

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: 2015 Responsible: Faculty of Mathematics and Computer Science Responsible: Institute of Mathematics

JMU Würzburg • generated 18-Apr-2025 • exam. reg. data record 88|h79|-|-|H|2015

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)):

13-Jul-2015 (2015-17)

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	pag
Compulsory Electives (90 l	ECTS credits)			
Mathematics (30 ECTS cr	edits)			
10-M=AAANin-152-m01	Applied Analysis	10	NUM	6
10-M=AALGin-152-m01	Topics in Algebra	10	NUM	7
10-M=ADGMin-152-mo1	Differential Geometry	10	NUM	8
10-M=AFTHin-152-m01	Complex Analysis	10	NUM	10
10-M=AGMSin-152-m01	Geometric Structures	10	NUM	1:
10-M=AISTin-152-m01	Industrial Statistics 1	10	NUM	1/
10-M=ALTHin-152-m01	Lie Theory	10	NUM	1
10-M=ANGGin-152-m01	Numeric of Large Systems of Equations	10	NUM	16
10-M=AOPTin-152-m01	Basics in Optimization	10	NUM	17
10-M=ARTHin-152-m01	Control Theory	10	NUM	18
10-M=ASMRin-152-m01	Stochastic Models of Risk Management	10	NUM	19
10-M=ASTPin-152-m01	Stochastical Processes	10	NUM	20
10-M=ATOPin-152-m01	Topology	10	NUM	2
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	1:
10-M=VANAin-152-m01	Selected Topics in Analysis	10	NUM	5
10-M=VATPin-152-m01	Algebraic Topology	10	NUM	6
10-M=VFNMin-152-mo1	Selected Topics in Financial Mathematics	10	NUM	6
10-M=VGDSin-152-mo1	Groups and their Representations	10	NUM	6.
10-M=VGEMin-152-m01	Geometrical Mechanics	10	NUM	6
10-M=VISTin-152-m01	Industrial Statistics 2	10	NUM	7
10-M=VKARin-152-m01	Field Arithmetics	10	NUM	70
10-M=VNPEin-152-m01	Numeric of Partial Differential Equations	10	NUM	8
10-M=VOPTin-152-mo1	Selected Topics in Optimization	10	NUM	8
	Statistical Analysis	10	NUM	8
10-M=VVSMin-152-m01	Insurance Mathematics 2	10	NUM	9
10-M=VZRAin-152-m01	Time Series Analysis 2	10	NUM	9
10-M=VDIMin-152-m01	Discrete Mathematics	5	NUM	6
10-M=VDSYin-152-m01	Dynamical Systems	5	NUM	6
10-M=VGEOin-152-mo1	Aspects of Geometry	5	NUM	6
10-M=VKOMin-152-m01	Mathematical Continuum Mechanics	5	NUM	7
10-M=VMBVin-152-m01	Mathematical Imaging	5	NUM	7
	Selected Topics in Mathematical Physics	10	NUM	8
10-M=VTRTin-152-m01	Selected Topics in Control Theory	10	NUM	9
10-M=VIPRin-152-m01	Inverse Problems	5	NUM	7
10-M=VMTHin-152-m01	Module Theory	5	NUM	8
10-M=VNANin-152-mo1	Non-linear Analysis	5	NUM	8
10-M=VOSTin-152-mo1	Optimal Control	5	NUM	8
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	Naturalized Systems	-	NILIAA	
	Networked Systems	5	NUM	92
10-M=VKGEin-152-m01	Complex Geometry	10	NUM	77
	Partial Differential Equations of Mathematical Physics	10	NUM	86
-	Pseudo Riemannian and Riemannian Geometry	10	NUM	87
-	Functional Analysis	10	NUM	9
	Applied Differential Geometry	10	NUM	58
-	Giovanni Prodi Lecture Selected Topics (Master)	10	NUM	72
	Giovanni Prodi Lecture Advanced Topics (Master)	10	NUM	68
	Giovanni Prodi Lecture Modern Topics (Master)	10	NUM	70
	eminars (20 ECTS credits)			r
	Research in Groups - Algebra	10	NUM	25
-	Research in Groups - Discrete Mathematics	10	NUM	30
-	Research in Groups - Dynamical Systems and Control Theory	10	NUM	31
-	Research in Groups - Complex Analysis	10	NUM	26
	Research in Groups - Geometry and Topology	10	NUM	32
	Research in Groups - Mathematics in Context	10	NUM	34
10-M=GMSCin-152-mo1	Research in Groups - Mathematics in the Sciences	10	NUM	35
10-M=GMAlin-152-m01	Research in Groups - Measure and Integral	10	NUM	33
10-M=GNMAin-152-m01	Research in Groups - Numerical Mathematics and Applied Ana- lysis	10	NUM	37
10-M=GROCin-152-mo1	Research in Groups - Robotics, Optimization and Control Theo- ry	10	NUM	40
10-M=GTSAin-152-m01	Research in Groups - Time Series Analysis	10	NUM	42
10-M=GSTAin-152-m01	Research in Groups - Statistics	10	NUM	41
10-M=GNTHin-152-m01	Research in Groups - Number Theory	10	NUM	38
10-M=GCQSin-152-m01	Research in Groups - Control Theory of Quantum Mechanical Systems	10	NUM	27
	Research in Groups - Differential Geometry	10	NUM	29
	Research in Groups - Deformation Quantization	10	NUM	28
	Research in Groups - Non-linear Analysis	10	NUM	36
	Research in Groups - Operator Algebras	10	NUM	39
	Seminar in Applied Differential Geometry	5	NUM	44
	Seminar in Algebra	5	NUM	44
-	Seminar in Dynamical Systems and Control		NUM	
	Seminar in Complex Analysis	5	NUM	47 46
5	Seminar in Financial and Insurance Mathematics	5	NUM	40
	Seminar in Geometry and Topology	5	NUM	· ·
-	Giovanni Prodi Seminar (Master)	5	NUM	51
-	Interdisciplinary Seminar	5		49
10-M=SIDCin-152-m01	Seminar Mathematics in the Sciences	5	NUM	52
3		5	NUM	53
	Seminar in Numerical Mathematics and Applied Analysis	5	NUM	55
	Seminar in Optimization	5	NUM	56
	Seminar in Statistics	5	NUM	57
	Seminar in Non-linear Analysis	5	NUM	54
Thesis (30 ECTS credits) 10-M=MAMI-152-m01	Master Thesis Mathematics International	20	NUM	12
		30	- -	43
aster's with 1 major Mathematics Int 015)	ernational JMU Würzburg • generated 18-Apr-2025 • exam. reg. cord Master (120 ECTS) Mathematics International		page	25/93

