

Subdivided Module Catalogue for the Subject

Mathematics International

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

Examination regulations version: 2021 Responsible: Faculty of Mathematics and Computer Science Responsible: Institute of Mathematics

JMU Würzburg • generated 19-Apr-2025 • exam. reg. data record 88|h79|-|-|H|2021

UNIVERSITÄT WÜRZBURG

Learning Outcomes

Scientific qualification

- Graduates are trained in analytical thinking, possess a highly developed capacity for abstraction, universally applicable problem-solving skills and the ability to structure complex relationships.
- Graduates are able to independently familiarise themselves with current research areas in mathematics using specialised literature.
- Graduates are able to present their knowledge, ideas and solutions to complex issues in English to an international audience of experts in a comprehensible way.
- Graduates possess the specialised knowledge, thought processes and methodological skills required for independent scientific work, in particular for doctoral studies.
- Graduates know the rules of good scientific practice and are able to observe them in extensive work.
- Graduates have advanced knowledge of current areas of mathematics and are able to confidently use advanced methods in these areas.
- Graduates have in-depth knowledge and an overview of a current research topic from at least one area of mathematics.

Ability to take up employment

- Graduates are trained in analytical thinking, possess a highly developed capacity for abstraction, universally applicable problem-solving skills and the ability to structure complex relationships.
- Graduates are able to formulate and present their knowledge, ideas and problem solutions in English in a way that is understandable to the target audience.
- Graduates are able to recognise, structure and model complex problems from other fields (such as the natural sciences, engineering or economics), develop solutions using mathematical methods and interpret and evaluate these results.
- The graduates have resilience in solving complex problems.
- The graduates are able to work constructively and oriented towards a goal in international teams and are able to take responsibility for a wide range of tasks.
- Graduates are able to develop new fields of knowledge independently, efficiently and systematically.

Personal development

- Graduates are trained in analytical thinking, possess a highly developed capacity for abstraction, universally applicable problem-solving skills and the ability to structure complex relationships.
- Graduates can play a constructive role in participatory processes.
- The graduates have resilience in solving complex problems.
- Graduates are able to formulate complex ideas and proposed solutions in a generally understandable way and present them professionally.
- Graduates possess intercultural skills and can communicate and act in an international environment.

Abbreviations used

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

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

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

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

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

Conventions

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

Notes

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

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

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

In accordance with

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

ASPO2015

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

03-Feb-2021 (2021-6)

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

The subject is divided into

Abbreviation	Module title	ECTS credits	Method of grading	page
Compulsory Electives (90 I	CTS credits)			
Mathematics (30 ECTS cr	edits)			
10-M=AAANin-152-m01	Applied Analysis	10	NUM	7
10-M=AALGin-152-m01	Topics in Algebra	10	NUM	8
10-M=ADGMin-152-m01	Differential Geometry	10	NUM	9
10-M=AFTHin-152-m01	Complex Analysis	10	NUM	11
10-M=AGMSin-152-m01	Geometric Structures	10	NUM	12
10-M=AISTin-152-m01	Industrial Statistics 1	10	NUM	15
10-M=ALTHin-152-m01	Lie Theory	10	NUM	16
10-M=ANGGin-152-m01	Numeric of Large Systems of Equations	10	NUM	17
10-M=AOPTin-152-m01	Basics in Optimization	10	NUM	18
10-M=ARTHin-152-m01	Control Theory	10	NUM	19
10-M=ASMRin-152-m01	Stochastic Models of Risk Management	10	NUM	20
10-M=ASTPin-152-m01	Stochastical Processes	10	NUM	2:
10-M=ATOPin-152-m01	Topology	10	NUM	22
10-M=AVSMin-152-m01	Insurance Mathematics 1	10	NUM	2
10-M=AZRAin-152-m01	Time Series Analysis 1	10	NUM	2/
10-M=AZTHin-152-m01	Number Theory	10	NUM	2
10-M=AGPCin-152-mo1	Giovanni Prodi Lecture (Master)	5	NUM	13
10-M=VANAin-152-mo1	Selected Topics in Analysis	10	NUM	6
10-M=VATPin-152-m01	Algebraic Topology	10	NUM	6
10-M=VFNMin-152-mo1	Selected Topics in Financial Mathematics	10	NUM	7
10-M=VGDSin-152-m01	Groups and their Representations	10	NUM	7
10-M=VGEMin-152-mo1	Geometrical Mechanics	10	NUM	7
10-M=VISTin-152-m01	Industrial Statistics 2	10	NUM	8
10-M=VKARin-152-m01	Field Arithmetics	10	NUM	8
10-M=VNPEin-152-m01	Numeric of Partial Differential Equations	10	NUM	94
10-M=VOPTin-152-mo1	Selected Topics in Optimization	10	NUM	9
10-M=VSTAin-152-m01	Statistical Analysis	10	NUM	10
10-M=VVSMin-152-m01	Insurance Mathematics 2	10	NUM	10
10-M=VZRAin-152-m01	Time Series Analysis 2	10	NUM	10
10-M=VDIMin-152-m01	Discrete Mathematics	5	NUM	6
10-M=VDSYin-152-m01	Dynamical Systems	5	NUM	70
10-M=VGEOin-152-m01	Aspects of Geometry	5	NUM	7
10-M=VKOMin-152-m01	Mathematical Continuum Mechanics	5	NUM	8
10-M=VMBVin-152-m01	Mathematical Imaging	5	NUM	89
-	Selected Topics in Mathematical Physics	10	NUM	90
10-M=VTRTin-152-m01	Selected Topics in Control Theory	10	NUM	10
10-M=VIPRin-152-m01	Inverse Problems	5	NUM	8
10-M=VMTHin-152-m01	Module Theory	5	NUM	9
-	Non-linear Analysis	5	NUM	9
10-M=VOSTin-152-mo1	Optimal Control	5	NUM	96
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10-M=VVSYin-152-mo1	Networked Systems	5	NUM	103
	Complex Geometry	10	NUM	86
3	Partial Differential Equations of Mathematical Physics	10	NUM	97
	Pseudo Riemannian and Riemannian Geometry	10	NUM	98
	Functional Analysis	10	NUM	10
	Applied Differential Geometry	10	NUM	63
	Giovanni Prodi Lecture Selected Topics (Master)	10	NUM	81
-	Giovanni Prodi Lecture Advanced Topics (Master)	10	NUM	+
3	Giovanni Prodi Lecture Advanced Topics (Master)	10	NUM	77
	Geometric Complex Analysis		NUM	79
	Selected Topics in Numerical and Applied Mathematics	10	NUM	76
10-M=VKRYin-211-m01		10	NUM	92 88
	Cryptography/Coding Theory	10	NUM	68
	Computer Algebra	10		
	Algorithmic Number Theory	10	NUM	67
	Algebraic Geometry	10	NUM	64
· · · · · · · · · · · · · · · · · · ·	Seminars (20 ECTS credits)			
	Research in Groups - Algebra	10	NUM	27
	Research in Groups - Discrete Mathematics	10	NUM	32
	Research in Groups - Dynamical Systems and Control Theory	10	NUM	33
	Research in Groups - Complex Analysis	10	NUM	28
	Research in Groups - Geometry and Topology	10	NUM	34
-	Research in Groups - Mathematics in Context	10	NUM	38
-	Research in Groups - Mathematics in the Sciences	10	NUM	39
10-M=GMAlin-152-m01	Research in Groups - Measure and Integral	10	NUM	36
10-M=GNMAin-152-m01	Research in Groups - Numerical Mathematics and Applied Ana- lysis	10	NUM	41
10-M=GROCin-152-mo1	Research in Groups - Robotics, Optimization and Control Theo- ry	10	NUM	44
10-M=GTSAin-152-m01	Research in Groups - Time Series Analysis	10	NUM	46
10-M=GSTAin-152-m01	Research in Groups - Statistics	10	NUM	45
10-M=GNTHin-152-m01	Research in Groups - Number Theory	10	NUM	42
10-M=GCQSin-152-m01	Research in Groups - Control Theory of Quantum Mechanical Systems	10	NUM	29
10-M=GDGEin-152-m01	Research in Groups - Differential Geometry	10	NUM	31
10-M=GDFQin-152-m01	Research in Groups - Deformation Quantization	10	NUM	30
10-M=GNLAin-152-m01	Research in Groups - Non-linear Analysis	10	NUM	40
10-M=GOPAin-152-mo1	Research in Groups - Operator Algebras	10	NUM	43
10-M=SADGin-152-m01	Seminar in Applied Differential Geometry	5	NUM	48
10-M=SALGin-152-m01	Seminar in Algebra	5	NUM	49
10-M=SDSCin-152-m01	Seminar in Dynamical Systems and Control	5	NUM	52
10-M=SCOAin-152-m01	Seminar in Complex Analysis	5	NUM	51
-	Seminar in Financial and Insurance Mathematics	5	NUM	53
	Seminar in Geometry and Topology	5	NUM	56
-	Giovanni Prodi Seminar (Master)	5	NUM	54
10-M=SIDCin-152-m01	Interdisciplinary Seminar	5	NUM	57
10-M=SMSCin-152-m01	Seminar Mathematics in the Sciences	5	NUM	58

10-M=SNMAin-152-m01	Seminar in Numerical Mathematics and Applied Analysis	5	NUM	60				
10-M=SOPTin-152-m01	Seminar in Optimization	5	NUM	61				
10-M=SSTAin-152-m01	Seminar in Statistics	5	NUM	62				
10-M=SNLAin-152-m01	Seminar in Non-linear Analysis	5	NUM	59				
10-M=SAMAin-211-m01	Seminar in Applied Mathematics	5	NUM	50				
10-M=GLIEin-211-m01	Research in Groups - Lie Theory	10	NUM	35				
10-M=GADGin-211-m01	Research in Groups - Applied Differential Geometry	10	NUM	26				
10-M=GMAPin-211-m01	Research in Groups - Mathematical Physics	10	NUM	37				
Thesis (30 ECTS credits)								
10-M=MAMI-152-m01	Master Thesis Mathematics International	30	NUM	47				

					Abbreviation			
Applied	Applied Analysis 10-M=AAANin-152-m01							
Module	e coord	inator		Module offered by				
		es Mathematik (Mather	-	Institute of Mathem	natics			
ECTS	<u> </u>	od of grading	Only after succ. con	npl. of module(s)				
10	· · · · ·	rical grade						
Duratio		Module level	Other prerequisites	i				
1 seme		graduate						
Conten	ts							
theory particu theory Recom	In-depth study of functional analysis and operator theory, Sobolev spaces and partial differential equations, theory of Hilbert spaces and Fourier analysis, spectral theory and quantum mechanics, numerical methods (in particular FEM methods), principles of functional analysis, function spaces, embedding theorems, compactness, theory of elliptic, parabolic and hyperbolic partial differential equations with methods from functional analysis. Recommended previous knowledge:							
		h the contents of the m	odule "Functional Ana	lysis" is strongly reco	ommended.			
		ning outcomes						
to esta	blish a	acquainted with the fu connection between hi ther natural and engine	s/her acquired skills a					
Course	s (type,	, number of weekly con	tact hours, language –	- if other than Germa	n)			
V (4) + Module		t in: English						
		essment (type, scope,			tion offered — if not	every seme-		
ster, in	formati	on on whether module	can be chosen to earn	a bonus)				
b) oral c) oral Langua	examin examin Ige of a ment o	nination (approx. 90 to ation of one candidate ation in groups (groups ssessment: English ffered: In the semester bonus	each (approx. 20 min 5 of 2, 15 minutes per c	utes) or andidate)	ıbsequent semester			
Allocat	ion of p	olaces						
Additio	onal info	ormation						
Worklo	ad							
300 h								
Teachi	ng cvcl	9						
Referre	d to in	LPOI (examination reg		degree programmes)				
			<u>, , , , , , , , , , , , , , , , , , , </u>					
Module	annea	rs in						
Module appears in Master's degree (1 major) Mathematics International (2015)								
Master's degree (1 major) Mathematics International (2015) Master's degree (1 major) Physics International (2020)								
	Master's degree (1 major) Mathematics International (2021)							
	Master's degree (1 major) Mathematics International (2022)							
	-	ee (1 major) Physics Int						
	-	ee (1 major) Mathemati				· · ·		
Master's w (2021)	ith 1 major	Mathematics International		enerated 19-Apr-2025 • exam o ECTS) Mathematics Internat	-	page 7 / 104		

Module	e title				Abbreviation			
Topics in Algebra					10-M=AALGin-152-m01			
Module	e coord	inator		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)				
10	nume	rical grade						
Duratio	n	Module level	Other prerequisites					
1 seme	ster	graduate						
Conten	ts							
algebra Recomi	n. mende	d previous knowledge:			oraic combinatorics or computer s "Introduction to Algebra" and			
"Applie								
		ning outcomes						
		acquainted with fundam se skills to complex que		nethods in a contem	porary field of algebra, and is ab-			
Course	s (type,	, number of weekly conta	ct hours, language —	if other than Germa	n)			
V (4) + Module		t in: English						
		-	nguage — if other tha	an German, examina	tion offered — if not every seme-			
		on on whether module ca						
b) oral c) oral (Langua	examin examin ge of a ment o	nination (approx. 90 to 1 ation of one candidate e ation in groups (groups c ssessment: English ffered: In the semester in bonus	ach (approx. 20 minu of 2, 15 minutes per ca	tes) or andidate)	ıbsequent semester			
Allocat	ion of p	olaces						
Additio	nal info	ormation						
Worklo	ad							
300 h								
Teachi	Teaching cycle							
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module appears in								
Master Master	Module appears inMaster's degree (1 major) Mathematics International (2015)Master's degree (1 major) Mathematics International (2021)Master's degree (1 major) Mathematics International (2022)Master's degree (1 major) Mathematics International (2025)							

Master's with 1 major Mathematics International

(2021)

Modul	e title		Abbreviation				
Differential Geometry 10-M=ADGMin-152-mo1							
Modul	e coord	inator		Module offered by			
Dean c	of Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics		
ECTS		od of grading	Only after succ. con	pl. of module(s)			
10	I	rical grade					
Durati		Module level	Other prerequisites				
1 seme	ester	graduate					
Conter	its						
folds. Recom Basic I	mende mowled	d previous knowledge: Ige from the modules "In			ntiable and Riemannian mani- roduction to Topology" and "Geo-		
-		s" is recommended.					
Intend	ed lear	ning outcomes					
					ds or Riemannian manifolds, is al methods in differential geome-		
Course	e s (type	, number of weekly conta	ct hours, language –	· if other than Germa	n)		
V (4) + Modul		t in: English					
		sessment (type, scope, la ion on whether module ca			tion offered — if not every seme-		
-				•			
		mination (approx. 90 to 1 nation of one candidate e					
		ation in groups (groups o					
Assess		ssessment: English ffered: In the semester in	which the course is	offered and in the su	ubsequent semester		
	tion of p						
Alloca		Jaces					
		ormation					
Additio	onat ini	ormation					
Worklo	ad						
300 h							
Teachi	ng cycl	е					
Referre	ed to in	LPOI (examination regu	lations for teaching-o	legree programmes)			
Module appears in							
Master	Master's degree (1 major) Mathematics International (2015)						
	Master's degree (1 major) Physics International (2020)						
	-	ee (1 major) Mathematics					
	-	ee (1 major) Mathematics					
	-	ee (1 major) Physics Inter	-				
master	Master's degree (1 major) Mathematics International (2025)						

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Module	e title				Abbreviation
Functio	Functional Analysis				10-M=AFANin-152-m01
Module	e coord	inator		Module offered by	<u> </u>
Dean o	of Studie	es Mathematik (Mathema	atics)	Institute of Mathem	natics
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	graduate			
Conten	Its				
functio Recom	nal ana mendeo	lysis and applications to d previous knowledge:	other fields of mathe	ematics.	s, further contemporary topics in
		h the contents of the mo	dule "Advanced Analy	ysis" is strongly reco	mmended.
		ning outcomes			
		acquainted with fundam e to apply these skills to		nethods in a contem	porary field of functional analy-
Course	s (type	number of weekly conta	ct hours, language —	if other than Germa	n)
V (4) +					
	-	t in: English			
		e ssment (type, scope, la on on whether module ca			tion offered — if not every seme-
b) oral c) oral Langua Assess	examin examin age of a	nination (approx. 90 to 1 ation of one candidate e ation in groups (groups c ssessment: English ffered: In the semester in bonus	ach (approx. 20 minu of 2, 15 minutes per c	ites) or andidate)	ubsequent semester
Allocat	ion of p	olaces			
Additio	onal info	ormation			
Worklo	ad				
300 h					
Teachi	ng cycl	9			
Referre	ed to in	LPOI (examination regu	lations for teaching-o	legree programmes)	
Modul	e appea	rs in			
Master Master	's degre 's degre	ee (1 major) Mathematics ee (1 major) Mathematics ee (1 major) Mathematics ee (1 major) Mathematics	International (2021) International (2022)		

Module title					Abbreviation			
-	Complex Analysis 10-M=AFTHin-152-mo1							
Modul	e coord	inator		Module offered by				
Dean o	of Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics			
ECTS	1	od of grading	Only after succ. con	npl. of module(s)				
10	I	rical grade						
Duratio	-	Module level	Other prerequisites					
1 seme	ester	graduate						
Conter	nts							
geome ons (e. Recom	tric me g. ellip mende		es of families of hold	omorphic and merom	ions with modern analytic and orphic functions. Special functi- is" is recommended.			
Intend	ed lear	ning outcomes						
ticular	the (ge		ties of holomorphic f	unctions. He/She is	f higher complex analysis, in par- able to establish a connection ations in other subjects.			
Course	s (type	, number of weekly conta	ct hours, language –	- if other than Germa	n)			
V (4) + Module		t in: English						
Metho	d of ass	sessment (type, scope, la	nguage — if other tha	an German, examina	tion offered — if not every seme-			
ster, in	formati	ion on whether module ca	an be chosen to earn	a bonus)				
b) oral c) oral Langua Assess	examir examin age of a	mination (approx. 90 to 1 nation of one candidate e nation in groups (groups c ssessment: English ffered: In the semester in honus	ach (approx. 20 minu of 2, 15 minutes per c	utes) or andidate)	ıbsequent semester			
	tion of p							
Additic	nalinf	ormation						
Auunit								
Worklo								
	Jau							
300 h								
Teachi	ng cycl	е						
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)							
Modul	Module appears in							
	Master's degree (1 major) Mathematics International (2015)							
	Master's degree (1 major) Physics International (2020)							
	-	ee (1 major) Mathematics						
	-	ee (1 major) Mathematics ee (1 major) Physics Inter						
	-	ee (1 major) Mathematics	-					

Module title					Abbreviation			
Geometric Structures 10-M=AGMSin-152-mo1								
Module coordinator Mo				Module offered by	Module offered by			
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	atics			
ECTS	1	od of grading	Only after succ. com	pl. of module(s)				
10	nume	rical grade						
Duratio		Module level	Other prerequisites					
1 seme	ster	graduate						
Conten	ts							
ang cor Recomi	ndition mende	s, classification results. d previous knowledge:	-		isms, BN pairs in groups, Mouf- 'Introduction to Topology" is re-			
comme	nded.							
		ning outcomes						
structu	re.He/		connection betweer	these results and b	oncerning a type of geometric roader theories, and learns			
Course	s (type	, number of weekly conta	ct hours, language —	· if other than Germa	n)			
V (4) + Module		t in: English						
		sessment (type, scope, la ion on whether module ca			tion offered — if not every seme-			
b) oral c) oral (Langua	examir examin ge of a ment o	mination (approx. 90 to 1 nation of one candidate e nation in groups (groups c ssessment: English ffered: In the semester in bonus	ach (approx. 20 minu of 2, 15 minutes per c	utes) or andidate)	ıbsequent semester			
Allocat	ion of p	olaces						
Additio	nal inf	ormation						
Worklo	ad							
300 h								
-	Teaching cycle							
Referred to in LPO I (examination regulations for teaching-degree programmes)								
 Module appears in								
	Module appears in Master's degree (1 major) Mathematics International (2015)							
	-	ee (1 major) Mathematics						
	-	ee (1 major) Mathematics						
Master	Master's degree (1 major) Mathematics International (2025)							

Module title Abbreviation							
Giovar	Giovanni Prodi Lecture (Master) 10-M=AGPCin-152-m01						
Module coordinator				Module offered by			
		es Mathematik (Mathem	-	Institute of Mathem	natics		
ECTS		od of grading	Only after succ. con	npl. of module(s)			
5		rical grade					
Durati	-	Module level	Other prerequisites				
1 seme	ester	graduate					
Conter	nts						
Introdu	uction to	o a specialised topic in	mathematics by an int	ernational expert.			
Intend	ed learn	ning outcomes					
thema	tics. He	acquainted with the fu /She is able to establish applications in other s	n a connection betwee				
Course	es (type	, number of weekly cont	act hours, language –	- if other than Germa	ın)		
V (3) + Modul	• •	t in: English	_				
		essment (type, scope, l on on whether module			tion offered — if not	every seme-	
b) oral c) oral Langua	 a) written examination (approx. 60 to 90 minutes, usually chosen) or b) oral examination of one candidate each (approx. 15 minutes) or c) oral examination in groups (groups of 2, approx. 10 minutes per candidate) Language of assessment: English Assessment offered: In the semester in which the course is offered and in the subsequent semester 						
	tion of p						
Additi	onal info	ormation					
nauren			_				
Worklo	oad						
150 h							
Teachi	ing cycl	9					
Referr	ed to in	LPOI (examination reg	ulations for teaching-	degree programmes)			
Modul	e appea	irs in					
Maste	r's degre	ee (1 major) Mathematic	s International (2015)				
Master	r's degre	ee (1 major) Mathematic	s (2016)				
Master's degree (1 major) Mathematical Physics (2016)							
Master's degree (1 major) Computational Mathematics (2016)							
Master's degree (1 major) Computational Mathematics (2019)							
Maste	Master's degree (1 major) Mathematics (2019)						
Master's degree (1 major) Mathematical Physics (2020)							
Maste	Master's degree (1 major) Mathematics International (2021)						
Maste	r's degre	ee (1 major) Computatio	nal Mathematics (202	2)			
Maste	r's degre	ee (1 major) Mathematic	s (2022)				
Maste	r's degre	ee (1 major) Mathematic	al Physics (2022)				
Master's w (2021)	vith 1 major	Mathematics International		enerated 19-Apr-2025 • exam 5 ECTS) Mathematics Internat	-	page 13 / 104	

