

Module Catalogue

for the Subject

Computational Mathematics

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

> Examination regulations version: 2009 Responsible: Institute of Mathematics

JMU Würzburg • generated 11-Jan-2023 • exam. reg. data record 82|f24|-|-|H|2009



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The subject is divided into

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Content and Objectives of the Programme

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WÜRZBURG

The Bachelor programme in Computational Mathematics is offered by the Department of Mathematics, with a total of currently (SS 2010) 9 chairs.

At the end of this course of study, the students should be familiar with the main branches of mathematics, taught methods of mathematical reasoning and working as well as analytical thinking, abstract concepts and the ability to recognize and construct complex structures and interconnections. In addition, they should also have interdisciplinary knowledge on the borderline between mathematics, computer science, natural science, and engineering.

Through the course these skills which the students acquire provide the basic knowledge required for a consecutive Bachelor-Masters degree. Moreover, they can later familiarize themselves with the many areas of society in which innovative computer-aided mathematical methods can be applied to or be of use. This is supported through the study of an integrated elective application-oriented subject in which the students become familiar with the basic thoughts and techniques of a subject of their choice, either in natural sciences or engineering, where mathematical methods apply.

In the Bachelor study in computational mathematics, the main emphasis is put on basic mathematical knowledge, method knowledge and the development of the mental constructs which are typical for mathematics. The acquisition of special topics in different secondary branches of mathematics is subordinate.

For the Bachelor thesis the student should work on a thematic and temporally closely limited frame in order to carry out a mathematical task, preferably in some application-oriented context, using well-known procedures and scientific criteria under guidance but, to a large extent, independently.

The exam enables the acquisition of a comparable, international degree in the field of mathematics and provides the framework of a consecutive Bachelor-Masters degree as an initial professional qualification which can be used as a mean for entry into the working world or as preparation for a subsequent Masters study. The exam should ascertain whether the candidate overlooks the context of the basics in mathematics and possesses the ability to use the corresponding scientific methods, with regards to mathematics and the selected elective application-oriented subjects.

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:

ASPO2007

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

10-Aug-2009 (2009-62)

15-Mar-2010 (2010-10)

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



Compulsory Courses

(88 ECTS credits)

Module	e title	·			Abbreviation
Propaedeutics of Mathematics			10-M-PPM-082-m01		
Module coordinator Module offered by					
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	atics
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
2	(not) s	successfully completed			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate	Admission prerequis		regular attendance of courses (as).
Conten	ts				
		proof methods and quest g. by reference to its histo			es of abstract concepts of ma- ic and deduction.
Intende	ed lear	ning outcomes			
	asy mat				nematics. He/She is able to per- y and reasonably in written and
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü (r	no infoi	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)
		sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
Assess	ment o	ments (type and expendi ffered: once a year, winte ssessment: German, Eng	er semester		er at the beginning of the course)
Allocat			<u> </u>		
Additio	Additional information				
Worklo	ad				
Referre	d to in	LPOI (examination regulation	s for teaching-degree progra	mmes)	
Module	e appea	ars in			
Bachelo Bachelo Bachelo Bachelo Bachelo	or' deg or' deg or' deg or' deg or's deg	ree (1 major) Mathematic ree (1 major) Economathe ree (1 major) Economathe ree (1 major) Mathematic ree (1 major) Computatio gree (1 major, 1 minor) Ma mination for the teaching	ematics (2009) ematics (2008) al Physics (2009) nal Mathematics (200 athematics (Minor, 20	008)	

Module	e title				Abbreviation	
Numerical Mathematics 1				10-M-NM1-082-mo:	L	
Module coordinator			Module offered by			
		es Mathematik (Mathema	atics)	Institute of Mathem	natics	
ECTS	1	od of grading	Only after succ. com			
	1		Only after Succ. con			
8		rical grade				
Duratio	on	Module level	Other prerequisites			
1 semester undergraduate		Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification fo admission to assessment anew.				
Conten	ts					
		stems of linear equations	and curve fitting pro	blems poplinger of	ulations and system	s of equation
		tion with polynomials, sp				s of equali-
		ning outcomes				
	-	acquainted with the fun	damontal conconte a	nd mathada in num	orical mathematics	applies them
		oblems and knows abou				applies them
		number of weekly contact hours,		••		
		mation on SWS (weekly			ablo)	
			· · · · · ·		· · ·	
		sessment (type, scope, langua le for bonus)	ge — If other than German, e	examination offered — if no	ot every semester, informat	ion on whether
by an c 2, appr Langua	oral exa ox. 30 age of a	nation (approx. 90 minut mination of one candida minutes) ssessment: German, Eng	te each (approx. 20 n	ninutes) or an oral ex		•
Allocat	ion of p	olaces				
Additio	onal inf	ormation				
Worklo	ad					
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)		
	-	hematik Angewandte Ma				
Module						
		ree (1 major) Computer S				
		ree (1 major) Computer 3 ree (1 major) Mathematic				
	-	ree (1 major) Physics (20				
	-	ree (1 major) Physics (20				
	-	ree (1 major) Physics (20	•			
	-	ree (1 major) Physics (20				
	-	ree (1 major) Technology		als (2009)		
	with 1 ma	or Computational Mathematics		enerated 11-Jan-2023 • exam	-	page 10 / 167
(2009)			COTO Bachelor (180	ECTS) Computational Mathe	ematics - 2009	

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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	e title				Abbreviation	
Analys	is				10-M-ANA-082-m01	
Module	e coord	inator		Module offered by		
		es Mathematik (Mathema	atics)	Institute of Mathem	atics	
ECTS	1	od of grading	Only after succ. con			
	1	rical grade				
17 Duratio		Module level	 Other prerequisites			
		undergraduate			isitos are listed in the section on	
2 seme		undergraduate	assessments.	, additional prerequi	isites are listed in the section on	
Conten	ts		<u>.</u>			
ries, po	ower se	ries, Taylor series, funda	mental calculus in or	e and several variab	ivergence of sequences and se- ples (including inverse and impli- ntegral and improper integrals).	
Intende	ed lear	ning outcomes				
mather	natical		them adequately in w	ritten and oral form.	He/She is able to perform easy He/She is acquainted with the geometric interpretation.	
Course	S (type, r	umber of weekly contact hours, l	anguage — if other than Ger	man)		
compo	nent. o-M-AN o-M-AN o-M-AN	IA-1-082: V + Ü (no inforn IA-2-082: V + Ü (no inforn IA-P-082: M (no informat	nation on SWS (week nation on SWS (week ion on SWS (weekly c	ly contact hours) and ly contact hours) an ontact hours) and co	sted separately for each module d course language available) d course language available) ourse language available)	
		essment (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	t every semester, information on whether	
	nless st	ated otherwise, successf			e components as specified be- successful completion of all indi-	
 8 a 4 4	BECTS,) writte approx anguag)ther provent ment in ECTS,) writte approx anguag)ther provent in ECTS, oral exa anguag)nly aft lule cor	20 minutes) or c) oral ex ge of assessment: Germa rerequisites: Modules 10- n module component 10- Method of grading: (not) n examination (approx. 9 20 minutes) or c) oral ex ge of assessment: Germa rerequisites: Modules 10 M-ANA-1 is recommende n module component 10- Method of grading: nume mination of one candida ge of assessment: Germa er successful completior	successfully complete o minutes; usually ch kamination in groups n, English if agreed u -M-VKM and 10-M-PPI M-ANA-2-082: Analys successfully complete o minutes; usually ch kamination in groups n, English if agreed u -M-VKM and 10-M-PP d for module compor M-ANA-P-082: Exami erical grade te each (approx. 30 n n, English if agreed u n of module compone D-M-ANL-1, 10-M-ANA-	ted (groups of 2, approx pon with the examin M are recommended sis 2 Analysis 2 ted (groups of 2, approx pon with the examin M are recommended nent 10-M-ANA-2. nation in Analysis ninutes) pon with the examin ents: Successful com	ner nination of one candidate each c. 30 minutes) ner d; in addition, module compo-	
Bachelor's (2009)	with 1 ma	or Computational Mathematics		enerated 11-Jan-2023 • exam ECTS) Computational Mathe		

Allocation of places

Additional information

Workload

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

§ 73 (1) 1. Mathematik Analysis

Module appears in

Bachelor' degree (1 major) Computer Science (2010) Bachelor' degree (1 major) Mathematics (2008) 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's degree (1 major, 1 minor) Mathematics (Minor, 2008)

Module	e title				Abbreviation
Linear	Algebra	a			10-M-LNA-082-m01
Module	e coord	inator		Module offered by	
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics
ECTS	Methe	od of grading	Only after succ. compl. of module(s)		
14	nume	rical grade			
Duratio	on	Module level	Other prerequisites	i	
2 seme	ester	undergraduate	By way of exception, additional prerequisites are listed in the section on assessments.		
Conten	ts				

Sets, relations and maps; notions of groups, rings and fields (in particular, polynomial rings); vector spaces (subspaces, quotient spaces, linear independency, basis, dimension); linear maps (isomorphism theorem, image, kernel, rank); matrix calculus; systems of linear equations, determinants, eigenvalues, eigenvectors and eigenspaces, diagonalisability (including characteristic polynomial, minimal polynomial), normal forms, bilinear forms; Euclidean and unitary vector spaces (orthonormal bases, isometries, principal axis transformation).

Intended learning outcomes

The student knows and masters the basic notions and essential methods of linear algebra. He/She is able to perform easy mathematical arguments independently, and can present them adequately in written and oral form. He/She is able to apply the central proof methods and concepts of linear algebra and knows about their algebraic and geometric background.

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.

- 10-M-LNA-1-082: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 10-M-LNA-2-082: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 10-M-LNA-P-082: M (no information on SWS (weekly contact hours) and course language available)

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

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

Assessment in module component 10-M-LNA-1-082: Linear Algebra 1 Linear Algebra 1

- 7 ECTS, Method of grading: (not) successfully completed
- 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
- Other prerequisites: Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

Assessment in module component 10-M-LNA-2-082: Linear Algebra 2 Linear Algebra 2

- 5 ECTS, Method of grading: (not) successfully completed
- 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

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Other prerequisites: Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

Assessment in module component 10-M-LNA-P-082: Examination in Linear Algebra

- 2 ECTS, Method of grading: numerical grade
- oral examination of one candidate each (approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner
- Only after successful completion of module components: Successful completion of module component 10-M-LNA-1 or module component 10-M-LNA-2 is a prerequisite for participation in module component 10-M-LNA-P.

Allocation of places

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Additional information

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Workload

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

§ 73 (1) 2. Mathematik Lineare Algebra, Algebra und Elemente der Zahlentheorie

Module appears in

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

Bachelor' degree (1 major) Mathematics (2008)

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

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

Module	e title				Abbreviation	
Numerical Mathematics 2					10-M-NM2-082-mo	1
Module coordinator			Module offered by	<u> </u>		
Dean of Studies Mathematik (Mathematics)		Institute of Mathem	atics			
ECTS		od of grading	Only after succ. com			
	1	rical grade	Only after succ. con			
5 Duratio	<u> </u>	Module level	 Other prevenuisites			
			Other prerequisites		1.6 6 1	
1 semester undergraduate		Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.			tive details ill be con- nt. If stu- ssment over ation for as- ill be admit- ster. For as-	
Conten	ts					
Solutio	n meth	ods and applications for		s, linear programmin	g, initial value probl	ems for ordi-
		al equations, boundary v	alue problems.			
Intende	ed learı	ning outcomes				
about t	heir ad	able to draw a distinctio vantages and limitations ng sciences and econom	concerning the poss			
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V + Ü (r	no infor	mation on SWS (weekly	contact hours) and co	ourse language avail	able)	
		essment (type, scope, langua				ion on whether
		le for bonus)				
by an o 2, appr	oral exa ox. 30	nation (approx. 90 minut mination of one candida minutes) ssessment: German, Eng	te each (approx. 20 n	ninutes) or an oral ex		
Allocat						
Additio	onal info	ormation				
Worklo	ad					
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)		
§ 73 (1)	5. Mat	hematik Angewandte Ma	thematik			
Module	-					
		ree (1 major) Mathematic	s (2008)			
	-	ree (1 major) Physics (20				
	-	ree (1 major) Physics (20				
	-	ree (1 major) Physics (20				
	-	ree (1 major) Physics (20 ree (1 major) Technology		ıls (2009)		
	with 1 maj	or Computational Mathematics		enerated 11-Jan-2023 • exam	-	page 16 / 167
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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	e title				Abbreviation
Ordina	ry Diffe	rential Equations and Co	mplex Analysis		10-M-DFT-082-m01
Module	e coord	inator		Module offered by	
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
13	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
2 seme	ster	undergraduate	By way of exception assessments.	, additional prerequi	isites are listed in the section on
Conten	ts				
ons, ba functio plex an Intende The stu	isic not ns, me alysis, ed lear dent is	ions in the qualitative th romorphic functions and applications in compute ning outcomes acquainted with the fun	eory of ordinary diffe conformal maps, bas r science, physics, er damental concepts a	rential equations, basic proof methods in agineering science a nd methods of the th	f nonlinear differential equati- asic properties of holomorphic differential equations and com- nd other fields of mathematics.
		g across the borders of d			cepts and realises the advanta-
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)	
compor • 1 • 1 • 1	nent. o-M-DF o-M-DF o-M-DF	T-1-082: V + Ü (no inform T-2-082: V + Ü (no inform T-P-082: M (no informati	ation on SWS (weekl nation on SWS (weekl on on SWS (weekly co	y contact hours) and y contact hours) and ontact hours) and co	sted separately for each module l course language available) d course language available) ourse language available) ot every semester, information on whether
		le for bonus)			cevery semester, monnation on whether
	less st	ated otherwise, successf			e components as specified be- successful completion of all indi-
ons 4 w rd g L C tu tl o p a h	ECTS, vritten eplaced roups anguag Other pl urer wi he cou btaine ut thei ssessn ave to	Method of grading: (not) examination (approx. 90 d by an oral examination (groups of 2, approx. 30 r ge of assessment: Germa rerequisites: Certain prer Il inform students about rse will be considered a d the qualification for adu r registration for assessment in the current or in to obtain the qualification for atom	successfully complet minutes); if announc of one candidate ea ninutes) n, English if agreed u equisites must be me the respective detai declaration of will to mission to assessme the subsequent seme for admission to asse	ted ed by the lecturer, the ch (approx. 20 minu pon with the examine to qualify for adm ls at the beginning seek admission to nt over the course of ents who meet all pre- ester. For assessment ssment anew.	ions Ordinary Differential Equati- he written examination can be utes) or an oral examination in her ission to assessment. The lec- of the course. Registration for assessment. If students have the semester, the lecturer will erequisites will be admitted to at at a later date, students will halysis Introduction to Complex

- 7 ECTS, Method of grading: (not) successfully completed
- 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)

Bachelor's with 1 major Computational Mathematics	JMU Würzburg • generated 11-Jan-2023 • exam. reg. data re-	page 18 / 167
(2009)	cord Bachelor (180 ECTS) Computational Mathematics - 2009	

- Language of assessment: German, English if agreed upon with the examiner
- Other prerequisites: Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

Assessment in module component 10-M-DFT-P-082: Examination in Ordinary Differential Equations and Complex Analysis

- 2 ECTS, Method of grading: numerical grade
- oral examination of one candidate each (approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner
- Only after successful completion of module components: Successful completion of module component 10-M-DFT-1 or module component 10-M-DFT-2 is a prerequisite for participation in module component 10-M-DFT-P.

Allocation of places

Additional information

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Workload

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

§ 73 (1) 1. Mathematik Analysis

Module appears in

Bachelor' degree (1 major) Mathematics (2008)

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

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

Module	e title				Abbreviation	
Advanced Analysis					10-M-VAN-082-m01	L
Module coordinator			Module offered by			
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
8		rical grade				
Duratio		Module level	Other prerequisites			
1 semesterundergraduateCertain prerequisites must be met to qualify for ad sessment. The lecturer will inform students about at the beginning of the course. Registration for the sidered a declaration of will to seek admission to dents have obtained the qualification for admissi the course of the semester, the lecturer will put th sessment into effect. Students who meet all prere ted to assessment in the current or in the subsequise sessment at a later date, students will have to ob admission to assessment anew.			nts about the respection for the course win hission to assessment r admission to assess will put their registration t all prerequisites with a subsequent semesting t subsequent semesting	ctive details ill be con- nt. If stu- ssment over ation for as- ill be admit- ster. For as-		
Conten	ts		<u>.</u>			
Lebesg	gue inte	gral in several variables, ry Fourier theory in L^2, (on convergence and	Fubini's theorem, L⁄	\p-spaces
Intende	ed lear	ning outcomes				
		acquainted with advanc understand the construc			of the Lesbegue int	egral, he or
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)		
Ü + V (r	no infoi	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)	
		sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, informat	ion on whether
by an o 2, appr	oral exa ox. 30	nation (approx. 90 minut mination of one candida minutes) ssessment: German, Eng	te each (approx. 20 m	ninutes) or an oral ex		
Allocat						
Allocal		Jaces				
Additio	onal Inf	ormation				
 Would -	ad					
Worklo	au					
Doform	d to in		Contraction 1			
		LPOI (examination regulations	s for teaching-degree progra	mmes)		
		hematik Analysis				
Module						
		ree (1 major) Mathematic				
	-	ree (1 major) Economathe ree (1 major) Economathe	-			
	-	ree (1 major) Economatik ree (1 major) Mathematic				
	-	ree (1 major) Computatio		09)		
Master	's degr	ee (1 major) Physics (201 ee (1 major) Physics (201	0)	~		
Bachelor's (2009)	with 1 ma	or Computational Mathematics		enerated 11-Jan-2023 • exam ECTS) Computational Mathe	-	page 20 / 167

Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008) First state examination for the teaching degree Gymnasium Mathematics (2009)

Module title Geometric Analysis and Partial Differential Equations					Abbreviation
					10-M-GAP-092-m01
Modul	e coord	inator		Module offered by	
Dean of Studies Mathematik (Mathema			atics)	Institute of Mathematics	
ECTS	Meth	od of grading	Only after succ. compl. of module(s)		
13	nume	rical grade			
Duration Module level		Module level	Other prerequisites		
2 semester		undergraduate	By way of exception, additional prerequisites are listed in the section on assessments.		
. .					

Contents

Basics in analysis on manifolds, e. g. submanifolds and calculus of differential forms, Stoke's theorem and its applications in vector calculus and topology, examples of first order partial differential equations, existence and uniqueness theorems, basic equations in mathematical physics, boundary value theorems, maximum principle and Dirichlet problem.

Intended learning outcomes

The student knows and masters the basic notions and essential methods of vector analysis on manifolds and partial differential equations. He/She is able to perform mathematical arguments in this field independently, and can present them adequately in written and oral form. He/She is able to apply the central proof methods and concepts of geometric analysis and partial differential equations and knows about their analytic background.

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.

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

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

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

Assessment in module component 10-M-GAP-1-092: Geometric Analysis Geometric Analysis

- 7 ECTS, Method of grading: (not) successfully completed
- a) written examination (approx. 90 minutes; usually chosen) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner
- Other prerequisites: Modules 10-M-ANA and 10-M-LNA are recommended.

Assessment in module component 10-M-GAP-2-092: Partial Differential Equations Partial Differential Equations

- 4 ECTS, Method of grading: (not) successfully completed
 a) written examination (approx. 90 minutes; usually chosen) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner
- Other prerequisites: Modules 10-M-ANA and 10-M-LNA are recommended.

Assessment in module component 10-M-GAP-P-092: Examination in Geometric Analysis and Partial Differential Equations

- 2 ECTS, Method of grading: numerical grade
- oral examination of one candidate each (approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner
- Only after successful completion of module components: 10-M-GAP-1 or 10-M-GAP-2
- Other prerequisites: Modules 10-M-ANA and 10-M-LNA are recommended.

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(2009)	cord Bachelor (180 ECTS) Computational Mathematics - 2009	

Allocation of places

Additional information

Workload

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

Module appears in

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

Module title Abbreviation					
Modelling and Computational Science10-M-MWR-092-m01					
Modul	e coord	inator		Module offered by	<u> </u>
Dean c	of Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
8	nume	rical grade			
Durati	on	Module level	Other prerequisites		
1 seme	ester	undergraduate			
Conter	nts	·	• •		
ons, fu near eo	indame quation	ntal methods for numerious.			and partial differential equati- ns and the resulting systems of li-
	_	ning outcomes			
		nasters the fundamental ng sciences on a comput		ds and techniques to	o simulate processes from natura
Course	es (type, 1	number of weekly contact hours,	language — if other than Ger	rman)	
V + Ü (no info	rmation on SWS (weekly	contact hours) and co	ourse language avail	able)
		5 essment (type, scope, langua ble for bonus)	age — if other than German, o	examination offered — if no	ot every semester, information on whether
		mination (approx. 90 mir tes) or c) oral examinatic			tion of one candidate each (ap- utes)
Allocat	tion of	places			
Additio	onal inf	ormation			
Worklo	bad				
Referre	ed to in	LPOI (examination regulation	s for teaching-degree progra	mmes)	
Modul	e appea	ars in			
	-	ree (1 major) Nanostructi)	
	-	ree (1 major) Mathematic	, , ,	`	
Bachel	lor' deg	ree (1 major) Computatio	nal Mathematics (20	09)	



Compulsory Electives

(62 ECTS credits)



Mathematics 1 (8-18 ECTS credits)

Students must complete modules worth no less than 8 ECTS credits; however, of the two modules 10-M-EZT and 10-M-ZAL no more than one may be taken.