Module title			Abbreviation			
Applie	Applied Analysis 10-M=AAANin-152-mo1					n01
Module	e coord	inator		Module offered by	d by	
Dean of Studies Mathematik (Mathematics) Institute of Mathematics			natics			
ECTS	<u> </u>	od of grading	Only after succ. con	npl. of module(s)		
10	· · · · · ·	rical grade				
Duratio		Module level	Other prerequisites			
1 seme		graduate				
Conten						
theory particu theory Recom	of Hilbe lar FEM of ellipt mendee	of functional analysis ert spaces and Fourier a methods), principles o tic, parabolic and hype d previous knowledge:	nalysis, spectral theor of functional analysis, f rbolic partial differenti	y and quantum mec unction spaces, emb al equations with me	hanics, numerical mo bedding theorems, co ethods from function	ethods (in ompactness,
		h the contents of the m	odule "Functional Ana	lysis" is strongly reco	ommended.	
Intend	ed learr	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				
		sessment (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 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 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) Master's degree (1 major) Mathematics International (2025)						
(2015)	iai i majul	matremates international		o ECTS) Mathematics Internat	-	page 6 / 93

Module	e title				Abbreviation
Topics in Algebra					10-M=AALGin-152-m01
Module	e coord	inator		Module offered by	<u> </u>
		es Mathematik (Mathema	ntics)	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				
Conten algebra		topics in algebra, for exa	ample coding theory,	elliptic curves, algel	braic combinatorics or computer
Basic k			d, such as can be acc	uired in the module	s "Introduction to Algebra" and
Intend	ed learr	ning outcomes			
		acquainted with fundam se skills to complex que		nethods in a contem	nporary field of algebra, and is ab
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	in)
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 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	utes) or andidate)	ubsequent semester
Allocat	ion of p	olaces			
Additio	onal info	ormation			
Worklo	ad				
300 h					
Teachi	ng cycl	9			
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module appears in					
Master	's degre	ee (1 major) Mathematics	International (2015)		
	-	ee (1 major) Mathematics			
	-	ee (1 major) Mathematics			
master	suegre	ee (1 major) Mathematics	mternational (2025)		

