

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

Wellenoptik (Physical Optics, WOP): P (2 weekly contact hours)

Atom- und Kernphysik (Atomic and Nuclear Physics, AKP): P (2 weekly contact hours)

Computer und Messtechnik (Computers and Measurement Technology, CMT): P (2 weekly contact hours)

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

This module has the following assessment components

- 1. Lab course in part 1: a) Preparing, performing and evaluating the experiments will be considered successfully completed if a Testat (exam) is passed. b) Talk (with discussion) to test the students' understanding of the physics-related contents of the course (approx. 30 minutes).
- 2. Lab course in part 2: a) Preparing, performing and evaluating the experiments will be considered successfully completed if a Testat (exam) is passed. b) Talk (with discussion) to test the students' understanding of the physics-related contents of the course (approx. 30 minutes).

Students must register for assessment components 1 and 2 online (registration deadline to be announced). Students will be offered one opportunity to retake element a) and/or element b). To pass an assessment component, they must pass both elements a) and b).

To pass this module, students must successfully complete two out of the three courses.

To pass this module, students must pass both assessment component 1 and assessment component 2.

#### Allocation of places

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#### **Additional information**

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#### Workload

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## Teaching cycle

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

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#### Module appears in

Bachelor' degree (1 major) Physics (2007)

Bachelor' degree (1 major) Physics (2009)

Bachelor' degree (1 major) Physics (2008)



Module title					Abbreviation	
Main S	eminar	Experimental / Theoretic	cal Physics		11-PHS-072-m01	
Module	e coord	inator		Module offered by		
		ectors of the Institute of A f Theoretical Physics and		Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	ıpl. of module(s)		
2	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
Curren	t issues	s of Theoretical/Experime	ntal Physics.			
Intend	ed lear	ning outcomes				
		have knowledge of the so or Experimental Physics.	ientific methods, wo	rk and presentation	techniques of a current question	
Course	<b>s</b> (type	, number of weekly conta	ct hours, language —	if other than Germa	n)	
S (no i	nformat	tion on SWS (weekly cont	act hours) and cours	e language available	9)	
		sessment (type, scope, la ion on whether module ca			tion offered — if not every seme-	
talk (ar	prox. 3	30 to 45 minutes) with dis	scussion			
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teachi	ng cycl	e				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
<del></del>						
Module	e appea	ars in				
Bachel	or' deg	ree (1 major) Physics (200	07)			
	Bachelor' degree (1 major) Physics (2009)					
	_	ree (1 major) Physics (200				
Bachel	Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008)					



Module title					Abbreviation	
Oral Exam Experimental Physics (Physicists)					11-PREP-072-m01	
Module	coordi	inator		Module offered by		
chairper	son of	examination committee		Faculty of Physics a	and Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
6	numer	rical grade				
Duration	1	Module level	Other prerequisites			
1 semes	ter	undergraduate				
Content	S		,			
		f the examination is to d d Physics and is able to a			ands basic contexts of Experimen-	
Intende	d learr	ning outcomes				
		nave gained an overview uired scientific methods.	of the basic contexts	of Experimental and	d Applied Physics and are able to	
Courses	(type,	number of weekly conta	ct hours, language –	- if other than Germa	n)	
A (no inf	format	ion on SWS (weekly cont	act hours) and cours	e language available	<u>e)</u>	
		essment (type, scope, la on on whether module ca			tion offered — if not every seme-	
oral exa	minati	on of one candidate eac	h (approx. 30 minute	s)		
Allocation	on of p	laces				
Addition	nal info	ormation				
Workloa	ıd					
Teachin	g cycle	e				
Referred	l to in	LPO I (examination regu	lations for teaching-o	degree programmes)		
Module	appea	rs in				
Bachelo	r' degr	ree (1 major) Physics (200	07)			
	Bachelor' degree (1 major) Physics (2009)					
Bachelo	Bachelor' degree (1 major) Physics (2008)					



Modu	le title				Abbreviation	
Oral Exam Theoretical Physics					11-PRT-072-m01	
Modu	le coord	inator		Module offered by		
		f examination committee		Faculty of Physics a	ind Astronomy	
ECTS	_	od of grading	Only after succ. com		,	
6	_	rical grade				
Durat	ion	Module level	Other prerequisites			
1 sem	ester	undergraduate				
Conte	ents					
	•	of the examination is to do			ands basic contexts of Theoretical	
Intend	ded lear	ning outcomes				
		have gained an overview fic methods.	of the basic contexts	of Theoretical Physi	cs and are able to apply the ac-	
Cours	es (type	, number of weekly conta	ct hours, language –	- if other than Germa	n)	
A (no	informa	tion on SWS (weekly cont	act hours) and cours	e language available	2)	
		sessment (type, scope, la ion on whether module ca			tion offered — if not every seme-	
oral e	xaminat	ion of one candidate eac	h (approx. 30 minute	s)		
Alloca	ation of <sub> </sub>	places				
Additi	ional inf	ormation				
Workl	load					
Teach	ing cycl	e				
Refer	red to in	LPO I (examination regu	lations for teaching-o	degree programmes)		
Modu	le appea	ars in				
		ree (1 major) Physics (200	07)			
	_	ree (1 major) Physics (200	•			
Bache	Bachelor' degree (1 major) Physics (2008)					