Module	e title				Abbreviation	
Introduction to Discrete Mathematics					10-M-EDM-072-mo:	L
Module coordinator			Module offered by			
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	atics	
ECTS	1	od of grading	Only after succ. com		<u></u>	
	1	rical grade	only alter sace. con			
5 Duratio		Module level	Other prerequisites			
					-1:6 . 6	
1 semester unde		undergraduate	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.			
Conten	ts					
	-	om combinatorics, introd	uction to graph theor	v (including applica	tions), cryptographic	methods.
	•	g codes.		,		
Intend	ed lear	ning outcomes				
levant realise	proof te s the so	acquainted with the fun echniques, is able to app cope of applications of di	ly methods from num screte structures.	ber theory and alge		
		number of weekly contact hours, l				
		mation on SWS (weekly				
		sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, informat	ion on whether
written by an o 2, appr	examii oral exa ox. 30	nation (approx. 90 minut mination of one candida minutes) ssessment: German, Eng	te each (approx. 20 n	ninutes) or an oral ex		
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)		
		hematik Lineare Algebra			5	
Module	e appea	ars in				
Bachel Bachel Bachel Bachel Bachel	or' deg or' deg or' deg or' deg or' deg	ree (1 major) Computer S ree (1 major) Computer S ree (1 major) Mathematic ree (1 major) Mathematic ree (1 major) Economathe ree (1 major) Economathe	cience (2010) s (2008) s (2007) ematics (2009)			
Bachelor's (2009)	with 1 ma	ior Computational Mathematics		enerated 11-Jan-2023 • exam ECTS) Computational Mathe	-	page 27 / 167

Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2009) Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008) First state examination for the teaching degree Gymnasium Mathematics (2009)

Modul	e title				Abbreviation	
Introduction to Functional Analysis					10-M-FAN-072-m01	
Module coordinator				Module offered by		
Dean o	of Studio	es Mathematik (Mathem	atics)	Institute of Mathem	natics	
ECTS	1	od of grading	Only after succ. com			
	1					
5		rical grade				
Duratio	on	Module level	Other prerequisites			
1 semester		undergraduate	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.			
Conter	te					
		a and Hilbort ansate his	unded energiateria	ninlag of function -1	analusis	
		s and Hilbert spaces, bo	ounded operators, prir	icipies of functional	analysis.	
Intend	ed lear	ning outcomes				
metho broad	ds, is al applica	nows the fundamental co ble to apply methods fro bility of the theory to oth number of weekly contact hours,	m linear algebra and a new second s	analysis to functiona matics.		
	_				abla)	
		mation on SWS (weekly				
module i	s creditab	sessment (type, scope, langua le for bonus)				
by an o 2, appi	oral exa rox. 30	nation (approx. 90 minut mination of one candida minutes)	ite each (approx. 20 n	ninutes) or an oral ex		
		ssessment: German, Eng	glish il agreed upon w	ith the examiner		
Allocat	ion of p	Diaces				
			_			
Additio	onal inf	ormation				
Worklo	ad					
Referre	ed to in	LPO I (examination regulation	ns for teaching-degree progra	mmes)		
§ 73 (1) 1. Mat	hematik Analysis				
	e appea	•				
		ree (1 major) Mathematio	rs (2008)			
	-	ree (1 major) Mathematic				
	-	ree (1 major) Technology		als (2009)		
		ree (1 major) Technology				
	-	ree (1 major) Economath		-		
	-	ree (1 major) Economath	-			
Bachel	or' deg	ree (1 major) Mathematio	cal Physics (2009)			
Bachelor's	with 1 ma	or Computational Mathematics	IMII Würzburg 🌢 🧟	enerated 11-Jan-2023 • exam	reg data re-	page 29 / 167
(2009)	i ma	s. computational mathematics		ECTS) Computational Mathe	-	puse 29/10/

Bachelor' degree (1 major) Computational Mathematics (2009) 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) Bachelor' degree (1 major) Technology of Functional Materials (2006)

Module title				Abbreviation		
Operations Research					10-M-ORS-072-m01	
Module coordinator				Module offered by		
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5		rical grade		, , , , , , , , , , , , , , , , , , ,		
Duratio	•	Module level	Other prerequisites			
		-			alify for admission to	2.20
1 semester		undergraduate	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification fo admission to assessment anew.			tive details ill be con- nt. If stu- ssment over ation for as- ill be admit- ster. For as-
Conten	its		-			
Linear	prograr	nming, duality theory, tra	ansport problems, int	egral linear program	ming, graph theoret	ic problems.
		ning outcomes	<u> </u>		0.01	•
for solv proble	/ing ma ms, bot	acquainted with the fun ny practical problems es h theoretically and nume	pecially in economic erically.	s. He/She is able to		
		number of weekly contact hours,				
V + Ű (I	no infoi	rmation on SWS (weekly	contact hours) and co	ourse language avail	able)	
		sessment (type, scope, langua le for bonus)	age — if other than German,	examination offered — if no	ot every semester, informat	ion on whether
by an c 2, appr	oral exa ox. 30	nation (approx. 90 minut mination of one candida minutes) ssessment: German, Eng	te each (approx. 20 n	ninutes) or an oral ex		•
Allocat	ion of _l	olaces				
Additio	onal inf	ormation				
			_			
Worklo	ad					
Referre	d to in	LPO I (examination regulation	s for teaching degree progra	ammec)		
		hematik Angewandte Ma				
Module	-	-				
		ree (1 major) Computer S	cience (2007)			
	-	ree (1 major) Computer S				
	-	ree (1 major) Mathematic				
Bachel	or' deg	ree (1 major) Mathematic	cs (2007)			
	-	ree (1 major) Economath	-			
	-	ree (1 major) Economath				
Bachel	or' deg	ree (1 major) Mathematic	al Physics (2009)			
Bachelor's (2009)	with 1 ma	jor Computational Mathematics		enerated 11-Jan-2023 • exam DECTS) Computational Mathe	-	page 31 / 167

Bachelor' degree (1 major) Computational Mathematics (2009) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008) First state examination for the teaching degree Gymnasium Mathematics (2009)

Module title				Abbreviation		
Introdu	iction t	o Number Theory			10-M-EZT-072-m01	
Module coordinator				Module offered by		
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	atics	
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
me test	ts and i		, structure of the resi	due class rings, theo	ation, modular arithmetics, pri- ory of quadratic remainder, qua-	
Intende	ed lear	ning outcomes				
		acquainted with the fun these methods to practic			entary number theory. He/She is	
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)		
V + Ü (r	no infoi	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)	
		sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
		mination (90 minutes; us nination in groups (group		ral examination of o	ne candidate each (20 minutes)	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Referre	d to in	LPOI (examination regulation	s for teaching-degree progra	mmes)		
Module	e appea	ars in				
	-	ree (1 major) Computer S				
	-	ree (1 major) Economathe		,		
	-	ree (1 major) Computatio		-		
Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008)						

Module	e title	·			Abbreviation	
Non-Linear Dynamics					10-M-NLD-072-m01	
Module coordinator				Module offered by		
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics	
ECTS		od of grading	Only after succ. com			
	1	rical grade				
5 Duratia		Module level				
Duration Module level 1 semester undergraduate		Other prerequisites Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification fo				
			admission to assess		1	
Conten	ts					
		in stability theory, Lyapu c dynamics; applications				
Intend	ed lear	ning outcomes				
		acquainted with the fun e is able to apply these m				eir proof me
Course	S (type, r	umber of weekly contact hours, I	language — if other than Ger	man)		
V + Ü (I	no infoi	mation on SWS (weekly	contact hours) and co	ourse language avail	able)	
Metho	d of ass	essment (type, scope, langua le for bonus)				ion on whether
by an c 2, appr	oral exa ox. 30	nation (approx. 90 minut mination of one candida minutes)	te each (approx. 20 m	ninutes) or an oral ex		
		ssessment: German, Eng	glish if agreed upon w	ith the examiner		
Allocat	ion of p	olaces				
Additio	onal inf	ormation				
Worklo	ad					
			-			
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)		
§ 73 (1)	1. Mat	hematik Analysis				
Module	e appea	in in				
		ree (1 major) Mathematic	cs (2008)			
	-	ree (1 major) Mathematic				
	-	ree (1 major) Economath	-			
	-	ree (1 major) Economath				
	-	ree (1 major) Mathematic				
	-	ree (1 major) Computatio ree (1 major) Aerospace (•		
Bachelor's (2009)	with 1 ma	or Computational Mathematics		enerated 11-Jan-2023 • exam ECTS) Computational Mathe	-	page 34 / 167



Bachelor' degree (1 major) Aerospace Computer Science (2011) Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008) First state examination for the teaching degree Gymnasium Mathematics (2009)

Module title					Abbreviation	
Introdu	iction t	o Geometry			10-M-GEO-082-m01	
Module coordinator				Module offered by		
Dean of Studies Mathematik (Mathema			natics)	Institute of Mathematics		
ECTS	TS Method of grading		Only after succ. con	Only after succ. compl. of module(s)		
8	nume	rical grade				
Duratio	Duration Module level		Other prerequisites			
1 semester undergraduate		undergraduate	By way of exception, additional prerequisites are listed in the section on assessments.			
Conten	ts					
					coordinates, fundamental theo- dean spaces, curvature.	

Intended learning outcomes

The student is acquainted with the fundamental concepts and methods of geometry.

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

This module has 2 components; information on courses listed separately for each component.

- 10-M-GEO-1-082: V + Ü (no information on language and number of weekly contact hours available)
- 10-M-GEO-2-082: V + Ü (no information on language and number of weekly contact hours available)

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

This module has the following 2 assessment components. To pass the module as a whole students must pass one of the two assessment components.

Assessment component to module component 10-M-GEO-1-082: Einführung in die Projektive Geometrie

- 8 ECTS credits, method of grading: numerical grade
- 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: English, German if agreed upon with the examiner
- Other prerequisites: Admission prerequisite to assessment: successful completion of approx. 50% of exercises. Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

Assessment component to module component 10-M-GEO-2-082: Einführung in die Differentialgeometrie

- 8 ECTS credits, method of grading: numerical grade
- 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: English, German if agreed upon with the examiner
- Other prerequisites: Admission prerequisite to assessment: successful completion of approx. 50% of exercises. Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

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(2009)	cord Bachelor (180 ECTS) Computational Mathematics - 2009	

Allocation of places

Additional information

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Workload

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

§ 73 (1) 4. Mathematik Geometrie

Module appears in

Bachelor' degree (1 major) Mathematics (2008)

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

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

Module title					Abbreviation
Numbe	r Theoi	ry and Algebra			10-M-ZAL-082-m01
Module	e coord	inator		Module offered by	
Dean o	fStudi	es Mathematik (Mathema	atics)	Institute of Mathem	atics
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)	
13	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
2 semester undergraduate		By way of exception, additional prerequisites are listed in the section on assessments.			
Contents					

Introduction to number theory, algebra and their interrelations: basic algebraic structures (groups, rings, fields); discussion of properties of integers and rational numbers (as well as algebraic extensions) with regard to their algebraic structure (residue class rings and finite fields).

Intended learning outcomes

The student is acquainted with the fundamental concepts and methods of number theory and algebra. He/she is able to interrelate these concepts and realises the advantages of thinking across the borders of different branches in mathematics.

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.

- 10-M-ZAL-1-082: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 10-M-ZAL-2-082: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 10-M-ZAL-P-082: M (no information on SWS (weekly contact hours) and course language available)

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

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

Assessment in module component 10-M-ZAL-1-082: Introduction to Number Theory Introduction to Number Theory

- 4 ECTS, Method of grading: (not) successfully completed
- 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
- Other prerequisites: Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

Assessment in module component 10-M-ZAL-2-082: Introduction to Algebra Introduction to Algebra

- 7 ECTS, Method of grading: (not) successfully completed
- 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
- 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

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the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

Assessment in module component 10-M-ZAL-P-082: Examination in Number Theory and Algebra

- 2 ECTS, Method of grading: numerical grade
- oral examination of one candidate each (approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner
- Only after successful completion of module components: Successful completion of module component 10-M-ZAL-1 or module component 10-M-ZAL-2 is a prerequisite for participation in module component 10-M-ZAL-P.

Allocation of places

Additional information

--

Workload

--

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

§ 73 (1) 2. Mathematik Lineare Algebra, Algebra und Elemente der Zahlentheorie

Module appears in

Bachelor' degree (1 major) Mathematics (2008)

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

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

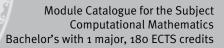
Module title					Abbreviation						
Stocha	stics 1				10-M-ST1-082-m01						
Module coordinator			Module offered by								
Dean of	f Studie	es Mathematik (Mathema	atics)	Institute of Mathem	natics						
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)							
8		rical grade									
Duratio	<u> </u>	Module level	Other prerequisites								
1 semester undergraduate		Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.									
Conten	te			inent anew.							
continu chastic	ious di indepe	s, Laplace models, select stributions: normal distri endence, elementary con theorems: law of large n	bution, random varia ditional probability, o	ble, distribution fun characteristics of dis	ction, product meas	ures and sto-					
Intende	ed learr	ning outcomes									
		acquainted with fundam lems and knows about th			ics, applies these m	ethods to					
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)							
V + Ü (r	no infor	mation on SWS (weekly	contact hours) and co	ourse language avail	able)						
		e essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, informat	ion on whether					
by an o 2, appr	ral exa ox. 30 i	nation (approx. 90 minut mination of one candida minutes) ssessment: German, Eng	te each (approx. 20 m	ninutes) or an oral ex							
Allocat	.=										
	nal inf	ormation									
	natini										
Worklo											
WUIKIO	au										
Referre	d to in	IPOI (ovamination regulation	for toaching dograa progra	mmoc)							
Referred to in LPO I (examination regulations for teaching-degree programmes) § 73 (1) 3. Mathematik Stochastik											
Module appears in											
Bachelor' degree (1 major) Computer Science (2010) Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematical Physics (2009)											
Bachelor's (2009)	with 1 maj	or Computational Mathematics		-	-	achelor's with 1 major Computational Mathematics JMU Würzburg • generated 11-Jan-2023 • exam. reg. data re- page 40 / 167					



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

Module	title				Abbreviation
Stochastics 2					10-M-ST2-082-m01
Module coordinator				Module offered by	<u> </u>
Dean o	fStudie	es Mathematik (Mathema	atics)	Institute of Mathem	natics
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)	
5		rical grade			
Duratio	ı	Module level	Other prerequisites		
1 semester undergraduate		Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.			
Conten	ts				
		ata analysis, statistics of	data in normal and c	ther distributions. e	lements of multivariate statistics
		ning outcomes			
			ental concepts and r	nethods in statistics	, applies these methods to prac-
		and knows about the ty			, applies these methods to plue
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	rman)	
V + Ü (r	no infor	mation on SWS (weekly	contact hours) and co	ourse language avail	able)
Method	l of ass	essment (type, scope, langua	ge — if other than German, o	examination offered — if no	t every semester, information on whether
module is	creditab	le for bonus)			
by an o 2, appr	ral exa ox. 30 I		te each (approx. 20 n	ninutes) or an oral ex	ten examination can be replaced kamination in groups (groups of
Allocat					
			,		
Additio	nal info	ormation			
Worklo	ad				
Referre	d to in	LPOI (examination regulation	s for teaching-degree progra	mmes)	
§ 73 (1) 3. Mathematik Stochastik					
Module appears in					
Bachelor' degree (1 major) Mathematics (2008) 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's degree (1 major, 1 minor) Mathematics (Minor, 2008) First state examination for the teaching degree Gymnasium Mathematics (2009)					





Mathematics 2 (4 ECTS credits)

Module title Abbreviation					Abbreviation
Reading Course Stochastics 10-M-RCS-082-m01					
Module	e coord	inator		Module offered by	<u> </u>
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics
ECTS	Methe	od of grading	Only after succ. con	npl. of module(s)	
4	nume	rical grade			
Duratio	n	Module level	Other prerequisites	i	
1 seme	ster	undergraduate			
Conten	ts				
Advanc	ed top	ics in stochastics.			
Intende	ed lear	ning outcomes			
The stu	dent is		ntly on a given scient	ific topic. He or she	can tackle a simple mathematical
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ge	rman)	
A (no ir	formation	tion on SWS (weekly cont	act hours) and cours	e language available	e)
		Sessment (type, scope, langua ole for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether
a) talk	(appro	x. 30 minutes) or b) writte	en elaboration (appro	ox. 5 to 10 pages)	
Allocat					
Additio	nal inf	ormation			
Worklo	ad				
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module	e appea	ars in			
		ree (1 major) Mathematic	s (2008)		
	Bachelor' degree (1 major) Mathematical Physics (2009)				
Bachelor' degree (1 major) Computational Mathematics (2009)					

Module title				Abbreviation		
Reading Course Discrete Mathematics					10-M-RCD-082-m01	
Module	e coord	inator		Module offered by		
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathen	natics	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
4	nume	rical grade				
Duratio	on	Module level	Other prerequisites	i		
1 seme	ster	undergraduate				
Conten	Its					
Basics	in disc	rete mathematics.	-			
Intend	ed lear	ning outcomes				
The stu	ident is		ntly on a given scient	ific topic. He or she	can tackle a simple mathematica	
Course	S (type, 1	number of weekly contact hours, I	anguage — if other than Ge	rman)		
		tion on SWS (weekly cont			e)	
		s essment (type, scope, langua	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
a) talk	(appro	x. 30 minutes) or b) writte	en elaboration (appro	ox. 5 to 10 pages)		
Allocat		-				
Additio	onal inf	ormation	-			
Worklo	ad					
			•			
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	ammes)		
Module	e appea	ars in				
		ree (1 major) Mathematic	s (2008)			
Bachelor' degree (1 major) Mathematical Physics (2009)						
Bachel	Bachelor' degree (1 major) Computational Mathematics (2009)					

Module title Abbreviation					Abbreviation
Reading Course Functional Analysis10-M-RCF-082-m01					
Module	e coord	inator		Module offered by	
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
4	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts		·		
Basics	in func	tional analysis.			
Intend	ed lear	ning outcomes			
		able to work independe se standard literature.	ntly on a given scient	ific topic. He or she	can tackle a simple mathematica
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ge	rman)	
A (no ir	format	tion on SWS (weekly cont	act hours) and cours	e language available	e)
		Sessment (type, scope, langua Ile for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether
a) talk	(approx	x. 30 minutes) or b) writte	en elaboration (appro	ox. 5 to 10 pages)	
Allocat	ion of j	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module	e appea	ars in			
		ree (1 major) Mathematic	s (2008)		
Bachelor' degree (1 major) Mathematical Physics (2009)					
Bachelor' degree (1 major) Computational Mathematics (2009)					

Module title Abbreviation					Abbreviation
Reading Course Operations Research 10-M-RCO-082-m01					
Module	e coord	inator		Module offered by	1
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
4	nume	rical grade			
Duratio	on in the second	Module level	Other prerequisites	i	
1 seme	ster	undergraduate			
Conten	ts				
Basics	in opei	rations research.			
Intend	ed lear	ning outcomes			
		able to work independe se standard literature.	ntly on a given scient	ific topic. He or she	can tackle a simple mathematical
Course	S (type, r	number of weekly contact hours, I	anguage — if other than Ge	rman)	
A (no ir	format	tion on SWS (weekly cont	act hours) and cours	e language available	e)
		Sessment (type, scope, langua Ile for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether
a) talk	(approx	x. 30 minutes) or b) writte	en elaboration (appro	ox. 5 to 10 pages)	
Allocat	ion of j	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	ammes)	
Module	e appea	ars in			
		ree (1 major) Mathematic	s (2008)		
Bachelor' degree (1 major) Mathematical Physics (2009)					
Bachelor' degree (1 major) Computational Mathematics (2009)					

Module title Abbreviation					Abbreviation
Reading Course Dynamical Systems 10-M-RCY-082-m01					10-M-RCY-082-m01
Module	e coord	inator		Module offered by	
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
4	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts	κ.			
Basics	in dyna	amical systems and nonli	near dynamics.		
Intend	ed lear	ning outcomes			
The stu	ident is		ntly on a given scient	ific topic. He or she	can tackle a simple mathematical
Course	S (type, 1	number of weekly contact hours, I	anguage — if other than Ge	rman)	
A (no ir	nforma	tion on SWS (weekly cont	act hours) and cours	e language available	e)
		s essment (type, scope, langua ble for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether
a) talk	(appro	x. 30 minutes) or b) writte	en elaboration (appro	ox. 5 to 10 pages)	
Allocat	ion of	places			
Additio	onal inf	ormation			
Worklo	ad				
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	ummes)	
Module	e appea	ars in			
Bachelor' degree (1 major) Mathematics (2008)					
Bachelor' degree (1 major) Mathematical Physics (2009)					
Bachelor' degree (1 major) Computational Mathematics (2009)					

Module title					Abbreviation	
Reading Course Optimisation 10-M-RCP-082-1					10-M-RCP-082-m01	
Module	e coord	inator		Module offered by	1	
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics	
ECTS	Methe	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	<u>.</u>				
Basics	in opti	mization.				
Intende	ed lear	ning outcomes				
		able to work independe use standard literature.	ntly on a given scient	ific topic. He or she	can tackle a simple mathematical	
Course	S (type, r	number of weekly contact hours, I	anguage — if other than Ge	rman)		
		tion on SWS (weekly cont			e)	
		S essment (type, scope, langua ole for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
a) talk	(approx	x. 30 minutes) or b) writte	en elaboration (appro	ox. 5 to 10 pages)		
Allocat	ion of _l	places				
Additio	nal inf	ormation				
Worklo	ad					
			-			
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	ammes)		
Module	e appea	ars in				
		ree (1 major) Mathematic	s (2008)			
Bachelor' degree (1 major) Mathematical Physics (2009)						
Bachelor' degree (1 major) Computational Mathematics (2009)						



Mathematics 3 (5 ECTS credits)

Module title Abbreviation					Abbreviation
Seminar in Analysis 10-M-BSA-072-m01					10-M-BSA-072-m01
Modul	e coord	inator		Module offered by	<u> </u>
Dean o	of Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics
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	undergraduate			
Conten	nts		·		
A selec	ted top	oic in analysis.			
Intend	ed lear	ning outcomes			
of a giv ly in a s	/en top scientif	ic using selected literatur ic discussion.	e, and prepares a tal	k on the subject. He	sters elaboration and structuring /She is able to participate active-
		number of weekly contact hours, l			
S (no iı	nformat	tion on SWS (weekly cont	act hours) and cours	e language available	2)
module is	s creditab	Sessment (type, scope, langua le for bonus) 50 minutes)	ge — if other than German, o	examination offered — if no	ot every semester, information on whether
Assess	ment o	ffered: in the semester ir ssessment: German, Eng			
Allocat	tion of _l	olaces			
Additio	onal inf	ormation			
Worklo	ad				
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)	
§ 73 (1)) 1. Mat	hematik Analysis			
Module	e appea	ars in			
	-	ree (1 major) Mathematic			
Bachelor' degree (1 major) Mathematics (2007)					
	Bachelor' degree (1 major) Economathematics (2009)				
	Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematical Physics (2009)				
	Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2009)				
	-	gree (1 major, 1 minor) M			
		mination for the teaching			

Module title					Abbreviation	
Seminar in Linear Algebra					10-M-BSL-072-m01	
Module	e coord	inator		Module offered by		
Dean o	fStudie	es Mathematik (Mathema	atics)	Institute of Mathem	atics	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
A selec	ted top	ic in linear algebra.				
Intende	ed learr	ning outcomes				
of a giv	en topi				sters elaboration and structuring /She is able to participate active-	
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
S (no ir	nformat	ion on SWS (weekly cont	act hours) and cours	e language available	2)	
		s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
Assess	ment o	50 minutes) ffered: in the semester in ssessment: German, Eng				
Allocat	ion of p	olaces				
Additio	onal info	ormation				
Worklo	ad					
Referre	ed to in	LPOI (examination regulations	s for teaching-degree progra	mmes)		
§ 73 (1)	2. Mat	hematik Lineare Algebra,	, Algebra und Elemen	te der Zahlentheorie		
Module	e appea	rs in				
Bachel Bachel Bachel Bachel Bachel Bachel	Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2007) 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's degree (1 major, 1 minor) Mathematics (Minor, 2008)					
First sta	First state examination for the teaching degree Gymnasium Mathematics (2009)					

Module title Abbreviation						
Semin	Seminar in Algebra 10-M-BSE-072-m01					
Module coordinator Mod				Module offered by	Module offered by	
Dean c	of Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duration Module level Other prerequisites						
1 seme	ester	undergraduate				
Conter	nts	~				
A selec	cted top	oic in algebra.				
Intend	ed lear	ning outcomes				
of a giv	ven top				sters elaboration and structuring /She is able to participate active-	
	_	number of weekly contact hours, l				
S (no i	nforma	tion on SWS (weekly cont	act hours) and cours	e language available	e)	
		sessment (type, scope, langua ole for bonus)	ge — if other than German, o	examination offered — if no	ot every semester, information on whether	
Assess	sment o	60 minutes) Iffered: in the semester ir Issessment: German, Eng				
Allocat	tion of _l	places				
Additio	onal inf	ormation				
Worklo	bad					
Referre	ed to in	LPOI (examination regulation	s for teaching-degree progra	mmes)		
§ 73 (1) 2. Mat	thematik Lineare Algebra	, Algebra und Elemen	te der Zahlentheorie	2	
Modul	e appea	ars in				
Bachel	lor' deg	ree (1 major) Mathematic	s (2008)			
	-	ree (1 major) Mathematic				
	-	ree (1 major) Economathe	-			
		ree (1 major) Economathe				
	-	ree (1 major) Mathematic)		
	-	ree (1 major) Computatio	-			
		gree (1 major, 1 minor) M				
riist st	First state examination for the teaching degree Gymnasium Mathematics (2009)					

Module	title				Abbreviation
Semina	ır in Ge	ometry			10-M-BSG-072-m01
Module	e coord	inator		Module offered by	
Dean of	fStudie	es Mathematik (Mathema	atics)	Institute of Mathem	atics
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				
A selec	ted top	ic in geometry or differer	ntial geometry.		
Intende	ed learn	ning outcomes	· · · · ·		
of a giv	en topi				sters elaboration and structuring /She is able to participate active-
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
S (no in	format	ion on SWS (weekly cont	act hours) and cours	e language available	e)
		e essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
Assess	ment o	50 minutes) ffered: in the semester in ssessment: German, Eng			
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
§ 73 (1)	4. Mat	hematik Geometrie			
Module					
Bachel	or' deg	ree (1 major) Mathematic	s (2008)		
		ree (1 major) Mathematic			
	-	ree (1 major) Economathe	-		
	-	ree (1 major) Economathe			
	-	ree (1 major) Mathematic			
	-	ree (1 major) Computatio		-	
		gree (1 major, 1 minor) Ma			
First sta	ate exa	mination for the teaching	g degree Gymnasium	Mathematics (2009)	