Module title				Abbreviation		
					10-M=ADGMin-152-m01	
Module	e coord	inator		Module offered by		
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics	
ECTS	1	od of grading	Only after succ. con	npl. of module(s)		
10	nume	rical grade				
Duratio		Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	Its					
folds. Recom	mende	d previous knowledge:			ntiable and Riemannian mani-	
		lge from the modules "In 's" is recommended.	troduction to Differer	ntial Geometry", "Intr	oduction to Topology" and "Geo-	
		ning outcomes				
The stu	udent is	acquainted with concep			ds or Riemannian manifolds, is al methods in differential geome-	
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 age of a sment o	mination (approx. 90 to 1 nation 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	utes) or andidate)	ıbsequent semester	
Allocat	tion 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						
Master's degree (1 major) Mathematics International (2015)						
Master's degree (1 major) Physics International (2020)						
	-	ee (1 major) Mathematics				
1	-	ee (1 major) Mathematics				
	-	ee (1 major) Physics Inter				
Master's degree (1 major) Mathematics International (2025)						

Module	e title				Abbreviation	
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					
Banach and Hilbert spaces, bounded operators, principles of functional analysis, further contemporary topics in functional analysis and applications to other fields of mathematics. Recommended previous knowledge:						
		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				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Modul	e appea	rs 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	
Complex Analysis 10-M=AFTHin-152-mo1					
Module co	ordinator		Module offered by		
Dean of St	udies Mathematik (Mathema	atics)	Institute of Mathem	natics	
	ethod of grading	Only after succ. com	npl. of module(s)		
10 NU	Imerical grade				
Duration	Module level	Other prerequisites			
1 semester	r graduate				
Contents					
geometric ons (e. g. e Recommer		es of families of hold	omorphic and merom	ions with modern analytic and orphic functions. Special functi- is" is recommended.	
Intended l	earning outcomes				
ticular the		ties of holomorphic f	unctions. He/She is	f higher complex analysis, in par- able to establish a connection ations in other subjects.	
Courses (t	ype, number of weekly conta	ct hours, language —	- if other than Germa	n)	
V (4) + Ü (2 Module ta	2) ught in: English				
	assessment (type, scope, la nation on whether module ca			tion offered — if not every seme-	
b) oral exa c) oral exa Language	examination (approx. 90 to 1 mination of one candidate e- mination in groups (groups o of assessment: English nt offered: In the semester in for bonus	ach (approx. 20 minu of 2, 15 minutes per c	utes) or andidate)	ıbsequent semester	
Allocation					
Allocation	of places				
Additional	information				
Auditional					
Workload					
300 h					
Teaching of	ryclo				
Teaching	Lycle				
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) Physics International (2020) Master's degree (1 major) Mathematics International (2021)					
	egree (1 major) Mathematics				
	egree (1 major) Physics Inter				
	egree (1 major) Mathematics	-			

			Abbreviation			
Geometric Structures 10-M=AGMSin-152-mo1					10-M=AGMSin-152-m01	
Module coordinator Module			Module offered by			
Dean of Studies Mathematik (Mathematics) Institute of Mathematic			atics			
ECTS	1	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					
ang cor Recom	ndition mende	s, classification results. d previous knowledge:	-		isms, BN pairs in groups, Mouf- "Introduction to Topology" is re-	
comme Intende		ning outcomes				
The stu structu	dent is re. He/	acquainted with the fund	connection between	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 e Langua	examir examin ge of a ment o	mination (approx. 90 to 1 nation 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)	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	
Giovan	ni Prodi Lecture (Master)	10-M=AGPCin-152-r	m01		
A4			Madula offered has	, , , , , , , , , , , , , , , , , , ,	
Module coordinator			Module offered by		
	of Studies Mathematik (Mathen	1 .	Institute of Mathem	natics	
ECTS	Method of grading	Only after succ. con	npl. of module(s)		
5	numerical grade				
Duratio		Other prerequisites	;		
1 seme	ster graduate				
Conter	its				
Introdu	uction to a specialised topic in	mathematics by an int	ernational expert.		
Intend	ed learning outcomes				
themat	udent is acquainted with the fu tics. He/She is able to establis tics and applications in other s	h a connection betwee			
Course	s (type, number of weekly con	act hours, language –	- if other than Germa	ın)	
V (3) + Module	Ü (1) e taught in: English				
	d of assessment (type, scope, formation on whether module			ition offered — if not	every seme-
a) writt	en examination (approx. 6o to	90 minutes, usually c	hosen) or		
	examination of one candidate		-		
	examination in groups (groups	of 2, approx. 10 minu	tes per candidate)		
-	age of assessment: English sment offered: In the semester	in which the course is	offered and in the cu	ubcoquent competer	
	ble for bonus	in which the course is	onered and in the st	ubsequent semester	
	tion of places				
	· · ·				
Additio	onal information				
Worklo	oad				
150 h					
Teachi	ng cycle				
Referre	ed to in LPO I (examination reg	ulations for teaching-	degree programmes)		
Modul	e appears in				
Master	's degree (1 major) Mathematio	s International (2015)			
Master	's degree (1 major) Mathematie	cs (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)					
Master's degree (1 major) Mathematics (2019)					
Master's degree (1 major) Mathematical Physics (2020)					
Master's degree (1 major) Mathematics International (2021)					
Master's degree (1 major) Computational Mathematics (2022)					
	degree (1 major) Mathematic				
master	's degree (1 major) Mathematio	ai Physics (2022)			
Master's w (2015)	ith 1 major Mathematics International		enerated 18-Apr-2025 • exam o ECTS) Mathematics Internat	-	page 12 / 93