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Master's degree (1 major) Mathematics International (2022) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) Mathematics (2024) Master's degree (1 major) Mathematics International (2025) Master's degree (1 major) Mathematical Data Science (2025)

Module	e title				Abbreviation					
Industr	ial Sta	tistics 1			10-M=AISTin-152-m01					
Module	e coord	inator		Module offered by	<u> </u>					
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)						
10	nume	rical grade								
Duratio	n	Module level	Other prerequisites							
1 seme	ster	graduate								
Conten	ts									
	•	meter and domain estim is, comparative analysis,			bution models, empirical distri- ing, audit sampling.					
Intende	ed lear	ning outcomes								
The stu	dent m	asters the fundamental s	statistical methods fo	or industrial applicat	ions.					
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	in)					
V (4) +	Ü (2)									
		t in: English								
		essment (type, scope, la on on whether module ca			tion offered — if not every seme-					
b) oral c) oral Langua	examir examin ge of a ment o	mination (approx. 90 to 1 nation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester in bonus	ach (approx. 20 minu of 2, 15 minutes per c	ites) or andidate)	ubsequent semester					
Allocat	ion of _l	olaces								
Additio	nal inf	ormation								
Worklo	ad									
300 h										
Teachi	ng cycl	e								
Referre	d to in	LPOI (examination regu	lations for teaching-o	legree programmes)						
Module	e appea	urs in								
		ee (1 major) Mathematics	International (2015)							
	-	ee (1 major) Mathematics								
	'c doar	oo (1 major) Mathomatics	Aaster's degree (1 major) Mathematics International (2022) Aaster's degree (1 major) Mathematics International (2025)							

Module title			Abbreviation			
Lie The	Lie Theory 10-M=ALTHin-152-mo1					101
Module coordinator Module o			Module offered by			
Dean o	f Studie	es Mathematik (Mathei	natics)	Institute of Mathem	atics	
ECTS	Metho	od of grading	Only after succ. cor	npl. of module(s)		
10	nume	rical grade				
Duratio	on	Module level	Other prerequisites	;		
1 seme	ster	graduate				
Conten	ts					
examp	les, app	ups and their Lie algeb blications, e.g. in phys		on, structure and cla	ssification of Lie alge	ebras, classic
Basic k	nowled d. Furth	d previous knowledge: lge of the contents of t nermore, basic knowled			, ,	
Intend	ed learı	ning outcomes				
	hese to	acquainted with the fu common problems, ar				
Course	s (type	, number of weekly con	tact hours, language –	– if other than Germa	n)	
V (4) + Module		t in: English				
		essment (type, scope, on on whether module			tion offered — if not	every seme-
b) oral c) oral Langua Assess	examin examin age of a	nination (approx. 90 to ation of one candidate ation in groups (group ssessment: English ffered: In the semester bonus	each (approx. 20 min 5 of 2, 15 minutes per c	utes) or andidate)	ıbsequent semester	
Allocat	ion of p	olaces				
Additio	onal inf	ormation				
 Workla						
300 h	au					
-	ng cycl	•				
Teacin	ing cycl	e				
Referre	d to in	LPOI (examination reg		degree programmes)		
Kerent						
Module	e appea	irs in				
Module appears in Master's degree (1 major) Mathematics International (2015)						
Master's degree (1 major) Physics International (2020)						
Master's degree (1 major) Mathematics International (2021)						
	Master's degree (1 major) Mathematics International (2022)					
	-	ee (1 major) Physics Int	•			
		ee (1 major) Mathemati		enerated 19-Apr-2025 • exam	rog data ro	page 16 / 10 /
Master's w (2021)	itir i majol	mathematics international		o ECTS) Mathematics Internat	-	page 16 / 104

Module title Abbreviation					
Numeric of Large Systems of Equations10-M=ANGGin-152-mo1					10-M=ANGGin-152-m01
Module coordinator				Module offered by	
Dean o	of Studie	es Mathematik (Mathema	atics)	Institute of Mathem	natics
ECTS		od of grading	Only after succ. com		
10		rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	Its				
Recom Basic k	mende	d previous knowledge: Ige of numerical mathem	atics, such as that ac	quired in the modul	conditioners, multigrid methods. les "Numerical Mathematics 1"
		al Mathematics 2", is req nended.	uired. Knowledge of t	the contents of the r	nodule "Basics in Optimization"
Intend	ed learı	ning outcomes			
		acquainted with the mo ient way to solve a given	•	s for solving large sy	stems of equations, and knows
		, number of weekly conta	· · ·	· if other than Germa	an)
V (4) +	Ü (2)		, , , , , , , , , , , , , , , , , , , ,		,
		t in: English	· · · · · · · · · · · · · · · · · · ·		
		on on whether module c			ition offered — if not every seme-
b) oral c) oral Langua Assess	examin examin age of a	mination (approx. 90 to 1 nation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester ir bonus	ach (approx. 20 minu of 2, 15 minutes per c	ites) or andidate)	ubsequent semester
Allocat	ion of p	olaces			
Additio	onal inf	ormation			
Worklo	ad				
300 h					
Teachi	ng cycl	e			
Referre	ed to in	LPOI (examination regu	lations for teaching-c	legree programmes)	
	e appea				
	-	ee (1 major) Mathematics			
		ee (1 major) Mathematics			
	-	ee (1 major) Mathematics			
master	saegr	ee (1 major) Mathematics	miternational (2025)		

	Module title Abbreviation					
Basics in Optimization 10-M=AOPTin-1					10-M=AOPTin-152-m01	
Module coordinator				Module offered by		
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathen	natics	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
10	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
					l optimization, conditions for opti- eering sciences as well as econo-	
Intende	ed lear	ning outcomes				
		nows the fundamental m ecide which method is th			dge their strengths and weaknes-	
Course	s (type	, number of weekly conta	act hours, language –	- if other than Germa	an)	
V (4) + Module	• •	t in: English				
					ation offered — if not every seme-	
		on on whether module c		a bonus)		
	chi chu		20 minutes usually i	chosen) or		
Langua	examin Ige of a ment o	ation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester ir	of 2, 15 minutes per c	utes) or andidate)	ubsequent semester	
Langua Assess	examin ige of a ment o ble for	ation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester ir bonus	each (approx. 20 minu of 2, 15 minutes per c	utes) or andidate)	ubsequent semester	
Langua Assess credita	examin ige of a ment o ble for	ation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester ir bonus	each (approx. 20 minu of 2, 15 minutes per c	utes) or andidate)	ubsequent semester	
Langua Assess credita Allocat	examin ige of a ment o ble for ion of j	ation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester ir bonus	each (approx. 20 minu of 2, 15 minutes per c	utes) or andidate)	ubsequent semester	
Langua Assess credita Allocat	examin ige of a ment o ble for ion of j	ation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester ir bonus blaces	each (approx. 20 minu of 2, 15 minutes per c	utes) or andidate)	ubsequent semester	
Langua Assess credita Allocat	examin ge of a ment o ble for ion of j mal inf	ation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester ir bonus blaces	each (approx. 20 minu of 2, 15 minutes per c	utes) or andidate)	ubsequent semester	
Langua Assess credita Allocat Additio	examin ge of a ment o ble for ion of j mal inf	ation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester ir bonus blaces	each (approx. 20 minu of 2, 15 minutes per c	utes) or andidate)	ubsequent semester	
Langua Assess credita Allocat Additio Worklo	examin ige of a ment o ble for ion of j nal inf ad	ation of one candidate e ation in groups (groups of ssessment: English ffered: In the semester in bonus blaces	each (approx. 20 minu of 2, 15 minutes per c	utes) or andidate)	ubsequent semester	
Langua Assess credita Allocat Additio Worklo 300 h	examin ige of a ment o ble for ion of j nal inf ad	ation of one candidate e ation in groups (groups of ssessment: English ffered: In the semester in bonus blaces	each (approx. 20 minu of 2, 15 minutes per c	utes) or andidate)	ubsequent semester	
Langua Assess credita Allocat Additio Worklo 300 h Teachin 	examin ige of a ment o ble for ion of j nal inf ad	ation of one candidate e ation in groups (groups of ssessment: English ffered: In the semester in bonus blaces	each (approx. 20 minu of 2, 15 minutes per c n which the course is	utes) or andidate) offered and in the s		
Langua Assess credita Allocat Additio Worklo 300 h Teachin 	examin ige of a ment o ble for ion of j nal inf ad	e e ation in groups (groups of ssessment: English ffered: In the semester in bonus blaces ormation	each (approx. 20 minu of 2, 15 minutes per c n which the course is	utes) or andidate) offered and in the s		
Langua Assess credita Allocat Additio Worklo 300 h Teachin 	examin ige of a ment o ble for ion of p nal inf ad ng cycl	e LPOI (examination regu	each (approx. 20 minu of 2, 15 minutes per c n which the course is	utes) or andidate) offered and in the s		
Langua Assess credita Allocat Morklo 300 h Teachin Referre Module	examin ge of a ment o ble for ion of j onal inf ad ng cycl	e LPOI (examination regu	each (approx. 20 minu of 2, 15 minutes per c n which the course is a diations for teaching-c	utes) or andidate) offered and in the s		
Langua Assess credita Allocat Additio Worklo 300 h Teachin Referre Module	examin ige of a ment o ble for ion of j onal inf ad ad ed to in e appea	e LPOI (examination regu	each (approx. 20 minu of 2, 15 minutes per c n which the course is a ulations for teaching-o s International (2015)	utes) or andidate) offered and in the s degree programmes)		
Langua Assess credita Allocat Additio Worklo 300 h Teachin Referre Module Master Master	examin ige of a ment o ble for ion of j mal inf ad ad ad ad ad ad ad ad ad ad ad ad ad	e LPOI (examination regulation) (e (1 major) Mathematics	each (approx. 20 minutes per control of 2, 15	utes) or andidate) offered and in the s degree programmes,		

Modul	e title				Abbreviation
Control Theory					10-M=ARTHin-152-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)	
10	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
bility, k	oasics i	n optimal control.	theory: stability, cont	rollability and obser	rvability, state feedback and sta-
		d previous knowledge: lge of the contents of the	module "Ordinary Di	ifferential Equations	" is useful.
Intend	ed lear	ning outcomes			
blish a	connee				l theory. He/She is able to esta- ut the interactions of geometry
Course	s (type	, number of weekly conta	ct hours, language –	- if other than Germa	ın)
V (4) + Module	• •	t in: English			
		essment (type, scope, la on on whether module ca			tion offered — if not every seme-
b) oral c) oral Langua Assess	examir examin age of a	mination (approx. 90 to 1 lation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester ir bonus	ach (approx. 20 minu of 2, 15 minutes per c	utes) or andidate)	ubsequent semester
Allocat	ion of p	olaces			
Additio	onal inf	ormation			
Worklo	ad				
300 h					
Teachi	ng cycl	e			
Referre	ed to in	LPOI (examination regu	lations for teaching-o	legree programmes)	
Module	e appea	nrs in			
	-	ee (1 major) Mathematics	-		
	-	ee (1 major) Mathematics			
	-	ee (1 major) Mathematics ee (1 major) Mathematics			
mastel	5 uegl	ce (1 major) mathematics	memational (2025)		

Module title				Abbreviation	
Stochastic Models of Risk Management					10-M=ASMRin-152-m01
Module coordinator				Module offered by	
	_	es Mathematik (Mathema	atics)	Institute of Mathem	natics
ECTS		od of grading	Only after succ. con		
10	Î	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
res, val la, moc estima series a	lue at ri lelling tes of s analysi	sk, conditional value at r of functional interrelation hortfall measures, estima	isk, axiomatic of risk is, regression models ates of value at risk a al smoothing, predict	measures, modellir s, basics in time seri nd conditional value ions and prediction	ent in auditing, shortfall measu- ng of interdependencies, copu- es modelling, aggregated losses e at risk, basics in empirical time domains, estimates of value at
		ning outcomes		, sinutation method	
		acquainted with the fun	damental methods of	f stochastic risk ana	lysis
		, number of weekly conta			•
V (4) +				n other than define	xii)
		t in: English			
ster, in a) writt b) oral c) oral Langua	formati en exar examir examin ge of a ment o	on on whether module can nination (approx. 90 to 1 nation of one candidate e ation in groups (groups of ssessment: English ffered: In the semester in	an be chosen to earn 20 minutes, usually o ach (approx. 20 minu of 2, 15 minutes per c	a bonus) chosen) or utes) or andidate)	ation offered — if not every seme
Allocat	ion of p	olaces			
	-				
Additio	nal inf	ormation			
Worklo	ad				
300 h					
Teachi	ng cycl	e			
Referre	d to in	LPO I (examination regu	lations for teaching-o	degree programmes)	
Module	e appea	irs in			
		ee (1 major) Mathematics	International (2015)		
	-	ee (1 major) Mathematics			
	-	ee (1 major) Mathematics			
Master	's degr	ee (1 major) Mathematics	international (2025)		

Module title Abbreviation							
Stochastical Processes 10-M=ASTPin-152-m01							
Module	e coord	inator		Module offered by			
Dean o	f Studio	es Mathematik (Mathema	atics)	Institute of Mathem	atics		
ECTS		od of grading	Only after succ. com	pl. of module(s)			
10	nume	rical grade					
Duratio		Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	Its						
			cesses in C[0,1], Brov	vnian motion, Donsk	er's theorem, projective limits.		
Basic k	nowled	d previous knowledge: Ige of stochastics is requ If the module "Stochastic	ired, such as that acc s 2" is also recomme	quired in the "Stocha nded.	astics 1" module. Knowledge of		
Intend	ed learı	ning outcomes					
		acquainted with the function acquainted with the function of t	damental notions and	d methods of stocha	stical processes and can apply		
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)		
V (4) +		t in English					
		t in: English					
		on on whether module ca			tion offered — if not every seme-		
b) oral c) oral Langua Assess	examin examin age of a	nination (approx. 90 to 1 ation of one candidate e ation in groups (groups c ssessment: English ffered: In the semester in bonus	ach (approx. 20 minu of 2, 15 minutes per ca	ites) or andidate)	ıbsequent semester		
	ion of p						
	•						
Additio	onal inf	ormation					
Worklo	ad						
300 h							
Teachi	ng cycl	e					
Referre	ed to in	LPOI (examination regu	lations for teaching-d	legree programmes)			
Module	e appea	ars in					
		ee (1 major) Mathematics	International (2015)				
	-	ee (1 major) Mathematics					
	-	ee (1 major) Mathematics					
Master	Master's degree (1 major) Mathematics International (2025)						

Module title Abbreviation					Abbreviation
Topology					10-M=ATOPin-152-m01
Module coordinator				Module offered by	
		es Mathematik (Mathema	atics)	Institute of Mathem	atics
ECTS	1	od of grading	Only after succ. com		Iauco
10		rical grade			
Duratio	I	Module level	Other prerequisites		
1 seme		graduate			
Conten	ts				
		copology, topological inv ing spaces.	ariants (e. g. fundame	ental group, connect	ion), construction of topological
Intende	ed lear	ning outcomes			
		acquainted with the fun non problems.	damental results, the	eorems and methods	in topology and is able to apply
Course	s (type	, number of weekly conta	ict hours, language —	- if other than Germa	n)
V (4) + Module	• •	t in: English			
		sessment (type, scope, la on on whether module c			tion offered — if not every seme-
Langua	age of a ment o	ation in groups (groups of ssessment: English ffered: In the semester ir bonus			ubsequent semester
Allocat	ion of _l	olaces			
Additio	onal inf	ormation			
Worklo	ad				
300 h					
-					
Teachi	ng cycl	e			
Teachii					
Teachii		e LPOI (examination regu	lations for teaching-c	legree programmes)	
Teachin Referre	ed to in	LPOI (examination regu	lations for teaching-o	legree programmes)	
Teachin Referre Module	ed to in e appea	LPOI (examination regu		degree programmes)	
Teachin Referre Module Master	ed to in e appea	LPO I (examination regunstrian regunstrian (examination regunstrian) (examination) (examination regunstrian) (examination regunstrian) (examination regunstrian) (examination regunstrian) (examination regunstrian) (examination)	s International (2015)	legree programmes)	
Teachin Referre Module Master Master	ed to in e appea 's degr 's degr	LPO I (examination regunses in the second	s International (2015) national (2020)	degree programmes)	
Teachin Referre Module Master Master Master	ed to in e appea 's degr 's degr 's degr	LPO I (examination regunned ITS in ee (1 major) Mathematics ee (1 major) Physics Inter ee (1 major) Mathematics	s International (2015) national (2020) 5 International (2021)		
Teachin Referre Module Master Master Master Master	ed to in e appea 's degr 's degr 's degr 's degr	LPO I (examination regunses in the second	s International (2015) national (2020) s International (2021) s International (2022)		

10 numerical grade Duration Module level Other prerect 1 semester graduate Contents The module discusses policies on one life: distributi types of benefits, present value, expection principle policy values, expenses, bonus, recursive methods, Recommended previous knowledge: Depending on the content, basic and advanced know quired. In case of doubt, it is recommended to construct the student is acquainted with the fundamental not	ions of future lifetime, life tables, life table approximations, e, premium calculation, commutation functions, reserves and Thiele's differential equation. wledge from different areas of statistics or stochastics is re-
Dean of Studies Mathematik (Mathematics) ECTS Method of grading Only after su 10 numerical grade Duration Module level Other prefect 1 semester graduate Contents The module discusses policies on one life: distributitypes of benefits, present value, expection principle policy values, expenses, bonus, recursive methods, Recommended previous knowledge: Depending on the content, basic and advanced know quired. In case of doubt, it is recommended to construct the sacquainted with the fundamental not Intended learning outcomes The student is acquainted with the fundamental not	Institute of Mathematics ucc. compl. of module(s) quisites ions of future lifetime, life tables, life table approximations, e, premium calculation, commutation functions, reserves and Thiele's differential equation. wledge from different areas of statistics or stochastics is re- ult the lecturer.
Dean of Studies Mathematik (Mathematics) ECTS Method of grading Only after su 10 numerical grade Duration Module level Other prefect 1 semester graduate Contents The module discusses policies on one life: distributitypes of benefits, present value, expection principle policy values, expenses, bonus, recursive methods, Recommended previous knowledge: Depending on the content, basic and advanced know quired. In case of doubt, it is recommended to construct the sacquainted with the fundamental not	Institute of Mathematics ucc. compl. of module(s) quisites ions of future lifetime, life tables, life table approximations, e, premium calculation, commutation functions, reserves and Thiele's differential equation. wledge from different areas of statistics or stochastics is re- ult the lecturer.
ECTSMethod of gradingOnly after su10numerical gradeDurationModule levelOther prerect1 semestergraduateContentsThe module discusses policies on one life: distributitypes of benefits, present value, expection principlepolicy values, expenses, bonus, recursive methods,Recommended previous knowledge:Depending on the content, basic and advanced knowquired. In case of doubt, it is recommended to constIntended learning outcomesThe student is acquainted with the fundamental not	acc. compl. of module(s) quisites ions of future lifetime, life tables, life table approximations, e, premium calculation, commutation functions, reserves and Thiele's differential equation. wledge from different areas of statistics or stochastics is re- ult the lecturer.
10 numerical grade Duration Module level Other prerect 1 semester graduate Contents The module discusses policies on one life: distributi types of benefits, present value, expection principle policy values, expenses, bonus, recursive methods, Recommended previous knowledge: Depending on the content, basic and advanced know quired. In case of doubt, it is recommended to const Intended learning outcomes The student is acquainted with the fundamental not	quisites ions of future lifetime, life tables, life table approximations, e, premium calculation, commutation functions, reserves and Thiele's differential equation. wledge from different areas of statistics or stochastics is re- ult the lecturer.
DurationModule levelOther prerect1 semestergraduate1 semestergraduateContentsThe module discusses policies on one life: distributitypes of benefits, present value, expection principlepolicy values, expenses, bonus, recursive methods,Recommended previous knowledge:Depending on the content, basic and advanced knowquired. In case of doubt, it is recommended to constrIntended learning outcomesThe student is acquainted with the fundamental not	ions of future lifetime, life tables, life table approximations, e, premium calculation, commutation functions, reserves and Thiele's differential equation. wledge from different areas of statistics or stochastics is re- ult the lecturer.
1 semester graduate Contents The module discusses policies on one life: distributi types of benefits, present value, expection principle policy values, expenses, bonus, recursive methods, Recommended previous knowledge: Depending on the content, basic and advanced know quired. In case of doubt, it is recommended to construct the student is acquainted with the fundamental not	ions of future lifetime, life tables, life table approximations, e, premium calculation, commutation functions, reserves and Thiele's differential equation. wledge from different areas of statistics or stochastics is re- ult the lecturer.
Contents The module discusses policies on one life: distributi types of benefits, present value, expection principle policy values, expenses, bonus, recursive methods, Recommended previous knowledge: Depending on the content, basic and advanced know quired. In case of doubt, it is recommended to consu Intended learning outcomes The student is acquainted with the fundamental not	e, premium calculation, commutation functions, reserves and Thiele's differential equation. wledge from different areas of statistics or stochastics is re- ult the lecturer.
The module discusses policies on one life: distributi types of benefits, present value, expection principle policy values, expenses, bonus, recursive methods, Recommended previous knowledge: Depending on the content, basic and advanced know quired. In case of doubt, it is recommended to consu Intended learning outcomes The student is acquainted with the fundamental not	e, premium calculation, commutation functions, reserves and Thiele's differential equation. wledge from different areas of statistics or stochastics is re- ult the lecturer.
types of benefits, present value, expection principle policy values, expenses, bonus, recursive methods, Recommended previous knowledge: Depending on the content, basic and advanced know quired. In case of doubt, it is recommended to consu Intended learning outcomes The student is acquainted with the fundamental not	e, premium calculation, commutation functions, reserves and Thiele's differential equation. wledge from different areas of statistics or stochastics is re- ult the lecturer.
Intended learning outcomes The student is acquainted with the fundamental not	
The student is acquainted with the fundamental not	ions and methods of life insurance mathematics and can ap-
•	cions and methods of life insurance mathematics and can ap-
ply them to practical problems.	
Courses (type, number of weekly contact hours, lang	guage — if other than German)
V (4) + Ü (2) Module taught in: English	
Method of assessment (type, scope, language — if or ster, information on whether module can be chosen	other than German, examination offered — if not every seme- to earn a bonus)
a) written examination (approx. 90 to 120 minutes, u b) oral examination of one candidate each (approx. 2 c) oral examination in groups (groups of 2, 15 minute Language of assessment: English Assessment offered: In the semester in which the co creditable for bonus	20 minutes) or es per candidate)
Allocation of places	
Additional information	
Workload	
300 h	
Teaching cycle	
Referred to in LPO I (examination regulations for tea	aching-degree programmes)
Module appears in	
Master's degree (1 major) Mathematics International	
Master's degree (1 major) Mathematics International Master's degree (1 major) Mathematics International	-
Master's degree (1 major) Mathematics International	
Master's degree (1 major) Mathematics International	