Module	title	·			Abbreviation
Semina	r in Nu	mber Theory			10-M-BSZ-072-m01
Module	e coord	inator		Module offered by	
Dean of	fStudie	es Mathematik (Mathema	atics)	Institute of Mathem	atics
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				
A selec	ted top	ic in number theory.			
Intende	ed leari	ning outcomes			
of a giv	en topi				sters elaboration and structuring /She is able to participate active-
Course	S (type, n	number of weekly contact hours, l	anguage — if other than Ger	man)	
S (no in	format	ion on SWS (weekly cont	act hours) and cours	e language available	2)
		eessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
Assess	ment o	60 minutes) ffered: in the semester in ssessment: German, Eng			
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
§ 73 (1)	2. Mat	hematik Lineare Algebra,	, Algebra und Elemen	te der Zahlentheorie)
Module					
Bachel	or' deg	ree (1 major) Mathematic	s (2008)		
	-	ree (1 major) Mathematic			
		ree (1 major) Economathe			
	-	ree (1 major) Economathe			
	-	ree (1 major) Mathematic		`	
	-	ree (1 major) Computation			
		gree (1 major, 1 minor) Ma mination for the teaching			
FIIST ST	ale exd	mination for the teaching	s degree dynnasium	mainematics (2009)	

Module	e title				Abbreviation
Semina	ar in Or	dinary Differential Equat	ions		10-M-BSW-072-m01
Module coordinator				Module offered by	<u>I</u>
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duratio	Duration Module level Other prerequisites				
1 seme	ster	undergraduate			
Conten	Its	к.	<u>.</u>		
A selec	ted top	pic in the theory of ordina	ry differential equation	ons.	
Intend	ed lear	ning outcomes			
of a giv ly in a s	ven top scientif	ic using selected literatur ic discussion.	re, and prepares a tal	k on the subject. He	sters elaboration and structuring /She is able to participate active-
	_	number of weekly contact hours, l			
		tion on SWS (weekly cont			
		sessment (type, scope, langua ole for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether
Assess	ment o	60 minutes) Iffered: in the semester ir Issessment: German, Eng			
Allocat	ion of _l	places			
Additio	onal inf	ormation			
Worklo	ad				
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	immes)	
§ 73 (1)) 1. Mat	hematik Analysis			
Module	e appea	ars in			
	0	ree (1 major) Mathematic	· ,		
	-	ree (1 major) Mathematic			
	-	ree (1 major) Economathe	-		
	-	ree (1 major) Economathe			
	-	ree (1 major) Mathematic		oo)	
	-	ree (1 major) Computatio gree (1 major, 1 minor) M		•	
		• • • • •		-)
First state examination for the teaching degree Gymnasium Mathematics (2009)					

Module	title				Abbreviation
Semina	r in Co	mplex Analysis			10-M-BSC-072-m01
Module	e coord	inator		Module offered by	
Dean of	fStudie	es Mathematik (Mathema	atics)	Institute of Mathem	atics
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				
A selec	ted top	ic in complex analysis.			
Intende	ed leari	ning outcomes			
of a giv	en topi				sters elaboration and structuring /She is able to participate active-
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
S (no in	format	ion on SWS (weekly cont	act hours) and cours	e language available	e)
		essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
Assess	ment o	50 minutes) ffered: in the semester in ssessment: German, Eng			
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	mmes)	
§ 73 (1)	1. Mat	hematik Analysis			
Module	e appea	nrs in			
Bachel	or' deg	ree (1 major) Mathematic	s (2008)		
		ree (1 major) Mathematic			
	-	ree (1 major) Economathe	-		
	-	ree (1 major) Economathe			
		ree (1 major) Mathematic		、 、	
	-	ree (1 major) Computatio			
		gree (1 major, 1 minor) Ma			
First sta	ate exa	mination for the teaching	g degree Gymnasium	iviathematics (2009)	

Module title				Abbreviation	
Seminar in Nu	merical Mathematics		10-M-BSN-072-m01		
Module coordi	nator		Module offered by		
Dean of Studie	s Mathematik (Mathema	atics)	Institute of Mathem	natics	
ECTS Metho	d of grading	Only after succ. com	pl. of module(s)		
5 numer	ical grade				
Duration	Module level	Other prerequisites			
1 semester	undergraduate				
Contents					
A selected top	ic in numerical mathema	itics.			
Intended learn	ing outcomes				
	c using selected literatur			sters elaboration and structuring /She is able to participate active-	
Courses (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
S (no informati	ion on SWS (weekly cont	act hours) and cours	e language available	2)	
Method of ass module is creditabl		ge — if other than German, e	examination offered — if no	ot every semester, information on whether	
	o minutes) fered: in the semester in ssessment: German, Eng				
Allocation of p	laces				
Additional info	ormation				
Workload					
Referred to in	LPO I (examination regulation	s for teaching-degree progra	mmes)		
§ 73 (1) 5. Math	nematik Angewandte Ma	thematik			
Module appea					
Bachelor' degr	ee (1 major) Mathematic	s (2008)			
Bachelor' degr	ee (1 major) Mathematic	s (2007)			
-	ee (1 major) Economathe	-			
-					
			`		
-			•		
-					
Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2009) Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008) First state examination for the teaching degree Gymnasium Mathematics (2009)					

Module title					Abbreviation
Semina	ar in St	ochastics			10-M-BSS-072-m01
Module	e coord	inator		Module offered by	
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	atics
ECTS	Meth	od of grading	Only after succ. com	pl. of module(s)	
5		rical grade		•	
	Duration Module level Other prerequisites				
1 seme	ster	undergraduate			
Conten	ts		<u> </u>		
		bic in stochastics.			
		ning outcomes			
of a giv ly in a s	en top scientif	ic using selected literatur ic discussion.	e, and prepares a tal	k on the subject. He	sters elaboration and structuring /She is able to participate active-
		number of weekly contact hours, l			
S (no ir	forma	tion on SWS (weekly cont	act hours) and cours	e language available	a)
		Sessment (type, scope, langua ole for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
		60 minutes)			
		ffered: in the semester in	which the course is	offered	
Langua	ge of a	ssessment: German, Eng	lish if agreed upon w	ith the examiner	
Allocat	ion of	places			
Additio	nal inf	ormation			
Worklo	ad				
	-				
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
§ 73 (1)	3. Mat	hematik Stochastik			
Module	e appea	ars in			
	-	ree (1 major) Mathematic			
	-	ree (1 major) Mathematic			
	-	ree (1 major) Economathe			
		ree (1 major) Economathe			
		ree (1 major) Mathematic		20)	
		ree (1 major) Computatio gree (1 major, 1 minor) Ma			
First sta	ate exa	mination for the teaching	g degree Gymnasium	Mathematics (2009)	

Module title					Abbreviation
Seminar in Functional Analysis					10-M-BSF-072-m01
Module	e coord	inator		Module offered by	
Dean o	fStudi	es Mathematik (Mathema	atics)	Institute of Mathem	natics
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	Its				
A selec	ted top	ic in functional analysis.			
Intend	ed lear	ning outcomes			
of a giv	en topi				sters elaboration and structuring /She is able to participate active-
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)	
S (no ir	nformat	tion on SWS (weekly cont	act hours) and cours	e language available	2)
Metho	d of ass	sessment (type, scope, langua	ge — if other than German, e	examination offered — if no	t every semester, information on whether
		le for bonus)			
talk (ap	oprox. 6	60 minutes)			
Allocat	ion of p	olaces			
Additio	onal inf	ormation			
	_				
Worklo	ad				
Referre	ed to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module	e appea	urs in			
Bachel	or' deg	ree (1 major) Mathematic	s (2008)		
	-	ree (1 major) Mathematic			
	-	ree (1 major) Economathe	-		
		ree (1 major) Economathe			
		ree (1 major) Mathematic			
	-	ree (1 major) Computation		•	
Bachel	or's de	gree (1 major, 1 minor) Ma	athematics (Minor, 20	008)	

Module title					Abbreviation
Semina	ar in Op	eration Research			10-M-BSO-072-m01
Module	e coord	inator		Module offered by	
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
A selec	ted top	ic in operations research	l.		
Intende	ed lear	ning outcomes			
of a giv	en topi				sters elaboration and structuring /She is able to participate active-
Course	S (type, r	umber of weekly contact hours, l	anguage — if other than Ger	man)	
S (no ir	format	ion on SWS (weekly cont	act hours) and cours	e language available	2)
		s essment (type, scope, langua ₎ le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
talk (ap	prox. 6	60 minutes)			
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
			,		
Module	e appea	irs in			
Bachel	or' deg	ree (1 major) Mathematic	s (2008)		
		ree (1 major) Mathematic			
	-	ree (1 major) Economathe			
		ree (1 major) Economathe			
		ree (1 major) Mathematic		`	
		ree (1 major) Computation			
васнее	or's de	gree (1 major, 1 minor) Ma	atnematics (Minor, 20	(אטט	

Module title					Abbreviation
Seminar in Discrete Mathematics					10-M-BSD-072-m01
Module	e coord	inator		Module offered by	
Dean o	fStudi	es Mathematik (Mathema	atics)	Institute of Mathem	natics
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
A selec	ted top	ic in discrete mathemati	cs.		
Intende	ed lear	ning outcomes			
of a giv	en topi				sters elaboration and structuring /She is able to participate active-
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)	
S (no ir	nformat	tion on SWS (weekly cont	act hours) and cours	e language available	e)
Method	d of ass	sessment (type, scope, langua	ge — if other than German, e	examination offered — if no	t every semester, information on whether
		le for bonus)			
		50 minutes)			
Allocat	ion of p	olaces			
Additio	nal inf	ormation	-		
Worklo	ad				
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)	
Module	e appea	ars in			
Bachel	or' deg	ree (1 major) Mathematic	s (2008)		
	-	ree (1 major) Mathematic			
	-	ree (1 major) Economathe	-		
		ree (1 major) Economathe			
		ree (1 major) Mathematic		,	
	-	ree (1 major) Computatio		•	
Bachel	Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008)				



Application-oriented Subject

(35-45 ECTS credits)

Students must take one of the application-oriented subjects (Biologie (Biology), Chemie (Chemistry), Informatik (Computer Science) and Physik (Physics)) with the specified mandatory courses and/or mandatory electives.



Application-oriented Subject Chemistry

(35 ECTS credits)

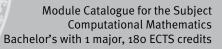


Application-oriented Subject Chemistry Compulsory Courses

(26 ECTS credits)

Module title					Abbreviation								
Introdu	uction t	o Physics for Students o	11-EFNF-072-m01										
Module coordinator Module offered by					<u> </u>								
Managing Director of the Institute of Applied Physics				Faculty of Physics a	and Astronomy								
ECTS	<u> </u>	od of grading	Only after succ. con		,								
		rical grade											
7 Duratio		Module level	Other preveruisites										
		-	Other prerequisites										
2 seme		undergraduate											
Conten													
Mecha	nics, vi	bration theory, thermody	namics, optics, scier	nce of electricity, Ato	mic and Nuclear Physic	cs.							
Intend	ed lear	ning outcomes											
The stu	Idents	have knowledge of the p	rinciples of Physics.										
		number of weekly contact hours,	· · · · · · · · · · · · · · · · · · ·	rman)									
	_	mation on SWS (weekly			able)								
		· · · · ·											
		Sessment (type, scope, langua Ile for bonus)	ige — If other than German,	examination offered — if no	ot every semester, information	on whether							
		nation (approx. 120 minu	tes)										
Allocat													
		f pool of general key skil	ls (ASQ): 10 places. P	laces will be allocate	ed by lot.								
Additio	onal inf	ormation											
Worklo	ad												
			-										
Referre	d to in	LPOI (examination regulation	s for teaching-degree progra	ammes)									
Referre													
Module	annos	are in											
			n (2011)										
	-	-											
	-					Bachelor' degree (1 major) Biochemistry (2011) Bachelor' degree (1 major) Biochemistry (2013)							
	-	Bachelor' degree (1 major) Biochemistry (2009)											
Bachelor' degree (1 major) Biology (2011)													
	or' deg	ree (1 major) Biology (20	11)										
Bachel		ree (1 major) Biology (20 ree (1 major) Biology (20	11) 07)										
Bachel Bachel	or' deg	ree (1 major) Biology (20	11) 07) 10)										
Bachel Bachel Bachel	or' deg or' deg	ree (1 major) Biology (20 ree (1 major) Biology (20 ree (1 major) Biology (20	11) 07) 10) 2007)										
Bachel Bachel Bachel Bachel	or' deg or' deg or' deg	ree (1 major) Biology (20 ree (1 major) Biology (20 ree (1 major) Biology (20 ree (1 major) Chemistry (11) 07) 10) 2007) 2008)										
Bachel Bachel Bachel Bachel Bachel Bachel	or' deg or' deg or' deg or' deg or' deg	ree (1 major) Biology (20 ree (1 major) Biology (20 ree (1 major) Biology (20 ree (1 major) Chemistry (ree (1 major) Chemistry (ree (1 major) Chemistry (ree (1 major) Chemistry (11) 07) 10) 2007) 2008) 2010) 2009)										
Bachel Bachel Bachel Bachel Bachel Bachel Bachel	or' deg or' deg or' deg or' deg or' deg or' deg	ree (1 major) Biology (20 ree (1 major) Biology (20 ree (1 major) Biology (20 ree (1 major) Chemistry (20 ree (1 major) Chemistry (20 ree (1 major) Chemistry (20 ree (1 major) Chemistry (20 ree (1 major) Geography	11) 07) 10) 2007) 2008) 2010) 2009) (2007)										
Bachel Bachel Bachel Bachel Bachel Bachel Bachel	or' deg or' deg or' deg or' deg or' deg or' deg or' deg	ree (1 major) Biology (20 ree (1 major) Biology (20 ree (1 major) Biology (20 ree (1 major) Chemistry (ree (1 major) Chemistry (ree (1 major) Chemistry (ree (1 major) Geography ree (1 major) Geography	11) 07) 10) 2007) 2008) 2010) 2009) (2007) (2008)										
Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel	or' deg or' deg or' deg or' deg or' deg or' deg or' deg or' deg	ree (1 major) Biology (20 ree (1 major) Biology (20 ree (1 major) Biology (20 ree (1 major) Chemistry (20 ree (1 major) Chemistry (20 ree (1 major) Chemistry (20 ree (1 major) Chemistry (20 ree (1 major) Geography ree (1 major) Geography ree (1 major) Geography	11) 07) 10) 2007) 2008) 2010) 2009) (2007) (2008) (2010)										
Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel	or' deg or' deg or' deg or' deg or' deg or' deg or' deg or' deg or' deg	ree (1 major) Biology (20 ree (1 major) Biology (20 ree (1 major) Biology (20 ree (1 major) Chemistry (20 ree (1 major) Chemistry (20 ree (1 major) Chemistry (20 ree (1 major) Chemistry (20 ree (1 major) Geography ree (1 major) Geography ree (1 major) Geography ree (1 major) Computer S	11) 07) 10) 2007) 2008) 2010) 2009) (2007) (2008) (2010) cience (2007)										
Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel	or' deg or' deg or' deg or' deg or' deg or' deg or' deg or' deg or' deg or' deg	ree (1 major) Biology (20 ree (1 major) Biology (20 ree (1 major) Biology (20 ree (1 major) Biology (20 ree (1 major) Chemistry (2 ree (1 major) Chemistry (2 ree (1 major) Chemistry (2 ree (1 major) Geography ree (1 major) Geography ree (1 major) Geography ree (1 major) Computer S ree (1 major) Computer S	11) 07) 10) 2007) 2008) 2010) 2009) (2007) (2008) (2010) cience (2007) cience (2014)										
Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel	or' deg or' deg	ree (1 major) Biology (20 ree (1 major) Biology (20 ree (1 major) Biology (20 ree (1 major) Biology (20 ree (1 major) Chemistry (1 ree (1 major) Chemistry (1 ree (1 major) Chemistry (1 ree (1 major) Geography ree (1 major) Geography ree (1 major) Geography ree (1 major) Computer S ree (1 major) Computer S ree (1 major) Computer S	11) 07) 10) 2007) 2008) 2010) 2009) (2007) (2008) (2010) cience (2007) cience (2014) cience (2010)										
Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel	or' deg or' deg	ree (1 major) Biology (20 ree (1 major) Biology (20 ree (1 major) Biology (20 ree (1 major) Biology (20 ree (1 major) Chemistry (1 ree (1 major) Chemistry (1 ree (1 major) Chemistry (1 ree (1 major) Geography ree (1 major) Geography ree (1 major) Geography ree (1 major) Computer S ree (1 major) Computer S ree (1 major) Computer S ree (1 major) Food Chemi	11) 07) 10) 2007) 2008) 2010) 2009) (2007) (2008) (2007) (2008) (2010) cience (2007) cience (2014) cience (2010) stry (2009)										
Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel	or' deg or' deg	ree (1 major) Biology (20 ree (1 major) Biology (20 ree (1 major) Biology (20 ree (1 major) Biology (20 ree (1 major) Chemistry (ree (1 major) Chemistry (ree (1 major) Chemistry (ree (1 major) Geography ree (1 major) Geography ree (1 major) Geography ree (1 major) Computer S ree (1 major) Computer S ree (1 major) Computer S ree (1 major) Food Chemi ree (1 major) Mathematic	11) 07) 10) 2007) 2008) 2010) 2009) (2007) (2008) (2010) cience (2007) cience (2014) cience (2010) stry (2009) cs (2008)										
Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel	or' deg or' deg	ree (1 major) Biology (20 ree (1 major) Biology (20 ree (1 major) Biology (20 ree (1 major) Biology (20 ree (1 major) Chemistry (1 ree (1 major) Chemistry (1 ree (1 major) Chemistry (1 ree (1 major) Geography ree (1 major) Geography ree (1 major) Geography ree (1 major) Geography ree (1 major) Computer S ree (1 major) Computer S ree (1 major) Computer S ree (1 major) Food Chemi ree (1 major) Mathematic ree (1 major) Mathematic	11) 07) 10) 2007) 2008) 2010) 2009) (2007) (2008) (2010) cience (2007) cience (2014) cience (2010) stry (2009) cs (2008) cs (2014)										
Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel	or' deg or' deg	ree (1 major) Biology (20 ree (1 major) Biology (20 ree (1 major) Biology (20 ree (1 major) Biology (20 ree (1 major) Chemistry (ree (1 major) Chemistry (ree (1 major) Chemistry (ree (1 major) Geography ree (1 major) Geography ree (1 major) Geography ree (1 major) Computer S ree (1 major) Computer S ree (1 major) Computer S ree (1 major) Food Chemi ree (1 major) Mathematic	11) 07) 10) 2007) 2008) 2010) 2009) (2007) (2008) (2010) cience (2007) cience (2014) cience (2010) stry (2009) cs (2008) cs (2014)										

Julius-Maximilians-UNIVERSITÄT WÜRZBURG



Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Biomedicine (2009) Bachelor' degree (1 major) Biomedicine (2013) Bachelor' degree (1 major) Computational Mathematics (2009) Bachelor' degree (1 major) Computational Mathematics (2014) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2013)

Module title Abbreviation										
General Chemistry for Mathematics Majors 08-CM1-072-m01					08-CM1-072-m01					
Module	e coord	inator		Module offered by	1					
lecture Chemis		ture "Experimentalchemie	e" (Experimental	Institute of Inorgan	ic Chemistry					
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)						
6	nume	rical grade								
Duratio	n	Module level	Other prerequisites							
1 seme	ster	undergraduate								
Conten	ts									
les, me	tals, a		eriodic table, chemica	al equilibrium and co	of chemistry. It focuses on partic- omplexometry. In addition, the c chemistry.					
Intende	ed lear	ning outcomes								
are able Course V (no ir	e to de s (type, r nformat	scribe the main quantitat number of weekly contact hours, k tion on SWS (weekly cont	ive and qualitative a anguage — if other than Ger act hours) and cours	nalytical methods ar ^{man)} e language available						
module is	creditab	le for bonus)		examination offered — if no	ot every semester, information on whether					
Allocat		nation (approx. 60 minut	es)							
Allocal		Jiaces								
 Additio	nal inf	ormation								
Auditio	inat IIII	טווומנוטוו								
Worklo	ad									
Referre	d to in	LPOI (examination regulations	s for teaching-degree progra	mmes)						
Module	appe	ars in								
		ree (1 major) Mathematic	s (2008)							
	-									
Deshal	or' dog	ree (1 major) Computatio			Bachelor' degree (1 major) Mathematics (2007)					

Modul	le title				Abbreviation				
Physic	cal Cher	nistry 1			08-PC1-092-m01				
Modul	le coord	inator		Module offered by	e offered by				
Spektr		ture "Grundlagen der Qu e" (Principles of Quantu)		Institute of Physica	l and Theoretical Ch	emistry			
ECTS	1	od of grading	Only after succ. com	y after succ. compl. of module(s)					
8	nume	rical grade							
			Other prerequisites	her prerequisites					
1 semester		undergraduate	ses in the respective (usually 70% of exer	site to assessment: successful completion of exerci- e classes as specified at the beginning of the course rcises to be successfully completed) as well as regu- tercises (usually a maximum of 2 incidents of unexcu-					
Conte	nts	1							
the mo UV-VIS	odule fo 5 spectr , differe	ne following models: pa ocuses on vibrational sp oscopy. In addition, the ntial equations, Fourier	ectroscopy, angular m module discusses line	omentum quantisati ear operators, eigen	ion, microwave spec value problems, ma	troscopy and trix represen-			
Intend	led lear	ning outcomes							
to des		able to explain key mod fferent spectroscopic m hanics.							
Course	es (type, 1	number of weekly contact hours	, language — if other than Ger	man)					
V + Ü +	+ <u>V + Ü (</u>	(no information on SWS	(weekly contact hours) and course langua	ge available)				
		s essment (type, scope, lang ble for bonus)	uage — if other than German, e	examination offered — if no	ot every semester, informat	tion on whether			
nutes	each; 3	en examinations (1 written written examinations: 6 oral examination in gro	o minutes each) or b)	oral examination of					
	tion of								
Additi	onal inf	ormation							
Workle	oad								
	-								
Referred to in LPO I (examination regulations for teaching-degree programmes)									
Modul	le appea	ars in							
			try (2011)						
Bachelor' degree (1 major) Biochemistry (2011) Bachelor' degree (1 major) Biochemistry (2013)									
Bachelor' degree (1 major) Biochemistry (2009)									
	-	ree (1 major) Chemistry							
Bachelor' degree (1 major) Chemistry (2009)									
Bache	lor' deg	ree (1 major) Mathemat	ics (2012)						
Bachelor'	s with 1 ma	jor Computational Mathematics	IMU Würzhurg ● g	enerated 11-Jan-2023 • exam	, reg. data re-	page 69 / 167			
		,	cord Bachelor (180		0	F-3			

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2009) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor' degree (1 major) FOKUS Chemistry (2011)