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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	
Industrial Statistics 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				
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 (2013) Master's degree (1 major) Mathematics International (2021)					
		ee (1 major) Mathematics				
	'c doar	ee (1 major) Mathematics	International (2025)			

Lie Theory 10-M=ALTHin-152-m01 Module coordinator Module offered by					
Dean of Studies Mathematik (Mathematics) Institute of Mathematics					
ECTS Method of grading Only after succ. compl. of module(s)					
10 numerical grade					
Duration Module level Other prerequisites					
1 semester graduate					
Contents					
Linear Lie groups and their Lie algebras, exponential function, structure and classification of Lie algebras, examples, applications, e.g. in physics and control theory.	, classic				
Recommended previous knowledge: Basic knowledge of the contents of the modules "Functional Analysis" and "Introduction to Topology" is r mended. Furthermore, basic knowledge of the contents of the module "Introduction to Differential Geome useful.					
Intended learning outcomes					
The student is acquainted with the fundamental results, theorems and methods in Lie theory. He/She is a apply these to common problems, and knows about the interactions of group theory, analysis, topology a ar algebra.					
Courses (type, number of weekly contact hours, language — if other than German)					
V (4) + Ü (2) Module taught in: English					
Method of assessment (type, scope, language — if other than German, examination offered — if not every	y 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					
Additional information					
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) Physics International (2020)					
Master's degree (1 major) Mathematics International (2021) Master's degree (1 major) Mathematics International (2022)					
Master's degree (1 major) Mathematics international (2022) Master's degree (1 major) Physics International (2024)					
Master's degree (1 major) Higsics international (2024) Master's degree (1 major) Mathematics International (2025)					
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Module title			Abbreviation			
Numeric of Large Systems of Equations			10-M=ANGGin-152-m01			
Module	e coord	inator		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	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	Its					
			uations, classical iter	ation methods, prec	onditioners, multigrid methods.	
Basic k and "N	nowlea umeric				es "Numerical Mathematics 1" nodule "Basics in Optimization"	
		ning outcomes				
The stu	ident is			for solving large sys	stems of equations, and knows	
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)	
V (4) +	Ü (2)	t in: English			·	
			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)		
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 in bonus	ach (approx. 20 minu of 2, 15 minutes per ca	ites) or andidate)	ıbsequent semester	
Allocat	ion of _l	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						
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
Basics in Optimization					10-M=AOPTin-152-mo1
Module coordinator				Module offered by	<u> </u>
Dean o	f Studie	es Mathematik (Mathema	atics)	Institute of Mathen	natics
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
10	numer	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 learr	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			
Method	. <u> </u>	t in: English	if other th	an German, examina	ation offered — if not every seme-
ster, in	d of ass formati	essment (type, scope, la on on whether module c	an be chosen to earn	a bonus)	ation offered — if not every seme-
ster, ini a) writt b) oral c) oral Langua	d of ass formati en exar examin examin ge of a ment of	eessment (type, scope, la on on whether module c nination (approx. 90 to a ation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester in	an be chosen to earn 120 minutes, usually each (approx. 20 minu of 2, 15 minutes per c	a bonus) chosen) or utes) or andidate)	
ster, ini a) writt b) oral c) oral o Langua Assess	d of ass formati en exar examin examin ge of as ment of ble for l	eessment (type, scope, la on on whether module c nination (approx. 90 to a ation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester in bonus	an be chosen to earn 120 minutes, usually each (approx. 20 minu of 2, 15 minutes per c	a bonus) chosen) or utes) or andidate)	
ster, in a) writt b) oral c) oral Langua Assess credita	d of ass formati en exar examin examin ge of as ment of ble for l	eessment (type, scope, la on on whether module c nination (approx. 90 to a ation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester in bonus	an be chosen to earn 120 minutes, usually each (approx. 20 minu of 2, 15 minutes per c	a bonus) chosen) or utes) or andidate)	
ster, in a) writt b) oral c) oral o Langua Assess credita Allocat	d of ass formati en exar examin examin ge of a: ment of ble for ion of p	eessment (type, scope, la on on whether module c nination (approx. 90 to a ation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester in bonus	an be chosen to earn 120 minutes, usually each (approx. 20 minu of 2, 15 minutes per c	a bonus) chosen) or utes) or andidate)	