Module	e title			Abbreviation				
Time Series Analysis 1					10-M=AZRAin-152-m01			
Module coordinator				Module offered by				
Dean o	f Studie	es Mathematik (Mathema	itics)	Institute of Mathem	atics			
ECTS		od of grading	Only after succ. com	pl. of module(s)				
10	L	ical grade	-					
Duratio		Module level	Other prerequisites					
1 seme	!	graduate						
Conten								
Additiv	e mode	l, linear filters, autocorre	lation, moving averag	ge, autoregressive p	rocesses, Box-Jenkins method.			
Basic k	nowled	l previous knowledge: ge of stochastics is requ f the module "Stochastic	ired, such as that acc s 2" is also recomme	juired in the "Stochanded.	astics 1" module. Knowledge of			
Intende	ed learr	ing outcomes						
The stu probler		acquainted with the fund	damental methods of	time series analysis	s and can apply them to practical			
Course	s (type,	number of weekly conta	ct hours, language —	if other than Germa	n)			
V (4) + Module		tin: English						
		essment (type, scope, la on on whether module ca			tion offered — if not every seme-			
b) oral c) oral (Langua	examin examin ge of a ment o	nination (approx. 90 to 1 ation of one candidate e ation in groups (groups c ssessment: English ffered: In the semester in bonus	ach (approx. 20 minu f 2, 15 minutes per ca	tes) or andidate)	ıbsequent semester			
Allocat	ion of p	laces						
Additio	nal info	ormation						
Worklo	ad							
300 h								
Teachi	ng cycle	9						
Referre	d to in	LPO I (examination regu	lations for teaching-d	legree programmes)				
		· · · ·						
Module	appea	rs in						
Master	's degre	ee (1 major) Mathematics ee (1 major) Mathematics						

Module title Abbreviation								
Number Theory 10-M=AZTHin-152-m01						101		
Module	e coord	inator		Module offered by				
	· · · · · ·	es Mathematik (Mathe		Institute of Mathem	atics			
ECTS	î	od of grading	Only after succ. compl. of module(s)					
10	· · · · ·	rical grade						
Duratio		Module level	Other prerequisites	i				
1 seme		graduate						
Conten	ts							
applica overvie Recom	Number-theoretic functions and their associated Dirichlet series resp. Euler products, their analytic theory with applications to prime number distribution and diophantine equations; discussion of the Riemann hypothesis, overview of the development of modern number theory. Recommended previous knowledge:							
			ber theory is assumed ber Theory" and "Appli			, introducti-		
		ing outcomes						
The stu structu	ident is res in n	acquainted with the fu	indamental methods o ws methods for the sol er theory.			-		
Course	s (type	number of weekly con	tact hours, language –	– if other than Germa	n)			
V (4) + Module		t in: English						
			language — if other th can be chosen to earn		tion offered — if not	every seme-		
b) oral c) oral Langua Assess	a) written examination (approx. 90 to 120 minutes, usually chosen) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, 15 minutes per candidate) Language of assessment: English Assessment offered: In the semester in which the course is offered and in the subsequent semester creditable for bonus							
Allocat	ion of p	olaces						
Additio	nal info	ormation						
Worklo	ad							
300 h								
Teachi	ng cvcl	9						
Referre	d to in	LPOI (examination re-	gulations for teaching-	degree programmes)				
			<u></u>					
Module	appea	rs in						
Master Master Master Master Master	Module appears in Master's degree (1 major) Mathematics International (2015) Master's degree (1 major) Physics International (2020) Master's degree (1 major) Mathematics International (2021) Master's degree (1 major) Mathematics International (2022) Master's degree (1 major) Physics International (2024)							
	-	Mathematics International	cs International (2025) JMU Würzburg • g	enerated 19-Apr-2025 • exam	. reg. data re-	page 25 / 104		
(2021)				o ECTS) Mathematics Internat	_			

Module	e title				Abbreviation	
Research in Groups - Applied Differential Geometry10-M=GADGin-211-m01						
Module coordinator Module o					ered by	
Dean o	f Studi	es Mathematik (Mathem	atics)	Institute of Mathem	natics	
ECTS		od of grading	Only after succ. con	npl. of module(s)		
10	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
Recom Advanc al Geor	mende ed kno netry".		ometry is required, su	troduction to Topolo	red in the module "Differenti- ogy", "Geometric Mechanics", amended.	
		ning outcomes		,		
The stu	dent g		<i>·</i> · ·		rential Geometry. He/She ma- s.	
Course	s (type	, number of weekly conta	act hours, language –	- if other than Germa	ın)	
V (2) + Module	• •	t in: English				
		sessment (type, scope, la ion on whether module c			tion offered — if not every seme-	
Langua	ige of a	o minutes) ssessment: English ffered: in the semester in	n which the course is	offered and in the su	ubsequent semester	
Allocat	ion of _l	olaces				
Additio	nal inf	ormation				
Worklo	ad					
300 h						
Teachi	ng cycl	e				
Referre	ed to in	LPOI (examination regu	lations for teaching-o	degree programmes)		
Module	e appea	ars in				
Master	's degr	ee (1 major) Mathematic: ee (1 major) Mathematic: ee (1 major) Mathematic:	s International (2022)			

Module	Module title Abbreviation							
Research in Groups - Algebra10-M=GALGin-152-mo1					10-M=GALGin-152-m01			
Module coordinator Module					<u> </u>			
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics			
ECTS		od of grading	Only after succ. com					
10		rical grade						
Duratio	on	Module level	Other prerequisites					
1 seme	ster	graduate						
Conten	ts							
puter a Recom Basic k	lgebra, mende nowlec	algebras, division rings, d previous knowledge: lge of algebra is assumed	quadratic forms).	-	rential algebra, local fields, com- s "Introduction to Algebra" and			
"Applie		ning outcomes						
	-		orary research proble	ems in algebra. He/9	She masters advanced techni-			
		eld and can apply them to						
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	ın)			
V (2) +	S (2)	· · · · ·						
Module	e taugh	t in: English						
		sessment (type, scope, la on on whether module ca			tion offered — if not every seme-			
Langua	ige of a) minutes) ssessment: English ffered: In the semester in	which the course is	offered and in the su	ubsequent semester			
Allocat	ion of p	olaces						
Additio	nal inf	ormation						
Worklo	ad							
300 h								
Teachi	ng cycl	e						
Referre	d to in	LPOI (examination regu	lations for teaching-c	legree programmes)				
			0					
Module	e appea	urs in						
		ee (1 major) Mathematics	International (2015)					
	-							
	0	. , ,	Master's degree (1 major) Mathematics International (2021)					
Master	Aaster's degree (1 major) Mathematics International (2022) Aaster's degree (1 major) Mathematics International (2025)							

Module title Abbreviation					Abbreviation	
Research in Groups - Complex Analysis 10-M=GCOAin-152					10-M=GCOAin-152-mo1	
Module coordinator				Module offered by	<u> </u>	
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)		
10	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
geome Recom Depend	tric con mende ding on	nplex analysis, value dist d previous knowledge: the current focus of the	ribution theory).	om different areas o	ential theory, complex dynamics, f analysis is required. Consultati-	
		cturer at the beginning of ning outcomes	the course is recom	nended.		
				ome in complex and	lucia II.a (Cha mastara advanced	
	•	this field and can apply t	, , ,	•	lysis. He/She masters advanced	
Course	s (type	, number of weekly conta	ct hours, language –	· if other than Germa	ın)	
V (2) +	S (2)					
Module	e taugh	t in: English				
		sessment (type, scope, la ion on whether module ca			tion offered — if not every seme-	
Langua	ige of a	o minutes) ssessment: English ffered: In the semester in	which the course is	offered and in the si	ubsequent semester	
Allocat	ion of j	olaces				
Additio	nal inf	ormation				
Worklo	ad					
300 h						
Teachi	ng cycl	е				
Referre	d to in	LPOI (examination regu	lations for teaching-o	legree programmes)		
Module	e appea	ars in				
		ee (1 major) Mathematics	International (2015)			
	-	ee (1 major) Mathematics				
	-	-				
NA +	Aaster's degree (1 major) Mathematics International (2022) Aaster's degree (1 major) Mathematics International (2025)					

Modul	Module title Abbreviation					
Resear	Research in Groups - Control Theory of Quantum Mechanical Systems10-M=GCQSin-152-mo1					
Modul	Module coordinator				d by	
Dean c	of Studi	es Mathematik (Mathema	atics)	Institute of Ma	•	
ECTS		od of grading	Only after succ. con	pl. of module(s		
10	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ester	graduate				
Conter	nts					
Selecte	ed mod	ern topics in control theo	ry of quantum mecha	anical systems.		
Intend	ed lear	ning outcomes				
					heory of quantum mechanical sy- em to complex problems.	
Course	es (type	, number of weekly conta	ct hours, language –	if other than G	erman)	
V (2) + Modul	• • •	t in: English				
		essment (type, scope, la on on whether module ca			mination offered — if not every seme-	
Langua	age of a	o minutes) ssessment: English ffered: In the semester in	which the course is	offered and in t	he subsequent semester	
Allocat	tion of j	olaces				
Additio	onal inf	ormation				
Worklo	bad					
300 h						
Teachi	ng cycl	e				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Modul	e appea	ars in				
	Master's degree (1 major) Mathematics International (2015)					
	Master's degree (1 major) Mathematics International (201)					
Master	's degr	ee (1 major) Mathematics	International (2022)			

Module title Abbreviation					
Research in Groups - Deformation Quantization10-M=GDFQin-152-mo1					
Module coordinator Module offered					1
Dean o	of Studi	es Mathematik (Mat	hematics)	Institute of Mathe	matics
ECTS		od of grading	Only after succ. co	mpl. of module(s)	
10		rical grade		• • • • •	
Duratio	on	Module level	Other prerequisites	5	
1 seme	ster	graduate			
Conten	Its				
Recom	mende	ern topics in deform d previous knowled	ge:		
		ning outcomes	modules Differential Geo	ometry and Geome	etric Mechanics" is recommended
The stu	ıdent g	ains insight into cor	ntemporary research prob and can apply them to co		Quantization. He/She masters
Course	s (type	, number of weekly	contact hours, language -	– if other than Germ	an)
V (2) +	S (2)	t in: English			· ·
			pe, language — if other th ule can be chosen to earr		ation offered — if not every seme
Langua	age of a	o minutes) Issessment: English Iffered: In the semes	ster in which the course is	offered and in the s	subsequent semester
Allocat	ion of	places			· · · ·
Additio	onal inf	ormation			
Worklo	ad				
300 h		· · · · · ·			
Teachi	ng cvcl	e			
	0.95				
Referre	ed to in	LPOI (examination	regulations for teaching-	degree programmes	5)
Module	e appea	ars in			
			natics International (2015))	
	-		natics International (2021		
	's degr	ee (1 major) Mathen	natics International (2022	2)	

Module title Abbreviation							
Resear	Research in Groups - Differential Geometry 10-M=GDGEin-152-mo1						
Module coordinator				Module offered by	<u> </u>		
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)			
10	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	ts						
Recom Advanc Geome	mende ced knc try". Kr		ometry is required, su of the modules "App	lied Differential Geo	red in the module "Differential metry", "Geometric Mechanics",		
		ning outcomes	Geometry and Lie i		imended.		
The stu	ident g				eometry. He/She masters advan-		
	· · ·	, number of weekly conta	· · ·	•	in)		
Metho ster, in	e taugh d of ass formati	t in: English sessment (type, scope, la ion on whether module ca o minutes)			ition offered — if not every seme-		
Langua	ige of a	ssessment: English ffered: In the semester in	which the course is	offered and in the su	ubsequent semester		
Allocat	ion of _l	olaces					
Additio	onal inf	ormation					
Worklo	ad						
300 h							
Teachi	ng cycl	e					
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	e appea	ars in					
		ee (1 major) Mathematics	International (2015)				
	-	ee (1 major) Mathematics					
	aster's degree (1 major) Mathematics International (2022)						
Master	's degr	ee (1 major) Mathematics	International (2025)				

Module title Abbreviation						
Resear	Research in Groups - Discrete Mathematics 10-M=GDIMin-152-m01					
Module coordinator Module offered b					<u> </u>	
Dean o	of Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics	
ECTS		od of grading	Only after succ. con			
10		rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ester	graduate				
Conter	nts					
Selecte	ed mod	ern topics in discrete mat	hematics.			
Intend	ed lear	ning outcomes				
					nematics. He/She masters advan-	
		es in this field and can ap , number of weekly conta		•	in)	
V (2) +						
	• • •	t in: English				
ster, in talk (60 Langua	o to 120 age of a	ion on whether module ca o minutes) ussessment: English	an be chosen to earn	a bonus)	ition offered — if not every seme-	
Assess Allocat		ffered: In the semester in	which the course is	offered and in the si	ubsequent semester	
Allocal		places				
Additio	onal inf	ormation				
Worklo	bad					
300 h						
Teachi	ng cycl	e				
Referre	ed to in	LPO I (examination regu	lations for teaching-	degree programmes)		
Modul	e appea	ars in				
Master	r's degr	ee (1 major) Mathematics	International (2015)			
	Master's degree (1 major) Mathematics International (2021)					
	Master's degree (1 major) Mathematics International (2022)					
waster	s degr	ee (1 major) Mathematics	international (2025)			

Module	Module title Abbreviation					
Resear	Research in Groups - Dynamical Systems and Control Theory10-M=GDSCin-152-m01					
Module coordinator Module offered by					,	
Dean o	f Studi	es Mathematik (Mathem	atics)	Institute of Mather	natics	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
10	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
Recom	mende	ern topics in dynamical s d previous knowledge:			ntrol Theory" is required	
				introl meory of Co	ntrol Theory" is required.	
		ning outcomes				
		ains insight into contem dvanced techniques in t			ystems and control theory. He/ problems.	
		, number of weekly conta		· ·		
V (2) + Module		t in: English				
		s essment (type, scope, la on on whether module c			ation offered — if not every seme-	
Langua	ge of a	o minutes) ssessment: English ffered: In the semester ii	n which the course is	offered and in the s	ubsequent semester	
Allocat						
Additio	nal inf	ormation				
Worklo	ad					
300 h						
Teachi	ng cycl	e				
Referre	d to in	LPOI (examination regu	llations for teaching-	degree programmes)	
······································						
Module	e appea	irs in				
		ee (1 major) Mathematic	s International (2015)			
	-	ee (1 major) Mathematic				
Master	's degr	ee (1 major) Mathematic	s International (2022)			
Master	's degr	ee (1 major) Mathematic	s International (2025)			

Module title Abbreviation						
Research in Groups - Geometry and Topology10-M=GGMTin-152-m01						
Module coordinator Module offered						
Dean o	of Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics	
ECTS	1	od of grading	Only after succ. con	pl. of module(s)		
10	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conter	nts					
Selecte	ed mod	ern topics in geometry an	id topology.			
Intend	ed lear	ning outcomes				
		ains insight into contemp iques in this field and car			d topology. He/She masters ad-	
		, number of weekly conta		•	an)	
V (2) +						
Modul	e taugh	t in: English				
ster, in	format	ion on whether module ca			ition offered — if not every seme-	
•		o minutes) Issessment: English				
Assess	ment o	ffered: In the semester in	which the course is	offered and in the su	ubsequent semester	
Allocat	tion of	places				
Additio	onal inf	ormation				
Worklo	ad					
300 h						
Teachi	ng cycl	e				
Referre	ed to in	LPO I (examination regu	lations for teaching-	degree programmes)		
Modul	e appea	ars in				
		ee (1 major) Mathematics	International (2015)			
	-	ee (1 major) Mathematics				
	-	ee (1 major) Mathematics				
Master	's degr	ee (1 major) Mathematics	International (2025)			

Module title Abbreviation							
Resear	Research in Groups - Lie Theory10-M=GLIEin-211-m01						
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. con	pl. of module(s)			
10	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	Its						
Recom	mende	ern topics in Lie Theory. d previous knowledge:					
Knowle	edge of	the contents of the mod	ule "Lie theory" is req	uired.			
Intend	ed lear	ning outcomes					
		ains insight into contemp eld and can apply them t		ems in Lie Theory. H	e/She masters advanced techni-		
Course	s (type	, number of weekly conta	act hours, language –	· if other than Germa	ın)		
V (2) + Module		t in: English					
		sessment (type, scope, la ion on whether module c			tion offered — if not every seme-		
Langua	age of a	o minutes) ssessment: English ffered: in the semester ir	n which the course is	offered and in the si	ubsequent semester		
Allocat	ion of	places			· · · · ·		
Additio	onal inf	ormation	-				
Worklo	ad						
300 h							
Teachi	ng cycl	e					
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module	e appea	ars in					
		ee (1 major) Mathematics	s International (2021)				
	-	ee (1 major) Mathematics					
	Aaster's degree (1 major) Mathematics International (2022) Aaster's degree (1 major) Mathematics International (2025)						

Module title					Abbreviation	
Resear	rch in G	roups - Measure and Inte		10-M=GMAlin-152-m01		
Module coordinator				Module offered by		
Dean o	of Studi	es Mathematik (Mathema	atics)	Institute of Mathen	natics	
ECTS		od of grading	Only after succ. con	pl. of module(s)		
10	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ester	graduate				
Conter	nts					
functio	ons and		cted applications, e.	g. product measure	me and measure, measurable s (with Fubini's theorem and the cal spaces.	
Intend	ed lear	ning outcomes				
	•	ains insight into contemp d techniques in this field	<i>·</i> · ·		l integration theory. He/She ma- is.	
Course	es (type	, number of weekly conta	ct hours, language –	- if other than Germa	an)	
V (2) + Module		t in: English				
		sessment (type, scope, la on on whether module ca			ation offered — if not every seme-	
Langua	age of a) minutes) ssessment: English ffered: In the semester in	which the course is	offered and in the s	ubsequent semester	
Allocat	tion of _l	olaces				
Additio	onal inf	ormation				
Worklo	bad					
300 h			· · · · · · · · · · · · · · · · · · ·			
-	ng cycl	e				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Modul	e appea	irs in				
		ee (1 major) Mathematics	International (2015)			
	-	ee (1 major) Mathematics	-			
	-	ee (1 major) Mathematics				
Master	r's degr	ee (1 major) Mathematics	International (2025)			

Module title					Abbreviation	
Resear	ch in G	roups - Mathematical	Physics		10-M=GMAPin-211-m01	
Module coordinator Module offere				Module offered by	<u> </u>	
Dean o	fStudie	es Mathematik (Mathe	matics)	Institute of Mathen	natics	
ECTS	Metho	od of grading	Only after succ. cor	npl. of module(s)		
10	nume	rical grade				
Duratio	on	Module level	Other prerequisites	6		
1 seme	ster	graduate				
Conten	ts					
Recom Depend	mende ding on				of analysis and/or differential r.	
Intende	ed learı	ning outcomes				
	•	-	nporary research probl an apply them to comp		ll Physics. He/She masters ad-	
Course	s (type	, number of weekly cor	itact hours, language –	– if other than Germa	an)	
Method ster, in talk (60 Langua Assess	d of ass formati to to 120 ge of a ment o	on on whether module minutes) ssessment: English ffered: in the semester	language — if other th can be chosen to earn in which the course is	ı a bonus)	ation offered — if not every seme-	
Allocat	ion of p	olaces				
 Additio	onal info	ormation				
Worklo	ad					
300 h						
Teachi	ng cycl	9				
Referre	d to in	LPOI (examination re	gulations for teaching-	degree programmes)		
Module	e appea	irs in				
Master Master	's degre 's degre	ee (1 major) Mathemat ee (1 major) Mathemat	ics International (2021) ics International (2022) ics International (2025))		