Module title				Abbreviation		
Theore	etical Pl	nysics 1 (Theoretical Med	hanics)		11-T1-072-m01	
Modul	le coord	inator		Module offered by		
	ging Dire	ector of the Institute of Th sics	neoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
8	nume	rical grade				
Durati	on	Module level	Other prerequisites	<u> </u>		
1 seme	ester	undergraduate				
Conte	nts					
Newto	nian me	echanics, Lagrangian me	chanics, Hamiltonian	equation of motion,	conservation laws.	
	_	ning outcomes				
The st metho		have knowledge of the p	inciples of classical	theoretical mechanic	s and the required calculation	
Course	<b>es</b> (type	, number of weekly conta	ict hours, language –	- if other than Germa	n)	
V + Ü (	(no info	rmation on SWS (weekly	contact hours) and co	ourse language avail	able)	
ster, ir writter	nformat n exami	ion on whether module c nation (approx. 120 minu	an be chosen to earn		tion offered — if not every seme-	
Alloca	tion of p	places				
Additi	onal inf	ormation				
Workl	oad					
Teach	ing cycl	e				
Referr	ed to in	LPO I (examination regu	lations for teaching-	degree programmes)		
Modul	le appea	ars in				
Bache	lor' deg	ree (1 major) Mathematic	s (2008)			
l	Bachelor' degree (1 major) Mathematics (2007)					
I	_	ree (1 major) Physics (20	•			
	_	ree (1 major) Physics (20	•			
I		ree (1 major) Physics (20		n)		
I	_	ree (1 major) Nanostructu				
l	_	ree (1 major) Nanostructı ree (1 major) Computatio				
I	_			0 <i>9)</i>		
Bucile	Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008)					



Module title					Abbreviation	
Theore	etical Pl	nysics 2 (Theoretical Elec	odynamics)	11-T2-072-m01		
Modul	le coord	inator		Module offered by		
	ging Dire	ector of the Institute of Th sics	neoretical Physics	Faculty of Physics a	and Astronomy	
ECTS		od of grading	Only after succ. con	npl. of module(s)		
8	nume	rical grade				
Durati	on	Module level	Other prerequisites	<u> </u>		
1 seme	ester	undergraduate				
Conte	nts					
Electro	ostatics,	, magnetostatics, Maxwe	ll equations, covaria	nt formulation, electr	odynamics and matter.	
Intend	led lear	ning outcomes				
The st		have knowledge of the p	rinciples of classical	electrodynamics and	the required calculation me-	
Course	<b>es</b> (type	, number of weekly conta	act hours, language –	- if other than Germa	ın)	
		rmation on SWS (weekly				
ster, ir	nformati	sessment (type, scope, la ion on whether module c nation (approx. 120 minu	an be chosen to earn		tion offered — if not every seme-	
	tion of p		11(3)			
Alloca	tion or j	Jiaces				
Δdditi	onal inf	ormation				
	Onat mi	omation				
Workl	oad					
Teach	ing cycl	е				
		-				
Referr	ed to in	LPO I (examination regu	lations for teaching-	degree programmes)		
Modul	le appea	ars in				
I	_	ree (1 major) Mathematic				
	Bachelor' degree (1 major) Mathematics (2007)					
	_	ree (1 major) Physics (20	•			
l	_	ree (1 major) Physics (20	•			
	_	ree (1 major) Physics (20		o)		
I	_	ree (1 major) Nanostructi				
	_	ree (1 major) Nanostructi ree (1 major) Computatio				
	_			09)		
Dacine	Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008)					