ster, in a) writt b) oral c) oral o Langua Assess credita Allocat	d of ass formati en exar examin examin ge of a: ment of ble for ion of p	eessment (type, scope, la on on whether module c mination (approx. 90 to a lation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester in bonus	an be chosen to earn 120 minutes, usually each (approx. 20 minu of 2, 15 minutes per c	a bonus) chosen) or utes) or andidate)	
ster, in a) writt b) oral c) oral o Langua Assess credita Allocat	d of ass formati en exar examin examin ge of a: ment of ble for ble for ion of p	eessment (type, scope, la on on whether module c mination (approx. 90 to a lation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester in bonus	an be chosen to earn 120 minutes, usually each (approx. 20 minu of 2, 15 minutes per c	a bonus) chosen) or utes) or andidate)	
ster, ini a) writt b) oral c) oral o Langua Assess credita Allocat Additio Worklo	d of ass formati en exar examin examin ge of a: ment of ble for ble for ion of p	eessment (type, scope, la on on whether module c mination (approx. 90 to a lation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester in bonus	an be chosen to earn 120 minutes, usually each (approx. 20 minu of 2, 15 minutes per c	a bonus) chosen) or utes) or andidate)	
ster, in a) writt b) oral c) oral Langua Assess credita Allocat Additio 	d of ass formati en exar examin examin ge of a: ment of ble for I ble for I ble for I on of p mal info	sessment (type, scope, la on on whether module c mination (approx. 90 to a lation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester in bonus blaces	an be chosen to earn 120 minutes, usually each (approx. 20 minu of 2, 15 minutes per c	a bonus) chosen) or utes) or andidate)	
ster, ini a) writte b) oral c Langua Assess credita Allocat Additio Worklo 300 h	d of ass formati en exar examin examin ge of a: ment of ble for I ble for I ble for I on of p mal info	sessment (type, scope, la on on whether module c mination (approx. 90 to a lation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester in bonus blaces	an be chosen to earn 120 minutes, usually each (approx. 20 minu of 2, 15 minutes per c	a bonus) chosen) or utes) or andidate)	
ster, in a) writt b) oral c) oral Langua Assess credita Allocat Morklo 300 h Teachin 	d of ass formati en exar examin ge of a: ment of ble for I ble for I ion of p mal info ad	eessment (type, scope, la on on whether module c mination (approx. 90 to f ation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester in bonus blaces	an be chosen to earn	a bonus) chosen) or utes) or andidate) offered and in the s	ubsequent semester
ster, ini a) writt b) oral c Langua Assess credita Allocat Additio 300 h Teachin 	d of ass formati en exar examin ge of a: ment of ble for I ble for I ion of p mal info ad	sessment (type, scope, la on on whether module c mination (approx. 90 to a lation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester in bonus blaces	an be chosen to earn	a bonus) chosen) or utes) or andidate) offered and in the s	ubsequent semester
ster, ini a) writt b) oral c c) oral d Langua Assess credita Allocat Additio 300 h Teachin Referre 	d of ass formati en exar examin ge of a: ment of ble for I ble for I ion of p mal info ad	e Exessment (type, scope, la on on whether module c mination (approx. 90 to f iation of one candidate e ation in groups (groups of ssessment: English ffered: In the semester in bonus blaces prmation e LPO I (examination regu	an be chosen to earn	a bonus) chosen) or utes) or andidate) offered and in the s	ubsequent semester
ster, ini a) writt b) oral c c) oral d Langua Assess credita Allocat Additio 300 h Teachin Referre Module	d of ass formati en exar examin ge of a: ment of ble for ble for ble for ion of p onal info ad	e LPO I (examination regu	an be chosen to earn	a bonus) chosen) or utes) or andidate) offered and in the s degree programmes	ubsequent semester
ster, in a) writt b) oral c) oral d Langua Assess credita Allocat Additio 300 h Teachin Referre Module	d of ass formati en exar examin ge of a: ment of ble for I ion of p onal info ad ed to in e appea	e Exessment (type, scope, la on on whether module c mination (approx. 90 to a lation of one candidate e ation in groups (groups of ssessment: English ffered: In the semester in bonus blaces ormation E E LPO I (examination regunnant e (1 major) Mathematics	an be chosen to earn	a bonus) chosen) or utes) or andidate) offered and in the s degree programmes)	ubsequent semester
ster, ini a) writt b) oral o Langua Assess credita Allocat Additio 300 h Teachin Referre Master Master	d of ass formati en exar examin ge of a: ment of ble for l ion of p mal info ad ad ed to in	e LPO I (examination regu	an be chosen to earn 20 minutes, usually each (approx. 20 minu of 2, 15 minutes per c n which the course is allations for teaching-on s International (2015) s International (2021)	a bonus) chosen) or utes) or andidate) offered and in the s degree programmes	ubsequent semester