Module title				Abbreviation	
Research in Groups - Mathematics in Context			Context		10-M=GMCXin-152-mo1
Modul	e coord	linator		Module offered I	by
Dean o	of Studi	es Mathematik (Mathem	atics)	Institute of Math	ematics
ECTS	Meth	od of grading	Only after succ. con	pl. of module(s)	
10	nume	rical grade			
Durati	on	Module level	Other prerequisites		
1 seme	ester	graduate			
Conte	nts				
ven by	ı a histo		c region or a particula	ar field of mathem	art of the history of mathematics, g natics. Other possibilities arise fron edia.
Intend	led lear	ning outcomes			
The st	udent re	ealises the cultural dime	nsion of mathematics	and its relation to	o other cultural fields.
Course	es (type	, number of weekly conta	act hours, language —	- if other than Ger	man)
V (2) +	S (2)				
Modul	e taugh	t in: English			
		sessment (type, scope, la ion on whether module c			ination offered — if not every seme
Langu	age of a	o minutes) issessment: English iffered: In the semester ii	n which the course is	offered and in the	e subsequent semester
	tion of				
Additi	onal inf	ormation			
Workl	oad				
300 h					
-	ing cycl	ρ	_		
	ed to in	LPOI (examination regu	lations for teaching	legree programm	مد)
	0.2000	are in			
	e appea	ee (1 major) Mathematic	s International (2015)		
Macta	i s uegr				
	r's daar				
Maste	-	ee (1 major) Mathematic: ee (1 major) Mathematic: ee (1 major) Mathematic:	s International (2021)		

Module title					Abbreviation	
Research in Groups - Mathematics in the Sciences10-M=GMSCin-152-mo1					10-M=GMSCin-152-mo1	
Modul	e coord	linator		Module offered by	1	
Dean o	of Studi	es Mathematik (Mat	hematics)	Institute of Mathen	natics	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
10	nume	erical grade				
Duratio	on	Module level	Other prerequisites	i		
1 seme	ster	graduate				
Conten	nts					
Recom Basic k	mende knowle		ge: s "Ordinary Differential Ec		duction to Partial Differential	
			ell as basic knowledge of	iunctional analysis.		
		ning outcomes	tomporany racearch nuch	ome in mathematics	in the sciences Up/She master	
	-	-	and can apply them to co		in the sciences. He/She master	
Course	e s (type	, number of weekly o	contact hours, language –	- if other than Germa	an)	
V (2) +	S (2)					
Module	e taugł	nt in: English				
			be, language — if other the ule can be chosen to earn		ation offered — if not every seme	
Langua	age of a	o minutes) assessment: English offered: In the semes	ter in which the course is	offered and in the s	ubsequent semester	
Allocat						
Additic	nal inf	formation				
Worklo	bad					
	oad					
300 h		le				
		le				
300 h Teachi 	ng cyc		regulations for teaching.	degree programmes)	
300 h Teachi 	ng cyc		regulations for teaching-o	degree programmes))	
300 h Teachi Referre	ng cycl ed to in	LPOI (examination	regulations for teaching-	degree programmes)	
300 h Teachi Referre Module	ng cycl ed to in e appe	LPOI (examination)	
300 h Teachi Referre Module Master	ng cycl ed to in e appe	LPOI (examination ars in ree (1 major) Mathem	regulations for teaching-one of the section of the)	
300 h Teachi Referre Module Master Master	ng cycl ed to in e appe ''s degr	LPO I (examination ars in ree (1 major) Mathem ree (1 major) Mathem	natics International (2015))	

Module title					Abbreviation
Research in Groups - Non-linear Analysis10-M=GNLAin-152-m01					10-M=GNLAin-152-m01
Modul	e coord	linator		Module offered by	<u> </u>
Dean o	of Studi	es Mathematik (Mathem	atics)	Institute of Mathem	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	graduate			
Conten	nts				
Recom Depen	mende ding or	ern topics in non-linear and previous knowledge: In the content, basic and a commended to consult t	advanced knowledge	from different areas	of analysis is required. In case of
		ning outcomes			
The stu	udent g				nalysis. He/She masters advan-
Course	s (type	, number of weekly cont	act hours, language –	- if other than Germa	in)
V (2) + Module	• •	t in: English			
		sessment (type, scope, l ion on whether module o			tion offered — if not every seme-
Langua	age of a	o minutes) Issessment: English Iffered: In the semester i	n which the course is	offered and in the si	ubsequent semester
Allocat	tion of	places			
Additio	onal inf	ormation			
	-				
 Worklo	ad				
	ad				
300 h		e			
		e			
300 h Teachi 	ng cycl		Jations for teaching-	degree programmes)	
300 h Teachi 	ng cycl	e LPOI (examination reg	ulations for teaching-o	degree programmes)	
300 h Teachi Referre	ng cycl ed to in	LPOI (examination reg	ulations for teaching-o	legree programmes)	
300 h Teachi Referre Module	ng cycl ed to in e appea	LPOI (examination reg		degree programmes)	
300 h Teachi Referre Module	ng cycl ed to in e appea	LPO I (examination regr ars in ee (1 major) Mathematic	s International (2015)		
300 h Teachi Referre Module Master Master	ng cycl ed to in e appea ''s degr	LPOI (examination reg	s International (2015) s International (2021)		

-	e title				Abbreviation		
Resear	ch in G	iroups - Numerical N	Nathematics and Applied	Analysis	10-M=GNMAin-152-m01		
Module	e coord	linator		Module offere	ed by		
Dean o	f Studi	es Mathematik (Mat	hematics)	Institute of Ma	athematics		
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)		
10	nume	rical grade					
Duratio	on	Module level	Other prerequisites	5			
1 seme	ster	graduate					
Conten	ts						
Recomi Depend	mende ding or	d previous knowled the content, basic a		from different a	areas of analysis and/or numerical ma		
		ning outcomes					
			ontemporary research pro	hlems in nume	rical mathematics or applied analysis.		
			ques in this field and can				
			contact hours, language –		· ·		
V (2) +		,					
• •	• •	ıt in: English					
			pe, language — if other th ule can be chosen to earn		amination offered — if not every seme-		
Langua	ige of a	o minutes) Issessment: English Iffered: In the semes		offered and in	the subsequent semester		
Allocat							
Additio	nal inf	ormation					
Worklo	ad						
300 h							
Teachi		0					
reaciiii	ig cyci						
 Doferre		IDOI (overineties	rogulations for tooching	dogroo program	amos)		
Reierre			regulations for teaching-	uegree program	lilles <i>)</i>		
 Module		arc in					
			antice International (2015)				
	-						
Mactor	JUCSI	Master's degree (1 major) Mathematics International (2015) Master's degree (1 major) Mathematics International (2021)					
	-		natics International (2021)				

Module title					Abbreviation
Resear	ch in G	roups - Number Theory			10-M=GNTHin-152-m01
Module	e coord	linator		Module offered by	<u> </u>
Dean o	f Studi	es Mathematik (Mathem	atics)	Institute of Mathem	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	graduate			
Conten	ts				
Recom Basic k	mende nowlee	d previous knowledge:	per theory is assumed,	, such as can be acq	ar forms, diophantine analysis). uired in the modules "Introducti
		ning outcomes			
The stu	ident g				. He/She masters advanced tech
Course	s (type	, number of weekly cont	act hours, language –	- if other than Germa	in)
V (2) + Module	• • •	t in: English			
		sessment (type, scope, l ion on whether module o			tion offered — if not every seme
Langua	ige of a	o minutes) Issessment: English Iffered: In the semester i	n which the course is	offered and in the su	ubsequent semester
Allocat	ion of	places			
Additio	onal inf	ormation	_		
Worklo	ad				
300 h					
Teachi		۵	_		
	Seyer				
	d to in	LPOI (examination reg	ulations for teaching-o	legree programmes)	
Module		ars in			
		ee (1 major) Mathematic	s International (2015)		
Master	-	(=			
	's degr	ee (1 major) Mathematic	s International (2021)		
Master	-	ee (1 major) Mathematic ee (1 major) Mathematic			

Module title					Abbreviation	
Research in Groups - Operator Algebras 10-M=GOPAin-1					10-M=GOPAin-152-mo1	
Module coordinator Module offere					<u> </u>	
Dean o	f Studi	es Mathematik (Mat	hematics)	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	graduate				
Conten	ts					
Recom Knowle	mende edge of	ern topics in operat d previous knowled the contents of the ommended.	ge:	ysis" and "Algebra a	nd Dynamics of Quantum Sy-	
		ning outcomes				
The stu	ıdent g	ains insight into cor	ntemporary research probl pply them to complex prol		ebras. He/She masters advanced	
Course	s (type	, number of weekly	contact hours, language –	- if other than Germa	an)	
V (2) + Module		t in: English				
			pe, language — if other th ule can be chosen to earn		tion offered — if not every seme-	
Langua	age of a	o minutes) Issessment: English Iffered: In the semes	ster in which the course is	offered and in the s	ubsequent semester	
Allocat	ion of	places				
Additio	onal inf	ormation				
Worklo	ad					
300 h						
Teachi	ng cvcl	e				
	0 - 9 - 0					
	d to in	IPOI (examination	regulations for teaching-	legree programmes		
Referre		C (channation	- could to is for teaching t			
Referre						
	e anne:	ars in				
 Module			natics International (2015)			
 Module Master	's degr	ee (1 major) Mathen	natics International (2015) natics International (2021)			
 Module Master Master	's degr 's degr	ee (1 major) Mathen ee (1 major) Mathen	natics International (2015) natics International (2021) natics International (2022)			

Module title					Abbreviation
Resear	ch in G	roups - Robotics, Optim	neory	10-M=GROCin-152-mo1	
Module	e coord	inator		Module offered by	<u> </u>
Dean o	f Studi	es Mathematik (Mathem	natics)	Institute of Mathen	natics
ECTS		od of grading	Only after succ. com	pl. of module(s)	
10	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
		ern topics in robotics, o d previous knowledge:	ptimisation and contro	ol theory.	
		. –	lule "Mathematical Co	ntrol Theory" or "Co	ntrol Theory" is required.
Intende	ed lear	ning outcomes			
		ains insight into contem dvanced techniques in			imization and control theory. He/ problems.
Course	s (type	, number of weekly cont	act hours, language —	· if other than Germa	an)
V (2) + Module		t in: English			
		essment (type, scope, on on whether module			ation offered — if not every seme-
Langua	ige of a) minutes) ssessment: English ffered: In the semester	in which the course is	offered and in the s	ubsequent semester
Allocat			_		I
Additio	nal inf	ormation			
Worklo	ad				
300 h					
Teachi		P			
	is cycl	•			
Referre	d to in	LPOI (examination reg	ulations for teaching a	legree programmee	
Referre					
	20000	ore in			
Module	appea	1311			
Module	'e doar	e (1 major) Mathomatik	c International (2015)		
Master	-	ee (1 major) Mathematio			
Master Master	's degr	ee (1 major) Mathematio ee (1 major) Mathematio ee (1 major) Mathematio	s International (2021)		

Module title					Abbreviation
Research in Groups - Statistics					10-M=GSTAin-152-m01
Module	e coord	inator		Module offered by	
Dean o	f Studie	es Mathematik (Mathema	atics)	Institute of Mathem	atics
ECTS	· · · · · · · · · · · · · · · · · · ·	od of grading	Only after succ. com	pl. of module(s)	
10	L	rical grade			
Duratio		Module level	Other prerequisites		
1 seme	I	graduate			
Conten					
Selecte	ed mod	ern topics in statistics.			
Recomi	mende	d previous knowledge:			
Basic k	nowled	lge of stochastics is requ			astics 1" module. Knowledge of
					the content of the course, other
		ge may also be helpful; c	onsultation with the		lueu.
		ning outcomes		ma in statistica IIa	/Chamasters advanced tashni
	-	eld and can apply them to		ems in statistics. He,	/She masters advanced techni-
Course	s (type,	, number of weekly conta	ct hours, language —	if other than Germa	n)
V(2) + 1		t in: English			
		-	nguago — if other the	n Corman oxamina	tion offered — if not every seme-
		on on whether module ca			
		minutes)			
		ssessment: English ffered: In the semester in	which the course is	offered and in the su	ibsequent semester
Allocat					
Additio	nal info	ormation			
Worklo	ad				
300 h					
Teachir	ng cycl	9			
Referre	d to in	LPOI (examination regu	lations for teaching-c	legree programmes)	
Module	e appea	rs in			
Master	's degre	ee (1 major) Mathematics	International (2015)		
	-	ee (1 major) Mathematics			
	-	ee (1 major) Mathematics			
Master	's degre	ee (1 major) Mathematics	international (2025)		

Module title A					Abbreviation	
Research in Groups - Time Series Analysis10-M=GTSAin-152-m01					10-M=GTSAin-152-m01	
Module coordinator Module o					<u> </u>	
Dean o	f Studi	es Mathematik (Mat	hematics)	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	graduate				
Conten	ts					
Recom Basic k	mende mowlee		ge:		astics 1" module. Knowledge of	
		ning outcomes				
The stu	ıdent g	ains insight into cor	itemporary research probl an apply them to complex		nalysis. He/She masters advan-	
Course	s (type	, number of weekly	contact hours, language –	- if other than Germa	an)	
V (2) + Module	• •	it in: English				
			pe, language — if other th ule can be chosen to earn		ation offered — if not every seme-	
Langua	age of a	o minutes) assessment: English offered: In the semes	ter in which the course is	offered and in the s	ubsequent semester	
Allocat	ion of	places				
Additio	onal inf	ormation				
Worklo	ad					
300 h						
Teachi	ng cvcl	e				
	0.99					
Referre	ed to in	LPO (examination	regulations for teaching-	degree programmes		
Module	e appe	ars in				
			natics International (2015)			
	-		natics International (2021)			
	-					
master	1aster's degree (1 major) Mathematics International (2022) 1aster's degree (1 major) Mathematics International (2025)					

Module title					Abbreviation
Master Thesis Mathematics International					10-M=MAMI-152-m01
Module	Module coordinator M				
		es Mathematik (Mathema	atics)	Module offered by Institute of Mathem	natics
ECTS	1	od of grading	Only after succ. con		
30		rical grade		<u></u>	
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	Its				
Indepe	ndently	researching and writing	on a topic in mathen	natics selected in co	nsultation with the supervisor.
Intend	ed lear	ning outcomes			
tained lish lan	during Iguage	his/her studies in the ma in a suitable form.	aster programme. He,	/She can write down	oply the skills and methods ob- the result of his/her work in Eng-
Course	s (type	, number of weekly conta	ct hours, language –	- if other than Germa	ın)
No cou	rses as	signed to module			
ster, in	formati	ion on whether module ca	an be chosen to earn		ition offered — if not every seme-
Registr	ation a	is (750 to 900 hours total nd assignment of topic ir ssessment: English		upervisor.	
Allocat	ion of j	olaces			
Additio	onal inf	ormation			
Time to	o compl	ete: 6 months			
Worklo					
900 h					
Teachi	ng cycl	e			
			-		
Referre	ed to in	LPOI (examination regu	lations for teaching-	degree programmes)	
Module	e appea	ars in			
		ee (1 major) Mathematics	International (2015)		
	-	ee (1 major) Mathematics			
	-	ee (1 major) Mathematics			
Master	's degr	ee (1 major) Mathematics	International (2025)		

Module title					Abbreviation	
Seminar in Applied Differential Geometry 10-M=SAI					10-M=SADGin-152-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	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
Recom Advanc Geome	mende ed kno try". Kr		ometry is required, su of the modules "App	lied Differential Geo	ed in the module "Differential metry", "Geometric Mechanics", imended.	
		ning outcomes	,	,		
The stu	dent is	able to elaborate a cont			omprehending and structuring of ate in a scientific discussion.	
Course	s (type	, number of weekly conta	act hours, language —	if other than Germa	ın)	
Method ster, in talk (60 Langua	d of ass formation to to 120 ge of a	on on whether module c o minutes) ssessment: English	an be chosen to earn	a bonus)	tion offered — if not every seme-	
		ffered: In the semester in	which the course is	offered and in the su	ibsequent semester	
Allocat		Diaces				
Additio	nalinf	ormation				
Auuitio						
Worklo	ad					
150 h						
Teachi		۵				
	is cycl					
Poforro	d to in	LPOI (examination regu	lations for toaching a	lagrae programmes)		
Referre				iegiee programmes)		
Module		arc in				
Master Master Master	's degr 's degr 's degr	ee (1 major) Mathematics ee (1 major) Mathematics ee (1 major) Mathematics ee (1 major) Mathematics	s International (2021) 5 International (2022)			

Module title Abbreviation					Abbreviation	
Seminar in Algebra					10-M=SALGin-152-m01	
Module	coord	inator		Module offered by		
Dean of	fStudie	es Mathematik (Mathema	atics)	Institute of Mathem	atics	
ECTS		od of grading	Only after succ. com	pl. of module(s)		
5	nume	rical grade				
Duratio		Module level	Other prerequisites			
1 semes		graduate				
Conten	ts					
Recomr	nendeo		l, such as can be acq	uired in the module:	s "Introduction to Algebra" and	
		ning outcomes				
The stu	dent is	able to elaborate a conte			mprehending and structuring of ate in a scientific discussion.	
Courses	s (type,	, number of weekly conta	ct hours, language —	if other than Germa	n)	
S (2) Module	taugh	t in: English				
		e ssment (type, scope, la on on whether module ca			tion offered — if not every seme-	
Langua	ge of a) minutes) ssessment: English ffered: In the semester in	which the course is	offered and in the su	ıbsequent semester	
Allocati	ion of p	olaces				
Additio	nal info	ormation				
Worklo	ad					
150 h						
Teachir	ng cycle	e				
Referre	d to in	LPOI (examination regu	lations for teaching-c	legree programmes)		
			<u>_</u>			
Module	appea	irs in				
		ee (1 major) Mathematics	International (2015)			
Master'	s degre	ee (1 major) Mathematics	International (2021)			
	-	ee (1 major) Mathematics				
Master'	Master's degree (1 major) Mathematics International (2025)					

Module title					Abbreviation	
Semina	r in Ap	plied Mathematics			10-M=SAMAin-211-m01	
Module	coord	inator		Module offered by		
Dean of	fStudie	es Mathematik (Mathema	ntics)	Institute of Mathem	atics	
-		od of grading	Only after succ. com	pl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate				
Conten	ts					
A mode	rn topi	c in applied mathematics	5.			
Recomm	nende	d previous knowledge:				
		. –	dvanced knowledge	from different areas	of applied mathematics is requi-	
red. In o	case of	doubt, it is recommende	d to consult the lectu	ırer.		
Intende	ed learn	ning outcomes				
					omprehending and structuring of ate in a scientific discussion.	
Courses	s (type,	, number of weekly conta	ct hours, language —	· if other than Germa	n)	
S (2)						
Module	taugh	t in: English				
		s essment (type, scope, la on on whether module ca			tion offered — if not every seme-	
		minutes)				
		ssessment: English ffered: in the semester in	which the course is	offered and in the cu	ubcoquent comester	
Allocati			which the course is	onereu anu în the st	ibsequent semester	
Allocal		Jaces				
 Additio	nalinf	ormation				
Additio						
Worklo	- d					
	au					
150 h						
Teachir	ig cycl	e				
 Doforro	d to in	IDOL (avamination regu	lations for toaching s	lagraa programmac)		
Referre		LPO I (examination regu	lations for teaching-c	legree programmes)		
 Module	20000	rc in				
		ee (1 major) Mathematics	International (2024)			
	-	ee (1 major) Mathematics				
	-	ee (1 major) Mathematics				

Module title Abbreviation					Abbreviation
Semina	ar in Co	omplex Analysis			10-M=SCOAin-152-m01
Module	e coord	linator		Module offered by	
Dean o	of Studi	es Mathematik (Mathem	atics)	Institute of Mathem	atics
ECTS	Meth	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	Its				
Recom Basic k	mende		e modules "Introducti	on to Complex Analy	sis" and " Complex Analysis" is
recom					
		ning outcomes		·	1 11 1 1 1 1 1
					omprehending and structuring of ate in a scientific discussion.
Course	s (type	, number of weekly conta	act hours, language —	if other than Germa	n)
S (2) Module	e taugh	ıt in: English			
		sessment (type, scope, la ion on whether module c			tion offered — if not every seme
Langua	age of a	o minutes) Issessment: English Iffered: In the semester ir	n which the course is	offered and in the su	ibsequent semester
Allocat					•
Additic	onal inf	ormation			
Worklo	ad				
150 h					
Teachi	ng cycl	e			
	_ ,				
Referre	ed to in	LPOI (examination regu	llations for teaching-c	legree programmes)	
 Module	e appea	ars in			
		ars in ee (1 major) Mathematics	s International (2015)		
Master	's degr				
Master Master	's degr 's degr	ee (1 major) Mathematics	s International (2021)		

Module title					Abbreviation	
Semina	ar in Dy	namical Systems and	d Control		10-M=SDSCin-152-m01	
Module coordinator Module offered by					J	
Dean o	f Studi	es Mathematik (Math	ematics)	Institute of Mather	natics	
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites	5		
1 seme	ster	graduate				
Conten	ts					
Recom	mende	ic in dynamical syster d previous knowledge the contents of the m	e:	ontrol Theony" or "Co	ntrol Theory" is required.	
		ning outcomes		Shirtor meory of Co	inition meory is required.	
The stu	ident is	able to elaborate a c			omprehending and structuring of ate in a scientific discussion.	
Course	s (type	, number of weekly co	ontact hours, language –	– if other than Germ	an)	
S (2) Module	e taugh	t in: English				
			e, language — if other th le can be chosen to earn		ation offered — if not every seme-	
Langua	age of a	o minutes) ssessment: English ffered: In the semest	er in which the course is	offered and in the s	ubsequent semester	
Allocat					· · ·	
Additio	onal inf	ormation				
	ad					
Worklo	au					
Worklo						
150 h		A				
		e				
150 h Teachi 	ng cycl		regulations for teaching	degree programmos)	
150 h Teachi 	ng cycl		regulations for teaching-	degree programmes)	
150 h Teachin Referre	ng cycl ed to in	LPOI (examination r	regulations for teaching-	degree programmes)	
150 h Teachin Referre Module	ng cycl ed to in e appea	LPOI (examination r)	
150 h Teachin Referre Module	ng cycl ed to in e appea	LPOI (examination r ars in ee (1 major) Mathema	atics International (2015)))	
150 h Teachin Referre Module Master Master	ng cycl ed to in e appea 's degr 's degr	LPO I (examination r ars in ee (1 major) Mathema ee (1 major) Mathema))	