Module	e title		Abbreviation							
Organi	c Chem	istry 1	08-0C1-092-m01							
Module	e coord	inator		Module offered by						
holder of the Professorship of Organic			c Chemistry	Institute of Organic Chemistry						
ECTS Method of grading		Only after succ. compl. of module(s)								
<u> </u>										
5 numerical grade Duration Module level			Other prerequisites							
1 semester		undergraduate	Admission prerequisite to assessment: successful completion of exerci- ses in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regu- lar attendance of exercises (usually a maximum of 2 incidents of unexcu- sed absence).							
Conten	ts									
This module provides students with an overview of the fundamental principles of organic chemistry. It examines the bonding situation of carbon and introduces students to the nomenclature of simple and moderately complex organic compounds. The module also discusses the fundamental principles of stereochemistry, substitution, addition and elimination reactions as well as synthesis planning.										
Intende	ed lear	ning outcomes								
Students know important categories of substances in organic chemistry. They are able to use different systems of nomenclature to determine simple substance names. Students are able to analyse the stereochemistry of molecules. They are able to describe and formulate some of the most important reactions in organic chemistry. For that purpose, they can analyse and categorise the characteristic reaction conditions and can use them for simple syntheses.										
Courses (type, number of weekly contact hours, language — if other than German)										
V + Ü (no information on SWS (weekly contact hours) and course language available)										
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)										
a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: 60 or 90 mi- nutes each; 3 written examinations: 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)										
Allocat	ion of _l	olaces								
Additio	onal inf	ormation								
Worklo	ad									
Poforro	d to in		ne for tooching dogroe progra	mmac						
Referred to in LPO I (examination regulations for teaching-degree programmes)										
§ 62 (1) 2. Chemie "Organische und Bioorganische Chemie"										
Module appears in										
Bachelor' degree (1 major) Biochemistry (2011)										
Bachelor' degree (1 major) Biochemistry (2013) Bachelor' degree (1 major) Biochemistry (2009)										
Bachelor' degree (1 major) Chemistry (2009) Bachelor' degree (1 major) Chemistry (2010)										
Bachelor' degree (1 major) Chemistry (2009)										
Bachelor' degree (1 major) Mathematics (2012)										
Bachelor' degree (1 major) Mathematics (2013)										
Bachel	or' deg	ree (1 major) Computati	onal Mathematics (20	09)						
Bachelor's (2009)	with 1 ma	ior Computational Mathematics		enerated 11-Jan-2023 • exam • ECTS) Computational Mathe	-	page 71 / 167				

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor' degree (1 major) FOKUS Chemistry (2011) First state examination for the teaching degree Gymnasium Chemistry (2009)



Application-oriented Subject Chemisty Compulsory Electives

(9 ECTS credits)

Module title Abbreviation					Abbreviation	
Organio	Organic Chemistry 2				08-0C2-092-m01	
Module	coord	inator		Module offered by		
holder	of the C	hair of Physically Organi	c Chemistry	Institute of Organic	Chemistry	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
9	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	undergraduate				
Conten	ts					
the exa on reac well as	mple o tions to rearrar	f carbonyl compounds, it o complex reaction mech	extends the student anisms. The course a ntroduces students to	s' knowledge of sub Ilso focuses on oxida	fic reactions of aromatics. Using stitution, elimination and additi- ation and reduction reactions as nethods of infrared spectrosco-	
Intende	ed learr	ning outcomes				
bonyl co they ca unknow	ompou n plan vn reac	nds. They are able to des and formulate multi-stag	scribe specific reactic e syntheses with con to describe importan	ons of carbonyls and applex reaction mecha	e the varying reactivity of car- aromatics. For that purpose, anisms and can transfer them to nods, to evaluate a spectrum and	
Courses	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V + Ü +	V (no i	nformation on SWS (weel	kly contact hours) an	d course language a	vailable)	
		e essment (type, scope, langua) le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
					ninations: 60 or 90 minutes 5 (groups of 2, approx. 30 minu-	
Allocati	ion of p	olaces				
Additio	nal info	ormation				
Workload						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Bachelor' degree (1 major) Biochemistry (2009) Bachelor' degree (1 major) Chemistry (2009) Bachelor' degree (1 major) Computational Mathematics (2009)						

Module	e title				Abbreviation
Theoretical Models in Chemistry 08-TC-092-m01					08-TC-092-m01
Module	e coord	inator		Module offered by	<u> </u>
lecture	r of lec	ture "Quantenchemie"		Institute of Physica	l and Theoretical Chemistry
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)	
3	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 semester undergraduate Admis ses in (usual lar atte		ses in the respective (usually 70% of exe	e classes as specifie rcises to be success	successful completion of exerci- d at the beginning of the course fully completed) as well as regu- aximum of 2 incidents of unexcu-	
Conten	ts				
spin, tł	ne Paul		inants, the Hartree-Fo	ock method, correlat	antum chemistry. It focuses on ion energy, configuration interac- dels of H2+.
Intende	ed lear	ning outcomes			
Studen	ts are a	able to describe excited s	tates of molecules w	ith the help of key c	oncepts and models.
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)	
1) Ü + V	no infoi	rmation on SWS (weekly	contact hours) and co	ourse language avail	able)
		sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, information on whether
or 90 m	ninutes		tions: approx. 60 min	nutes each) or b) ora	tten examinations: approx. 60 l examination of one candidate . 30 minutes)
Allocat	<u></u>				
Additio	onal inf	ormation			
Worklo	ad				
Referre	ed to in	LPOI (examination regulation	s for teaching-degree progra	mmes)	
			00 F.03.0		
Module	e appea	ars in			
Bachelor' degree (1 major) Chemistry (2010)					
Bachelor' degree (1 major) Chemistry (2009)					
	-	ree (1 major) Mathematic			
	-	ree (1 major) Mathematic		、 、	
	-	ree (1 major) Computatio		•	
	-	ree (1 major) Computatio			
	-	ree (1 major) Computatio ree (1 major) FOKUS Cher		13)	
Duchet	or acg				

Module	e title				Abbreviation		
Physical and Theoretical Chemistry 3: Symmetry and Quan				um Chemistry	08-PC3-092-m01		
Module coordinator				Module offered by	<u> </u>		
		ure "Quantenchemie"		•	l and Theoretical Cł	nemistry	
			Г	*		Termstry	
ECTS		od of grading	Only after succ. com	pl. of module(s)			
6	- r	rical grade					
Duratio	n	Module level	Other prerequisites				
1 seme:	ster	undergraduate	Admission prerequis ses in the respective (usually 70% of exer- lar attendance of exe sed absence).	classes as specifie cises to be success	d at the beginning of fully completed) as	of the course well as regu-	
Conten	ts						
This mo	odule d	iscusses the fundament	al principles of quantu	um chemistry and s	ymmetry in chemist	ry.	
		ning outcomes					
Studen	ts have	become familiar with the able to apply the knowl	, ,	•	emistry and symmet	try in che-	
Course	S (type, n	umber of weekly contact hours,	language — if other than Gerr	nan)			
V + Ü +	V + Ü (no information on SWS (weekly contact hours)	and course langua	ge available)		
		s essment (type, scope, langua le for bonus)	age — if other than German, e	xamination offered — if no	ot every semester, informa	tion on whether	
each; 3 tes) or o	writter c) oral e	n examinations (1 written n examinations: 60 minu examination in groups (g	tes each) or b) oral ex	amination of one ca			
Allocat	ion of p	liaces					
Additio	nal info	ormation	-				
Worklo	ad						
Referre	d to in	LPO I (examination regulation	s for teaching-degree program	nmes)			
Module	annea	rs in					
	or' degi	ree (1 major) Biochemist ree (1 major) Chemistry (
	-	ree (1 major) Chemistry (
	-	ree (1 major) Mathematic	-				
	Bachelor' degree (1 major) Mathematics (2013)						
Bachelor' degree (1 major) Computational Mathematics (2009)							
Bachelor' degree (1 major) Computational Mathematics (2012)							
Bachelor' degree (1 major) Computational Mathematics (2013)							
	Bachelor' degree (1 major) FOKUS Chemistry (2011)						
Bachelo	-	mination for the teaching	First state examination for the teaching degree Grundschule Chemistry (2009) First state examination for the teaching degree Hauptschule Chemistry (2009)				
Bachelo First sta	ate exa						
Bachelo First sta First sta	ate exa ate exa	mination for the teaching	g degree Hauptschule	Chemistry (2009)			
Bachelo First sta First sta First sta	ate exa ate exa ate exa		g degree Hauptschule g degree Realschule C	Chemistry (2009) hemistry (2009)			
Bacheld First sta First sta First sta First sta	ate exa ate exa ate exa ate exa ate exa	mination for the teaching mination for the teaching	g degree Hauptschule g degree Realschule C g degree Gymnasium (Chemistry (2009) hemistry (2009) Chemistry (2009)			



Application-oriented Subject Computer Science

(35 ECTS credits)

Students are recommended to select one of the following four combinations: (a) 10-I-RAL, 10-I-ST, 10-I-AR, 10-I-RAK, 10-I-RK, (b) 10-I-ADS, 10-I-ST, 10-I-PP, 10-I-SWP, (c) 10-I-ADS, 10-I-ST, 10-I-DB, 10-I-WMS, 10-I-OOP, (d) 10-I-ADS, 10-I-TI, 10-I-LOG, 10-I-GT, 10-I-KT



Application-oriented Subject Computer Science Compulsory Electives (35 ECTS credits)

Module title					Abbreviation	
Information transmission					10-l-lÜ-072-m01	
Module	e coord	inator		Module offered by		
holder	of the (Chair of Computer Scienc	e III	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)		
8	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
theory, ductior	spectr to the	um and Fourier transform structure of computer ne	, modulation technic	que, structure of digi	d fault correction, information tal transmission systems, intro-	
		ning outcomes				
		possess a technical, theo a knowledge that is nece	•	5	ucture of systems for information	
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	rman)		
V + Ü (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)	
		s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
		nation (80 minutes) or or o minutes)	al examination (one o	candidate each: 20 r	ninutes, groups of 2: 30 minutes,	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Bachel	or' deg	ree (1 major) Computer S	cience (2007)			
	-	ree (1 major) Mathematic				
	-	ree (1 major) Mathematic		、 、		
Bachelor' degree (1 major) Computational Mathematics (2009)						

Module title				Abbreviation		
Digital computer systems					10-I-RAL-072-m01	
Modul	e coord	inator		Module offered by		
holder	of the (Chair of Computer Scienc	e V	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
8	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conter	ts					
			-		nchronous and asynchronous cir- e programming, memory hierar-	
Intend	ed lear	ning outcomes				
ming o	f easy r				up to the design and program- vare description languages for the	
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)		
V + Ü (no infoi	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)	
		sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
		nation (80 minutes) or or o minutes)	al examination (one o	candidate each: 20 r	ninutes, groups of 2: 30 minutes,	
Allocat	ion of p	olaces				
Additio	onal inf	ormation				
Worklo	ad					
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Bachelor' degree (1 major) Computer Science (2007) Bachelor' degree (1 major) Mathematics (2008)						
	-	ree (1 major) Mathematic)		
Bachelor' degree (1 major) Computational Mathematics (2009)						

Module title					Abbreviation
Theoretical informatics					10-l-Tl-072-m01
Module	e coord	inator		Module offered by	
Dean o	f Studie	es Informatik (Computer S	Science)	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
8	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
		, decidability, countabilit Ilar sets, generative gram			nctions and circuits, finite auto- nsitive languages.
Intende	ed learr	ning outcomes			
tability	, compl		olean functions and c	ircuits, finite automa	nputability, decidability, coun- ata and regular sets, generative
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)
		e essment (type, scope, langua; le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
		nation (80 minutes) or ora o minutes)	al examination (one o	candidate each: 20 n	ninutes, groups of 2: 30 minutes,
Allocat	ion of p	olaces			
Additio	onal info	ormation			
Worklo	ad				
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module appears in					
	-	ree (1 major) Computer So			
	-	ree (1 major) Mathematic			
	-	ree (1 major) Mathematic ree (1 major) Computation)	
Bachelor' degree (1 major) Computational Mathematics (2009)					

Module title				Abbreviation			
Algorit	Algorithm and data structures				10-I-ADS-072-m01		
Module	coord	inator		Module offered by			
Dean of	fStudie	es Informatik (Computer S	Science)	Institute of Comput	er Science		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)			
8	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 semes	ster	undergraduate					
Conten	ts						
		alysis of algorithms, recu trees, graphs, basic grap			ods, data structures, abstract da-		
Intende	ed learı	ning outcomes					
lyse the three ba are able familia	em. The asic pro e to inc r with t	ey are able to apply recur ogramming paradigms ar lependently design algor	sion in algorithms an nd are able to apply th ithms as well as to pr e design of algorithm	d data structures. The mem in practical prog recisely describe and s and are able to ap	to precisely describe and ana- ne students are familiar with the grams.] [Version 2: The students d analyse them. The students are ply them in practical programs. rove their correctness.]		
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)			
V + Ü (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)		
		essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
		nation (80 minutes) or or o minutes)	al examination (one o	candidate each: 20 n	ninutes, groups of 2: 30 minutes,		
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	ad						
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)			
Module appears in							
Bachelo Bachelo Bachelo Bachelo	Bachelor' degree (1 major) Computer Science (2007) Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Business Information Systems (2007)						
Bachelo	or' deg	ree (1 major) Business In	formation Systems (2	008)			
Bachelo	Bachelor' degree (1 major) Computational Mathematics (2009)						

Module title					Abbreviation		
Automation and control technology					10-I-AR-072-m01		
Module	e coord	inator		Module offered by			
holder	of the (Chair of Computer Scienc	e VII	Institute of Comput	er Science		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)			
8	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 seme	ster	undergraduate					
Conten	ts						
tion, tra ring, au putatio system	ansfer f utomata on mach s, proc	unction, plant, controller a, structure of Petri nets, nines, communication be ess synchronisation, pro	r types, basic feedbac Petri nets for automis tween process comp	ck loop, fundamenta sation, machine-rela uters and periphery	technology, Laplace transforma- I principles of control enginee- ted structure of processing com- devices, software for automation systems, real-time planning.		
		ning outcomes					
-		master the fundamentals					
		number of weekly contact hours, l					
		mation on SWS (weekly o					
		sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, information on whether		
written	exami	nation (80 minutes)					
Allocat	ion of p	olaces					
Additio	onal inf	ormation					
Worklo	Workload						
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module appears in							
		ree (1 major) Computer S					
	-	ree (1 major) Mathematic					
	-	ree (1 major) Mathematic					
Bachelor' degree (1 major) Computational Mathematics (2009)							

Module title					Abbreviation
Data bases 10-I-DB-072-mod					10-I-DB-072-m01
Module	e coord	inator		Module offered by	
Dean o	f Studi	es Informatik (Computer	Science)	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
	-	ebra and complex SQL st gement.	atements; database	planning and norma	l forms; xml data modelling; tran-
Intende	ed lear	ning outcomes			
		possess a knowledge abo g in XML.	out database modelli	ng and queries in SC	QL, transactions as well as easy
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü (r	no infoi	mation on SWS (weekly	contact hours) and co	ourse language avail	able)
		Sessment (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	ot every semester, information on whether
		nation (50 minutes) or or 5 minutes)	al examination (one o	candidate each: 15 m	ninutes, groups of 2: 20 minutes,
Allocat	ion of _l	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	mmes)	
Module	e appea	ars in			
Bachel	or' deg	ree (1 major) Computer S	cience (2007)		
	-	ree (1 major) Mathematic			
Bachelor' degree (1 major) Mathematics (2007)					
	Bachelor' degree (1 major) Technology of Functional Materials (2009)				
	Bachelor' degree (1 major) Technology of Functional Materials (2010) Bachelor' degree (1 major) Business Information Systems (2007)				
	-	ree (1 major) Business in ree (1 major) Business in			
	-	ree (1 major) Business In ree (1 major) Business In	, ,		
	-	ree (1 major) Busiliess in ree (1 major) Computatio	•		
	-	ree (1 major) Computatio		•	
200100					

Module title				Abbreviation		
Graphtheoretical concepts and algorithms					10-l-GT-072-m01	
Module	e coord	inator		Module offered by		
holder	of the O	Chair of Computer Scienc	e l	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
8	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
forests work de graph p with pla miliar v	and ma esign a problen anar gra vith nev	atroids, depth first search nd routing, planar graphs ns: we solve round trip pr aphs and find out how th	n, breadth first search s, graph transformatio oblems, calculate ma e ranking algorithm c amples of graph prob	n, shortest paths, flo ons] [Version 2: On t aximal flows, find ma of Google works. On lems, for example h	all and irreducible kernel, trees, ows and streams, matchings, net- he one hand, we handle typical atchings and colourings, work the other hand, we become fa- ow we model problems as linear	
		ning outcomes	· · ·	· -		
rests, n sign an blems o the lect	natroid d routi of comp ure he	s, depth first search, brea ng, planar graphs, graph puter science as graph pr	adth first search, sho transformations.] [Ve oblems. In addition, roblem algorithmical	rtest path, flows and ersion 2: The student the participants are	and irreducible kernel, trees, fo- d streams, matching, network de- ts are able to model typical pro- able to decide which tool from udents learn in detail how to esti-	
-		umber of weekly contact hours, l	-	man)		
V + Ü (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)	
		essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, information on whether	
		nation (80 minutes) or or o minutes)	al examination (one o	candidate each: 20 r	ninutes, groups of 2: 30 minutes,	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Workload						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Bachel Bachel	Bachelor' degree (1 major) Computer Science (2007) Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2007)					
Bachel	or' deg	ree (1 major) Computatio	nal Mathematics (20	09)		

Module title					Abbreviation	
Theory of complexity					10-I-KT-072-m01	
Module	coord	inator		Module offered by		
holder	of the (Chair of Computer Scienc	e IV	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
8	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
sumption	on vers		terminism versus ind	eterminism, hierarch	nd time classes, memory con- nical theorems, translation me- of systems.	
Intende	ed learr	ning outcomes				
ments a putatio comple dament on vers	[Version 1: The students possess a fundamental and applicable knowledge in the areas of complexity measure- ments and classes, general relationships between space and time classes, memory consumption versus com- putation time, determinism versus indeterminism, hierarchical theorems, translation methods, P-NP problem, completeness problems, Turing reduction, interactive proof systems.] [Version 2: The students possess a fun- damental and applicable knowledge in the areas of complexity measurements and classes, memory consumpti- on versus computation time, determinism versus indeterminism, P-NP problem, completeness problems, lower bounds, Boolean hierarchy, polynomial time hierarchy, complexity of parallel algorithms and complexity of pro-					
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V + Ü (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language availa	able)	
		e essment (type, scope, langua; le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
		nation (80 minutes) or ora o minutes)	al examination (one o	andidate each: 20 n	ninutes, groups of 2: 30 minutes,	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	appea	irs in				
	-	ree (1 major) Computer S				
	-	ree (1 major) Mathematic ree (1 major) Mathematic				
	-	•		09)		
	Bachelor' degree (1 major) Computational Mathematics (2009)					

Module title				Abbreviation			
Logic fo	or infor	matics			10-l-LOG-072-m01		
Module	e coord	inator		Module offered by			
Dean o	f Studie	es Informatik (Computer	Science)	Institute of Comput	er Science		
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)			
5	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 seme	ster	undergraduate					
Conten	ts						
		mantics of propositional ets, syntax and semantic		nd normal forms, Ho	rn formulas, SAT, resolution, infi-		
Intende	ed learı	ning outcomes					
					ositional logic, equivalence and semantics of predicate logic.		
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)			
V + Ü (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)		
		essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
		nation (50 minutes) or ora 5 minutes)	al examination (one o	candidate each: 15 m	inutes, groups of 2: 20 minutes,		
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	ad						
Referre	d to in	LPOI (examination regulation	s for teaching-degree progra	mmes)			
Module appears in							
	-	ree (1 major) Computer S					
	-	ree (1 major) Mathematic					
	-	ree (1 major) Mathematic		20)			
Bachelor' degree (1 major) Computational Mathematics (2009)							

Modul	e title				Abbreviation
Object	oriente	ed programming			10-I-00P-072-m01
Module coordinator Module offered by		<u> </u>			
Dean c	of Studi	es Informatik (Computer	Science)	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ester	undergraduate			
Conter	nts				
Polymo ment.	orphism	n, generic programming, ı	meta programming, w	veb programming, te	mplates, document manage-
Intend	ed lear	ning outcomes			
	udents a ractical		rent paradigms of obj	ect-oriented prograr	nming and have experience in
Course	es (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)	
V + Ü (no infoi	rmation on SWS (weekly	contact hours) and co	ourse language avail	able)
module i written	s creditab I exami	le for bonus)	-		ot every semester, information on whether ninutes, groups of 2: 20 minutes,
	tion of J				
Additio	onal inf	ormation			
Worklo	bad		-		
Referre	ed to in	LPOI (examination regulation	s for teaching-degree progra	mmes)	
			0 0 0 0 0 0 0		
Modul	e appea	ars in			
Bachel	lor' deg	ree (1 major) Computer S	cience (2007)		
Bachelor' degree (1 major) Mathematics (2008)					
	-	ree (1 major) Mathematic			
Bachelor' degree (1 major) Business Information Systems (2007)					
		ree (1 major) Business In			
	-	ree (1 major) Business In	,	-	
Bachel	lor' deg	ree (1 major) Computatio	nal Mathematics (20	09)	

Module title					Abbreviation
Practical course in programming				10-I-PP-072-m01	
Module coordinator Module offered by					
Dean o	fStudie	es Informatik (Computer	Science)	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
9	(not) s	successfully completed			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
The pro	gramm	ing language Java. Indep	endent creation of si	nall to middle-sized	, high-quality Java programs.
Intende	ed learı	ning outcomes			
The stu	dents a	are able to independently	/ develop small to mi	ddle-sized, high-qua	ality Java programs.
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
P (no in	format	ion on SWS (weekly cont	act hours) and cours	e language available	2)
		essment (type, scope, langua	ge — if other than German, e	examination offered — if no	ot every semester, information on whether
nation	(60 to <u>9</u>				al examination: written exami- nutes, groups of 2: 20 minutes,
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Referre	d to in	LPOI (examination regulations	s for teaching-degree progra	mmes)	
Module	e appea	irs in			
Bachelor' degree (1 major) Computer Science (2007) Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Computational Mathematics (2009)					

Module	e title				Abbreviation
Compu	ter arcl	nitecture			10-I-RAK-072-m01
Module	e coord	inator		Module offered by	
holder	of the (Chair of Computer Scienc	e V	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
		t architectures, command rector processors, multi-c		pipelining, statical a	and dynamic instruction schedu-
Intende	ed learı	ning outcomes			
		naster the most importar operating systems.	nt techniques to desig	gn fast computers as	s well as their interaction with
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)
		essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
		nation (80 minutes) or or o minutes)	al examination (one o	candidate each: 20 n	ninutes, groups of 2: 30 minutes,
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module	appea	ars in			
	-	ree (1 major) Computer S			
	-	ree (1 major) Mathematic			
	-	ree (1 major) Mathematic		20)	
васпец	or deg	ree (1 major) Computatio	nat mathematics (200	09)	

Module title					Abbreviation
Computer networks and communication systems			on systems		10-I-RK-072-m01
Module coordinator		Module offered by	,		
holder	of the (Chair of Computer Scien	ce III	Institute of Compu	iter Science
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
8	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	Its				
and str chies, and IS	ructure dataflo O archit	of computer networks: n w control and traffic con tecture models. Internet:	etwork structure, netw trol, transfer network. structure and basic r	work access, access Communication pr nechanism, TCP/IP,	troduction to method architecture s methods, digital transfer hierar- otocols: fundamental principles routing, network management. ommunication systems and net-
Intend	ed lear	ning outcomes			
		possess an intricate kno damental principles to ra		re of computer netw	vorks and communication systems
Course	S (type, r	number of weekly contact hours,	language — if other than Ger	rman)	
V + Ü (I	no infoi	mation on SWS (weekly	contact hours) and co	ourse language avai	ilable)
		sessment (type, scope, langu le for bonus)	age — if other than German,	examination offered — if r	not every semester, information on whether
		nation (80 minutes) or o o minutes)	ral examination (one o	candidate each: 20	minutes, groups of 2: 30 minutes,
Allocat	tion of p	olaces			
Additio	onal inf	ormation			
Worklo	ad				
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module appears in					
Bachelor' degree (1 major) Computer Science (2007)					
Bachelor' degree (1 major) Mathematics (2008)					
	-	ree (1 major) Mathemati			

Module	e title				Abbreviation
Softwa	re tech	nology			10-l-ST-072-m01
Module	e coord	inator		Module offered by	
Dean of	f Studi	es Informatik (Computer	Science)	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
8	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
bases a	and obj		oundations of web p	rogramming (HTML,)	r interfaces, foundations of data- XML), software development pro- lity assurance.
Intende	ed lear	ning outcomes			
		possess a fundamental the second s		al knowledge on the	e design and development of
Course	S (type, r	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)
module is	creditab	le for bonus)			t every semester, information on whether
		nation (80 minutes) or or o minutes)	al examination (one o	candidate each: 20 h	ninutes, groups of 2: 30 minutes,
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	mmes)	
Module	e appea	irs in			
Bachelor' degree (1 major) Computer Science (2007) Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Business Information Systems (2007) Bachelor' degree (1 major) Business Information Systems (2008) Bachelor' degree (1 major) Computational Mathematics (2009)					
			(