ECTS Metho				10-M=ARTHin-152-m01
Dean of Studio ECTS Metho 10 nume				10-M-AK1111-152-1101
Dean of Studio ECTS Metho 10 nume			Module offered by	
ECTS Metho 10 nume		atics)	Institute of Mathem	natics
10 nume	od of grading	Only after succ. com		
Duration	rical grade			
	Module level	Other prerequisites		
1 semester	graduate			
Contents				
bility, basics i	o mathematical systems n optimal control. d previous knowledge:	theory: stability, cont	rollability and obser	rvability, state feedback and sta-
	ige of the contents of the	module "Ordinary Di	fferential Equations	" is useful.
1	ning outcomes			
blish a conneo				l theory. He/She is able to esta- ut the interactions of geometry
Courses (type	, number of weekly conta	ct hours, language —	if other than Germa	in)
V (4) + Ü (2) Module taugh	t in: English			
	sessment (type, scope, la ion on whether module ca			tion offered — if not every seme-
b) oral examinc) oral examinLanguage 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 ca	ites) or andidate)	ubsequent semester
Allocation of p	olaces			
Additional inf	ormation			
Workload				
300 h				
Teaching cycl	e			
Referred to in	LPOI (examination regu	lations for teaching-c	legree programmes)	
Module appea				
-	ee (1 major) Mathematics			
-	ee (1 major) Mathematics ee (1 major) Mathematics			
-	ee (1 major) Mathematics			

Module title				Abbreviation		
Stochastic Models of Risk Management			nt		10-M=ASMRin-152-m01	
Module	e coord	inator		Module offered by	<u> </u>	
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics	
ECTS		od of grading	Only after succ. con			
10	1	rical grade		-		
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	Its					
res, va la, moo estima series a	lue at ri delling tes of s analysi	sk, conditional value at r of functional interrelatior hortfall measures, estim	isk, axiomatic of risk is, regression models ates of value at risk a al smoothing, predict	measures, modellir , basics in time seri nd conditional value ions and prediction	ent in auditing, shortfall measu- ig of interdependencies, copu- es modelling, aggregated losses e at risk, basics in empirical time domains, estimates of value at	
		ning outcomes		, sinulation include		
		acquainted with the fun	damental methods o	f stochastic risk ana	lysis	
		, number of weekly conta			·	
V (4) +						
		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	nination (approx. 90 to 1 ation 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-o	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	s International (2025)			

Module title				Abbreviation		
Stochastical Processes					10-M=ASTPin-152-m01	
Module coordinator				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	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				
	-	ee (1 major) Mathematics				
Master	Master's degree (1 major) Mathematics International (2025)					

Module title				Abbreviation		
Topology					10-M=ATOPin-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)		
10	nume	rical grade				
Duratio		Module level	Other prerequisites			
1 seme		graduate				
Conten	ts					
		opology, topological inva ing spaces.	ariants (e. g. fundame	ntal group, connect	ion), construction of topological	
Intende	ed learr	ning outcomes				
		acquainted with the fund non problems.	damental results, the	orems and methods	in topology and is able to apply	
Course	s (type,	, number of weekly conta	ct hours, language —	if other than Germa	n)	
V (4) + Module		t in: English				
		s essment (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. 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						
Teachir	ng cycl	e				
Referre	d to in	LPOI (examination regu	lations for teaching-d	egree programmes)		
Module appears in						
Master	Master's degree (1 major) Mathematics International (2015)					
Master	's degre	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 title				Abbreviation		
Insurance Mathematics 1					10-M=AVSMin-152-m01	
Module coordinator				Module offered by		
		es Mathematik (Mathema	ntics)	Institute of Mathem	atics	
ECTS	1	od of grading	Only after succ. com			
10	1	rical grade				
Duratio	on .	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
types o policy v Recom Depend	of benei values, mende ding on	fits, present value, expec expenses, bonus, recurs d previous knowledge: the content, basic and a	tion principle, premiu ive methods, Thiele's dvanced knowledge f	im calculation, comi differential equatio from different areas	bles, life table approximations, nutation functions, reserves and n. of statistics or stochastics is re-	
		e of doubt, it is recomme	nded to consult the le	ecturer.		
		ning outcomes	damontal nations and	l mothode of life inc	urance mathematics and can ap-	
		actical problems.	uamental notions and	a methous of the Ins	urance mathematics and call ap-	
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 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 j	olaces				
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	urs in				
Master Master	's degr 's degr	ee (1 major) Mathematics ee (1 major) Mathematics ee (1 major) Mathematics ee (1 major) Mathematics	International (2021) International (2022)			