Module title					Abbreviation					
Semina	ar in Fii	nancial and Insurance	Mathematics		10-M=SFIMin-152-m01					
Module	e coord	inator		Module offered by	l					
Dean o	f Studi	es Mathematik (Math	ematics)	Institute of Mathen	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	ster	graduate								
Conten	ts									
A mode	ern top	ic in financial and ins	urance mathematics.							
Familia	rity wit	d previous knowledge h the contents of the recommended.		o Stochastic Financi	al Mathematics" and "Stochastics					
		ning outcomes								
			ontemporany research to	nic This includes of	omprehending and structuring of					
					ate in a scientific discussion.					
Course	s (type	, number of weekly co	ontact hours, language –	- if other than Germa	an)					
S (2) Module	e taugh	t in: English								
			e, language — if other the e can be chosen to earn		ation offered — if not every seme-					
Langua	ige of a	o minutes) ssessment: English ffered: In the semeste	er in which the course is	offered and in the s	ubsequent semester					
Allocat										
Additio	nal inf	ormation								
Worklo	ad									
150 h										
Teachi	ng cvcl	e								
Referre	d to in	LPOI (examination r	egulations for teaching-	degree programmes)						
		-		_ , 0 /						
Module	e appea	ars in								
			tics International (2015)							
	-		tics International (2021)							
Master	's degr	ee (1 major) Mathema	tics International (2022))						
Master	's degr	ee (1 major) Mathema	tics International (2025)		Aaster's degree (1 major) Mathematics International (2022) Aaster's degree (1 major) Mathematics International (2025)					

Module title Abbreviation						
Giovan	ini Prodi Seminar (Mast	ter)			10-M=SGPCin-152-r	m01
Module coordinator				Module offered by	<u> </u>	
			··			
	of Studies Mathematik (Institute of Mathem	latics	
ECTS	Method of grading	1	Only after succ. com	ipl. of module(s)		
5	numerical grade					
Duratio			Other prerequisites			
1 seme	3					
Conten	its					
A mode	ern topic in the research	h expertis	e of the current hold	er of the Giovanni Pr	odi Chair.	
Intend	ed learning outcomes					
The stu	udent is able to elabora	te a conte	emporary research to	pic. This includes co	omprehending and s	tructuring of
	oic and the available lite					
Course	es (type, number of wee	kly contac	ct hours, language —	if other than Germa	n)	
S (2)						
• •	e taught in: English					
	d of assessment (type,	scope, lai	nguage — if other tha	an German, examina	tion offered — if not	every seme-
	formation on whether n					,
talk (60	o to 120 minutes)					
Langua	age of assessment: Eng					
Assess	ment offered: In the se	mester in	which the course is	offered and in the su	ubsequent semester	
Allocat	tion of places					
Additic	onal information					
Worklo	ad					
150 h						
-	ng cycle					
Referre	ed to in LPO I (examina	tion regul	ations for teaching-o	legree programmes)		
Module	e appears in					
Master	's degree (1 major) Mat	hematics	International (2015)			
	's degree (1 major) Mat					
	's degree (1 major) Ecor					
	's degree (1 major) Mat					
	's degree (1 major) Corr	•				
	's degree (1 major) Corr	•		9)		
Master's degree (1 major) Mathematics (2019)						
Master's degree (1 major) Mathematical Physics (2020)						
	Master's degree (1 major) Mathematics International (2021)					
Master						
Master Master	's degree (1 major) Ecor	nomather	natics (2021)	ວ)		
Master Master Master	's degree (1 major) Ecor 's degree (1 major) Com	nomathen nputationa	natics (2021) al Mathematics (202	2)		
Master Master Master Master	r's degree (1 major) Ecor r's degree (1 major) Com r's degree (1 major) Mat	nomathen nputationa hematics	natics (2021) al Mathematics (202 (2022)	2)		
Master Master Master Master Master	d's degree (1 major) Econ d's degree (1 major) Com d's degree (1 major) Mat degree (1 major) Mat	nomathen nputationa hematics hematica	natics (2021) al Mathematics (202 (2022) l Physics (2022)			
Master Master Master Master Master Master	d's degree (1 major) Ecor d's degree (1 major) Com d's degree (1 major) Mat d's degree (1 major) Mat d's degree (1 major) Mat	nomathen nputationa hematics hematical hematics	natics (2021) al Mathematics (202 (2022) l Physics (2022) International (2022)			
Master Master Master Master Master Master Master	d's degree (1 major) Econ d's degree (1 major) Com d's degree (1 major) Mat degree (1 major) Mat	nomathen nputationa hematics hematical hematics nomathen	natics (2021) al Mathematics (202 (2022) l Physics (2022) International (2022) natics (2022)		reg data re-	page 54 / 104

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Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) Mathematics (2024) Master's degree (1 major) Economathematics (2024) Master's degree (1 major) Mathematics International (2025) Master's degree (1 major) Mathematical Data Science (2025) Master's degree (1 major) Economathematics (2025)

Module title Abbreviation						
Semina	ar in Ge	eometry and Topology			10-M=SGTOin-152-m01	
Module	Module coordinator Module offered by					
		es Mathematik (Mathem	atics)	Institute of Mathem	atics	
ECTS		od of grading	Only after succ. com		latics	
5	1	rical grade				
Duratio	I	Module level	Other prerequisites			
1 seme		graduate				
Conten	ts	•	•			
A mode	ern top	ic in geometry and topol	ogv.			
Basic k	nowle	d previous knowledge: dge of the contents of the ommended.	e modules "Introducti	on to Differential Ge	ometry" and "Introduction to To-	
		ning outcomes				
					omprehending and structuring of ate in a scientific discussion.	
		, number of weekly cont				
S (2)	э (type	, number of weekly conta	act nours, tanguage –	- ii otilei tilali Geima	11)	
• •	e taugh	it in: English				
		sessment (type, scope, la ion on whether module c			tion offered — if not every seme-	
Langua	age of a	o minutes) Issessment: English Iffered: In the semester i	n which the course is	offered and in the su	ıbsequent semester	
Allocat	ion of	places				
Additio	onal inf	ormation				
Worklo	Workload					
	ad					
150 h		e				
		e				
150 h Teachi 	ng cycl		Jations for teaching.	legree programmes)		
150 h Teachi 	ng cycl	e LPOI (examination reg	ulations for teaching-o	legree programmes)		
150 h Teachi Referre	ng cycl ed to in	LPOI (examination reg	ulations for teaching-o	legree programmes)		
150 h Teachi Referre Module	ng cycl ed to in e appea	LPOI (examination regu		legree programmes)		
150 h Teachi Referre Module	ng cycl ed to in e appea	LPOI (examination reg	s International (2015)			
150 h Teachi Referre Module Master Master	ng cycl ed to in e appea 's degr 's degr	LPO I (examination reginars in equation for the second s	s International (2015) s International (2021)			

Module title Abbreviation						
Interdi	sciplina	ary Seminar			10-M=SIDCin-152-m01	
Module	Module coordinator Module offered by					
		es Mathematik (Mathema	atics)	Institute of Mathem	atics	
ECTS	-	od of grading	Only after succ. com		latics	
5		rical grade				
Duratio	on .	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	Its					
A mode	ern topi	c in mathematics with in	terdisciplinary aspec	ts.		
		ning outcomes				
					omprehending and structuring of ate in a scientific discussion.	
		, number of weekly conta		· · · ·		
S (2)					,	
• • •	e taugh	t in: English				
ster, in talk (60 Langua	formati o to 120 age of a	on on whether module ca o minutes) ssessment: English ffered: In the semester in	an be chosen to earn	a bonus)	tion offered — if not every seme-	
Allocat						
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teachi	ng cvcl	e				
	.5 .9 .1	-				
Referre	ed to in	LPO I (examination regu	lations for teaching-	legree programmes)		
Module	e appea	irs in				
		ee (1 major) Mathematics	International (2015)			
	-	ee (1 major) Mathematics				
	-	ee (1 major) Mathematics				
Master	's degr	ee (1 major) Mathematics	International (2025)			

Module title					Abbreviation
Seminar Mathematics in the Sciences					10-M=SMSCin-152-m01
Module	e coord	inator		Module offered by	
Dean of	f Studie	es Mathematik (Mathema	atics)	Institute of Mathem	atics
ECTS		od of grading	Only after succ. com	pl. of module(s)	
5	L	rical grade			
Duratio		Module level	Other prerequisites		
1 seme		graduate			
Conten					
Recomr Basic k	mendeo nowlec	c in mathematics in the s d previous knowledge: lge from the modules "Or recommended, as well as	dinary Differential Eq		duction to Partial Differential
		ning outcomes		·····,····	
The stu	dent is	able to elaborate a conte			omprehending and structuring of ate in a scientific discussion.
Course	s (type,	, number of weekly conta	ct hours, language —	if other than Germa	n)
S (2) Module	e taugh	t in: English			
		e ssment (type, scope, la on on whether module ca			tion offered — if not every seme-
Langua	ge of a) minutes) ssessment: English ffered: In the semester in	which the course is	offered and in the su	ıbsequent semester
Allocat	ion of p	olaces			
Additio	nal info	ormation			
Worklo	ad				
150 h					
Teachir	ng cycl	e			
Referre	d to in	LPOI (examination regu	lations for teaching-c	legree programmes)	
Module	e appea	irs in			
		ee (1 major) Mathematics	International (2015)		
	-	ee (1 major) Mathematics			
	-	ee (1 major) Mathematics			
Master'	's degre	ee (1 major) Mathematics	International (2025)		

Module title					Abbreviation
Semina	r in No	n-linear Analysis		10-M=SNLAin-152-m01	
Module	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		Module level	Other prerequisites		
1 seme	ster	graduate			
Conten					
Recomr Depenc	nende ling on	c in non-linear analysis. d previous knowledge: the content, basic and a commended to consult th		from different areas	of analysis is required. In case of
Intende	ed learr	ning outcomes			
The stu	dent is	able to elaborate a conte			mprehending and structuring of ate in a scientific discussion.
Course	s (type,	, number of weekly conta	ct hours, language —	if other than Germa	n)
S (2) Module	taugh	t in: English			
		e ssment (type, scope, la on on whether module ca			tion offered — if not every seme-
Langua	ge of a	n minutes) ssessment: English ffered: In the semester in	which the course is	offered and in the su	ıbsequent semester
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
150 h					
Teachir	ng cycl	e			
Referre	d to in	LPOI (examination regu	lations for teaching-c	legree programmes)	
Module	appea	irs in			
Master' Master'	s degre s degre	ee (1 major) Mathematics ee (1 major) Mathematics ee (1 major) Mathematics ee (1 major) Mathematics	International (2021) International (2022)		

Module title					Abbreviation
Seminar in Numerical Mathematics and Applied Analysis					10-M=SNMAin-152-mo1
Module	Module coordinator Mo				
Dean o	f Studi	es Mathematik (Mat	hematics)	Institute of Mathen	natics
ECTS	Methe	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites	i	
1 seme	ster	graduate			
Conten	ts				
Recom Depend	mende ding on	d previous knowled the content, basic		from different areas	of analysis and/or numerical ma
		ning outcomes			
The stu	ident is	able to elaborate a			omprehending and structuring of ate in a scientific discussion.
Course	s (type	, number of weekly	contact hours, language –	- if other than Germa	an)
S (2)		t in: English			
			pe, language — if other th ule can be chosen to earn		ation offered — if not every seme-
Langua	ige of a	o minutes) ssessment: English ffered: In the semes	ster in which the course is	offered and in the s	ubsequent semester
Allocat					· ·
Additio	onal inf	ormation			
Worklo	ad				
150 h					
Teachi	ng cvcl	e			
Referre	ed to in	LPO I (examination	regulations for teaching-	degree programmes	
Module	e appea	ars in			
			natics International (2015)		
Master		(=			
	's degr	ee (1 major) Mathen			
Master			natics International (2021) natics International (2022)		

Module title Abbreviation					Abbreviation
Semina	ar in Op	otimization			10-M=SOPTin-152-m01
Module	e coord	inator		Module offered by	
		es Mathematik (Mathema	atics)	Institute of Mathem	atics
ECTS		od of grading	Only after succ. con		
5		rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
A mode	ern top	ic in optimisation.			
Intend	ed lear	ning outcomes			
					omprehending and structuring of ate in a scientific discussion.
Course	s (type	, number of weekly conta	ct hours, language –	- if other than Germa	n)
S (2)		t in: English			
ster, in talk (60	formation to 120	ion on whether module ca o minutes)			tion offered — if not every seme-
		ssessment: English ffered: In the semester in	which the course is	offered and in the su	ubsequent semester
Allocat	ion of _l	places			
	-				
Additio	onal inf	ormation			
	-				
Worklo	ad				
150 h	-				
Teachi	ng cycl	e			
Referre	ed to in	LPOI (examination regu	lations for teaching-	degree programmes)	
Module	e appea	ars in			
Master	's degr	ee (1 major) Mathematics	International (2015)		
	-	ee (1 major) Mathematics			
	-	ee (1 major) Mathematics			
Master	's degr	ee (1 major) Mathematics	International (2025)		

Module title					Abbreviation	
Seminar in Statistics					10-M=SSTAin-152-m01	
Module coordinator				Module offered by		
Dean o	f Studie	es Mathematik (Mathema	atics)	Institute of Mathem	atics	
ECTS		od of grading	Only after succ. com	pl. of module(s)		
5	L	rical grade				
Duratio		Module level	Other prerequisites			
1 seme		graduate				
Conten						
A mode	ern topi	c in statistics.				
Recom	mende	d previous knowledge:				
Basic k	nowlec	lge of stochastics is requ			astics 1" module. Knowledge of	
					the content of the course, other	
-		ge may also be helpful; c	onsultation with the	lecturer is recommer	1dea.	
		ning outcomes		· + · · · · ·		
					mprehending and structuring of ate in a scientific discussion.	
Course	s (type,	number of weekly conta	ct hours, language —	if other than Germa	n)	
S (2) Module	taugh	t in: English				
			nguago — if other the	n Corman oxamina	tion offered — if not every seme-	
		on on whether module ca				
		minutes)				
		ssessment: English ffered: In the semester in	which the course is	offered and in the su	ibsequent semester	
Allocat						
Additio	nal info	ormation				
Worklo	ad					
150 h						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
	Master's degree (1 major) Mathematics International (2015)					
	-	ee (1 major) Mathematics				
	-	ee (1 major) Mathematics				
master	Master's degree (1 major) Mathematics International (2025)					

Module	e title				Abbreviation	
Applied Differential Geometry					10-M=VADGin-152-m01	
Module coordinator						
			atian)	Module offered by		
ECTS	ean of Studies Mathematik (Mathematics) CTS Method of grading Only after succ. of		Only after succ. com	Institute of Mathem		
10		rical grade				
Duratio		Module level	Other prerequisites			
1 seme		graduate				
Conten	its	0				
tial geo timisat Recom Advano Geome	ometry, ion on mende ced kno etry". Kr	e.g. at the interface of c manifolds or application d previous knowledge: wledge of differential ge	ontrol theory and me s in physics. ometry is required, su of the modules "App	chanics (subriemanr uch as can be acquir lied Differential Geo	selected applications of differen- nian geometry), in the smooth op- ed in the module "Differential metry", "Geometric Mechanics", mended.	
Intend	ed lear	ning outcomes				
					eometry. He/She is able to esta- ematics and questions in phy-	
Course	s (type	, number of weekly conta	act hours, language —	if other than Germa	n)	
V (4) + Module		t in: English				
		essment (type, scope, la on on whether module c			tion offered — if not every seme-	
b) oral c) oral Langua Assess	examir examin age of a	mination (approx. 90 to a nation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester in bonus	each (approx. 20 minu of 2, 15 minutes per c	ites) or andidate)	ıbsequent semester	
Allocat	ion of p	olaces				
Additio	onal inf	ormation				
Worklo	ad					
300 h						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Module appears in Master's degree (1 major) Mathematics International (2015) Master's degree (1 major) Mathematics International (2021) Master's degree (1 major) Mathematics International (2022) Master's degree (1 major) Mathematics International (2025)						

Module title				Abbreviation	
Algebraic Geometry					10-M=VAGEin-211-m01
Modul	e coordi	nator		Module offered by	
	ean of Studies Mathematik (Mathematics)			Institute of Mathem	
ECTS	· · · ·	d of grading	Only after succ. con		latics
10		ical grade			
Duratio	L	Module level	Other prorequisites		
1 seme		graduate	Other prerequisites		
		graduate			
Conter					
sors ar Bezout Recom Basic k	nd Riema 's theor mendec	ann-Roch theorem f em; Grassmann and I previous knowledg ge of algebra is ass	or curves; genus, singular I flag varieties; 27 lines in ge:	ities and Plücker for a cubic surface.	onal maps; function fields, divi- mula; dual curve, dual surface; s "Introduction to Algebra" and
		ing outcomes			
		-	damontal concenter mat	and recults in a	algebraic geometry, is able to
classif	these i				tions of algebraic geometry with
Course	s (type,	number of weekly o	ontact hours, language –	- if other than Germa	an)
V (4) +	Ü (2)				
Modul	e taught	in: English			
			be, language — if other the ule can be chosen to earn		ntion offered — if not every seme
			to 120 minutes, usually		
			ate each (approx. 20 minu	-	
		ssessment: English	ups of 2, 15 minutes per c	andidate)	
	0	5	ter in which the course is	offered and in the s	ubsequent semester
	ble for b				
Allocat	ion of p	laces			
Additio	onal info	rmation			
Worklo	ad				
300 h					
Teaching cycle					
ICatin	0 .,				
	d to in	POI (examination	regulations for teaching.	legree programmes	
	ed to in	POI (examination	regulations for teaching-o	degree programmes)	
 Referre 			regulations for teaching-o	degree programmes)	
 Referre Module	e appea	rs in			
 Referre Modul e Master	e appea 's degre	r s in e (1 major) Mathem	atics International (2021)		
 Referre Module Master Master	e appea 's degre	r s in e (1 major) Mathem	atics International (2021) atics International (2022)		

Module	e title				Abbreviation
Selecte	ed Topi	cs in Analysis			10-M=VANAin-152-m01
Module	e coord	inator		Module offered by	
Dean of Studies Mathematik (Mathematics)				Institute of Mathem	atics
ECTS	r	od of grading	Only after succ. com		
10	nume	rical grade		•	
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
with ot	her ma	ission of a specialised to thematical concepts. d previous knowledge:	pic in analysis taking	into account recent	developments and interrelations
Depen	ding on			from different areas	of analysis is required. In case of
Intend	ed learı	ning outcomes			
The stu comple		•	ed results in a select	ed topic in analysis,	and is able to apply these to
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)
V (4) + Module	• •	t in: English			
		e ssment (type, scope, la on on whether module ca			tion offered — if not every seme-
b) oral c) oral Langua	examin examin Ige of a ment o	nination (approx. 90 to 1 ation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester in bonus	ach (approx. 20 minu of 2, 15 minutes per ca	ites) or andidate)	ubsequent semester
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
300 h					
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module appears in					
	-	ee (1 major) Mathematics			
	-	ee (1 major) Mathematics ee (1 major) Mathematics			
		ee (1 major) Mathematics			
musici	5 4651	ce (± major) mathematics			

Module title					Abbreviation
Algebraic Topology					10-M=VATPin-152-m01
Module coordinator				Module offered by	
Dean o	of Studio	es Mathematik (Mathema	atics)	Institute of Mathem	natics
ECTS	1	od of grading	Only after succ. com	pl. of module(s)	
10	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ester	graduate			
Conter	nts				
spaces Recom	s. mende	d previous knowledge:			the topology of Euclidean e "Introduction to Topology".
		ning outcomes		•	
The stu	udent is	acquainted with advanc	ed results in algebrai	c topology.	
Course	es (type	, number of weekly conta	ct hours, language –	if other than Germa	ın)
V (4) +	Ü (2)				
Modul	e taugh	t in: English			
		s essment (type, scope, la on on whether module ca			tion offered — if not every seme-
c) oral Langua Assess	examin age of a	ation of one candidate e ation in groups (groups c ssessment: English ffered: In the semester in bonus	of 2, 15 minutes per c	andidate)	ubsequent semester
Allocat	tion of p	olaces			
Additio	onal inf	ormation			
Worklo	ad				
300 h					
Teachi	ng cycl	e			
	-				
Referre	ed to in	LPO I (examination regu	lations for teaching-o	legree programmes)	
Module appears in					
		ee (1 major) Mathematics	International (2015)		
	•	ee (1 major) Mathematics			
	-	ee (1 major) Mathematics			
		gram Mathematics (2023)			
Master	's degr	ee (1 major) Mathematics	international (2025)		