Module	title				Abbreviation
Practica	al cour	se in software			10-I-SWP-072-m01
Module	coord	inator		Module offered by	
Dean of	fStudi	es Informatik (Computer S	Science)	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)	
10	(not) s	successfully completed			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	undergraduate			
Conten	ts				
cation o	of solut		AL) and milestones, u	user manual, program	uirements specifications, specifi- nming documentation, presenta-
Intende	ed lear	ning outcomes			
The stu small te		possess the practical skil	ls for the design, dev	velopment and execu	ition of a software project in
Courses	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)	
P (no in	Iformat	tion on SWS (weekly cont	act hours) and cours	e language available	.)
		Sessment (type, scope, langua ₎ le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
lution c tributio	ompor ns mao	nents (software) and the o	documentation of the ent required; software	ese; if project is com	cifications, the corresponding so- pleted in groups, proof of con- entation as specified in assign-
Allocati	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Referre	d to in	LPOI (examination regulations	s for teaching-degree progra	mmes)	
Module	e appea	ars in			
Bachelo Bachelo Bachelo Bachelo	or' deg or' deg or' deg or' deg	ree (1 major) Computer So ree (1 major) Mathematic ree (1 major) Mathematic ree (1 major) Business Inf ree (1 major) Business Inf ree (1 major) Computation	s (2008) s (2007) formation Systems (2 formation Systems (2	2008)	

Module	e title				Abbreviation
Knowle	edge m	anagement systems and	d data mining		10-I-WMS-072-m01
Module	e coord	inator		Module offered by	•
holder	of the (Chair of Computer Scien	ce VI	Institute of Compu	ter Science
ECTS	1	od of grading	Only after succ. con		
10	1	rical grade			
Duratio		Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten					
poral cl quisitic learnin [Versio basic k poral cl tic web Intende The stu manag quired Course	losures on and g algor n 2: Fo nowled losure) .] ed lear idents ement experie s (type, r	s), problem classes and process models, data m ithms with data mining undations in the followi dge representation and , solution methods (dia ning outcomes possess the theoretical	solution methods (dia nining (data warehouse (learning of decidabili ng areas: process and inference (rules, objec gnostic, construction), and practical knowled og systems including k	gnostic, constructio e and OLAP, data pro- ty trees, rules, subg product-oriented kr ts, constraints, pro- knowledge acquising ge necessary to uncon nowledge formalisa	babilistic, non-monotonous, tem on, simulation), knowledge ac- eprocessing, data visualisation), roups, clusters), semantic web.] nowledge management systems, babilistic, non-monotonous, tem tion and process models, semar derstand and develop knowledge tion. The students also have ac-
					ot every semester, information on whether
		ole for bonus)			ot every semester, information on whether
		nation (80 minutes) or c o minutes)	oral examination (one o	candidate each: 20	minutes, groups of 2: 30 minute
Allocat	ion of _l	places			
Additio	onal inf	ormation			
Worklo	ad				
Referre	ed to in	LPO I (examination regulatio	ns for teaching-degree progra	immes)	
Module	e appea	ars in			
Bachel Bachel	or' deg or' deg	ree (1 major) Computer ree (1 major) Mathemati ree (1 major) Mathemati ree (1 major) Business I	ics (2008) ics (2007)	2007)	



Application-oriented Subject Physics

(35-36 ECTS credits)

If consent is obtained from the examination committee, modules 11-ENNF1 and 11-ENNF2 (7 ECTS credits each) may be replaced with modules 11-E1 and 11-E2 (8 ECTS credits each).



Application-oriented Subject Physics Compulsory Courses

(16 ECTS credits)

Module	e title				Abbreviation
Introdu	ction t	o Physics Part 1 for stude	11-ENNF1-062-m01		
Module	coord	inator		Module offered by	
		ector of the Institute of Ap	onlied Physics	Faculty of Physics a	and Astronomy
ECTS		od of grading	Only after succ. com		
7		rical grade			
, Duratio		Module level	Other prerequisites		
1 seme		undergraduate			
Conten		undergraduate			
		bration theory, thermody	namics		
			iidiiiics.		
		ning outcomes			
		nave basic knowledge of		-	
		umber of weekly contact hours, l			
		mation on SWS (weekly o	-		
			ge — if other than German, e	examination offered — if no	ot every semester, information on whether
		le for bonus)			
		nation (approx. 120 minu	tes)		
Allocat					
	· · · · · · · · · · · · · · · · · · ·	f pool of general key skill	s (ASQ): 20 places. P	laces will be allocat	ed by lot.
Additio	nal inf	ormation			
Worklo	ad				
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module	e appea	ars in			
Bachel	or' deg	ree (1 major) Mathematic	s (2008)		
		ree (1 major) Mathematic			
		ree (1 major) Mathematic			
	-	ree (1 major) Mathematic	-		
	-	ree (1 major) Mathematic			
	-	ree (1 major) Technology ree (1 major) Technology		-	
	-	ree (1 major) Technology			
	-	ree (1 major) Computation		-	
	-	ree (1 major) Computatio		•	
	-	ree (1 major) Computatio		-	
	-	ree (1 major) Aerospace (-	
	-	ree (1 major) Aerospace (•	•	
	-	ree (1 major) Aerospace (ree (1 major) Eurotional N	•)11)	
	-	ree (1 major) Functional A ree (1 major) Technology		uls (2006)	
Datiel	or ueg	ice (I major) recimology			

Module	e title				Abbreviation	
Introdu	iction t	o Physics Part 2 for stude	ents of Physics Relat	ed Minor Subjects	11-ENNF2-062-m01	
Module coordinator Module offered by						
Managi	ing Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	and 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	undergraduate				
Conten	ts					
Science	e of ele	ctricity, magnetism, optic	s, Atomic Physics.			
Intende	ed lear	ning outcomes				
The stu	dents l	have basic knowledge of	physics for engineeri	ng students.		
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)		
V + Ü (r	no infoi	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)	
		sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, information on whether	
written	exami	nation (approx. 120 minu	tes)			
Allocat	ion of p	olaces				
Only as	s part o	f pool of general key skill	s (ASQ): 20 places. P	laces will be allocat	ed by lot.	
Additio	nal inf	ormation				
Worklo	ad					
Referre	d to in	LPOI (examination regulations	s for teaching-degree progra	mmes)		
Module	e appea	ars in				
Bachel	or' deg	ree (1 major) Mathematic	s (2008)			
		ree (1 major) Mathematic				
	-	ree (1 major) Mathematic				
	-	ree (1 major) Mathematic ree (1 major) Mathematic	-			
	-	ree (1 major) Mathematic		15 (2000)		
	-	ree (1 major) Technology		-		
	-	ree (1 major) Computation				
Bachel	Bachelor' degree (1 major) Computational Mathematics (2014)					
	-	ree (1 major) Computatio				
		ree (1 major) Computation				
	-	ree (1 major) Aerospace (ree (1 major) Aerospace (•	•		
	-	ree (1 major) Aerospace (ree (1 major) Aerospace (•	•		
		ree (1 major) Functional N				
	-	ree (1 major) Technology		lls (2006)		

Module	e title				Abbreviation
Measu	rement	s and Data Analysis			11-PFR-072-m01
Module	e coord	inator		Module offered by	
Managi	ing Dire	ector of the Institute of Ap	oplied Physics	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
2	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
		, error approximation and oution functions, significa			average values and standard de- lications.
Intende	ed lear	ning outcomes			
		e, the students acquire su error propagation and the			ave knowledge of practical experi-
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Gei	man)	
V + Ü (r	no infoi	rmation on SWS (weekly o	contact hours) and co	ourse language avail	able)
module is	exami	le for bonus) nation (approx. 120 minu			t every semester, information on whether
Additio	nal inf	ormation			
Worklo	ad				
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	mmes)	
Module	e appea	ars in			
Bachel	or' deg	ree (1 major) Mathematic	s (2008)		
	-	ree (1 major) Mathematic			
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)					
	-	ree (1 major) Nanostructu	•, •, •,		
		ree (1 major) Computatio		09)	
Bachel	or's de	gree (1 major, 1 minor) Ph	ysics (Minor, 2008)		



Application-oriented Subject Physics Compulsory Electives 1

(3-4 ECTS credits)

Module	e title				Abbreviation
Physic	s Labor	atory Course for student	s of Physics Related	Minor Subjects	11-PNNF-062-m01
Module	e coord	inator		Module offered by	1
Manag	ing Dire	ector of the Institute of Ap	oplied Physics	Faculty of Physics	and Astronomy
ECTS	Metho	od of grading	Only after succ. cor	npl. of module(s)	
3	(not) s	successfully completed			
Duratio	on	Module level	Other prerequisites	;	
1 seme	ster	undergraduate			
Conten	Its		<u>.</u>		
Mecha Physics		bration theory, thermody	namics, optics, X-ray	vs, nuclear magnetio	c resonance, Atomic and Nuclear
Intende	ed lear	ning outcomes			
The stu	Idents	know the principles of Ph	ysics.		
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ge	rman)	
P (no ir	nformat	tion on SWS (weekly cont	act hours) and cours	e language availab	le)
		sessment (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if i	not every semester, information on whether
a) oral	test (ap	oprox. 15 minutes) during	experiment and b) ι	ingraded written ex	amination (approx. 90 minutes)
Allocat	ion of _l	olaces			
Only as	s part o	f pool of general key skill	s (ASQ): 15 places. P	laces will be alloca	ted by lot.
Additio	onal inf	ormation			
Worklo	ad				
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	ammes)	
Module	e appea	ars in			
Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel	or' deg or' deg	ree (1 major) Mathematic ree (1 major) Technology ree (1 major) Technology ree (1 major) Computatio ree (1 major) Computatio ree (1 major) Computatio ree (1 major) Computatio ree (1 major) Functional <i>N</i> ree (1 major) Technology	s (2014) s (2012) s (2013) s (2007) of Functional Materia of Functional Materia nal Mathematics (20 nal Mathematics (20 nal Mathematics (20 Naterials (2012)	als (2010) 09) 14) 12) 13)	

Module title Abbreviation						
Practical Course 11-PG-IAF-0					11-PG-IAF-072-m01	
Module coordinator Module offered by			Module offered by			
Manag	ing Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)		
4	(not) s	successfully completed				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	undergraduate	Module 11-PFR recor	nmended.		
Conten	ts					
		of mechanics, thermodyr cs and wave optics. Basic				
Intende	ed lear	ning outcomes				
are abl	e to inc	have knowledge and skill lependently plan and cor nent protocol.				
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)		
BAM): I Klassis Elektriz Wellen Atom- u	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) 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)					
		sessment (type, scope, langua			•	
module is	s creditab	le for bonus)				
1. Lab (ly co phys 2. Lab (ly co	course mplete ics-rela course mplete	as the following assessm in part 1: a) Preparing, pe d if a Testat (exam) is par ated contents of the cours in part 2: a) Preparing, pe d if a Testat (exam) is par ated contents of the cours	rforming and evaluat ssed. b) Talk (with di se (approx. 30 minute erforming and evalua ssed. b) Talk (with di	scussion) to test the es). ting the experiments scussion) to test the	students' understan	nding of the successful-
Studen nent, th To pass Studen	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 compo- nent, they must pass both elements a) and b). To pass this module, students must successfully complete two out of the six courses. Students must attend BAM, KLP or ELS courses prior to attending WOP, AKP or CMT courses. To pass this module, students must pass both assessment component 1 and assessment component 2.					ment compo-
Allocat	ion of _l	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Referre	d to in	LPOI (examination regulations	s for teaching-degree progra	mmes)		
Module	e appea	ars in				
		jor Computational Mathematics		enerated 11-Jan-2023 • exam ECTS) Computational Mathe		page 102 / 167

Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Computational Mathematics (2009)



Application-oriented Subject Physics Compulsory Electives 2

(16 ECTS credits)

Modul	e title		Abbreviation				
Experi Physic		Physics 3 (Optics, Quant	tum Phenomena, l	ntroduction Atomic	11-E3-072-m01		
Module coordinator Module offered by					/		
Manag	ing Dir	ector of the Institute of A	oplied Physics	Faculty of Physics	and Astronomy		
ECTS	Meth	od of grading	Only after succ. o	compl. of module(s)			
8	nume	rical grade					
Duration Module level		Other prerequisites					
1 semester		undergraduate					
Conter	nts						
Physic	al laws	of optics, quantum phen	omena, introducti	on to Atomic Physics.			
		ning outcomes	,				
	udents		asic contexts and p	principles of optics, q	uantum phenomena and Atomic		
Course	es (type, 1	number of weekly contact hours,	language — if other than	German)			
V + Ü (no info	rmation on SWS (weekly	contact hours) and	l course language ava	ilable)		
module i	s creditat	Sessment (type, scope, langua ole for bonus) nation (approx. 120 minu		an, examination offered — if	not every semester, information on whethe		
Alloca	tion of	places					
Additio	onal inf	ormation					
Worklo	bad						
Referre	ed to in	LPO I (examination regulation	s for teaching-degree pro	ogrammes)			
Modul	e appea	ars in					
Bache	lor' deg	ree (1 major) Mathematic	cs (2008)				
	-	ree (1 major) Mathematic					
	Bachelor' degree (1 major) Physics (2007)						
	Bachelor' degree (1 major) Physics (2009)						
	Bachelor' degree (1 major) Physics (2008)						
		ree (1 major) Nanostructu					
		ree (1 major) Nanostructu					
	Bachelor' degree (1 major) Computational Mathematics (2009) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008)						
Bache	lor's de	gree (1 major, 1 minor) Pł	nysics (Minor, 200	8)			

Module title Abbreviation							
Theoretical Physics 1 (Theoretical Mechanics)					11-T1-072-m01		
Module coordinator				Module offered by			
Managing Director of the Institute of Theoretical Physics and Astrophysics			neoretical Physics	Faculty of Physics and Astronomy			
ECTS	Meth	od of grading					
8	nume	rical grade					
		Other prerequisites					
1 seme	1 semester undergraduate						
Conten	ts		•				
Newtor	nian me	echanics, Lagrangian me	chanics, Hamiltonian	equation of motion.	, conservation laws.		
		ning outcomes			·		
	dents		rinciples of classical t	theoretical mechanio	cs and the required calculation		
Course	S (type, r	number of weekly contact hours, I	language — if other than Ge	rman)			
V + Ü (r	no info	rmation on SWS (weekly	contact hours) and co	ourse language avail	lable)		
module is	creditab	Sessment (type, scope, langua ole for bonus) nation (approx. 120 minu		examination offered — if no	ot every semester, information on whether		
Allocat		• •					
Additio	nal inf	ormation					
Workload							
Referre	d to in	LPOI (examination regulation	s for teaching-degree progra	immes)			
			0 = -0.1 = p100.0	/			
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)						
Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008)							

Module title					Abbreviation		
Theoretical Physics 2 (Theoretical Electrostatics and Electrodynamics) 11-T2-072-m01							
Module coordinator				Module offered by			
Managing Director of the Institute of Theoretical Physics and Astrophysics			Theoretical Physics	Faculty of Physics and Astronomy			
ECTS				npl. of module(s)		
8	nume	rical grade					
			Other prerequisites	Other prerequisites			
1 semester undergraduate							
Conten	Contents						
Electrostatics, magnetostatics, Maxwell equations, covariant formulation, electrodynamics and matter.							
		ning outcomes	• • • • • •	, -	,		
			principles of classical	electrodynamics	and the required calculation me-		
Course	S (type, r	number of weekly contact hou	rs, language — if other than Ge	rman)			
V + Ü (r	no info	rmation on SWS (week	ly contact hours) and c	ourse language a	available)		
module is	creditab exami	le for bonus) nation (approx. 120 mi			– if not every semester, information on whether		
Additio	nal inf	ormation					
Worklo	ad						
Referre	d to in	LPO I (examination regulat	ions for teaching-degree progra	ammes)			
Module	e 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) Physics (2008) Bachelor' degree (1 major) Nanostructure Technolomy (2008)							
Bachelor' degree (1 major) Nanostructure Technology (2008) Bachelor' degree (1 major) Nanostructure Technology (2007)							
Bachelor' degree (1 major) Nanostructure recimology (2007) Bachelor' degree (1 major) Computational Mathematics (2009)							
Bachel	or' deg						

Module title Abbreviation					Abbreviation		
Theoretical Physics 3 (Theoretical Quantum Mechanics)					11-T3-072-m01		
Module coordinator				Module offered by			
	Managing Director of the Institute of Theoretical Physics and Astrophysics			Faculty of Physics and Astronomy			
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)			
8	nume	rical grade					
Duratio	n	Module level	Other prerequisites	Other prerequisites			
1 seme	1 semester undergraduate						
Conten	ts		•				
oscillat	or, ang	gular momentum and spi			quantum mechanics, harmonic		
		ning outcomes					
		· · · ·	- · · ·		required calculation methods.		
Course	S (type, 1	number of weekly contact hours,	language — if other than Ge	rman)			
V + Ü (r	no info	rmation on SWS (weekly	contact hours) and co	ourse language avai	lable)		
module is	creditat	ole for bonus)		examination offered — if no	ot every semester, information on whether		
		nation (approx. 120 minu	utes)				
Allocat	ion of	places					
Additio	nal inf	ormation	_				
Worklo	ad						
Referre	d to in	LPO I (examination regulation	is for teaching-degree progra	ammes)			
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)						
Bachel	Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008)						

Module	e title				Abbreviation	
Theoretical Physics 4 (Theoretical Thermodynamics and St				atistics)	11-T4-072-m01	
Module	e coord	inator		Module offered	l by	
Manag and As		ector of the Institute of T sics	heoretical Physics	Faculty of Phys	ics and Astronomy	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s))	
8	nume	rical grade		-		
Duratio		Module level	Other prerequisites	;		
1 seme	ster	undergraduate				
Conten	ts					
Princip chanic:		hermodynamics, fundan	nental theorems, ther	modynamic pote	entials, principles of statistical me-	
Intend	ed lear	ning outcomes				
		have knowledge of the p ethods.	rinciples of thermody	namics and stat	istical mechanics and the required	
Course	S (type, r	number of weekly contact hours,	language — if other than Ge	rman)		
V + Ü (ı	no info	rmation on SWS (weekly	contact hours) and co	ourse language a	available)	
		Sessment (type, scope, langu ole for bonus)	age — if other than German,	examination offered -	- if not every semester, information on whether	
written	exami	nation (approx. 120 mini	utes)			
Allocat	ion of _l	places				
Additio	onal inf	ormation				
Worklo	ad					
Referre	ed to in	LPO I (examination regulation	ns for teaching-degree progra	ammes)		
Module	e appea	ars in				
		ree (1 major) Mathemati	cs (2008)			
Bachel	or' deg	ree (1 major) Mathemati	cs (2007)			
Bachelor' degree (1 major) Physics (2007)						
Bachelor' degree (1 major) Physics (2009)						
Bachelor' degree (1 major) Physics (2008)						
		ree (1 major) Nanostruct				
		ree (1 major) Nanostruct				
		ree (1 major) Computatio gree (1 major, 1 minor) P		09)		
Dacriel	or s de	giee (1 major, 1 mmor) P	inysics (williof, 2008)			

Module title Abbreviation							
Experir	Experimental Physics 5 (Introduction to Solid State Physics) 11-E5-082-mo1						
Module	e coord	inator		Module offered by			
Manag	ing Dir	ector of the Institute of Ap	oplied Physics	Faculty of Physics a	and Astronomy		
ECTS	Meth	od of grading	Only after succ. con	pl. of module(s)			
8	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 seme	ster	undergraduate					
Conten	ts		Ļ				
		of solids: Bonding and s lectron gas)	tructure, lattice dynai	mics, thermal prope	rties, principles of electronic pro-		
Intend	ed lear	ning outcomes					
		have knowledge of the ba properties, principles of			nding and structure, lattice dyna-		
Course	S (type, 1	number of weekly contact hours, I	anguage — if other than Ger	man)			
v + Ü (r	no info	rmation on SWS (weekly	contact hours) and co	ourse language avai	lable)		
			ge — if other than German, o	examination offered — if n	ot every semester, information on whether		
		ole for bonus)					
		nation (approx. 120 minu	ites)				
Allocat	ion of	places					
Additio	nal inf	ormation					
Worklo	ad						
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)			
Module							
Bachelor' degree (1 major) Physics (2008)							
Bachelor' degree (1 major) Nanostructure Technology (2008) Bachelor' degree (1 major) Computational Mathematics (2009)							
	Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008)						
Dachel	01 3 48		1,3,1,3,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1				



Application-oriented Subject Biology

(35 ECTS credits)

There is a restricted number of places in the application-oriented subject Biologie (Biology). Only those students that have submitted a written application and have obtained prior approval from the subject coordinator (Studienfachverantwortliche(r)) will be able to attend courses offered as part of modules from this application-oriented subject. A decision as to what applicants will be granted approval will be made as follows: applicants will be ranked by lottery and the places offered by the Faculty of Biology in the respective academic year will be allocated according to this ranking. Approval will cover in particular the courses offered as part of modules / module components from the area of mandatory courses. Approval may be withdrawn if students spent two consecutive semesters without completing any modules / module components from the application-oriented subject Biologie (Biology). In the case of students changing degree subjects, approval will become void.



Application-oriented Subject Biology Compulsory Courses

(10 ECTS credits)

Module title				Abbreviation		
Genetics, Neu	robiology, Behaviour			07-2A2GNV-072-m01		
Module coord	inator		Module offered by			
Dean of Studi	es Biologie (Biology)		Faculty of Biology			
ECTS Meth	od of grading	Only after succ. con	npl. of module(s)			
6 nume	rical grade					
Duration	Module level	Other prerequisites				
1 semester	undergraduate	By way of exception assessments.	, additional prerequi	isites are listed in the section on		
Contents						
Fundamental	principles of genetics, ne	urobiology and beha	vioural biology.			
Intended lear	ning outcomes					
bases of inhe cal mechanisi molecular and	ritance.] [Version 2: Stud ns and processes involve I formal bases of inherita	ents will understand ed in animal behaviou nce.]	that there are molec ur and will be able to	iour to the molecular and formal ular, cellular and system biologi- o relate animal behaviour to the		
	number of weekly contact hours, l			sted separately for each module		
07-2A2(07-2A2(07-2A2(Method of ass module is creditable Assessment in low. Unless st	GNV-2N-072: V + Ü (no info GNV-3V-072: V + Ü (no info Gessment (type, scope, langua ole for bonus) n this module comprises rated otherwise, successf	ormation on SWS (we ormation on SWS (we ge — if other than German, o the assessments in t	ekly contact hours) a ekly contact hours) a examination offered — if no he individual modul	and course language available) and course language available) and course language available) ot every semester, information on whether e components as specified be- successful completion of all indi-		
 low. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments. Assessment in module component o7-2A2GNV-1G-072: Basic Genetics Basic Genetics 2 ECTS, Method of grading: numerical grade written examination (approx. 30 minutes) Other prerequisites: Admission prerequisite to assessment: regular attendance of exercises and successful completion of the respective exercises as specified at the beginning of the course. Assessment in module component o7-2A2GNV-2N-072: Basic Neurobiology Basic Neurobiology 2 ECTS, Method of grading: numerical grade written examination (approx. 30 minutes) Other prerequisites: Admission prerequisite to assessment: regular attendance of exercises and successful completion of the respective exercises as specified at the beginning of the course. Assessment in module component o7-2A2GNV-3V-072: Behavioural Biology Behavioural Biology 2 ECTS, Method of grading: numerical grade written examination (approx. 30 minutes) Other prerequisites: Admission prerequisite to assessment: regular attendance of exercises and successful completion of the respective exercises as specified at the beginning of the course. Assessment in module component o7-2A2GNV-3V-072: Behavioural Biology Behavioural Biology 2 ECTS, Method of grading: numerical grade written examination (approx. 30 minutes, word problems and/or multiple choice questions) Other prerequisites: Admission prerequisite to assessment: regular attendance of exercises and successful completion of the respective exercises as specified at the beginning of the course. Allocation of places Only as part of "spezielles Studienangebot": 10 places.						
	· · · · ·	ebot": 10 places.				
Additional inf	ormation					

Workload

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

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Module appears in	1
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Bachelor' degree (1 major) Biology (2011) Bachelor' degree (1 major) Biology (2007) Bachelor' degree (1 major) Biology (2010) Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Computational Mathematics (2009) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor' degree (1 major, 1 minor) Biology (Minor, 2008) Bachelor's degree (1 major, 1 minor) Biology (Minor, 2010) No final examination (2010)

Module title					Abbreviation	
Structure and Function of Cells 07-1A1Z-072-m01					07-1A1Z-072-m01	
Module coordinator Module offered by					<u> </u>	
holder	of the (Chair of Plant Physiology	and Biophysics	Faculty of Biology		
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)		
4	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ester	undergraduate		pletion of the respec	regular attendance of exercises ctive exercises as specified at the	
Conten	nts					
acquai knowle before cells (b Intende Knowle ge of th and pla Course	int stud edge, th moving pacteria edge of he spec ant cell: es (type, r	ents with the elementary e course will then discus g on to its microscopic str , archaebacteria) and eu ning outcomes the structures of prokary	building blocks of lif s the cell, the smalle ructure. It will point o karyotic cells (animal otic and eukaryotic c intracellular and ext nponents and functic anguage — if other than Ger	e as well as biologic st unit of life, startin ut differences and si ls, plants).] ells and their (biolog racellular structures oning of microscopes man)		
Metho	d of ass	· · · · · · · · · · · · · · · · · · ·			ot every semester, information on whether	
written	exami	nation (60 minutes)				
Allocat	tion of p	olaces				
Additio	onal inf	ormation				
Worklo	oad					
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Computational Mathematics (2009)						



Application-oriented Subject Biology Compulsory Electives

(25 ECTS credits)

Students must take two out of the following three modules: 07-1A1E, 07-1A1P, 07-1A1T. When taking up their studies, students are highly recommended to consult with the course advisory service Biology that will help them choose appropriate modules from the remaining modules.