Module title				Abbreviation	
Time Series Analysis 1					10-M=AZRAin-152-m01
Module coordinator				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)	
10	n	rical grade			
Duratio		Module level	Other prerequisites		
1 seme		graduate			
Conten					
Additiv	e mode	el, linear filters, autocorre	lation, moving average	ge, autoregressive p	rocesses, Box-Jenkins method.
Basic k	nowled	d previous knowledge: Ige of stochastics is requ f the module "Stochastic	ired, such as that acc s 2" is also recomme	quired in the "Stocha nded.	astics 1" module. Knowledge of
Intende	ed learr	ning 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) + I 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 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					
Teachir	ng cycle	2			
Referre	d to in	LPOI (examination regu	lations for teaching-d	legree programmes)	
			0		
Module	appea	rs in			
		ee (1 major) Mathematics	International (2015)		
	-	ee (1 major) Mathematics			

				Abbreviation		
Numbe	r Theor	У			10-M=AZTHin-152-n	101
Module coordinator			Module offered by			
Dean o	f Studie	es Mathematik (Mather	natics)	Institute of Mathem	atics	
ECTS		od of grading	Only after succ. compl. of module(s)			
10	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
applica overvie Recom Basic k	ations to w of th mendeo nowlec	etic functions and their o prime number distrib e development of mod d previous knowledge: lge of algebra and num , "Introduction to Num	ution and diophantine ern number theory. ber theory is assumed	equations; discussion, such as can be acq	on of the Riemann hy	pothesis,
Intende	ed learr	ning outcomes				
structu	res in n	acquainted with the fu umber theory and know evelopments in numbe	ws methods for the sol			
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	nal info	ormation				
Worklo	ad					
300 h						
Teachi	ng cvcl	9				
Referre	d to in	LPOI (examination reg	ulations for teaching-	degree programmes)		
			<u></u>			
Module	appea	in in				
		ee (1 major) Mathemati	cs International (2015)			
	-	ee (1 major) Physics Int				
	-	ee (1 major) Mathemati				
	-	ee (1 major) Mathemati)		
	-	ee (1 major) Physics Int				
		ee (1 major) Mathemati				
Master's wi (2015)	ith 1 major	Mathematics International		enerated 18-Apr-2025 • exam o ECTS) Mathematics Internat	-	page 24 / 93

Module title Abbreviation					Abbreviation
Research in Groups - Algebra 10-M=GALGin-152-mo					10-M=GALGin-152-m01
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	n	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		ora". ning outcomes			
		-		ana in alaah na 11a/6	
		eld and can apply them to		ems in algebra. He/s	She masters advanced techni-
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	in)
	e taugh	t in: English			
		essment (type, scope, la on 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 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-o	legree programmes)	
Module	e appea	urs in			
		ee (1 major) Mathematics	International (2015)		
	-	ee (1 major) Mathematics			
	-	· · ·			
	Aaster's degree (1 major) Mathematics International (2022) Aaster's degree (1 major) Mathematics International (2025)				

Module title					Abbreviation	
Research in Groups - Complex Analysis					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	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				
	-	-				
NA +	Aaster's degree (1 major) Mathematics International (2022) Aaster's degree (1 major) Mathematics International (2025)					

Module tit	e			Abbreviation
Research i	n Groups - Control Theory o	f Quantum Mechanica	al Systems	10-M=GCQSin-152-mo1
Module co	ordinator		Module offere	d by
Dean of St	ıdies Mathematik (Mathem	atics)	Institute of Ma	
	thod of grading	Only after succ. com	pl. of module(s	5)
10 nu	merical grade			
Duration	Module level	Other prerequisites		
1 semester	graduate			
Contents				
Selected m	odern topics in control theo	ory of quantum mecha	nical systems.	
Intended le	arning outcomes			
	t gains insight into contem She masters advanced tech			heory of quantum mechanical sy- em to complex problems.
Courses (ty	pe, number of weekly conta	act hours, language —	if other than G	erman)
V (2) + S (2 Module tai) Ight in: English			
	assessment (type, scope, la nation on whether module o			mination offered — if not every seme-
Language of	120 minutes) If assessment: English It offered: In the semester i	n which the course is	offered and in t	he subsequent semester
Allocation	of places			
Additional	information			
Workload				
300 h				
Teaching c	ycle			
Referred to in LPO I (examination regulations for teaching-degree programmes)				
Module ap	pears in			
		s 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 (2021) Master's degree (1 major) Mathematics International (2022)				