Module	title				Abbreviation	
Algorithmic Number Theory					10-M=VAZTin-211-m01	
Module coordinator				Module offered by		
			ntics)	Institute of Mathem	atics	
ECTS		od of grading	Only after succ. com	pl. of module(s)		
10	nume	rical grade		•		
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate				
Conten	ts					
roots. P tic curve Recomr	rimalit e meth nendee	y tests for Fermat and Me od, quadratic sieve meth d previous knowledge:	ersenne numbers, fac od), discrete logarith	torisation methods (m.	ts, computation of primitive (Pollard-Rho, (p-1)-method, ellip- uired in the modules "Introducti-	
		, "Introduction to Numbe				
Intende	ed learr	ning outcomes				
		nows about the theoreticater theory.	al foundations and th	ie possible applicati	ons of several methods in algo-	
Courses	s (type,	, number of weekly conta	ct hours, language —	if other than Germa	n)	
V (4) + ĺ Module	• •	t in: English				
		essment (type, scope, la on on whether module ca			tion offered — if not every seme-	
b) oral e c) oral e Langua	examin examin ge of a ment o	nination (approx. 90 to 1 ation of one candidate e ation in groups (groups c ssessment: English ffered: in the semester in bonus	ach (approx. 20 minu of 2, 15 minutes per ca	ites) or andidate)	ıbsequent semester	
Allocati	ion of p	olaces				
Additio	nal info	ormation				
Worklo	ad					
300 h						
Teaching cycle						
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module	Module appears in					
Moule appears in Master's degree (1 major) Mathematics International (2021) Master's degree (1 major) Mathematics International (2022) Master's degree (1 major) Mathematics International (2025)						

					Abbreviation		
Computer Algebra 10-M=VCALin-211-mo1							
Module coordinator				Module offered by			
Dean of Studies Mathematik (Mathemat			atics)	Institute of Mathem	atics		
ECTS	1	od of grading	Only after succ. con	npl. of module(s)			
10	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	ts						
lynomi als, syr als, Grö Recom Basic k	als ove nbolic öbner b mende	r finite fields; lattices, lat integration of rational fur asis, Buchberger's algori d previous knowledge: lge of algebra is assumed	tice basis reduction a actions; exact arithm thm, algorithms for p	and LLL-algorithm; fa etic with algebraic nu permutation groups.	er theorem; factorisation of po- actorisation of rational polynomi- umbers; multivariate polynomi- s "Introduction to Algebra" and		
		ning outcomes					
The stu puter a			al foundations and th	ne possible applicati	ons of several methods in com-		
-		, number of weekly conta	ct hours, language –	- if other than Germa	n)		
V (4) + Module		t in: English					
		sessment (type, scope, la ion on whether module ca			tion offered — if not every seme-		
b) oral c) oral Langua	examir examin Ige of a ment o	mination (approx. 90 to 1 nation of one candidate e nation in groups (groups c ssessment: English ffered: in the semester in bonus	ach (approx. 20 minu of 2, 15 minutes per c	utes) or andidate)	ıbsequent semester		
Allocat	ion of j	olaces					
Additio	onal inf	ormation					
Worklo	ad						
300 h							
Teaching cycle							
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module appears in							
		ee (1 major) Mathematics	International (2021)				
	-	ee (1 major) Mathematics					
Master	Master's degree (1 major) Mathematics International (2025)						

	e title				Abbreviation	
Discrete Mathematics					10-M=VDIMin-152-m01	
Module coordinator				Module offered by	Module offered by	
Dean of Studies Mathematik (Mathematics)			amatics)	Institute of Mathen	atics	
ECTS		od of grading	Only after succ. con		latics	
5		rical grade				
Duratio		Module level	Other prerequisites			
1 seme		graduate				
Conten		Sidduite				
Advanc	ced me	thods and results in a or combinatorics)	selected field of discret	e mathematics (e. g	. coding theory, cryptography,	
- ,	-					
		d previous knowledge	e: the module "Introductio	on to Discrete Mathe	matics" is required	
		ning outcomes	module miloduello		in a story in required.	
			anced results in a select	ed topic in discrete	mathematics.	
Course	s (type	, number of weekly co	ntact hours, language –	- if other than Germa	an)	
V (3) +	• •					
Module	e taugh	it in: English				
			e, language — if other the e can be chosen to earn		ation offered — if not every seme	
b) oral	examir	nation of one candidat	to 90 minutes, usually c te each (approx. 15 minu os of 2, approx. 10 minu	ites) or		
b) oral c) oral Langua Assess	examin examir age of a ment c	nation of one candidat nation in groups (group assessment: English offered: In the semeste		ites) or tes per candidate)	ubsequent semester	
b) oral c) oral Langua Assess credita	examin examir age of a ment o ble for	nation of one candidat nation in groups (group assessment: English offered: In the semester bonus	te each (approx. 15 minu os of 2, approx. 10 minu	ites) or tes per candidate)	ubsequent semester	
b) oral c) oral Langua Assess credita	examin examir age of a ment o ble for	nation of one candidat nation in groups (group assessment: English offered: In the semester bonus	te each (approx. 15 minu os of 2, approx. 10 minu	ites) or tes per candidate)	ubsequent semester	
b) oral c) oral Langua Assess credita Allocat	examin examir age of a ment o ble for ion of	nation of one candidat nation in groups (group assessment: English offered: In the semeste bonus places	te each (approx. 15 minu os of 2, approx. 10 minu	ites) or tes per candidate)	ubsequent semester	
b) oral c) oral Langua Assess credita Allocat	examin examir age of a ment o ble for ion of	nation of one candidat nation in groups (group assessment: English offered: In the semester bonus	te each (approx. 15 minu os of 2, approx. 10 minu	ites) or tes per candidate)	ubsequent semester	
b) oral (c) oral (Langua Assess credita Allocat Additio	examir examir age of a ment c ble for ion of	nation of one candidat nation in groups (group assessment: English offered: In the semeste bonus places	te each (approx. 15 minu os of 2, approx. 10 minu	ites) or tes per candidate)	ubsequent semester	
b) oral c) oral c Langua Assess credita Allocat Additio Worklo	examir examir age of a ment c ble for ion of	nation of one candidat nation in groups (group assessment: English offered: In the semeste bonus places	te each (approx. 15 minu os of 2, approx. 10 minu	ites) or tes per candidate)	ubsequent semester	
b) oral c c) oral c Langua Assess credita Allocat Additio Worklo 150 h	examir examir age of a ment o ble for ion of onal inf	nation of one candidat nation in groups (group assessment: English offered: In the semeste bonus places	te each (approx. 15 minu os of 2, approx. 10 minu	ites) or tes per candidate)	ubsequent semester	
b) oral c) oral Langua Assess credita Allocat	examir examir age of a ment o ble for ion of onal inf	nation of one candidat nation in groups (group assessment: English offered: In the semeste bonus places	te each (approx. 15 minu os of 2, approx. 10 minu	ites) or tes per candidate)	ubsequent semester	
b) oral c) oral c Langua Assess credita Allocat Worklo 150 h Teachin 	examir examir age of a ment c ble for ion of onal inf onal inf	nation of one candidat nation in groups (group assessment: English offered: In the semester bonus places	te each (approx. 15 minu os of 2, approx. 10 minu er in which the course is	ites) or tes per candidate) offered and in the si		
b) oral c c) oral c Langua Assess credita Allocat Morklo 150 h Teachin 	examir examir age of a ment c ble for ion of onal inf onal inf	nation of one candidat nation in groups (group assessment: English offered: In the semester bonus places	te each (approx. 15 minu os of 2, approx. 10 minu	ites) or tes per candidate) offered and in the si		
b) oral c) oral c Langua Assess credita Allocat Worklo 150 h Teachin Referre	examir examir age of a ment o ble for ion of onal inf pad	nation of one candidat nation in groups (group assessment: English offered: In the semester bonus places	te each (approx. 15 minu os of 2, approx. 10 minu er in which the course is	ites) or tes per candidate) offered and in the si		
b) oral c) oral c Langua Assess credita Allocat Additio Worklo 150 h Teachin Referre Module	examir examir age of a ment c ble for ion of onal inf onal inf oad ed to in e appea	ation of one candidation in groups (group assessment: English offered: In the semester bonus places formation	e each (approx. 15 minu os of 2, approx. 10 minu er in which the course is egulations for teaching-o	ites) or tes per candidate) offered and in the si degree programmes)		
b) oral c c) oral c Langua Assess credita Allocat Worklo 150 h Teachin Referre Module	examir examir age of a ment o ble for ion of onal inf onal inf oad ed to in e appea	ation of one candidation in groups (group assessment: English offered: In the semester bonus places formation LPO I (examination re ars in ree (1 major) Mathema	tics International (2015)	ites) or tes per candidate) offered and in the si degree programmes)		
b) oral c) oral c Langua Assess credita Allocat Worklo 150 h Teachin Referre Module Master Master	examir examir age of a ment o ble for ion of onal inf onal inf oad ad ad ad to in e appea 's degr	ation of one candidation in groups (group assessment: English offered: In the semester bonus places formation	te each (approx. 15 minu os of 2, approx. 10 minu er in which the course is egulations for teaching-o tics International (2015) nternational (2020)	ites) or tes per candidate) offered and in the si degree programmes)		
b) oral c) oral c Langua Assess credita Allocat Morklo 150 h Teachin Referre Master Master Master Master	examir examir age of a ment o ble for ion of onal inf onal inf ona	ation of one candidation in groups (group assessment: English offered: In the semester bonus places formation ee (1 major) Mathema ree (1 major) Quantum	te each (approx. 15 minu os of 2, approx. 10 minu er in which the course is egulations for teaching-o tics International (2015) nternational (2020)	ites) or tes per candidate) offered and in the si degree programmes)		
b) oral c) oral c Langua Assess credita Allocat Additio Teachin Referre Module Master Master Master Master	examir examir age of a ment c ble for ion of onal inf onal inf oad ed to in e appea 's degr 's degr 's degr	ation of one candidation in groups (group assessment: English offered: In the semester bonus places formation LPO I (examination re ars in ree (1 major) Mathema ree (1 major) Quantum ree (1 major) Mathema	tics International (2015) Engineering (2020)	ites) or tes per candidate) offered and in the si degree programmes)		
b) oral c) oral c Langua Assess credita Allocat Worklo 150 h Teachin Referre Module Master Master Master Master Master	examir examir age of a ment o ble for ion of onal inf onal inf onal inf onal inf oad ed to in 's degr 's degr 's degr 's degr	ation of one candidation in groups (group assessment: English offered: In the semester bonus places formation tee (1 major) Mathema ree (1 major) Mathema	tics International (2021) Engineering (2020) tics International (2021)	ites) or tes per candidate) offered and in the si degree programmes)		
b) oral c) oral c Langua Assess credita Allocat Worklo 150 h Teachin Referre Master Master Master Master Master Master Master	examir examir age of a ment o ble for ion of onal inf onal inf onal inf onal inf oad ad ad ad ad ad ad ad ad ad ad ad ad a	ation of one candidation in groups (group assessment: English offered: In the semester bonus places formation LPO I (examination re ars in ree (1 major) Mathema ree (1 major) Quantum ree (1 major) Mathema	tics International (2015) Engineering (2020) Engineering (2024)	ites) or tes per candidate) offered and in the si degree programmes)		

Module title					Abbreviation	
Dynamical Systems					10-M=VDSYin-152-m01	
Module coordinator				Module offered by		
Dean o	f Studie	es Mathematik (Mathema	atics)	Institute of Mathem	atics	
ECTS		od of grading	Only after succ. com	pl. of module(s)		
5	L	rical grade				
Duratio		Module level	Other prerequisites			
1 seme		graduate	-			
Conten						
Fundan	nentals	of dynamical systems, e	. g. stability theory, e	rgodic theory, Hamil	ltonian systems.	
Recom	mende	d previous knowledge:				
		lge of the contents of the	module "Ordinary Di	fferential Equations'	" is useful.	
		ning outcomes				
The stu	dent m	asters the mathematical	methods in the theor	y of dynamic system	ns, and is able to analyse their	
quality				· · · ·	. ,	
Course	s (type,	, number of weekly conta	ct hours, language —	if other than Germa	n)	
V (3) +	Ü (1)					
Module	e taugh	t in: English				
		essment (type, scope, la on on whether module ca			tion offered — if not every seme-	
		nination (approx. 60 to 9				
		ation of one candidate e ation in groups (groups o		-		
		ssessment: English	<i>n</i> 2, approx. 10 mmat	es per candidate)		
Assess	ment o	ffered: In the semester in	which the course is o	offered and in the su	ibsequent semester	
credita						
Allocat	ion of p	olaces				
Additio	nal info	ormation				
Worklo	ad					
150 h						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
		ee (1 major) Mathematics	International (2015)			
1	-	ee (1 major) Mathematics				
1	-	ee (1 major) Mathematics				
Master	Master's degree (1 major) Mathematics International (2025)					

Module	e title				Abbreviation		
Selected Topics in Financial Mathematics					10-M=VFNMin-152-m01		
Module coordinator				Module offered by			
Dean o	f Studi	es Mathematik (Mathem	atics)	Institute of Mathem	atics		
ECTS		od of grading	Only after succ. com				
10	1	rical grade		,			
Duratio	n	Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	ts		-				
of asse stochas Recom Familia	t pricin stic into mende rity wit	g in discrete time for fin egration, stochastic diffe d previous knowledge: h the contents of the mo	ite spaces, American perential equations and	out, Snell envelope, Ito calculus, Black-	tingales, fundamental theorem stopping time, optimal stopping, Merton-Scholes model. al Mathematics" and "Stochastics		
		ecommended.	_				
		ning outcomes	and regulte in financia	mothomotics 11-16	The going the chility to work or		
					She gains the ability to work on er skills to complex problems.		
	-	, number of weekly cont			· · ·		
V (4) + Module	• •	t in: English					
		sessment (type, scope, l ion on whether module o			tion offered — if not every seme-		
b) oral c) oral (Langua	examir examin ge of a ment o	mination (approx. 90 to nation of one candidate ation in groups (groups ssessment: English ffered: In the semester i bonus	each (approx. 20 minu of 2, 15 minutes per ca	tes) or andidate)	ubsequent semester		
Allocat	ion of _l	olaces					
Additio	nal inf	ormation					
Worklo	ad						
300 h							
Teaching cycle							
-							
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module appears in							
		ee (1 major) Mathematic	s International (2015)				
	-	ee (1 major) Mathematic					
Master	-	ee (1 major) Mathematic	s International (2022)				
	Aaster's degree (1 major) Mathematics International (2022) Aaster's degree (1 major) Mathematics International (2025)						

Module title				Abbreviation			
Groups and their Representations					10-M=VGDSin-152-m01		
Module	e coord	inator		Module offered by			
Dean o	Dean of Studies Mathematik (Mathematics)			Institute of Mathem	natics		
ECTS		od of grading	Only after succ. com	pl. of module(s)			
10	L	rical grade					
Duratio		Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	ts						
the S-ri Recom Basic k	ings of mende	Schur. d previous knowledge: lge of algebra is assumed			nd special techniques such as s "Introduction to Algebra" and		
		ning outcomes					
					the ability to work on contempo- y his/her skills to complex pro-		
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)		
V (4) + Module		t in: English					
		essment (type, scope, la on on whether module ca			tion offered — if not every seme-		
b) oral c) oral Langua	examin examin age of a ment o	nination (approx. 90 to 1 ation of one candidate e ation in groups (groups c ssessment: English ffered: In the semester in bonus	ach (approx. 20 minu of 2, 15 minutes per c	ites) or andidate)	ıbsequent semester		
Allocat	ion of p	olaces					
Additio	onal info	ormation					
Worklo	ad						
300 h							
Teachi	ng cycl	e					
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module appears in							
Master's degree (1 major) Mathematics International (2015)							
Master	's degr	ee (1 major) Physics Inter	national (2020)				
	-	ee (1 major) Mathematics					
	-	ee (1 major) Mathematics					
	-	ee (1 major) Physics Inter	-				
Master	Master's degree (1 major) Mathematics International (2025)						

Module	e title			Abbreviation		
Geome	etrical Mechanics			10-M=VGEMin-152-	m01	
Module	e coordinator		Module offered by			
	of Studies Mathematik (Mathe	amatics)	Institute of Mathematics			
ECTS						
10	numerical grade					
Duratio		Other prerequisites	-			
1 seme			•			
Conten	I <u>~</u>					
tic geo phase Recom Advanc Geome	odule builds on the topics cov metry, cotangent bundles and space reduction, normal form mended previous knowledge ced knowledge of differential etry". Knowledge of the conten- neoretical mechanics can also	d other examples of syr ns, introduction to Poiss : geometry is required, s nts of the module "Intro	nplectic manifolds, s son geometry. uch as can be acquir	ymmetries and Noet ed in the module "D	her theorem, ifferential	
-	ed learning outcomes					
He/She	udent is acquainted with sele e is able to establish a conne lestions in physics.	• •		, .		
Course	s (type, number of weekly co	ntact hours, language -	– if other than Germa	in)		
V (4) + Module	Ü (2) e taught in: English					
	d of assessment (type, scope formation on whether modul			tion offered — if not	every seme-	
b) oral c) oral Langua Assess	en examination (approx. 90 t examination of one candidat examination in groups (group age of assessment: English sment offered: In the semeste	e each (approx. 20 min os of 2, 15 minutes per c	utes) or candidate)	ubsequent semester		
	ble for bonus					
Allocat	ion of places					
Additio	onal information					
	-					
Worklo	pad					
300 h						
Teachi	ng cycle					
Referre	ed to in LPO I (examination re	egulations for teaching-	degree programmes)			
		0				
Module	e appears in					
Master Master Master	r's degree (1 major) Mathema r's degree (1 major) Physics In r's degree (1 major) Mathema r's degree (1 major) Mathema r's degree (1 major) Physics In	iternational (2020) tics International (2021) tics International (2022)			
Master	Master's degree (1 major) Physics International (2024) aster's with 1 major Mathematics International JMU Würzburg • generated 19-Apr-2025 • exam. reg. data re- cord Master (120 ECTS) Mathematics International - 2021					



Master's degree (1 major) Mathematics International (2025)

Module	e title				Abbreviation
Aspect	s of Ge	ometry			10-M=VGEOin-152-m01
Module coordinator				Module offered by	
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 numerical grade					
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
with ot Recom	her mat mende	hematical structures, e. d previous knowledge:	g. topological geome	tries, diagram geom	
			fferential Geometry"	and "Introduction to	Topology" is recommended.
		ning outcomes			
The stu comple		-	ed results in a select	ed field of geometry	and can apply his/her skills to
Course	s (type,	, number of weekly conta	ct hours, language —	· if other than Germa	in)
V (3) + Module		t in: English			
		-	nguage — if other th	an German, examina	tion offered — if not every seme-
		on on whether module ca			
b) oral c) oral Langua	examin examin Ige of a ment o	nination (approx. 60 to 9 ation of one candidate e ation in groups (groups c ssessment: English ffered: In the semester in bonus	ach (approx. 15 minu of 2, approx. 10 minut	tes) or tes per candidate)	ubsequent semester
Allocat	ion of p	olaces			
Additio	nal info	ormation			
Worklo	ad				
150 h					
Teachi	ng cycl	9			
Referre	ed to in	LPOI (examination regu	lations for teaching-o	legree programmes)	
Module	e appea	rs in			
Master Master	Master's degree (1 major) Mathematics International (2015) Master's degree (1 major) Mathematics International (2021) Master's degree (1 major) Mathematics International (2022) Master's degree (1 major) Mathematics International (2025)				

Module	Abbreviation				
Geome	tric Cor	nplex Analysis		10-M=VGFTin-211-m01	
Module	e coord	inator		Module offered by	
Dean o	f Studie	es Mathematik (Mathema	atics)	Institute of Mathem	atics
ECTS		od of grading	Only after succ. com	pl. of module(s)	
10	nume	rical grade			
Duratio		Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
trics, q	uasicor	hods and results in geon nformal maps, harmonic f d previous knowledge:			aps, conformal Riemannian me-
		lge of the contents of the	module "Introductio	n to Complex Analys	is" is recommended.
		ning outcomes			
able cla	assify tl		general theories and		eometric complex analysis, is nections of geometric complex
Course	s (type,	, number of weekly conta	ct hours, language —	if other than Germa	n)
V (4) + Module	• • •	t in: English			
		e ssment (type, scope, la on on whether module ca			tion offered — if not every seme-
b) oral c) oral Langua	examin examin Ige of a ment o	nination (approx. 90 to 1 ation of one candidate e ation in groups (groups c ssessment: English ffered: in the semester in bonus	ach (approx. 20 minu of 2, 15 minutes per ca	ites) or andidate)	ıbsequent semester
Allocat	ion of p	olaces			
Additio	nal info	ormation			
Worklo	ad				
300 h					
Teachi	ng cycl	9			
	3 3,00	-			
Referre	d to in	LPOI (examination regu	lations for teaching of	egree programmec)	
Module		irs in			
Master Master	Module appears in Master's degree (1 major) Mathematics International (2021) Master's degree (1 major) Mathematics International (2022) Master's degree (1 major) Mathematics International (2025)				

Modul			Abbreviation			
Giovar	nni Prod	i Lecture Advanced Top	pics (Master)		10-M=VGPAin-152-r	no1
Modul	le coord	inator		Module offered by		
Dean of Studies Mathematik (Mathematics)			matics)	Institute of Mathem	natics	
			Only after succ. con		laties	
10		rical grade				
Durati	on	Module level	Other prerequisites			
1 seme		graduate				
Conte	nts					
Introd	uction to	o a specialised topic in	mathematics by an int	ernational expert.		
		ning outcomes				
thema thema	itics. He itics and	acquainted with the fu /She is able to establis applications in other s	h a connection betwee subjects.	en his/her acquired s	skills and other brand	
		, number of weekly con	tact hours, language –	- if other than Germa	an)	
V (4) +		t in. English				
		t in: English				
		sessment (type, scope, on on whether module			ition offered — if not	every seme
b) oral c) oral Langua Assess	l examin examin age of a	mination (approx. 90 to ation of one candidate ation in groups (groups ssessment: English ffered: In the semester bonus	each (approx. 20 minu 5 of 2, 15 minutes per c	utes) or andidate)	ubsequent semester	
Alloca	tion of p	olaces				
Additi	onal inf	ormation				
	_					
Workle	oad					
300 h						
-	ing cycl	٩				
reacin	ing cyce	6				
Doforr	ad to in	LPO I (examination reg		dogroo programmoc)		
KEIEII				degree programmes		
 M = d++1						
	le appea					
	-	ee (1 major) Mathemati ee (1 major) Mathemati				
	-	ee (1 major) Mathemati				
	-	ee (1 major) Computatio	-	6)		
	-	ee (1 major) Computatio				
	-	ee (1 major) Mathemati				
	-	ee (1 major) Mathemati	-			
	-	ee (1 major) Mathemati				
		ee (1 major) Computatio		2)		
	-	ee (1 major) Mathemati ee (1 major) Mathemati				
			-			
	aster's with 1 major Mathematics International JMU Würzburg • generated 19-Apr-2025 • exam. reg. data re- 2021) cord Master (120 ECTS) Mathematics International - 2021					nage 77 / 10/