Modul	le title		Abbreviation				
Theoretical Physics 3 (Theoretical Quantum Mechanics)					11-T3-072-m01		
Modul	le coord	inator		Module offered by			
Manag	ging Dire	ector of the Institute of Th	eoretical Physics	Faculty of Physics a	and Astronomy		
	and Astrophysics						
ECTS		od of grading	Only after succ. con	npl. of module(s)			
8		erical grade					
Duration Module level		Other prerequisites					
1 semester undergraduate							
Conte							
Limits of classical physics, Schrödinger equation, mathematical foundations of quantum mechanics, harmonic oscillator, angular momentum and spin, hydrogen atom, many-particle systems.							
Intend	led lear	ning outcomes					
The st	udents	have knowledge of the pr	inciples of quantum	mechanics and the r	required calculation methods.		
Course	<b>es</b> (type	, number of weekly conta	ct hours, language –	- if other than Germa	ın)		
V + Ü (	(no info	rmation on SWS (weekly	contact hours) and co	ourse language avail	able)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)  written examination (approx. 120 minutes)  Allocation of places							
Additional information							
Workl	oad						
Teachi	ing cycl	e					
Referr	ed to in	LPO I (examination regu	lations for teaching-o	degree programmes)			
Modul	le appea	ars in					
Bachelor' degree (1 major) Mathematics (2008)							
Bachelor' degree (1 major) Mathematics (2007)							
Bachelor' degree (1 major) Physics (2007)							
Bachelor' degree (1 major) Physics (2009)							
Bachelor' degree (1 major) Physics (2008)							
Bachelor' degree (1 major) Nanostructure Technology (2008) Bachelor' degree (1 major) Nanostructure Technology (2007)							
Bachelor' degree (1 major) Nanostructure rechnology (2007)  Bachelor' degree (1 major) Computational Mathematics (2009)							
	Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008)						
Dachelor 3 degree (1 major, 1 minor) rhysics (minor, 2000)							



Module	e title		Abbreviation				
Theore	tical Pl	hysics 3 FOKUS (Theoret	nics)	11-T3F-072-m01			
Module	e coord	inator		Module offered by			
Managing Director of the Institute of Theoretical Physics and Astrophysics				Faculty of Physics and Astronomy			
ECTS	ECTS   Method of grading   Only after succ. co			npl. of module(s)			
8	nume	rical grade					
Duration Modu		Module level	Other prerequisites				
1 seme	ster	undergraduate					
Conten	ıts						
Limits of classical physics, Schrödinger equation, mathematical foundations of quantum mechanics, harmonic oscillator, angular momentum and spin, hydrogen atom, many-particle systems							
Intend	ed lear	ning outcomes					
The stu	udents	have knowledge of the p	rinciples of quantum	mechanics and the r	equired calculation methods		
Course	s (type	, number of weekly conta	ict hours, language –	- if other than Germa	n)		
V + Ü (ı	no info	rmation on SWS (weekly	contact hours) and co	ourse language avail	able)		
<b>Method of assessment</b> (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)  written examination (approx. 120 minutes)							
Allocat	ion of <sub>I</sub>	places					
Additio	onal inf	ormation					
Worklo	ad						
Teachi	ng cycl	e					
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module appears in							
Bachelor' degree (1 major) Physics (2007)							
Bachelor' degree (1 major) Physics (2009)							
Bachelor' degree (1 major) Physics (2008)							
	Bachelor' degree (1 major) Nanostructure Technology (2008)						
Bachel	Bachelor' degree (1 major) Nanostructure Technology (2007)						



Modul		<u> </u>			Abbreviation		
Theore	etical P	hysics 4 (Theoretical Th	nermodynamics and St	atistics)	11-T4-072-m01		
Modul	lo coord	lingtor		Module offered by			
Module coordinator				<u> </u>			
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)					
8	nume	rical grade					
Duration Module level		Module level	Other prerequisites				
1 semester		undergraduate					
Conte	nts						
Principles of thermodynamics, fundamental theorems, thermodynamic potentials, principles of statistical mechanics.							
Intended learning outcomes							
The students have knowledge of the principles of thermodynamics and statistical mechanics and the required calculation methods.							
<b>Courses</b> (type, number of weekly contact hours, language — if other than German)							
V + Ü (	(no info	rmation on SWS (weekl	y contact hours) and co	ourse language avai	lable)		
<b>Method of assessment</b> (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)							
	_	nation (approx. 120 mir		,			
Allocation of places							
	,						
Additi	onal inf	ormation					
Workl	oad						
Teach	ing cycl	e					
Referr	ed to in	LPO I (examination re	gulations for teaching-	degree programmes			
	1						
Module appears in							
Bachelor' degree (1 major) Mathematics (2008)							
Bachelor' degree (1 major) Mathematics (2007)							
Bachelor' degree (1 major) Physics (2007)							
Bachelor' degree (1 major) Physics (2009)							
Bachelor' degree (1 major) Physics (2008)							
Bachelor' degree (1 major) Nanostructure Technology (2008)							
	Bachelor' degree (1 major) Nanostructure Technology (2007)						
Bache	Bachelor' degree (1 major) Computational Mathematics (2009)						

Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008)