Module title					Abbreviation	
Bioinformatics					07-3A3BI-072-m01	
Module	coord	inator		Module offered by		
holder	of the C	Chair of Bioinformatics		Faculty of Biology		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
2	numei	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	undergraduate				
Conten	ts					
Fundam	nental p	orinciples of bioinformati	cs.			
Intende	ed learr	ning outcomes				
Studen	ts are p	proficient in methods for	the analysis of DNA a	nd protein database	25.	
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
compor • o	nent. 7-3A3B	I-1B-072: V (no informati	on on SWS (weekly c	ontact hours) and co	sted separately for each module ourse language available) ourse language available)	
		-			t every semester, information on whether	
		le for bonus)	ge — II other than German, e	xammation onered — If no	t every semester, mornation on whether	
	less st	ated otherwise, successf			e components as specified be- successful completion of all indi-	
• 1 • w Assess • 1 • te	ECTS, I vritten e ment ir ECTS, I erm pap	Method of grading: nume examination (approx. 20 module component o7- Method of grading: (not) per (approx. 5 to 10 page	rical grade minutes) 3A3BI-2B-072: Bioinf successfully complet	ormatics (Seminar)		
Allocati	-					
		f Biochemistry Master's:	5 places. Places will b	be allocated by lot.		
Additio	nal info	ormation				
Worklo	ad					
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)		
Module appears in						
Bachelor' degree (1 major) Biochemistry (2011) Bachelor' degree (1 major) Biochemistry (2009) Bachelor' degree (1 major) Biology (2007) Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Computational Mathematics (2009) Master's degree (1 major) Biochemistry (2012) Bachelor's degree (1 major, 1 minor) Biology (Minor, 2008)						

Module title					Abbreviation	
Ecology	Ecology of plants and animals					
Module coordinator				Module offered by		
Dean o	f Studie	es Biologie (Biology)		Faculty of Biology		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
6	numer	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
and bid as on th model (otic env he struc concep	rill provide students with ironments. The module w cture and dynamics of po ts of ecology, will becom edge necessary to develo	vill focus on the funct pulations and ecosys e familiar with examp	ional adaptation to stems. Students will bles of research findi	environmental condi be introduced to fun ings and will acquire	tions as well damental
Intende	ed learr	ning outcomes				
portant	abiotio vironm	amiliar with the fundame c and biotic factors that in ent. In addition, they und ues.	nfluence the distribut	tion and frequency o	f occurrence of orgar	nisms in
Course	S (type, n	umber of weekly contact hours, la	anguage — if other than Ger	man)		
compo • 0 • 0	nent. 7-3A30 7-3A30	omprises 2 module comp)E-1T-072: V + Ü (no infor)E-2P-072: V + Ü (no infor essment (type, scope, languag	mation on SWS (weel mation on SWS (wee	kly contact hours) an kly contact hours) ar	id course language a nd course language a	vailable) available)
		le for bonus)				
	less sta	this module comprises t ated otherwise, successf nents.				
 Assessment in module component o7-3A3OE-1T-072: Ecology of Animals (Lecture and Practice) Ecology of Animals (Lecture and Practice) 3 ECTS, Method of grading: numerical grade written examination (45 minutes) Assessment in module component o7-3A3OE-2P-072: Ecology of Plant (Lecture and Practice) Ecology of Plant (Lecture and Practice) 3 ECTS, Method of grading: numerical grade written examination (60 minutes) 						
Allocat	ion of p	olaces				
Additio	nal info	ormation				
Workload						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
		-				
Module	e appea	rs in				
		ree (1 major) Biology (200	7)			
	-	or Computational Mathematics	JMU Würzburg • ge	enerated 11-Jan-2023 • exam. ECTS) Computational Mathe	-	page 118 / 167



Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Computational Mathematics (2009)

Module title Abbreviation							
Bioinfo	Bioinformatics for advanced students 07-4BFMZ4-092-mo1						
Module	e coord	inator		Module offered by	<u> </u>		
holder	of the (Chair of Bioinformatics		Faculty of Biology			
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	undergraduate					
Conten	ts						
					ver the following topics: se- etworks as well as gene regulati-		
Intende	ed lear	ning outcomes					
Studen their re		able to use appropriate b	ioinformatic algorith	ns to address simpl	e problems as well as to interpret		
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)			
V + Ü (r	no infoi	rmation on SWS (weekly	contact hours) and co	ourse language avail	able)		
		Sessment (type, scope, langua vle for bonus)	ge — if other than German, o	examination offered — if no	ot every semester, information on whether		
log (ap	prox. 1	o to 20 pages)					
Allocat	ion of p	places					
Additio	onal inf	ormation					
Worklo	ad						
Referre	ed to in	LPOI (examination regulation	s for teaching-degree progra	mmes)			
Module appears in							
Bachelor' degree (1 major) Biology (2007)							
Bachelor' degree (1 major) Mathematics (2008)							
	Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Computational Mathematics (2009)						
Bachel	or deg	ree (1 major) Computatio	nai Mathematics (20	09)			

Module title					Abbreviation		
Ecology of Animals for advanced students 07-4BFNV03-092-m01							
Module coordinator Module offered by					l		
holder	ofthe	Chair of Zoology III		Faculty of Biology			
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)			
5	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 seme	ster	undergraduate					
Conten	ts						
Selecte logy.	ed topio	cs in autecology and syn	ecology; experimenta	l design, data collec	tion and analysis in animal eco-		
Intende	ed lear	ning outcomes					
		e acquired an advanced and field experiments a			They are able to design simple dings.		
Course	S (type, 1	number of weekly contact hours,	language — if other than Ge	rman)			
1) Ü + V	no info	rmation on SWS (weekly	contact hours) and co	ourse language avai	lable)		
		Sessment (type, scope, langu ble for bonus)	age — if other than German,	examination offered — if n	ot every semester, information on whether		
		nation (60 minutes)	_				
Allocat							
Allocal		places					
 Additio	nalinf	ormation					
Auuitio	inat ini	ormation	_				
	- 4						
Worklo	du		_				
 Def=:::			-				
Referre	a to in	LPO I (examination regulation	ns for teaching-degree progra	immes)			
Modula	anne	ars in					
Module appears in Bachelor' degree (1 major) Biology (2007)							
Bachelor' degree (1 major) Mathematics (2008)							
	Bachelor' degree (1 major) Mathematics (2007)						
Bachel	Bachelor' degree (1 major) Computational Mathematics (2009)						

Module title					Abbreviation		
Biophysics - Basic course					07-4BFPS2-092-m01		
Module	coord	inator		Module offered by			
holder	of the O	Chair of Plant Physiology	and Biophysics	Faculty of Biology			
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)			
5	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 seme	ster	undergraduate					
Conten	ts						
method	ls with		rised. For this purpos	e, students will be in	ne transport and the biophysical ntroduced to modern methods of		
Intende	ed learn	ning outcomes					
		erstand basic membrane act plants, isolated plant			experimental methods in experi- ms.		
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	rman)			
V + Ü (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)		
		s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
written	examir	nation (60 minutes)					
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	ad						
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in							
	Bachelor' degree (1 major) Biology (2007)						
	Bachelor' degree (1 major) Mathematics (2008)						
	-	ree (1 major) Mathematic					
Bachelor' degree (1 major) Computational Mathematics (2009)							

Module title					Abbreviation	
Specia	l Bioinf	ormatics I		07-4S1MZ6-092-m01		
Module	e coord	inator		Module offered by		
holder	of the (Chair of Bioinformatics		Faculty of Biology		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
	tal prin	ciples of evolutionary bio			ics (methods and markers), fun- structure prediction, phylogene-	
Intende	ed leari	ning outcomes				
Studen netic re			databases for sequer	nce analysis, RNA str	ructure prediction and phyloge-	
Course	S (type, n	number of weekly contact hours, l	anguage — if other than Ger	rman)		
V + Ü (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)	
		sessment (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	ot every semester, information on whether	
log (ap	prox. 10	o to 20 pages)				
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	immes)		
Module appears in						
Bachelor' degree (1 major) Biology (2007) Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Computational Mathematics (2009) Bachelor's degree (1 major, 1 minor) Biology (Minor, 2008)						
Success 5 degree (1 major, 1 minor) Blobby (minor, 2000)						

Module title Abbreviation							
Neurobiology I					07-4S1NV01-092-m01		
Module	e coordi	inator		Module offered by			
holder	of the C	Chair of Neurobiology and	d Genetics	Faculty of Biology			
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)			
5	numei	rical grade					
Duratio	on	Module level	Other prerequisites				
1 seme	ster	undergraduate					
Conten	ts						
Neurob	iology	and methods in neurobic	ology, using Drosophi	la as a neurogenetic	: model system.		
Intende	ed learr	ning outcomes					
		acquired an advanced k ethods in neurobiology.	nowledge of the neu	robiology of a model	l organism and are able to apply		
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)			
P (no in	format	ion on SWS (weekly cont	act hours) and course	e language available	2)		
		essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
log (ap	prox. 10	o to 20 pages)					
Allocat	ion of p	olaces					
Additio	nal info	ormation					
Worklo	ad						
Referre	d to in	LPOI (examination regulations	s for teaching-degree progra	mmes)			
Module appears in							
Bachelor' degree (1 major) Biology (2007)							
	Bachelor' degree (1 major) Mathematics (2008)						
	Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Computational Mathematics (2009)						
				99)			
Bachelor's degree (1 major, 1 minor) Biology (Minor, 2008)							

Modul	e title				Abbreviation		
Ecolog	y of po	pulations			07-4S1NV05-092-m	101	
Modul	e coord	linator		Module offered by	<u> </u>		
holder	of the	Chair of Zoology III		Faculty of Biology			
ECTS	Meth	od of grading	Only after succ. con				
5	nume	rical grade					
Duratio	on	Module level	Other prerequisites	Other prerequisites			
1 seme	ester	undergraduate					
Conter	nts						
		n discussion of the struc management.	ture and dynamics of	human and animal p	opulations; regulati	on of popula-	
Intend	ed lear	ning outcomes					
		able to interpret the stru ots in population ecolog					
Course	es (type, i	number of weekly contact hours	, language — if other than Ge	rman)			
This m	odule d	comprises 2 module com	ponents. Information	on courses will be li	sted separately for e	each module	
compo					N 1 1	•1	
1	07-4511 ole)	₩05-1PO-092: V + Ü (no	information on SWS (weekly contact hour	s) and course langua	age availa-	
1	,	1V05-2P0-092: S (no inf	ormation on SWS (we	ekly contact hours) a	nd course language	available)	
Metho	d of as	sessment (type, scope, langu	age — if other than German,	examination offered — if no	t every semester, informat	ion on whether	
module i	s creditat	ole for bonus)					
		n this module comprises					
	nless si assess	tated otherwise, success ments	sful completion of the	module will require :	successful completion	on of all indi-	
Viduat	055655	inents.					
		n module component 07		Basic Ecology of Popu	ulations (Lecture, Pra	actice) Basic	
		pulations (Lecture, Pract Method of grading: num					
		examination (45 minute					
Assess	sment i	n module component o7	-4 S1NVO5-2PO-092:	e, i	ns (Seminar)		
		Method of grading: (not ation (approx. 20 to 30)		ted			
Alloca	tion of	places					
		ormation					
Additio	onat ini	ormation					
Worklo							
WORKIG	Jau						
				``````````````````````````````````````			
Referre		LPO I (examination regulatio	ns for teaching-degree progra	immes)			
Modul	e appea	are in					
		ree (1 major) Biology (20	202)				
1	-	ree (1 major) Mathemati	-				
1	-	ree (1 major) Mathemati					
Bachel	lor' deg	ree (1 major) Computati	onal Mathematics (20	09)			
Bachel	lor's de	gree (1 major, 1 minor) E	Biology (Minor, 2008)				
Bachelor's	with 1 ma	jor Computational Mathematics	IMU Würzhurg ● ø	enerated 11-Jan-2023 • exam	. reg. data re-	page 125 / 167	
(2009)		,		ECTS) Computational Mathe	-		

Module	e title				Abbreviation
Molecu	ılar mo	delling - From DNA to pr	otein		07-4S1PS1-092-m01
Module	e coord	inator		Module offered by	<u>.</u>
holder	of the (	Chair of Plant Physiology	and Biophysics	Faculty of Biology	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	Its		•		
	is as we	ell as on the search for a			function of nucleic acids and molecules using databases and
Intend	ed lear	ning outcomes			
		e acquired a specialist ki rk with relevant databas		ture-function relation	nships of macromolecules and
Course	<b>S</b> (type, r	number of weekly contact hours,	language — if other than Ger	rman)	
V + Ü (I	no infoi	mation on SWS (weekly	contact hours) and co	ourse language avail	able)
		<b>sessment</b> (type, scope, languale for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether
compu	terised	practical examination (A	hours)		
Allocat	ion of p	olaces			
Additio	onal inf	ormation			
Worklo	ad				
Referre	ed to in	LPOI (examination regulation	ns for teaching-degree progra	mmes)	
Module	e appea	urs in			
	-	ree (1 major) Biology (20			
	-	ree (1 major) Mathemati			
	-	ree (1 major) Mathemati		)	
	-	ree (1 major) Computatic gree (1 major, 1 minor) B		09)	
Dachel	or s de	giee (1 major, 1 millor) D	1010gy (1011101, 2000)		

Module title Abbreviation					Abbreviation
Specific Bioinformatics II 07-5S2MZ3-092-m01			07-5S2MZ3-092-m01		
Module coordinator		Module offered by			
holder	of the (	Chair of Bioinformatics		Faculty of Biology	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
10	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
quence	analys		olution - gene expres		from the following list: - se- in structure analysis - program-
Intende	ed lear	ning outcomes			
		e acquired knowledge abo perform scientific laborate		s and methods of bio	pinformatics. They are able to in-
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)
		<b>sessment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
didate	each (a		oral examination in §		r c) oral examination of one can- to 3 candidates, approx. 60 mi-
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)				
Module	e appea	urs in			
Bachel Bachel	Bachelor' degree (1 major) Biology (2007) Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2007)				
Bachel	or' deg	ree (1 major) Computatio	nal Mathematics (20	09)	

Module	e title				Abbreviation
Evoluti	on - Ba	sics and Principles (Lec	ture and Practice)		07-1A1E-072-m01
Module	e coord	inator		Module offered by	•
holder	ofthe	Chair of Zoology II		Faculty of Biology	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
1	nume	rical grade			
Duratio	•	Module level	Other prerequisites	;	
1 seme	ster	undergraduate			
Conten	ts	κ.			
		vill address one of the co scussed and students wi			mental mechanisms and hypothe- construction methods.
Intend	ed lear	ning outcomes			
		gnise evolution as the d ic relationships betweer		e phylogeny of spec	ies. Familiarity with the concepts
Course	<b>S</b> (type, 1	number of weekly contact hours,	language — if other than Ge	rman)	
Ü (no iı	nforma	tion on SWS (weekly cor	itact hours) and cours	se language availabl	le)
		S <b>essment</b> (type, scope, langu ole for bonus)	age — if other than German,	examination offered — if n	ot every semester, information on whether
written	exami	nation (30 minutes)			
Allocat	ion of	places			
Additio	onal inf	ormation			
Worklo	ad				
Referre	ed to in	LPO I (examination regulation	ns for teaching-degree progra	ammes)	
Module	e appea	ars in			
		ree (1 major) Mathemati	cs (2008)		
	-	ree (1 major) Mathemati			
Bachel	or' deg	ree (1 major) Computatio	onal Mathematics (20	09)	

Module	e title				Abbreviation
The An	imal Ki	ngdom			07-1A1T-072-m01
Module	e coord	inator		Module offered by	
holder Electro		Professorship of Zoology scopy	at the Department of	Faculty of Biology	
ECTS	r	od of grading	Only after succ. com	ıpl. of module(s)	
4	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 semesterundergraduateAdmission prerequisite to assessment: regular attendance cipation in exercises as well as successful completion of th exercises as specified at the beginning of the course.		ful completion of the respective			
Conten	ts				
vel of g the for	roups i ns and	n the animal kingdom, s	tudents will acquire t	he fundamental kno	liversity of eukaryotes. At the le- wledge necessary to understand ing discussed in an evolutionary
Intende	ed lear	ning outcomes			
nisms t micros croscoj	that are copes. by. Fun	e most suitable for partic Fundamental skills in the damental preparation sk	ular scientific issues. e interpretation of ma ills.	Familiarity with the croscopic and histo	ity to select those animal orga- components and functioning of logic preparations by light mi-
		number of weekly contact hours,			
		mation on SWS (weekly			
		<b>sessment</b> (type, scope, langua le for bonus)	age — if other than German, e	examination offered — if no	ot every semester, information on whether
	-	nation (approx. 60 minut			
Allocat					
Additio	nal inf	ormation			
Worklo	ad				
Referre	d to in	LPOI (examination regulation	s for teaching-degree progra	mmes)	
Module	e appea	ars in			
Bachel	or' deg	ree (1 major) Mathematic ree (1 major) Mathematic ree (1 major) Computatio	cs (2007)	09)	

Module title Abbreviation					Abbreviation		
The Plant Kingdom     07-1A1P-072-m01			07-1A1P-072-m01				
Module coordinator				Module offered by			
holder	of the (	Chair of Plant Physiology	and Biophysics	Faculty of Biology			
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)			
4	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 seme:	ster	undergraduate			regular attendance of exercises respective exercises.		
Conten	ts						
of grou	ps in th nd fun	ne plant kingdom, studen ctions of plant organisms	ts will acquire the fu	ndamental knowledg	versity of eukaryotes. At the level ge necessary to understand the scussed in an evolutionary and		
Intende	ed leari	ning outcomes					
that are copes. Fundan Course	e most Fundar nental   <b>s</b> (type, n	suitable for particular sci	entific issues. Familia retation of macrosco anguage — if other than Ger	arity with the compo pic and histologic pr man)	y to select those plant organisms nents and functioning of micros- reparations by light microscopy.		
		· · · · · ·			t every semester, information on whether		
		le for bonus)					
written	exami	nation (approx. 60 minut	es)				
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	Workload						
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)			
Module							
	-	ree (1 major) Mathematic					
	-	ree (1 major) Mathematic ree (1 major) Computatio		99)			
	Bachelor' degree (1 major) Computational Mathematics (2009)						

Module	title				Abbreviation	
Genetics 07-3A3GE-072-m01					07-3A3GE-072-m01	
Module	e coord	inator		Module offered by		
holder	of the O	Chair of Neurobiology and	d Genetics	Faculty of Biology		
ECTS	Metho	od of grading	Only after succ. compl. of module(s)			
2	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
Molecu	lar and	classical genetics.				
Intende	ed learı	ning outcomes				
Studen biology			sms of inheritance th	at are essential for o	developing an understanding of	
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V + S (r	infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)	
		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	
written	examiı	nation (30 minutes)				
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	mmes)		
Module	e appea	rs in				
Bachel	or' deg	ree (1 major) Biology (200	7)			
	-	ree (1 major) Mathematic				
	-	ree (1 major) Mathematic		,		
Bachel	or' deg	ree (1 major) Computatio	nal Mathematics (200	09)		



# **Thesis** (10 ECTS credits)

Module title Abbreviation					Abbreviation
Thesis	Compu	Itational Mathematics (B	achelor Thesis)		10-M-BAC-092-m01
Modul	e coord	inator		Module offered by	
Dean o	of Studi	es Mathematik (Mathema	atics)	Institute of Mathen	natics
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	ster	undergraduate	Registration for asse	essment: as specifie	ed.
Conter	nts				
Indepe	ndentl	y researching and writing	on a topic in mathen	natics selected in co	onsultation with the supervisor.
Intend	ed lear	ning outcomes			
	during	his/her studies in the ba			pply the skills and methods ob- wn the result of his/her work in a
Course	S (type, 1	number of weekly contact hours,	anguage — if other than Gei	man)	
(no inf	ormatio	on on SWS (weekly conta	ct hours) and course	language available)	
		5 <b>essment</b> (type, scope, langua ble for bonus)	ge — if other than German,	examination offered — if n	ot every semester, information on whether
written Langua		issessment: German, Eng	lish if agreed upon w	ith the examiner	
Allocat	-				
Additio	onal inf	ormation			
	_				
Worklo	ad				
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)	
Modul	e appea	ars in			
		ree (1 major) Computatio			



# Subject-specific Key Skills

(15 ECTS credits)



## Key Skills 1 (Compulsory)

(10-15 ECTS credits)

Students must take the following modules: 10-M-VKM and 10-M-BAKC as well as either (10-M-PRG and 10-M-COM) or (10-MPRGk and 10-M-COMg) or (10-M-PRG and 10-M-COMg).