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Master's degree (1 major) Mathematics International (2022) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) Mathematics (2024) Master's degree (1 major) Mathematics International (2025)

	le title		Abbreviation			
Giovai	nni Prod	i Lecture Modern Topic	cs (Master)		10-M=VGPMin-152-	m01
Modul	le coord	inator		Module offered by		
		es Mathematik (Mather	matics)	Institute of Mathematics		
			Only after succ. con			
10		rical grade				
Durati	on	Module level	Other prerequisites			
1 seme		graduate				
Conte	nts					
	-	o a specialised topic in	mathematics by an int	ernational expert.		
		ning outcomes				
thema thema	tics. He tics and	acquainted with the fu /She is able to establis applications in other s	h a connection betwee subjects.	en his/her acquired s	skills and other bran	
		, number of weekly con	tact hours, language –	- If other than Germa	an)	
V (4) + Modul		t in: English				
		-	languaga if ath ar th	an Carman, avaming	tion offered if not	
		s essment (type, scope, on on whether module			ation offered — If not	every serile
c) oral Langu Asses	examin age of a	ation of one candidate ation in groups (groups ssessment: English ffered: In the semester bonus	s of 2, 15 minutes per c	andidate)	ubsequent semester	
Alloca	tion of p	olaces				
Additi	onal inf	ormation				
Workl	oad					
300 h						
	ing cycl	e				
		-				
Roforr	ed to in	LPOI (examination reg	ulations for teaching.	degree programmes		
					•	
Modul	le appea	arc in				
		ee (1 major) Mathemati	cs International (2015)			
	-	ee (1 major) Mathemati				
	-	ee (1 major) Mathemati				
	-	ee (1 major) Computati	•	6)		
Maste	r's degre	ee (1 major) Computatio	onal Mathematics (201	9)		
	-	ee (1 major) Mathemati	-			
	-	ee (1 major) Mathemati	-			
	-	ee (1 major) Mathemati				
		ee (1 major) Computations (1 major) Mathemati		2)		
	-	ee (1 major) Mathemati ee (1 major) Mathemati				
			-			
	aster's with 1 major Mathematics International JMU Würzburg • generated 19-Apr-2025 • exam. reg. data re- 201) cord Master (120 ECTS) Mathematics International - 2021					page 79 / 102

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Master's degree (1 major) Mathematics International (2022) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) Mathematics (2024) Master's degree (1 major) Mathematics International (2025)

Modul	le title		Abbreviation			
Giovar	nni Prod	li Lecture Selected Top		10-M=VGPSin-152-r	no1	
Modul	e coord	inator		Module offered by		
			matics)	Institute of Mathematics		
Dean of Studies Mathematik (Mathematics) ECTS Method of grading Only after succ. com				latics		
10		rical grade				
Durati		Module level	Other prerequisites			
1 seme		graduate				
Conte	nts	0				
		o a specialised topic in	mathematics by an int	ernational expert		
		ning outcomes				
The sti thema thema	udent is itics. He itics and	acquainted with the fu /She is able to establis applications in other s	h a connection betwee subjects.	en his/her acquired s	skills and other bran	
		, number of weekly con	tact nours, language –	- If other than Germa	in)	
V (4) + Modul		t in: English				
		-	languaga if ath ar th	an Carmon avamina	tion offered if not	
		sessment (type, scope, ion on whether module			illion offered — If not	every serile
c) oral Langu Assess	examin age of a	nation of one candidate ation in groups (groups ssessment: English ffered: In the semester bonus	s of 2, 15 minutes per c	andidate)	ubsequent semester	
Alloca	tion of _l	olaces				
Additi	onal inf	ormation				
Workle	oad					
300 h						
	ing cycl	ρ				
reacin	ing cyce					
Doform	ad to in	LPOI (examination reg		dograa programmas		
KEIEII				degree programmes		
		•				
	le appea					
	-	ee (1 major) Mathemati ee (1 major) Mathemati				
	-	ee (1 major) Mathemati ee (1 major) Mathemati				
	-	ee (1 major) Kathemati ee (1 major) Computatio	-	6)		
	-	ee (1 major) Computatio				
	-	ee (1 major) Mathemati				
	-	ee (1 major) Mathemati	-			
	-	ee (1 major) Mathemati				
		ee (1 major) Computatio		2)		
	-	ee (1 major) Mathemati ee (1 major) Mathemati				
			-			
Aaster's v	aster's with 1 major Mathematics International JMU Würzburg • generated 19-Apr-2025 • exam. reg. data re- cord Master (120 ECTS) Mathematics International - 2021					page 81 / 104

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Master's degree (1 major) Mathematics International (2022) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) Mathematics (2024) Master's degree (1 major) Mathematics International (2025) Master's degree (1 major) Mathematical Data Science (2025)

Module title Abbreviation						
Inverse	Proble	ems		10-M=VIPRin-152-m01		
Module coordinator Module off						
Dean of	fStudie	es Mathematik (Mathema		Institute of Mathem	atics	
ECTS		od of grading	Only after succ. com	pl. of module(s)		
5	L	rical grade				
Duratio		Module level	Other prerequisites			
1 seme		graduate				
Linear of sation i	operato methoc mendeo	ls, examples of ill-posed d previous knowledge:	problems.		egularisation, iterative regulari- ctional Analysis", is recommen-	
ded.			,			
Intende	ed learr	ning outcomes				
					he can apply regularisation me- th selected inverse problems.	
Course	s (type,	, number of weekly conta	ct hours, language —	if other than Germa	n)	
V (3) + I Module		t in: English				
		e ssment (type, scope, la on on whether module ca			tion offered — if not every seme-	
b) oral c) oral e Langua	examin examin ge of a ment o	nination (approx. 60 to 9 ation of one candidate e ation in groups (groups c ssessment: English ffered: In the semester in bonus	ach (approx. 15 minu of 2, approx. 10 minut	tes) or es per candidate)	ıbsequent semester	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teachir	ng cycl	9				
Referre	d to in	LPOI (examination regu	lations for teaching-c	legree programmes)		
Module						
	-	ee (1 major) Mathematics				
Master	Master's degree (1 major) Mathematics International (2021)					

Module	e title				Abbreviation
Industrial Statistics 2					10-M=VISTin-152-m01
Module coordinator				Module offered by	
Dean of Studies Mathematik (Mathematics)			otics)	Institute of Mathem	atics
ECTS	1	od of grading	Only after succ. com		ומוונס
10		rical grade			
Duratio		Module level	Other prerequisites		
1 seme		graduate			
Conten	ts				
ling, ba	asics in				basics in time series model- g, predictions and prediction do-
Intende	ed lear	ning outcomes			
The stu	ident m	asters advanced statistic	cal methods for indus	strial applications.	
Course	s (type	, number of weekly conta	ct hours, language —	· if other than Germa	n)
V (4) +	• •				
Module	e taugh	t in: English			
		s essment (type, scope, la on on whether module ca			tion offered — if not every seme-
b) oral c) oral	examir examin	nination (approx. 90 to 1 ation of one candidate e ation in groups (groups c	ach (approx. 20 minu	ites) or	
	ment o	ssessment: English ffered: In the semester in bonus	which the course is	offered and in the su	ubsequent semester
Allocat	ion of p	olaces			
Additio	onal inf	ormation			
Worklo	ad				
300 h					
Teachi	ng cvcl	e			
Referre	ed to in	LPO I (examination regu	lations for teaching-c	legree programmes)	
			0		
Module	e appea	irs in			
		ee (1 major) Mathematics	International (2015)		
	-	ee (1 major) Mathematics			
	-	ee (1 major) Mathematics			
Mactor	Master's degree (1 major) Mathematics International (2025)				

Module	e title				Abbreviation
Field A	rithmet	ics			10-M=VKARin-152-m01
Module coordinator				Module offered by	
		es Mathematik (Mathema	atics)	Institute of Mathem	atics
ECTS	-	od of grading	Only after succ. com		
10	nume	rical grade		L	
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	lts				
ber the ture) ar Recom	eory, e. ; nd the i mendee mowlec	g. topics around Hilbert's nverse problem in Galois d previous knowledge: lge of algebra is assumed	irreducibility theorem theory.	m, permutation poly	h the aim of application in num- nomials (e.g. Calitz-Wan-conjec- s "Introduction to Algebra" and
		ning outcomes			
			ic concepts and meth	nods. He/She gains	the ability to work on contempo-
		questions in algebra and	•		, , ,
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)
V (4) + Module		t in: English			
		e ssment (type, scope, la on on whether module ca			tion offered — if not every seme-
b) oral c) oral Langua	examin examin age of a ment o	nination (approx. 90 to 1 ation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester in bonus	ach (approx. 20 minu of 2, 15 minutes per ca	ites) or andidate)	ubsequent semester
Allocat	ion of p	olaces			
Additio	onal inf	ormation			
Worklo	ad				
300 h					
Teachi	ng cycl	e			
Referre	ed to in	LPOI (examination regu	lations for teaching-o	legree programmes)	
Module	e appea	in			
Master	-	ee (1 major) Mathematics ee (1 major) Mathematics	International (2015)		

Comple	Module title				Abbreviation
Complex Geometry					10-M=VKGEin-152-m01
Module coordinator				Module offered by	<u> </u>
Dean o	of Studi	es Mathematik (Mathem	natics)	Institute of Mathem	natics
ECTS	1	od of grading	Only after succ. con		
10	1	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	nts				
calculu Kähler) Recom Basic k	us, com), differ mende (nowled	plex structures and com ential operators on com d previous knowledge: lge of the contents of th	plex manifolds, metri plex manifolds, classi e modules "Introducti	cs on complex mani fication of complex i	these in more detail: Wirtinger folds (e.g. conformal, hermitian, manifolds. ysis" and " Complex Analysis" or
		omplex Analysis" is reco	mmended.		
		ning outcomes	-		
				•	ferential geometry. He is familiar f methods independently.
Course	s (type	, number of weekly cont	act hours, language –	- if other than Germa	in)
V (4) + Module	• •	t in: English			
		sessment (type, scope, l ion on whether module o			tion offered — if not every seme-
· ·					
b) oral c) oral Langua	examir examin age of a sment o	mination (approx. 90 to nation of one candidate ation in groups (groups ssessment: English ffered: In the semester i bonus	120 minutes, usually each (approx. 20 minu of 2, 15 minutes per c	chosen) or utes) or andidate)	ubsequent semester
b) oral c) oral Langua Assess	examir examin age of a ment o ble for	nation of one candidate ation in groups (groups ssessment: English ffered: In the semester i bonus	120 minutes, usually each (approx. 20 minu of 2, 15 minutes per c	chosen) or utes) or andidate)	ubsequent semester
b) oral c) oral Langua Assess credita	examir examin age of a ment o ble for	nation of one candidate ation in groups (groups ssessment: English ffered: In the semester i bonus	120 minutes, usually each (approx. 20 minu of 2, 15 minutes per c	chosen) or utes) or andidate)	ubsequent semester
b) oral c) oral Langua Assess credita Allocat	examir examin age of a ment o ble for tion of J	nation of one candidate ation in groups (groups ssessment: English ffered: In the semester i bonus	120 minutes, usually each (approx. 20 minu of 2, 15 minutes per c	chosen) or utes) or andidate)	ubsequent semester
b) oral c) oral Langua Assess credita Allocat	examir examin age of a ment o ble for tion of J	nation of one candidate ation in groups (groups ssessment: English ffered: In the semester i bonus blaces	120 minutes, usually each (approx. 20 minu of 2, 15 minutes per c	chosen) or utes) or andidate)	ubsequent semester
b) oral c) oral Langua Assess credita Allocat	examir examin age of a sment o ble for tion of p onal inf	nation of one candidate ation in groups (groups ssessment: English ffered: In the semester i bonus blaces	120 minutes, usually each (approx. 20 minu of 2, 15 minutes per c	chosen) or utes) or andidate)	ubsequent semester
b) oral c) oral Langua Assess credita Allocat Additio Worklo	examir examin age of a sment o ble for tion of p onal inf	nation of one candidate ation in groups (groups ssessment: English ffered: In the semester i bonus blaces	120 minutes, usually each (approx. 20 minu of 2, 15 minutes per c	chosen) or utes) or andidate)	ubsequent semester
b) oral c) oral Langua Assess credita Allocat Morklo 300 h	examir examin age of a sment o ble for tion of j onal inf	ation of one candidate ation in groups (groups ssessment: English ffered: In the semester i bonus places	120 minutes, usually each (approx. 20 minu of 2, 15 minutes per c	chosen) or utes) or andidate)	ubsequent semester
b) oral c) oral Langua Assess credita Allocat Morklo 300 h	examir examin age of a sment o ble for tion of p onal inf	ation of one candidate ation in groups (groups ssessment: English ffered: In the semester i bonus places	120 minutes, usually each (approx. 20 minu of 2, 15 minutes per c	chosen) or utes) or andidate)	ubsequent semester
b) oral c) oral Langua Assess credita Allocat Worklo 300 h Teachin 	examin examin age of a ment o ble for tion of p onal inf pad	e	120 minutes, usually each (approx. 20 minu of 2, 15 minutes per c n which the course is	chosen) or utes) or andidate) offered and in the si	
b) oral c) oral Langua Assess credita Allocat Worklo 300 h Teachin 	examin examin age of a ment o ble for tion of p onal inf pad	ation of one candidate ation in groups (groups ssessment: English ffered: In the semester i bonus places	120 minutes, usually each (approx. 20 minu of 2, 15 minutes per c n which the course is	chosen) or utes) or andidate) offered and in the si	
b) oral c) oral Langua Assess credita Allocat Worklo 300 h Teachin Referre	examin examin age of a ment o ble for tion of p onal inf pad	e LPOI (examination reg	120 minutes, usually each (approx. 20 minu of 2, 15 minutes per c n which the course is	chosen) or utes) or andidate) offered and in the si	
b) oral c) oral Langua Assess credita Allocat Additio 300 h Teachin Referre Module	examin examin age of a sment o ble for tion of p onal inf pad ng cycl ed to in e appea	e LPOI (examination reg	120 minutes, usually each (approx. 20 minu of 2, 15 minutes per c n which the course is ulations for teaching-c	chosen) or utes) or andidate) offered and in the si	
b) oral c) oral Langua Assess credita Allocat Worklo 300 h Teachin Referre Module	examin examin age of a sment o ble for tion of p onal inf oad ng cycl ed to in e appea	e LPO I (examination regions) LPO I (atomination region) LPO I (becamination region) LPO I (becamination) LPO I (becaminatio	120 minutes, usually each (approx. 20 minu of 2, 15 minutes per c n which the course is ulations for teaching-o	chosen) or utes) or andidate) offered and in the so degree programmes)	
b) oral c) oral Langua Assess credita Allocat Worklo 300 h Teachin Referre Module Master Master	examin examin age of a ment o ble for tion of p onal inf oad ng cycl ed to in e appea	e LPOI (examination reg	120 minutes, usually each (approx. 20 minu of 2, 15 minutes per c n which the course is ulations for teaching-out is International (2015) is International (2021)	chosen) or utes) or andidate) offered and in the su degree programmes)	

Modul	e title				Abbreviation
Mathe	matical	Continuum Mechanics			10-M=VKOMin-152-mo1
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. com	pl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
Partial	differer	ntial equations and/or va	riational methods in	the context of contir	nuum mechanics.
D		d			
		d previous knowledge: Ige from the modules "O	rdinary Differential Fo	wations" and "Intro	duction to Partial Differential
		recommended, as well as			
		ning outcomes		,	
		asters the mathematical application.	methods in mathema	atical continuum me	chanics and knows about their
		, number of weekly conta	ct hours, language —	if other than Germa	ın)
V (3) +	Ü (1)				
		t in: English			
Metho	d of ass	essment (type, scope, la	nguage — if other tha	an German, examina	tion offered — if not every seme-
ster, in	formati	on on whether module ca	an be chosen to earn	a bonus)	
		nination (approx. 60 to 9			
		ation of one candidate e			
		ation in groups (groups o ssessment: English	of 2, approx. 10 minut	es per candidate)	
		ffered: In the semester in	which the course is	offered and in the su	ubsequent semester
credita					
Allocat	ion of p	olaces			
Additio	onal info	ormation			
Worklo	ad				
150 h					
Teachi	ng cycl	e			
Referre	ed to in	LPOI (examination regu	lations for teaching-c	legree programmes)	
Module	e appea	irs in			
		ee (1 major) Mathematics	International (2015)		
	-	ee (1 major) Mathematics			
	-	ee (1 major) Mathematics			
Master	's degr	ee (1 major) Mathematics	International (2025)		

Module	e title				Abbreviation
Crypto	graphy	/Coding Theory	10-M=VKRYin-211-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)	
10	nume	rical grade			
Duratio		Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
rary coo Recom	des, bo mende nowleo	unds, network codes, co d previous knowledge: lge of algebra is assumed	nnections to cryptogr	aphy.	hannon, classical and contempo- s "Introduction to Algebra" and
		ning outcomes			
The stu is able	dent is to clas	acquainted with fundam	nore general theories		oding theory and cryptography, ne connections of coding theory
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)
V (4) + Module	• •	t in: English			
		sessment (type, scope, la on on whether module ca			tion offered — if not every seme-
b) oral c) oral Langua	examir examin Ige of a ment o	mination (approx. 90 to 1 nation of one candidate e ation in groups (groups o ssessment: English ffered: in the semester in bonus	ach (approx. 20 minu of 2, 15 minutes per ca	tes) or andidate)	ıbsequent semester
Allocat	ion of j	olaces			
Additio	nal inf	ormation			
Worklo	ad				
300 h					
Teachi	ng cvcl	e			
Referre	d to in	LPOI (examination regu	lations for teaching-d	legree programmes)	
Module	appea	urs in			
Master Master	Module appears in Master's degree (1 major) Mathematics International (2021) Master's degree (1 major) Mathematics International (2022) Master's degree (1 major) Mathematics International (2025)				

Mather	e title				Abbreviation
Mathematical Imaging					10-M=VMBVin-152-m01
Module coordinator				Module offered by	
Dean o	of Studi	es Mathematik (Mathem	atics)	Institute of Mathen	natics
ECTS	1	od of grading	Only after succ. com		
5		rical grade			
Duratio	I	Module level	Other prerequisites		
1 seme		graduate			
Conten	nts				
camera ra pictu Recomi Basic k	a mode ures; al mende	ls and camera calibratio gorithms; module might d previous knowledge:	n, rigid and non-rigid also include an introd	registration, reconst luction to geometric	elementary projective geometry, ruction of 3D objects from came methods and tomography. ctional Analysis", is recommen-
ded.					
		ning outcomes	1		
		cation.	t methods in the theo	iy or image processi	ng and knows about their main
Course	s (type	, number of weekly cont	act hours, language —	- if other than Germa	an)
V (3) + Module		it in: English			
		sessment (type, scope, l ion on whether module o			tion offered — if not every seme
b) oral	examiı examir	mination (approx. 60 to nation of one candidate nation in groups (groups	each (approx. 15 minu	tes) or	
Langua Assess	sment o	issessment: English iffered: In the semester i bonus			ubsequent semester
Langua Assess credita	ment of the second s	offered: In the semester i bonus			ubsequent semester
Langua Assess credita	ment of the second s	offered: In the semester i bonus			ubsequent semester
Langua Assess credita Allocat	ment of	offered: In the semester i bonus			ubsequent semester
Langua Assess credita Allocat	ment of	offered: In the semester i bonus places			ubsequent semester
Langua Assess credita Allocat	ment of ble for tion of onal inf	offered: In the semester i bonus places			ubsequent semester
Langua Assess credita Allocat Additio Worklo	ment of ble for tion of onal inf	offered: In the semester i bonus places			ubsequent semester
Langua Assess credita Allocat Additio Worklo 150 h	ment c ble for tion of onal inf	offered: In the semester i bonus places formation			ubsequent semester
Langua Assess credita Allocat Additio Worklo 150 h Teachin	ment c ble for tion of onal inf	offered: In the semester i bonus places formation			ubsequent semester
Langua Assess credita Allocat Additio Worklo 150 h Teachin 	ment c ble for tion of onal inf	offered: In the semester i bonus places formation	n which the course is	offered and in the s	
Langua Assess credita Allocat Additio Worklo 150 h Teachin 	ment c ble for tion of onal inf	offered: In the semester i bonus places formation	n which the course is	offered and in the s	
Langua Assess credita Allocat Additio 150 h Teachin Referre 	ment c ble for tion of onal inf oad ng cycl	offered: In the semester i bonus places formation e LPOI (examination reg	n which the course is	offered and in the s	
Langua Assess credita Allocat Additio 150 h Teachin Referre Module	ment of ble for tion of onal inf oad ng cycl	offered: In the semester i bonus places formation e LPO I (examination reg	n which the course is	offered and in the s	
Langua Assess credita Allocat Additio Worklo 150 h Teachin Referre Module Master	ment of ble for tion of onal inf oad ng cycl ed to in e appea	offered: In the semester i bonus places formation ee LPOI (examination reg ars in ee (1 major) Mathematic	n which the course is ulations for teaching-co s International (2015)	offered and in the su	
Langua Assess credita Allocat Additio 150 h Teachin Referre Module Master Master	ed to in e appea	offered: In the semester i bonus places formation e LPO I (examination reg	n which the course is ulations for teaching-out s International (2015) s International (2021)	offered and in the su	