	e title				Abbreviation	
Compu	Itationa	al Mathematics, advance	d		10-M-COMg-082-m01	
Module	e coord	inator		Module offered by		
Dean o	of Studi	es Mathematik (Mathema	atics)	Institute of Mathen		
ECTS	Meth	od of grading	Only after succ. con	ter succ. compl. of module(s)		
4	1	successfully completed				
4 Duratio		Module level	Other prerequisites			
1 semester undergraduate		-	Admission prerequi	site to assessment:	regular attendance of exercises one incident of unexcused ab-	
Conten	nts					
merica 10-M-A	l comp NL and	utation (e. g. Matlab) to s	supplement the basic ased solution of prob	modules in analysis lems in linear algebr	Mathematica or Maple) and nu- s and linear algebra (10-M-ANA, ra, geometry, analysis, in particu	
Intend	ed lear	ning outcomes				
		earns the use of advance cation to solve mathema		cal software packag	es, and is able to assess their	
		number of weekly contact hours,	- · · ·	rman)		
Ü + V (I	no info	rmation on SWS (weekly	contact hours) and co	ourse language avail	able)	
Metho	d of as	sessment (type, scope, langua	age — if other than German.	examination offered — if no	ot every semester, information on whether	
		e for bonus)			,	
		form of programming exe	arcises (type and exp			
Assess	ment o	he course) ffered: once a year, sum	mer semester		e specified by the lecturer at the	
Assess	ment of a	he course) ffered: once a year, sum ssessment: German, Eng	mer semester		e specified by the lecturer at the	
Assess Langua	ment of a	he course) ffered: once a year, sum ssessment: German, Eng	mer semester		e specified by the lecturer at the	
Assess Langua Allocat	age of a	he course) ffered: once a year, sum ssessment: German, Eng	mer semester		e specified by the lecturer at the	
Assess Langua Allocat	age of a	he course) ffered: once a year, sum ssessment: German, Eng places	mer semester		e specified by the lecturer at the	
Assess Langua Allocat  Additic	ment o age of a tion of p	he course) ffered: once a year, sum ssessment: German, Eng places	mer semester		e specified by the lecturer at the	
Assess Langua Allocat	ment o age of a tion of p	he course) ffered: once a year, sum ssessment: German, Eng places	mer semester		e specified by the lecturer at the	
Assess Langua Allocat  Additic  Worklo	age of a age of a tion of p onal inf	he course) ffered: once a year, sum ssessment: German, Eng places	mer semester glish if agreed upon w	vith the examiner	e specified by the lecturer at the	
Assess Langua Allocat  Additic  Worklo  Referre	age of a age of a tion of p onal inf oad	he course) ffered: once a year, sum ssessment: German, Eng places ormation	mer semester glish if agreed upon w	vith the examiner	e specified by the lecturer at the	
Assess Langua Allocat  Additic  Worklo  Referre § 73 (1)	age of a age of a tion of p onal inf oad ed to in ) 5. Mat	he course) ffered: once a year, summissessment: German, Engen places ormation LPO I (examination regulation chematik Angewandte Ma	mer semester glish if agreed upon w	vith the examiner	e specified by the lecturer at the	
Assess Langua Allocat  Worklo  Referre § 73 (1) Module	age of a age of a tion of p onal inf oad ed to in ) 5. Mat e appea	he course) ffered: once a year, summissessment: German, Engen places ormation LPO I (examination regulation chematik Angewandte Ma	mer semester glish if agreed upon w s for teaching-degree progra	vith the examiner	e specified by the lecturer at the	
Assess Langua Allocat  Additic  Worklo  Referre § 73 (1) Module Bachel	age of a age of a tion of p onal inf onal inf oad ed to in ) 5. Mat e appea or' deg	he course) ffered: once a year, summissessment: German, Engen places formation LPOI (examination regulation chematik Angewandte Ma ars in	mer semester glish if agreed upon w s for teaching-degree progra athematik :s (2008)	vith the examiner	e specified by the lecturer at the	
Assess Langua Allocat  Additic  Worklo  Referre § 73 (1) Module Bachel Bachel	age of a age of a tion of p onal inf onal inf oad ed to in ) 5. Mat e appea or' deg or' deg	he course) ffered: once a year, summissessment: German, Engentices places ormation LPO I (examination regulation thematik Angewandte Materia ars in ree (1 major) Mathematic	mer semester glish if agreed upon w s for teaching-degree progra athematik cs (2008) ure Technology (2010	vith the examiner	e specified by the lecturer at the	
Assess Langua Allocat  Additic  Worklo  § 73 (1) Module Bachel Bachel Bachel	age of a age of a tion of p onal inf oad oad ) 5. Mat e appea or' deg or' deg or' deg	he course) ffered: once a year, summissessment: German, Engentices ormation LPO I (examination regulation chematik Angewandte Materia ars in ree (1 major) Mathematic ree (1 major) Nanostructu	mer semester glish if agreed upon w s for teaching-degree progra athematik cs (2008) ure Technology (2010 ematics (2009)	vith the examiner	e specified by the lecturer at the	
Assess Langua Allocat  Additic  Worklo  Referre § 73 (1) Module Bachel Bachel Bachel Bachel Bachel	age of a age of a tion of p onal inf onal inf oad oad oad oad oad oad oad oad oad oad	he course) ffered: once a year, summissessment: German, Enginates places ormation LPO I (examination regulation chematik Angewandte Mathematic ree (1 major) Mathematic ree (1 major) Nanostructur ree (1 major) Economathe	mer semester glish if agreed upon w s for teaching-degree progra athematik cs (2008) ure Technology (2010 ematics (2009) ematics (2008)	vith the examiner	e specified by the lecturer at the	
Assess Langua Allocat  Additic  Worklo  Referre § 73 (1) Module Bachel Bachel Bachel Bachel Bachel Bachel	ed to in eage of a conal inf onal inf onal inf onal inf or deg or' deg or' deg or' deg or' deg or' deg	he course) ffered: once a year, summissessment: German, Enginates places ormation LPO I (examination regulation chematik Angewandte Marsin ree (1 major) Mathematic ree (1 major) Nanostructur ree (1 major) Economathor ree (1 major) Economathor	mer semester glish if agreed upon w s for teaching-degree progra athematik :s (2008) ure Technology (2010 ematics (2009) ematics (2008) cal Physics (2009)	vith the examiner	e specified by the lecturer at the	
Assess Langua Allocat  Additic  Worklo  Referre § 73 (1) Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel	ed to in bad bad bad bad bad bad bad bad bad bad	he course) ffered: once a year, summissessment: German, Enginates places ormation LPO I (examination regulation thematik Angewandte Marsin ree (1 major) Mathematic ree (1 major) Nanostructur ree (1 major) Economather ree (1 major) Economather ree (1 major) Mathematic	mer semester glish if agreed upon w s for teaching-degree progra athematik cs (2008) ure Technology (2010 ematics (2009) ematics (2009) cal Physics (2009) nal Mathematics (20	vith the examiner	e specified by the lecturer at the	
Assess Langua Allocat  Additic  Worklo  8 73 (1) Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel Bachel	age of a age of a tion of p onal inf onal inf oad ed to in ) 5. Mat e appea or' deg or' deg or' deg or' deg or' deg	he course) ffered: once a year, summissessment: German, Engentices ormation LPOI (examination regulation thematik Angewandte Marsin ree (1 major) Mathematic ree (1 major) Nanostructur ree (1 major) Economather ree (1 major) Economather ree (1 major) Mathematic ree (1 major) Computatio	mer semester glish if agreed upon w s for teaching-degree progra athematik cs (2008) ure Technology (2010 ematics (2009) ematics (2008) cal Physics (2009) nal Mathematics (20 of Functional Materia	vith the examiner	e specified by the lecturer at the	

Module	e title				Abbreviation
Progra	mming	course for students of M	athematics and othe	er subjects, simple	10-M-PRGk-082-m01
Module	e coord	inator		Module offered by	
Dean o	ean of Studies Mathematik (Mathematics) Institute of Mathematics		natics		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
2	(not) s	successfully completed			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate			regular attendance (attendance of unexcused absence).
Conten	ts				
Basics matics.		odern programming langu	uage (e. g. C or Fortra	n) taking into accou	nt the particular needs in mathe-
Intende	ed lear	ning outcomes			
The stu in math		•	ntly on small program	nming exercises and	standard programming problems
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)	
P (no ir	nformat	tion on SWS (weekly cont	act hours) and cours	e language available	e)
module is project beginn	in the ing of t	^{le for bonus)} form of programming exe he course)	rcises (type and expe	enditure of time to b	ot every semester, information on whether e specified by the lecturer at the
Allocat		ssessment: German, Eng	lish if agreed upon w	ith the examiner	
Allocal		JIACES			
Additio	nalinf	ormation			
	matim				
Worklo	ad				
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	mmes)	
		hematik Angewandte Ma			
Module					
		ree (1 major) Mathematic	s (2008)		
	-	ree (1 major) Nanostructu		)	
	-	ree (1 major) Economathe			
	-	ree (1 major) Economathe			
	-	ree (1 major) Mathematic			
	-	ree (1 major) Computatio		•	
		gree (1 major, 1 minor) M		-	
First sta	ate exa	mination for the teaching	g degree Gymnasium	Mathematics (2009)	)

Module title				Abbreviation
Preparatory C	ourse Mathematics			10-M-VKM-082-m01
Module coord	linator		Module offered by	
Dean of Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics
ECTS Meth	od of grading	Only after succ. con	npl. of module(s)	
1 (not)	successfully completed			
Duration Module level Other prerequisites				
1 semester	undergraduate	Admission prerequi specified at the beg		regular attendance of courses (as ).
Contents				
Introduction t	o the basic techniques in	mathematics; appro	ach to sets, proposi	tions, propositional logic.
Intended lear	ning outcomes			
-	ets acquainted with the b s degree study programm	<b>.</b> .	ues which are prere	quisites for the further courses in
Courses (type, i	number of weekly contact hours, l	anguage — if other than Ger	rman)	
V + Ü (no info	rmation on SWS (weekly	contact hours) and co	ourse language avail	able)
module is creditat project assigr Assessment c	ole for bonus)	iture of time to be spo er semester	ecified by the lecture	ot every semester, information on whether er at the beginning of the course)
Allocation of				
Additional inf	ormation			
Workload				
Referred to in	LPOI (examination regulation	s for teaching-degree progra	mmes)	
		- · · ·		
Module appea	ars in			
Bachelor' deg	ree (1 major) Mathematic	s (2008)		
-	ree (1 major) Economathe	-		
-	ree (1 major) Economathe			
-	ree (1 major) Mathematic			
	ree (1 major) Computatio			
	gree (1 major, 1 minor) M			
First state exa	mination for the teaching	g degree Gymnasium	Mathematics (2009)	)

Module	e title				Abbreviation	
Progra	mming	course for students of M	athematics and othe	r subjects	10-M-PRG-082-mo	1
Module	e coord	inator		Module offered by	,	
		es Mathematik (Mathema	atics)	Institute of Mather		
_	1				Inducs	
ECTS		od of grading	Only after succ. com	pl. of module(s)		
3		successfully completed				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	undergraduate	Admission prerequis monitored, a maxim			
Conten	Its					
Basics matics		odern programming langu	uage (e. g. C or Fortrar	n) taking into accou	int the particular nee	eds in mathe-
Intend	ed lear	ning outcomes				
The stu in math		able to work independe cs.	ntly on small program	ming exercises and	d standard programn	ning problems
Course	<b>S</b> (type, r	number of weekly contact hours, I	anguage — if other than Ger	man)		
P (no ir	nformat	tion on SWS (weekly cont	act hours) and course	e language availabl	.e)	
		<b>Sessment</b> (type, scope, langua Ile for bonus)	ge — if other than German, e	xamination offered — if r	ot every semester, informa	tion on whether
		form of programming exe ssessment: German, Eng		• •	he course)	
Allocat	-					
Additic	nal inf	ormation	·			
/ la artre						
Worklo	ad					
WORKIO	au					
 Referre	d to in	<b>LPO I</b> (examination regulation	for toaching dogroo progra	mmoc)		
				innes)		
		hematik Angewandte Ma				
	e appea					
		ree (1 major) Mathematic				
		ree (1 major) Physics (20 ree (1 major) Physics (20				
		ree (1 major) Physics (20				
	-	ree (1 major) Physics (20				
	-	ree (1 major) Technology		ls (2000)		
	-	ree (1 major) Technology		-		
	-	ree (1 major) Nanostructu				
		ree (1 major) Economath				
Bachel	or' deg	ree (1 major) Economath	ematics (2008)			
Bachel	or' deg	ree (1 major) Mathematic	al Physics (2009)			
Bachel	or' deg	ree (1 major) Computatio	nal Mathematics (200	9)		
	's degr	ee (1 major) Physics (201				
	-		C	(2010)		
Master	's degr	ee (1 major) Technology o				
Master Master	's degr 's degr	ee (1 major) Technology ( ee (1 major) Technology (	of Functional Material			
Master Master Master	's degr 's degr 's degr	ee (1 major) Technology ( ee (1 major) Technology ( ee (1 major) Functional M	of Functional Material aterials (2012)	s (2009)		
Master Master Master Bachel	's degr 's degr 's degr or's degr	ee (1 major) Technology ( ee (1 major) Technology (	of Functional Material aterials (2012) athematics (Minor, 20	s (2009)	n rog date s	page 139 / 167



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

Module	e title				Abbreviation	
Compu	terorie	nted Mathematics			10-M-COM-082-mo	1
Module	e coordi	inator		Module offered by	<u> </u>	
Dean of Studies Mathematik (Mathematik			atics)	Institute of Mathematics		
ECTS			E .	succ. compl. of module(s)		
	<u> </u>		Only arter succ. con			
3	<u> </u>	successfully completed				
Duration Module le		Module level	Other prerequisites			
1 semester		undergraduate	Admission prerequisite to assessment: regular attendance of exercises (attendance monitored, a maximum of one incident of unexcused absence).			
Conten	ts					
merical 10-M-A	l compı NL) anc	o modern mathematical s utation (e.g. Matlab) to s l 10-M-LNA). Computer-b and integral calculus; vi	supplement the basic based solution of prob	modules in analysis lems in linear algeb	and linear algebra (	((10-M-ANA or
Intende	ed learr	ning outcomes				
		arns the use of advance cation to solve mathema		cal software package	es, and is able to ass	sess their
Course	<b>S</b> (type, n	umber of weekly contact hours,	language — if other than Ger	man)		
V + Ü (r	no infor	mation on SWS (weekly	contact hours) and co	ourse language avail	able)	
Method	d of ass	essment (type, scope, langua				on on whether
		form of programming exe		t the beginning of th		
		ffered: once a year, sum				
		ssessment: German, Eng		ith the examiner		
Allocat	ion of p	olaces				
	nal info	ormation				
Additio						
Worklo						
worklo						
		LPO I (examination regulation		mmes)		
		<b>LPO I</b> (examination regulation hematik Angewandte Ma		mmes)		
	5. Mat	hematik Angewandte Ma		mmes)		
§ 73 (1) Module	5. Mat e appea	hematik Angewandte Ma	athematik	mmes)		
§ 73 (1) <b>Module</b> Bachele	5. Mat <b>e appea</b> or' degi	hematik Angewandte Ma <b>rs in</b>	athematik science (2010)	mmes)		
§ 73 (1) <b>Module</b> Bachele Bachele	5. Mat e appea or' degi or' degi	hematik Angewandte Ma r <b>rs in</b> ree (1 major) Computer S	athematik ccience (2010) cs (2008)	mmes)		
§ 73 (1) Module Bachele Bachele Bachele	5. Mat e appea or' degi or' degi or' degi or' degi	hematik Angewandte Ma r <b>rs in</b> ree (1 major) Computer S ree (1 major) Mathematic ree (1 major) Physics (20 ree (1 major) Physics (20	athematik science (2010) cs (2008) 10) 09)	mmes)		
§ 73 (1) Module Bachele Bachele Bachele Bachele	5. Mat e appea or' degi or' degi or' degi or' degi or' degi or' degi	hematik Angewandte Ma r <b>rs in</b> ree (1 major) Computer S ree (1 major) Mathematic ree (1 major) Physics (20 ree (1 major) Physics (20 ree (1 major) Physics (20	athematik science (2010) cs (2008) 10) 09) 12)	mmes)		
§ 73 (1) Module Bachele Bachele Bachele Bachele Bachele	5. Mat or' degi or' degi or' degi or' degi or' degi or' degi or' degi	hematik Angewandte Ma <b>rs in</b> ree (1 major) Computer S ree (1 major) Mathematic ree (1 major) Physics (20 ree (1 major) Physics (20 ree (1 major) Physics (20 ree (1 major) Physics (20	athematik ccience (2010) cs (2008) 10) 09) 12) 08)			
§ 73 (1) <b>Module</b> Bachele Bachele Bachele Bachele Bachele Bachele	e appea or' degi or' degi or' degi or' degi or' degi or' degi or' degi or' degi or' degi	hematik Angewandte Ma rs in ree (1 major) Computer S ree (1 major) Mathematic ree (1 major) Physics (20 ree (1 major) Physics (20 ree (1 major) Physics (20 ree (1 major) Physics (20 ree (1 major) Technology	athematik ficience (2010) cs (2008) 10) 09) 12) 08) of Functional Materia	als (2009)		
§ 73 (1) <b>Module</b> Bachele Bachele Bachele Bachele Bachele Bachele Bachele Bachele	e appea or' degr or' degr	hematik Angewandte Ma <b>rs in</b> ree (1 major) Computer S ree (1 major) Mathematic ree (1 major) Physics (20 ree (1 major) Physics (20 ree (1 major) Physics (20 ree (1 major) Physics (20 ree (1 major) Technology ree (1 major) Technology	athematik Science (2010) SS (2008) 10) 09) 12) 08) of Functional Materia of Functional Materia	als (2009) als (2010)		
§ 73 (1) <b>Module</b> Bachele Bachele Bachele Bachele Bachele Bachele Bachele Bachele	5. Mat e appea or' degr or' degr	hematik Angewandte Ma <b>rs in</b> ree (1 major) Computer S ree (1 major) Mathematic ree (1 major) Physics (20 ree (1 major) Physics (20 ree (1 major) Physics (20 ree (1 major) Physics (20 ree (1 major) Technology ree (1 major) Technology ree (1 major) Nanostructu	athematik science (2010) cs (2008) 10) 09) 12) 08) of Functional Materia of Functional Materia	als (2009) als (2010)		
§ 73 (1) <b>Module</b> Bachele Bachele Bachele Bachele Bachele Bachele Bachele Bachele Bachele Bachele	5. Mat appea or' degi or' degi	hematik Angewandte Ma <b>rs in</b> ree (1 major) Computer S ree (1 major) Mathematic ree (1 major) Physics (20 ree (1 major) Technology ree (1 major) Technology ree (1 major) Nanostructu ree (1 major) Economath	athematik science (2010) cs (2008) 10) 09) 12) 08) of Functional Materia of Functional Materia ure Technology (2010) ematics (2009)	als (2009) als (2010)		
§ 73 (1) <b>Module</b> Bachele Bachele Bachele Bachele Bachele Bachele Bachele Bachele Bachele Bachele Bachele	• 5. Mat • appea or' degi or' degi	hematik Angewandte Ma <b>rs in</b> ree (1 major) Computer S ree (1 major) Mathematic ree (1 major) Physics (20 ree (1 major) Technology ree (1 major) Technology ree (1 major) Sconomath ree (1 major) Economath	athematik ficience (2010) cs (2008) 10) 09) 12) 08) of Functional Materia of Functional Materia ure Technology (2010) ematics (2009) ematics (2008)	als (2009) als (2010)		
§ 73 (1) <b>Module</b> Bachele Bachele Bachele Bachele Bachele Bachele Bachele Bachele Bachele Bachele Bachele Bachele Bachele	e appea or' degr or' degr	hematik Angewandte Ma <b>rs in</b> ree (1 major) Computer S ree (1 major) Mathematic ree (1 major) Physics (20 ree (1 major) Sconomath ree (1 major) Economath ree (1 major) Mathematic	athematik Science (2010) Science (2010) Science (2008) 10) 09) 12) 08) of Functional Materia of Functional Materia ure Technology (2010) ematics (2009) ematics (2009) cal Physics (2009)	als (2009) als (2010) )		
§ 73 (1) <b>Module</b> Bachele Bachele Bachele Bachele Bachele Bachele Bachele Bachele Bachele Bachele Bachele Bachele Bachele	e appea or' degr or' degr	hematik Angewandte Ma <b>rs in</b> ree (1 major) Computer S ree (1 major) Mathematic ree (1 major) Physics (20 ree (1 major) Technology ree (1 major) Technology ree (1 major) Sconomath ree (1 major) Economath	athematik Science (2010) Science (2010) Science (2008) 10) 09) 12) 08) of Functional Materia of Functional Materia ure Technology (2010) ematics (2009) ematics (2009) cal Physics (2009)	als (2009) als (2010) )		

#### Julius-Maximilians-UNIVERSITÄT WÜRZBURG

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	e title			Abbreviation			
Defense of Bachelor Thesis in Computational Mathematics         10-M-BAKC-092-m01							
Module	e coord	inator		Module offered by			
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathematics			
ECTS				compl. of module(s)			
3	nume	rical grade					
Duration Module level		Other prerequisites					
1 semester		undergraduate					
Conten	ts						
The stu ons on			on the topic and resul	ts of his/her Bache	lor's thesis and answers questi-		
Intende	ed lear	ning outcomes					
	<b>S</b> (type, r	number of weekly contact hours, tion on SWS (weekly con			le)		
		<b>sessment</b> (type, scope, langua le for bonus)	age — if other than German,	examination offered — if r	not every semester, information on whether		
talk (ap	prox. 1	15 minutes) with subsequ	ent discussion (appr	ox. 15 minutes)			
Allocat	ion of _l	olaces					
			-				
Additio	nal inf	ormation					
Worklo	ad						
Referre	d to in	LPOI (examination regulation	s for teaching-degree progra	ammes)			
Module	e appea	ars in					
De de el	or' dog	ree (1 major) Computatio	······································				



# Key Skills 2 (Elective)

(max. 5 ECTS credits)

Students may not select modules they already took in the area of mandatory electives.