Modul	e title				Abbreviation
Selecte	ed Topi	cs in Mathematical Phys	ics		10-M=VMPHin-152-mo1
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		
10	1	rical grade		•	
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	Its				
terial s Recom Depene	ciences mende ding on	s, geometric field theory, d previous knowledge:	advanced topics in q dvanced knowledge	uantum theory.	uid dynamics, mathematical ma- of analysis is required. In case of
		ning outcomes			
The stu	udent is	acquainted with an adv			She is able to establish a a and questions in physics.
Course	e s (type	, number of weekly conta	act hours, language —	- if other than Germa	an)
V (4) + Module		t in: English			
		sessment (type, scope, la ion on whether module c			tion offered — if not every seme-
b) oral c) oral Langua	examir examin age of a ment o	mination (approx. 90 to 1 nation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester ir bonus	each (approx. 20 minu of 2, 15 minutes per c	utes) or andidate)	ubsequent semester
Allocat	tion of p	olaces			
Additio	onal inf	ormation			
Worklo	ad				
300 h					
Teachi	ng cvcl	e			
		-			
Referre	ed to in	LPOI (examination regu	lations for teaching of	legree programmes	
Module	e anne:	ars in			
		ee (1 major) Mathematics	International (2015)		
	-	ee (1 major) Physics Inter	-		
		ee (1 major) Mathematics			
	-	ee (1 major) Mathematics			
	-	ee (1 major) Physics Inter			
Master	's degr	ee (1 major) Mathematics	s International (2025)		

Module title Abbreviation					Abbreviation
Module	e Theor	у			10-M=VMTHin-152-m01
Module	coord	inator		Module offered by	
		es Mathematik (Mathema	atics)	Institute of Mathem	atics
ECTS		od of grading	Only after succ. com		
5		rical grade		,	
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
					n and representations, simple, ion theorems, reduction theo-
	nowled		d, such as can be acc	uired in the module	s "Introduction to Algebra" and
		ning outcomes			
The stu	dent m	asters mathematical me	thods in module theo	ry and is able to ana	alyse their quality.
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)
V (3) + Module	• •	t in: English			
		essment (type, scope, la on on whether module ca			tion offered — if not every seme-
b) oral c) oral Langua	examin examin Ige of a ment o	nination (approx. 60 to 9 ation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester in bonus	ach (approx. 15 minu of 2, approx. 10 minut	tes) or es per candidate)	ıbsequent semester
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
150 h					
Teachi	ng cycl	e			
Referre	d to in	LPO I (examination regu	lations for teaching-o	legree programmes)	
Module	e appea	irs in			
	-	ee (1 major) Mathematics			
	-	ee (1 major) Mathematics			
	-	ee (1 major) Mathematics			
master	Master's degree (1 major) Mathematics International (2025)				

Module title Abbreviation					Abbreviation
Selecte	ed Topi	cs in Numerical and Appl	ied Mathematics		10-M=VNAMin-211-m01
Module	a coord	inator		Module offered by	
		es Mathematik (Mathema	atics)	Institute of Mathem	natics
ECTS		od of grading	Only after succ. com		latics
10	î	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
lopmer Recom Depend	nts and mende ding on	interrelations with other d previous knowledge:	mathematical conce	pts. from different areas	taking into account recent deve- of applied mathematics is requi-
		ning outcomes			
			ed results in a select	ed topic in numerica	l or applied mathematics, and is
		hese to complex problem			a or applied matternaties, and is
Course	s (type	, number of weekly conta	ct hours, language —	· if other than Germa	ın)
V (4) + Module	• •	t in: English			
		e ssment (type, scope, la on on whether module ca			tion offered — if not every seme-
b) oral c) oral Langua	examin examin Ige of a ment o	nination (approx. 90 to 1 ation of one candidate e ation in groups (groups c ssessment: English ffered: in the semester in bonus	ach (approx. 20 minu of 2, 15 minutes per ca	utes) or andidate)	ubsequent semester
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
300 h					
Teachi	ng cycl	9			
Referre	d to in	LPO I (examination regu	lations for teaching-c	legree programmes)	
Module	e appea	irs in			
Master	Master's degree (1 major) Mathematics International (2021) Master's degree (1 major) Mathematics International (2022) Master's degree (1 major) Mathematics International (2025)				

Module title					Abbreviation		
Non-linear Analysis					10-M=VNANin-152-m01		
Module	e coord	inator		Module offered by			
Dean o	f Studie	es Mathematik (Mathema	atics)	Institute of Mathem	atics		
ECTS		od of grading	Only after succ. com	pl. of module(s)			
5	L	rical grade					
Duratio		Module level	Other prerequisites				
1 seme		graduate					
Conten	ts						
		onlinear analysis (e. g. toj d previous knowledge:	oological methods, m	onotony and variati	onal methods) with applications.		
We rec	ommen				quations, such as can be acqui-		
Intende	ed learı	ning outcomes					
		acquainted with the con ical problems.	cepts of non-linear a	nalysis, can compare	e them and assess their applica-		
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)		
V (3) + Module		t in: English					
		essment (type, scope, la on on whether module ca			tion offered — if not every seme-		
b) oral c) oral Langua	examin examin Ige of a ment o	nination (approx. 60 to 9 ation of one candidate e ation in groups (groups c ssessment: English ffered: In the semester in bonus	ach (approx. 15 minu of 2, approx. 10 minut	tes) or es per candidate)	ıbsequent semester		
Allocat	ion of p	olaces					
Additio	onal info	ormation					
Worklo	ad						
150 h							
Teachi	ng cycl	e					
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module appears in							
		ee (1 major) Mathematics	International (2015)				
	-	ee (1 major) Mathematics	-				
	-	ee (1 major) Mathematics					
Master	Master's degree (1 major) Mathematics International (2025)						

Module				Abbreviation
Numeric of Partial Differential Equations				10-M=VNPEin-152-m01
Module	coordinator		Module offered by	
Dean of	Studies Mathematik (Mat	thematics)	Institute of Mathem	natics
	Method of grading	Only after succ. con	npl. of module(s)	
	numerical grade			
Duratior		Other prerequisites		
1 semes				
Content				
(numerio disconti Recomm We reco	cal methods for elliptic, p nuous Gelerkin finite eler nended previous knowled mmend basic knowledge	arabolic and hyperbolic pa nents method, finite differ ge: of functional analysis and	artial differential equ ences and finite volu partial differential e	equations, such as can be acqui
		to Functional Analysis" an	a Applied Analysis	•
	d learning outcomes	hunnend metheede femal	oticing restict diff	antial aquations
		dvanced methods for discr	- •	•
		contact hours, language –	- if other than Germa	an)
V (4) + Ü Module	(2) taught in: English			
a) writte b) oral e c) oral e Languag Assessn	n examination (approx. 9 xamination of one candic xamination in groups (gro ge of assessment: English	lule can be chosen to earn o to 120 minutes, usually date each (approx. 20 minu oups of 2, 15 minutes per c ster in which the course is	chosen) or utes) or andidate)	ubsequent semester
Allocati	on of places			
Additior	al information			
Workloa	d			
300 h				
Teachin	g cycle			
Referred	I to in LPO I (examination	n regulations for teaching-o	degree programmes)	
		<u> </u>		
Module	appears in			
		natics International (2015)		
	degree (1 major) Mattier			
		natics International (2021)		
		natics International (2022)		
	s degree (1 major) Physics			
		natics International (2025)		

Module title Abbreviation				Abbreviation	
Selected Topics in Optimization 10-M=VOPTin-152-mo1					10-M=VOPTin-152-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. com	pl. of module(s)	
10	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
		cs in optimization, e.g. in timization with differentia		emidefinite program	ns, non-smooth optimization, ga-
Intend	ed lear	ning outcomes			
		acquainted with advanc research questions in co		•	He gains the ability to work on
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	in)
V (4) + Module		t in: English			
		sessment (type, scope, la ion on whether module ca			tion offered — if not every seme-
c) oral Langua	examin age of a ment o	nation of one candidate e ation in groups (groups of ssessment: English ffered: In the semester in bonus	of 2, 15 minutes per c	andidate)	ubsequent semester
Allocat					
Additio	nal inf	ormation			
	inat init				
Worklo	ad				
300 h					
Teachi	ng cycl	e			
Referre	ed to in	LPO I (examination regu	lations for teaching-o	legree programmes)	
Module	e appea	ars in			
Mastan	's degr	ee (1 major) Mathematics	International (2015)		
Master	Master's degree (1 major) Mathematics International (201)				
Master	-		International (2021)		
Master Master	's degr	ee (1 major) Mathematics ee (1 major) Mathematics ee (1 major) Mathematics	International (2021) International (2022)		

Module title					Abbreviation	
	Optimal Control 10-M=VOSTin-152-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. con	npl. of module(s)		
5	nume	rical grade				
Duratio		Module level	Other prerequisites			
1 seme		graduate				
Conten	ts					
optima Recom	lity, me mende	ethods for numerical solu d previous knowledge:	tion.		optimal control, conditions for equations, such as can be ac-	
		modules "Introduction to of the module "Basics in (rential Equations". Knowledge of	
Intende	ed lear	ning outcomes				
		acquainted with advanc questions in continuous o		al control. He gains t	the ability to work on contempo-	
Course	s (type	, number of weekly conta	ct hours, language –	- if other than Germa	n)	
V (3) + Module		t in: English				
		sessment (type, scope, la ion on whether module ca			tion offered — if not every seme-	
b) oral c) oral Langua	examir examin Ige of a ment o	mination (approx. 60 to 9 nation of one candidate e ation in groups (groups c ssessment: English ffered: In the semester in bonus	ach (approx. 15 minu of 2, approx. 10 minut	tes) or tes per candidate)	ıbsequent semester	
Allocat	ion of _l	olaces				
	_					
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teachi	ng cycl	e				
Roforro	Referred to in LPO I (examination regulations for teaching-degree programmes)					
Kerene						
Module	annos	ars in				
		ee (1 major) Mathematics	International (2015)			
	-	ee (1 major) Mathematics	-			
	-	ee (1 major) Mathematics				
	Master's degree (1 major) Mathematics International (2025)					

Module	e title			Abbreviation	
Partial	Differential Equations of Ma	thematical Physics		10-M=VPDPin-152-	m01
Modul	e coordinator		Module offered by		
Dean o	of Studies Mathematik (Mathe	ematics)	Institute of Mathem	atics	
ECTS	Method of grading	Only after succ. con			
10	numerical grade				
Duratio	<u> </u>	Other prerequisites			
1 seme	· · · · · · · · · · · · · · · · · · ·				
Conter		I			
examp ons an Recom Basic k	, parabolic, and hyperbolic e les; initial and boundary valu d generalisations; Hilbert spa mended previous knowledge knowledge from the modules ons" is recommended, as we	e problems; well-posed ace methods; Sobolev s : "Ordinary Differential Ed	l and ill-posed proble paces and Fourier tra quations" and "Introd	ms; solution methons forms.	ods; extensi-
	ed learning outcomes				
equation	udent is acquainted with func- ons, as well as standard exar en his/her acquired skills and	nples from mathematica	al physics. He/She is	able to establish a	
Course	s (type, number of weekly co	ntact hours, language –	- if other than Germa	n)	
V (4) + Module	Ü (2) e taught in: English				
a) writt b) oral c) oral Langua Assess	formation on whether modul en examination (approx. 90 f examination of one candidat examination in groups (group age of assessment: English sment offered: In the semester able for bonus	to 120 minutes, usually re each (approx. 20 minutes of 2, 15 minutes per c	chosen) or utes) or andidate)	bsequent semester	
Allocat	tion of places				
	•				
Additic	onal information				
Worklo	ad				
300 h					
-	ng cycle				
reaction					
Referre	ed to in LPO I (examination re	egulations for teaching-	degree programmes)		
Module	e appears in				
	's degree (1 major) Mathema				
Master Master Master Master	r's degree (1 major) Physics Ir r's degree (1 major) Mathema r's degree (1 major) Mathema r's degree (1 major) Physics Ir	tics International (2021) tics International (2022) Iternational (2024))		
Master Master Master Master Master	r's degree (1 major) Mathema r's degree (1 major) Mathema	tics International (2021) tics International (2022) Iternational (2024))		

Module tit	le			Abbreviation	
Pseudo Rie	emannian and Riemannian		10-M=VPRGin-152-r	n01	
Module co	ordinator		Module offered by		
	udies Mathematik (Mather	natics)	Institute of Mathem	natics	
	thod of grading	Only after succ. con			
10 nu	merical grade				
Duration	Module level	Other prerequisites	;		
1 semester	graduate				
Contents					
nian and p map, Jacob Laplace op theory.	e builds on the topics cove seudo-Riemannian manifo oi fields, comparison theor erators, causal structure o nded previous knowledge:	lds, Levi-Civita connec ems in Riemannian ge	tion and curvature, g ometry, submanifold	geodesics and the ex ls, integration, d'Ale	kponential mbert and
Advanced Geometry"	knowledge of differential g . Knowledge of the conten " is also recommended.				
Intended le	earning outcomes				
manifolds.	it is acquainted with advar He/She is able to establis and questions in physics.				
Courses (ty	/pe, number of weekly con	tact hours, language –	- if other than Germa	ın)	
V (4) + Ü (2	-				
	ught in: English				
	assessment (type, scope, nation on whether module			tion offered — if not	every seme-
b) oral exac) oral exaLanguage of	examination (approx. 90 to mination of one candidate mination in groups (groups of assessment: English nt offered: In the semester for bonus	each (approx. 20 min 5 of 2, 15 minutes per c	utes) or andidate)	ubsequent semester	
Allocation					
Additional	information				
Workload					
300 h					
Teaching c	vcle				
	• -				
Referred to	in LPO I (examination reg	gulations for teaching-	degree programmes)		
Module ap	pears in				
Master's d Master's d	, egree (1 major) Mathemati egree (1 major) Physics Int egree (1 major) Mathemati	ernational (2020)			
Master's with 1 r (2021)	najor Mathematics International		enerated 19-Apr-2025 • exam o ECTS) Mathematics Internat	-	page 98 / 104



Master's degree (1 major) Mathematics International (2022) Master's degree (1 major) Physics International (2024) Master's degree (1 major) Mathematics International (2025)

Module title Abbreviation					Abbreviation
Statist	ical An	alysis			10-M=VSTAin-152-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. com	pl. of module(s)	
10	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conter	Its				
crimina Recom Basic k	mende	ction analysis, cluster and d previous knowledge: lge of stochastics is requ	alysis, principal comp ired, such as that acc	ponent analysis, fact	factorial variance analysis, dis- tor analysis. astics 1" module. Knowledge of
		of the module "Stochastic	s 2" is also recomme	ended.	
		ning outcomes			
The stu proble		acquainted with the fun	damental methods in	i statistical analysis	and can apply them to practical
Course	s (type	, number of weekly conta	ct hours, language —	- if other than Germa	an)
V (4) + Module	• •	t in: English			
		essment (type, scope, la on on whether module ca			tion offered — if not every seme-
b) oral c) oral Langua Assess	examir examin age of a	mination (approx. 90 to 1 lation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester in bonus	ach (approx. 20 minu of 2, 15 minutes per c	ıtes) or andidate)	ubsequent semester
Allocat	ion of j	olaces			
Additio	onal inf	ormation			
Worklo	ad				
300 h					
-	ng cycl	e			
Referre	ed to in	LPOI (examination regu	lations for teaching-o	degree programmes)	
Modul	e appea	ars in			
Master	's degr	ee (1 major) Mathematics	International (2015)		
Master	Master's degree (1 major) Mathematics International (2021)				

Module title					Abbreviation
Selected Topics in Control Theory					10-M=VTRTin-152-m01
Module coordinator				Module offered by	
		es Mathematik (Mathema	atics)	Institute of Mathem	natics
ECTS		od of grading	Only after succ. com		-
10	·	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
bilinea	r syster	ns.	r control theory, e. g.	networked linear co	ntrol systems, controllability of
		d previous knowledge: the contents of the modu	ıle "Mathematical Co	ntrol Theory" or "Coi	ntrol Theory" is required.
Intend	ed learı	ning outcomes			
		ains insight into contemp this field and can apply t			y. He/She masters advanced
Course	s (type	, number of weekly conta	ct hours, language –	· if other than Germa	ın)
V (4) +	Ü (2)				
Module	e taugh	t in: English			
		essment (type, scope, la on on whether module ca			tion offered — if not every seme-
b) oral c) oral Langua	examin examin age of a ment o	nination (approx. 90 to 1 ation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester in bonus	ach (approx. 20 minu of 2, 15 minutes per c	ites) or andidate)	ubsequent semester
Allocat	ion of p	olaces			
Additio	onal info	ormation			
Worklo	ad				
300 h					
Teachi	ng cycl	e			
Referre	ed to in	LPOI (examination regu	lations for teaching-c	legree programmes)	
Modul	e appea	irs in			
		ee (1 major) Mathematics	International (2015)		
	-	ee (1 major) Mathematics			
	-	ee (1 major) Mathematics			
Master	's degr	ee (1 major) Mathematics	International (2025)		

Module	title		Abbreviation				
Insuranc	ce Matl	nematics 2	10-M=VVSMin-152-m01				
Module	coordi	nator		Module offered by			
Dean of Studies Mathematik (Mathema				patics			
ECTS Method of grading		Only after succ. compl. of module(s)					
		ical grade					
Duratior							
1 semester graduate							
Content	s						
This module discusses modern valuation approaches and multiple decrement models regarding one life or two lives: modern valuation in life insurance mathematics, axiomatic derivation of the product measure approach, Markov chain models, Kolmogorov's differential equations, Thiele's differential equations, numerical applicati- ons, joint life policies. Recommended previous knowledge:							
Familiar	ity with		dules "Insurance Mat	hematics 1" and "Se	lected Topics in Financial Mathe-		
Intende	d learn	ing outcomes					
					e gains the ability to work on her skills to complex problems.		
Courses	(type,	number of weekly conta	ict hours, language —	if other than Germa	ın)		
V (4) + Ü Module		in: English					
Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus)							
a) written examination (approx. 90 to 120 minutes, usually chosen) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, 15 minutes per candidate) Language of assessment: English Assessment offered: In the semester in which the course is offered and in the subsequent semester creditable for bonus							
Allocatio	on of p	laces					
Addition	nal info	rmation					
Workloa	d						
300 h							
Teaching	g cvcle						
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module appears in							
Master's degree (1 major) Mathematics International (2015)							
Master's degree (1 major) Mathematics International (2015) Master's degree (1 major) Mathematics International (2021)							
Master's degree (1 major) Mathematics International (2022)							
Master's degree (1 major) Mathematics International (2025)							

Modul	e title			Abbreviation		
Netwo	rked Sy	stems			10-M=VVSYin-152-m01	
Module coordinator				Module offered by		
Dean o	of Studie	es Mathematik (Mathema	atics)	Institute of Mathem	natics	
ECTS		od of grading	Only after succ. com			
5	<u> </u>	rical grade				
Duratio	on	Module level	Other prerequisites			
		graduate				
Conter	nts					
Contemporary topics in networked linear and non-linear dynamical systems (homogenous and non-homogenous systems); analysis of control-theoretical aspects (controllability, accessibility, etc.). Recommended previous knowledge:						
Basic k	nowled	lge of the contents of the	module "Ordinary Di	fferential Equations	" is useful.	
Intend	ed leari	ning outcomes				
The student is acquainted with advanced methods in the field of networked systems. He gains the ability to work on contemporary research questions in networked systems.						
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	in)	
V (3) +	Ü (1)					
Modul	e taugh	t in: English				
		s essment (type, scope, la on on whether module ca			tion offered — if not every seme-	
a) written examination (approx. 60 to 90 minutes, usually chosen) or b) oral examination of one candidate each (approx. 15 minutes) or c) oral examination in groups (groups of 2, approx. 10 minutes per candidate) Language of assessment: English Assessment offered: In the semester in which the course is offered and in the subsequent semester creditable for bonus						
Allocat	tion of p	olaces				
Additio	onal inf	ormation				
Worklo	ad					
150 h	_					
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master's degree (1 major) Mathematics International (2015)						
Master's degree (1 major) Mathematics International (2021)						
Master's degree (1 major) Mathematics International (2022)						
Master	Master's degree (1 major) Mathematics International (2025)					

Module			Abbreviation				
Time So	eries A	nalysis 2			10-M=VZRAin-152-m01		
Module coordinator				Module offered by			
Dean of Studies Mathematik (Mathematics)				Institute of Mathematics			
ECTS	ECTS Method of grading		Only after succ. compl. of module(s)				
10 numerical grade		rical grade					
Duratio		Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	ts						
State-s varianc			uency spaces, Fourie	r analysis, periodog	rams, characterisation of autoco-		
Intende	ed learn	ning outcomes					
The student is acquainted with advanced methods in time series analysis. He gains the ability to work on con- temporary research questions in this field.							
Course	s (type,	, number of weekly conta	ct hours, language —	if other than Germa	n)		
V (4) + Ü (2) Module taught in: English							
Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus)							
 a) written examination (approx. 90 to 120 minutes, usually chosen) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, 15 minutes per candidate) Language of assessment: English Assessment offered: In the semester in which the course is offered and in the subsequent semester creditable for bonus 							
Allocation of places							
Additio	nal info	ormation					
Workload							
300 h							
Teaching cycle							
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module appears in							
Master's degree (1 major) Mathematics International (2015)							
	Master's degree (1 major) Mathematics International (2021)						