	Module title Abbreviation					
Semina	r in Analysis			10-M-BSA-072-m01		
Module	coordinator		Module offered by	l		
Dean of	Studies Mathematik (Mathema	atics)	Institute of Mathem	natics		
ECTS	Method of grading	Only after succ. com	pl. of module(s)			
	numerical grade		• • • • •			
Duratio		Other prerequisites				
1 semes	ter undergraduate					
Content		Į				
	ed topic in analysis.					
	d learning outcomes	·				
of a give				sters elaboration and structuring /She is able to participate active-		
Courses	i (type, number of weekly contact hours, l	anguage — if other than Ger	man)			
S (no in	formation on SWS (weekly cont	act hours) and cours	e language available	e)		
	of assessment (type, scope, langua creditable for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
Assessn	prox. 60 minutes) nent offered: in the semester ir ge of assessment: German, Eng					
	on of places	· · · ·				
Additior	nal information					
Workloa	ıd					
Referred	to in LPO I (examination regulation	s for teaching-degree progra	mmes)			
§ 73 (1)	1. Mathematik Analysis					
Module	appears in					
	r' degree (1 major) Mathematic					
	r' degree (1 major) Mathematic					
	r' degree (1 major) Economathe	-				
	r' degree (1 major) Economathe r' degree (1 major) Mathematic					
	r' degree (1 major) Mathematic		n)			
	r's degree (1 major, 1 minor) M					
	te examination for the teaching			)		

Module	Module title Abbreviation				
Semina	ar in Lin	ear Algebra		10-M-BSL-072-m01	
Module	e coordi	nator		Module offered by	
Dean o	f Studie	es Mathematik (Mathema	atics)	Institute of Mathem	atics
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	numer	ical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	its				
A selec	ted top	ic in linear algebra.			
Intende	ed learn	ning outcomes			
of a giv	en topi				sters elaboration and structuring /She is able to participate active-
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
S (no ir	nformat	ion on SWS (weekly cont	act hours) and cours	e language available	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
Assess	ment of	o minutes) ffered: in the semester in ssessment: German, Eng			
Allocat	ion of p	laces			
Additio	onal info	ormation			
Worklo	ad				
Referre	ed to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
§ 73 (1)	2. Mat	hematik Lineare Algebra,	, Algebra und Elemen	te der Zahlentheorie	
Module	e appea	rs in			
Bachel	or' degr	ree (1 major) Mathematic	s (2008)		
	-	ree (1 major) Mathematic			
	-	ee (1 major) Economathe	-		
		ree (1 major) Economathe			
		ree (1 major) Mathematic		,	
	-	ee (1 major) Computatio	-		
	_	gree (1 major, 1 minor) Ma			
First sta	irst state examination for the teaching degree Gymnasium Mathematics (2009)				

Modul	e title				Abbreviation
Semin	ar in Al	gebra			10-M-BSE-072-m01
Modul	e coord	inator		Module offered by	<u>.</u>
Dean c	of Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ester	undergraduate			
Conter	nts	~			
A selec	cted top	oic in algebra.			
Intend	ed lear	ning outcomes			
of a giv	ven top				sters elaboration and structuring /She is able to participate active-
	_	number of weekly contact hours, l			
S (no i	nforma	tion on SWS (weekly cont	act hours) and cours	e language available	e)
		<b>sessment</b> (type, scope, langua ole for bonus)	ge — if other than German, o	examination offered — if no	ot every semester, information on whether
Assess	sment o	60 minutes) Iffered: in the semester ir Issessment: German, Eng			
Allocat	tion of _l	places			
Additio	onal inf	ormation			
Worklo	bad				
Referre	ed to in	LPOI (examination regulation	s for teaching-degree progra	mmes)	
§ 73 (1	) 2. Mat	thematik Lineare Algebra	, Algebra und Elemen	te der Zahlentheorie	2
Modul	e appea	ars in			
Bachel	lor' deg	ree (1 major) Mathematic	s (2008)		
	-	ree (1 major) Mathematic			
	-	ree (1 major) Economathe	-		
		ree (1 major) Economathe			
	-	ree (1 major) Mathematic		)	
	-	ree (1 major) Computatio	-		
		gree (1 major, 1 minor) M			
riist st	First state examination for the teaching degree Gymnasium Mathematics (2009)				

Module	title				Abbreviation
Semina	ır in Ge	ometry			10-M-BSG-072-m01
Module	e coord	inator		Module offered by	
Dean of	fStudie	es Mathematik (Mathema	atics)	Institute of Mathem	atics
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				
A selec	ted top	ic in geometry or differer	ntial geometry.		
Intende	ed learn	ning outcomes	· · · · ·		
of a giv	en topi				sters elaboration and structuring /She is able to participate active-
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
S (no in	format	ion on SWS (weekly cont	act hours) and cours	e language available	e)
		e <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
Assess	ment o	50 minutes) ffered: in the semester in ssessment: German, Eng			
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
§ 73 (1)	4. Mat	hematik Geometrie			
Module					
Bachel	or' deg	ree (1 major) Mathematic	s (2008)		
		ree (1 major) Mathematic			
	-	ree (1 major) Economathe	-		
	-	ree (1 major) Economathe			
	-	ree (1 major) Mathematic			
	-	ree (1 major) Computatio		-	
		gree (1 major, 1 minor) Ma			
First sta	First state examination for the teaching degree Gymnasium Mathematics (2009)				

Module	Module title Abbreviation				
Semina	r in Co	mplex Analysis			10-M-BSC-072-m01
Module	e coord	inator		Module offered by	
Dean of	fStudie	es Mathematik (Mathema	atics)	Institute of Mathem	atics
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				
A selec	ted top	ic in complex analysis.			
Intende	ed leari	ning outcomes			
of a giv	en topi				sters elaboration and structuring /She is able to participate active-
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
S (no in	format	ion on SWS (weekly cont	act hours) and cours	e language available	e)
		<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
Assess	ment o	50 minutes) ffered: in the semester in ssessment: German, Eng			
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Referre	d to in	LPOI (examination regulation	s for teaching-degree progra	mmes)	
§ 73 (1)	1. Mat	hematik Analysis			
Module	e appea	nrs in			
Bachel	or' deg	ree (1 major) Mathematic	s (2008)		
		ree (1 major) Mathematic			
	-	ree (1 major) Economathe	-		
	-	ree (1 major) Economathe			
		ree (1 major) Mathematic		、 、	
	-	ree (1 major) Computatio			
		gree (1 major, 1 minor) Ma			
First sta	ate exa	mination for the teaching	g degree Gymnasium	iviathematics (2009)	

Module title Abbreviation					Abbreviation
Semina	ar in Fu	nctional Analysis			10-M-BSF-072-m01
Module	Module coordinator Module of				
Dean o	f Studie	es Mathematik (Mathema	atics)	Institute of Mathem	natics
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				
A selec	ted top	ic in functional analysis.			
Intende	ed leari	ning outcomes			
of a giv	en topi				sters elaboration and structuring /She is able to participate active-
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
S (no ir	nformat	ion on SWS (weekly cont	act hours) and cours	e language available	e)
		<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
talk (ap	prox. 6	60 minutes)			
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
				·	
Module	e appea	irs in			
Bachel	or' deg	ree (1 major) Mathematic	s (2008)		
		ree (1 major) Mathematic			
	-	ree (1 major) Economathe			
		ree (1 major) Economathe			
		ree (1 major) Mathematic		)	
		ree (1 major) Computation			
васпе	Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008)				

Module	Module title Abbreviation				
Semina	ar in Dis	screte Mathematics		10-M-BSD-072-m01	
Module coordinator Module offered by					
Dean o	f Studie	es Mathematik (Mathema	atics)	Institute of Mathem	atics
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
A selec	ted top	ic in discrete mathemati	cs.		
Intende	ed learı	ning outcomes			
of a giv	en topi				sters elaboration and structuring /She is able to participate active-
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
S (no ir	format	ion on SWS (weekly cont	act hours) and cours	e language available	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
talk (ap	prox. 6	50 minutes)			
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module	e appea	ars in			
Bachel	or' deg	ree (1 major) Mathematic	s (2008)		
		ree (1 major) Mathematic			
	-	ree (1 major) Economathe	-		
		ree (1 major) Economathe			
		ree (1 major) Mathematic		<b>`</b>	
	-	ree (1 major) Computation	-		
Bachel	Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008)				

Module	e title				Abbreviation	
Introdu	iction t	o Discrete Mathematics			10-M-EDM-072-mo:	1
Module	e coord	inator		Module offered by	<u> </u>	
Dean of Studies Mathematik (Mathematics)			Institute of Mathem	atics		
ECTS	1	od of grading	Only after succ. com		<u></u>	
	1	rical grade	only alter sace. con			
5 Duratio		Module level	Other prerequisites			
					- 1:6 . 6	
		Certain prerequisite sessment. The lectu at the beginning of t sidered a declaratio dents have obtained the course of the se sessment into effect ted to assessment in sessment at a later admission to assess	rer will inform stude the course. Registrat n of will to seek adm d the qualification fo mester, the lecturer t. Students who mee n the current or in th date, students will h	nts about the respection for the course we have a sees we have a sees we have a sees will put their registrates we have a subsequent semestication of the semestic se	ctive details ill be con- nt. If stu- ssment over ation for as- ill be admit- ster. For as-	
Conten	ts					
	-	om combinatorics, introd	uction to graph theor	v (including applica	tions), cryptographi	c methods.
	•	g codes.		,		
Intend	ed lear	ning outcomes				
levant realise	proof te s the so	acquainted with the fun echniques, is able to app cope of applications of di	ly methods from num screte structures.	ber theory and alge		
		umber of weekly contact hours, l				
		mation on SWS (weekly				
		s <b>essment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, informat	ion on whether
written by an o 2, appr	examii oral exa ox. 30	nation (approx. 90 minut mination of one candida minutes) ssessment: German, Eng	te each (approx. 20 n	ninutes) or an oral ex		
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)		
§ 73 (1)	2. Mat	hematik Lineare Algebra	, Algebra und Elemen	te der Zahlentheorie	2	
Module	e appea	ins in				
Bachel Bachel Bachel Bachel Bachel	or' deg or' deg or' deg or' deg or' deg	ree (1 major) Computer S ree (1 major) Computer S ree (1 major) Mathematic ree (1 major) Mathematic ree (1 major) Economathe ree (1 major) Economathe	cience (2010) s (2008) s (2007) ematics (2009)			
Bachelor's (2009)	with 1 maj	or Computational Mathematics		enerated 11-Jan-2023 • exam ECTS) Computational Mathe	-	page 152 / 167

## Julius-Maximilians-UNIVERSITÄT WÜRZBURG

Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2009) Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008) First state examination for the teaching degree Gymnasium Mathematics (2009)

Modul	e title				Abbreviation		
Introdu	uction t	o Functional Analysis			10-M-FAN-072-m01		
Module	e coord	inator		Module offered by			
Dean o	f Studi	es Mathematik (Mathem	atics)	Institute of Mathem	natics		
ECTS	1	od of grading	Only after succ. com				
	1						
5		rical grade					
Duratio	on	Module level	Other prerequisites				
sess at th side den the sess ted sess			sessment. The lectu at the beginning of t sidered a declaratio dents have obtained the course of the se sessment into effect ted to assessment in	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for			
Conter	te	<u> </u>					
Conten			unded a training to the second				
		s and Hilbert spaces, bo	ounded operators, prir	nciples of functional	analysis.		
Intend	ed lear	ning outcomes					
metho broad a	ds, is a applica	nows the fundamental co ble to apply methods fro bility of the theory to oth number of weekly contact hours,	m linear algebra and a new second s	analysis to functiona matics.			
V + Ü (I	no infoi	rmation on SWS (weekly	contact hours) and co	ourse language avail	able)		
		<b>sessment</b> (type, scope, langua le for bonus)	age — if other than German, e	examination offered — if no	ot every semester, informat	ion on whether	
by an c 2, appi	oral exa rox. 30	nation (approx. 90 minut mination of one candida minutes) ssessment: German, Eng	ite each (approx. 20 n	ninutes) or an oral ex			
Allocat							
		Jaces					
	nal inf	ormation					
Additit	matim		<u>.</u>				
Worklo	ad						
Referre	ed to in	LPO I (examination regulation	ns for teaching-degree progra	mmes)			
§ 73 (1)	) 1. Mat	hematik Analysis					
Module	e appea	ars in					
Bachel	or' deg	ree (1 major) Mathematio	cs (2008)				
	-	ree (1 major) Mathematio					
		ree (1 major) Technology					
	-	ree (1 major) Technology		als (2010)			
	-	ree (1 major) Economath	-				
		ree (1 major) Economath					
Bachel	or' deg	ree (1 major) Mathematio	cal Physics (2009)				
Bachelor's	with 1 ma	jor Computational Mathematics	JMU Würzburg • g	enerated 11-Jan-2023 • exam	. reg. data re-	page 154 / 167	
2009)			cord Bachelor (180	ECTS) Computational Mathe	ematics - 2009		

## Julius-Maximilians-UNIVERSITÄT WÜRZBURG

Bachelor' degree (1 major) Computational Mathematics (2009) 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) Bachelor' degree (1 major) Technology of Functional Materials (2006)

Module	e title				Abbreviation	
Operat	ions Re	esearch			10-M-ORS-072-m01	
Module	e coord	inator		Module offered by		
Dean o	of Studi	es Mathematik (Mathe	matics)	Institute of Mathem	natics	
ECTS	Methe	od of grading	Only after succ. con	npl. of module(s)		
5	numerical grade					
Duratio	on	Module level	Other prerequisites	;		
1 semester undergraduate		sessment. The lecture at the beginning of sidered a declaration dents have obtained the course of the se sessment into effect ted to assessment i	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification fo			
Conten	nts					
Linear	program	mming, duality theory,	transport problems, int	egral linear program	ming, graph theoret	ic problems.
Intend	ed lear	ning outcomes				
for solv proble	ving ma ms, bot	iny practical problems h theoretically and nu		s. He/She is able to		
			rs, language — if other than Ge			
			ly contact hours) and co			
		<b>sessment</b> (type, scope, lang ole for bonus)	guage — if other than German,	examination offered — if no	ot every semester, informat	ion on whether
by an c 2, appr	oral exa rox. 30	mination of one candio minutes)	utes); if announced by date each (approx. 20 r nglish if agreed upon w	ninutes) or an oral ex		
Allocat	tion of _l	places				
Additio	onal inf	ormation				
Worklo	ad					
Referre	ed to in	LPO I (examination regulat	ons for teaching-degree progra	ammes)		
§ 73 (1)	) 5. Mat	hematik Angewandte I	Mathematik			
Module	e appea	ars in				
Bachel Bachel Bachel Bachel Bachel Bachel	Module appears in         Bachelor' degree (1 major) Computer Science (2007)         Bachelor' degree (1 major) Computer Science (2010)         Bachelor' degree (1 major) Mathematics (2008)         Bachelor' degree (1 major) Mathematics (2007)         Bachelor' degree (1 major) Economathematics (2009)         Bachelor' degree (1 major) Economathematics (2008)         Bachelor' degree (1 major) Mathematics (2009)					
Bachelor's (2009)	with 1 ma	jor Computational Mathematics		generated 11-Jan-2023 • exam o ECTS) Computational Mathe		page 156 / 167

## Julius-Maximilians-UNIVERSITÄT WÜRZBURG

Bachelor' degree (1 major) Computational Mathematics (2009) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008) First state examination for the teaching degree Gymnasium Mathematics (2009)

Module	Module title Abbreviation				
Introdu	iction t	o Number Theory			10-M-EZT-072-m01
Module	e coord	inator		Module offered by	
Dean o	f Studio	es Mathematik (Mathema	atics)	Institute of Mathem	atics
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
me test	ts and r		, structure of the resi	due class rings, theo	ation, modular arithmetics, pri- ory of quadratic remainder, qua-
Intende	ed leari	ning outcomes			
		acquainted with the fun hese methods to practic			entary number theory. He/She is
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)
		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
		mination (90 minutes; us nination in groups (group		ral examination of o	ne candidate each (20 minutes)
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Referre	d to in	LPOI (examination regulation	s for teaching-degree progra	mmes)	
Module	e appea	ars in			
		ree (1 major) Computer S			
	-	ree (1 major) Economathe		,	
	-	ree (1 major) Computatio			
Dachel	Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008)				

Modul	e title				Abbreviation	
Non-Li	near Dy	mamics			10-M-NLD-072-m01	
Module	e coord	inator		Module offered by		
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics	
ECTS	1	od of grading	Only after succ. com	pl. of module(s)		
5	1	rical grade		······································		
Duratio		Module level	Other prerequisites			
1 semesterundergraduateCertain prerequisites must be met to qualify sessment. The lecturer will inform students a at the beginning of the course. Registration sidered a declaration of will to seek admissi dents have obtained the qualification for ad the course of the semester, the lecturer will sessment into effect. Students who meet all ted to assessment in the current or in the su sessment at a later date, students will have admission to assessment anew.			nts about the respec- tion for the course wints ion to assessme or admission to assessme will put their registrates at all prerequisites winter the semession of the semession o	ctive details ill be con- nt. If stu- ssment over ation for as- ill be admit- ster. For as-		
Conten	its					
Basic r dixson	iotions , chaoti	in stability theory, Lyapu c dynamics; applications ning outcomes				
		acquainted with the fun e is able to apply these m				eir proof me
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)		
V + Ü (I	no infoi	mation on SWS (weekly	contact hours) and co	ourse language avail	able)	
		<b>Sessment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, informat	ion on whether
by an c 2, appi	oral exa ox. 30	nation (approx. 90 minut mination of one candida minutes)	te each (approx. 20 m	ninutes) or an oral ex		
		ssessment: German, Eng	lish n agreed upon w	ith the examiner		
Allocat	ion of p	Dlaces				
Additio	onal inf	ormation				
Worklo	ad					
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)		
§ 73 (1)	) 1. Mat	hematik Analysis				
Module	e appea	ars in				
Bachel	or' deg	ree (1 major) Mathematic	s (2008)			
	-	ree (1 major) Mathematic				
	-	ree (1 major) Economathe	-			
	-	ree (1 major) Economathe				
	-	ree (1 major) Mathematic	• •			
	-	ree (1 major) Computatio ree (1 major) Aerospace (		•		
Bachelor's (2009)	with 1 maj	or Computational Mathematics		enerated 11-Jan-2023 • exam ECTS) Computational Mathe	-	page 159 / 167



Bachelor' degree (1 major) Aerospace Computer Science (2011) Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008) First state examination for the teaching degree Gymnasium Mathematics (2009)

Module title					Abbreviation	
Stochastics 2					10-M-ST2-082-m01	
Module coordinator				Module offered by	l	
Dean of Studies Mathematik (Mathematics)			atics)	Institute of Mathem	natics	
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)		
5		rical grade				
Duratio	· · · · · ·	Module level	Other prerequisites			
1 semester undergraduate		undergraduate	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.			
Conten	ts					
		ata analysis, statistics of	data in normal and c	ther distributions	lements of multivariate statistics	
		ning outcomes				
			ontal conconts and r	nothods in statistics	, applies these methods to prac	
		and knows about the ty			, applies these methods to place	
		umber of weekly contact hours,	· · ·			
		mation on SWS (weekly			able)	
					t every semester, information on whether	
		le for bonus)				
by an o 2, appr	ral exa ox. 30 I		te each (approx. 20 n	ninutes) or an oral ex	ten examination can be replaced kamination in groups (groups of	
Allocat	ion of p	olaces				
Additio	nal info	ormation				
Worklo	ad					
Referre	d to in	LPOI (examination regulation	s for teaching-degree progra	mmes)		
§ 73 (1)	3. Mat	hematik Stochastik				
Module appears in						
Bachele Bachele Bachele Bachele Bachele	or' degi or' degi or' degi or' degi or' degi or's deg	ree (1 major) Mathematic ree (1 major) Economath ree (1 major) Economath ree (1 major) Mathematic ree (1 major) Computatio gree (1 major, 1 minor) M mination for the teaching	ematics (2009) ematics (2008) al Physics (2009) nal Mathematics (200 athematics (Minor, 200	008)	)	

Module	Module title Abbreviation						
Readin	Reading Course Stochastics 10-M-RCS-082-m01						
Module coordinator Module offered by							
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics		
ECTS	Methe	thod of grading Only after succ. compl. of module(s)					
4	numerical grade						
Duratio	on .	Module level	Other prerequisites				
1 seme	ster	undergraduate					
Conten	ts						
Advand	ed top	ics in stochastics.					
Intende	ed lear	ning outcomes					
		able to work independe se standard literature.	ntly on a given scient	ific topic. He or she	can tackle a simple mathematical		
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ge	rman)			
		tion on SWS (weekly cont			e)		
		s <b>essment</b> (type, scope, langua ile for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether		
a) talk	(appro	x. 30 minutes) or b) writte	en elaboration (appro	ox. 5 to 10 pages)			
Allocat	ion of	olaces					
Additio	nal inf	ormation					
Worklo	ad						
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module	e appea	ars in					
		ree (1 major) Mathematic	s (2008)				
	Bachelor' degree (1 major) Mathematical Physics (2009)						
Bachelor' degree (1 major) Computational Mathematics (2009)							

Module title Abbreviation							
Readin	Reading Course Discrete Mathematics 10-M-RCD-082-m01						
Module coordinator Module offered by					I		
Dean of Studies Mathematik (Mathematics)				Institute of Mathen	natics		
ECTS	Methe	od of grading	Ing Only after succ. compl. of module(s)				
4	nume	rical grade					
Duration Module level Other prerequisites							
1 seme	ster	undergraduate					
Conten	ts						
Basics	in disc	rete mathematics.					
Intend	ed lear	ning outcomes					
		able to work independe use standard literature.	ntly on a given scient	tific topic. He or she	can tackle a simple mathematica		
Course	<b>S</b> (type, r	number of weekly contact hours, I	anguage — if other than Ge	rman)			
A (no ir	nforma	tion on SWS (weekly cont	act hours) and cours	e language availabl	e)		
		sessment (type, scope, langua ile for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether		
a) talk	(appro	x. 30 minutes) or b) writte	en elaboration (appro	ox. 5 to 10 pages)			
Allocat	ion of _l	places					
Additio	onal inf	ormation					
Worklo	ad						
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	ammes)			
Module	e appea	ars in					
		ree (1 major) Mathematic	s (2008)				
	Bachelor' degree (1 major) Mathematical Physics (2009)						
Bachel	or' deg	ree (1 major) Computatio	nal Mathematics (20	09)			

Module	Module title Abbreviation						
Reading Course Functional Analysis 10-M-RCF-082-mo1							
Module	Module coordinator Module offered by						
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics		
ECTS	Metho	Method of grading Only after succ. compl. of module(s)					
4	numerical grade						
Duratio	n	Module level	Other prerequisites				
1 seme	ster	undergraduate					
Conten	ts						
Basics	in func	tional analysis.					
Intende	ed lear	ning outcomes					
		able to work independents able to work independents	ntly on a given scient	ific topic. He or she	can tackle a simple mathematical		
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Gei	rman)			
A (no ir	format	tion on SWS (weekly cont	act hours) and cours	e language available	e)		
		<b>Sessment</b> (type, scope, langua Ile for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether		
a) talk	(approx	x. 30 minutes) or b) writte	en elaboration (appro	ox. 5 to 10 pages)			
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	ad						
Referred to in LPO I (examination regulations for teaching-degree programmes)							
-							
Module appears in							
		ree (1 major) Mathematic	s (2008)				
Bachelor' degree (1 major) Mathematical Physics (2009)							
Bachelor' degree (1 major) Computational Mathematics (2009)							

Module	Module title Abbreviation						
Readin	Reading Course Operations Research 10-M-RCO-082-mo1						
Module coordinator Module offered by							
Dean of Studies Mathematik (Mathematics)				Institute of Mathem	natics		
ECTS	Methe	thod of grading Only after succ. compl. of module(s)					
4	nume	rical grade					
Duration Module level Other prerequisites							
1 seme	ster	undergraduate					
Conten	ts	<u>.</u>	<u>.</u>				
Basics	in opei	rations research.					
Intend	ed lear	ning outcomes					
		able to work independe use standard literature.	ntly on a given scient	ific topic. He or she	can tackle a simple mathematical		
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Gei	rman)			
A (no ir	nforma	tion on SWS (weekly cont	act hours) and cours	e language available	e)		
		S <b>essment</b> (type, scope, langua vle for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether		
a) talk	(approz	x. 30 minutes) or b) writte	en elaboration (appro	ox. 5 to 10 pages)			
Allocat	ion of	olaces					
Additio	nal inf	ormation					
Worklo	ad						
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module appears in							
		ree (1 major) Mathematic	s (2008)				
Bachelor' degree (1 major) Mathematical Physics (2009)							
Bachel	Bachelor' degree (1 major) Computational Mathematics (2009)						

Module	Module title Abbreviation						
Readin	Reading Course Dynamical Systems 10-M-RCY-082-mo1						
Module coordinator Module offered by							
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics		
ECTS	Meth	od of grading	Only after succ. compl. of module(s)				
4	nume	rical grade					
Duration Module level Other prerequisites							
1 seme	ster	undergraduate					
Conten	ts	κ.					
Basics	in dyna	amical systems and nonli	near dynamics.				
Intend	ed lear	ning outcomes					
The stu	ident is		ntly on a given scient	ific topic. He or she	can tackle a simple mathematical		
Course	<b>S</b> (type, 1	number of weekly contact hours, I	anguage — if other than Ge	rman)			
A (no ir	nforma	tion on SWS (weekly cont	act hours) and cours	e language available	e)		
		s <b>essment</b> (type, scope, langua ble for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether		
a) talk	(appro	x. 30 minutes) or b) writte	en elaboration (appro	ox. 5 to 10 pages)			
Allocat	ion of	places					
Additio	onal inf	ormation					
Worklo	ad						
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	ummes)			
Module	e appea	ars in					
		ree (1 major) Mathematic	s (2008)				
	Bachelor' degree (1 major) Mathematical Physics (2009)						
Bachel	Bachelor' degree (1 major) Computational Mathematics (2009)						

Module	Module title Abbreviation						
Readin	Reading Course Optimisation 10-M-RCP-082-mo1						
Module coordinator Module offered by							
Dean o	f Studi	es Mathematik (Mathema	Institute of Mathen	natics			
ECTS	Methe	od of grading					
4	nume	rical grade					
Duration Module level Other prerequisites							
1 seme	ster	undergraduate					
Conten	ts	<u>.</u>					
Basics	in opti	mization.					
Intende	ed lear	ning outcomes					
		able to work independe use standard literature.	ntly on a given scient	ific topic. He or she	can tackle a simple mathematical		
Course	<b>S</b> (type, r	number of weekly contact hours, I	anguage — if other than Ge	rman)			
		tion on SWS (weekly cont			e)		
		<b>Sessment</b> (type, scope, langua ole for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether		
a) talk	(approx	x. 30 minutes) or b) writte	en elaboration (appro	ox. 5 to 10 pages)			
Allocat	ion of _l	places					
Additio	nal inf	ormation					
			-				
Worklo	ad						
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)							
Module	e appea	ars in					
		ree (1 major) Mathematic	cs (2008)				
Bachelor' degree (1 major) Mathematical Physics (2009)							
Bachel	Bachelor' degree (1 major) Computational Mathematics (2009)						