Module title					Abbreviation	
Resear	ch in G	roups - Deformation	Quantization		10-M=GDFQin-152-mo1	
Modul	e coord	linator		Module offered by	<u> </u>	
Dean o	f 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 prerequisite	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	ian)	
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	s offered and in the s	subsequent semester	
Allocat	ion of	places			· · · ·	
Additio	onal inf	ormation				
Worklo	ad					
300 h						
Teachi	ng cycl	e				
Referre	ed to in	LPOI (examination	regulations for teaching	degree programmes	5)	
Module	e appea	ars in				
			natics International (2015)		
	-		natics International (2021			
Mactor	's degr	ee (1 major) Mathen	actics International (2022			
	-	-	natics International (2022			

Module title Abbreviation					
Research in Groups - Differential Geometry10-M=GDGEin-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	Its				
Recom Advano Geome	mende ced kno etry". Kr	lowledge of the contents	ometry is required, su of the modules "App	lied Differential Geo	red in the module "Differential metry", "Geometric Mechanics",
		annian and Riemannian ning outcomes	Geometry" and "Lie I	neory" is also recom	imended.
The stu	udent g				eometry. He/She masters advan-
		, number of weekly conta			an)
Metho ster, in talk (60 Langua	e taugh d of ass formation to to 120 age of a	t in: English cessment (type, scope, la on on whether module ca o minutes) ssessment: English ffered: In the semester in	an be chosen to earn	a bonus)	ation offered — if not every seme-
	tion of				
Additic	nal inf	ormation			
Worklo	ad				
300 h	au				
-	n <i>a</i> aval	•			
	ng cycl	C			
 Dofo <i>rm</i>			lation o fonte let.		
	ea to in	LPO I (examination regu	lations for teaching-o	legree programmes)	
		•			
	e appea				
		ee (1 major) Mathematics			
		ee (1 major) Mathematics ee (1 major) Mathematics	· · ·		
	-	ee (1 major) Mathematics			
muster	Jucgi	ce (i major) matricinatics	, international (2025)		

Module title					Abbreviation	
Research in Groups - Discrete Mathematics 10-M=GD					10-M=GDIMin-152-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	npl. of module(s)		
10	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
Selecte	ed mod	ern topics in discrete mat	hematics.			
Intend	ed lear	ning outcomes				
					nematics. He/She masters advan	
ced tec	chnique	es in this field and can ap	ply them to complex	problems.		
Course	s (type	, number of weekly conta	ct hours, language –	- if other than Germa	in)	
V (2) +						
		t in: English				
		s essment (type, scope, la ion on whether module ca			tion offered — if not every seme-	
talk (60	o to 120	o minutes)				
		ssessment: English				
		ffered: In the semester in	which the course is	offered and in the si	ubsequent semester	
Allocat	ion of _l	olaces				
Additio	onal inf	ormation				
Worklo	ad					
300 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						
Resear	Research in Groups - Dynamical Systems and Control Theory 10-M=GDSCin-152-mo1					
Module	e coord	inator		Module offered	by	
Dean o	f Studi	es Mathematik (Mathem	natics)	Institute of Math	nematics	
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 d previous knowledge: the contents of the mos		·	Control Theory" is required	
		ning outcomes		introl meory of	Control Theory" is required.	
The stu	dent g				l systems and control theory. He/ ex problems.	
Course	s (type	, number of weekly cont	tact hours, language –	- if other than Ger	rman)	
V (2) + Module		t in: English				
		essment (type, scope, on on whether module			ination offered — if not every seme-	
Langua	ge of a	o minutes) ssessment: English ffered: In the semester	in which the course is	offered and in the	e subsequent semester	
Allocat					I	
Additio	nal inf	ormation				
Worklo	ad					
300 h						
Teachi	ng cycl	٩				
	Suger					
Referre	d to in	LPO I (examination reg	ulations for teaching	legree programm	65)	
Referre					()	
Module		ors in				
		ee (1 major) Mathematio	s International (2015)			
	-	ee (1 major) Mathematic				
	-	ee (1 major) Mathematic				
	-	ee (1 major) Mathematic				

Module title Abbreviation					
Research in Groups - Geometry and Topology10-M=GGMTin-152-mo1					
Module	e coord	inator	Module offered by		
Dean o	of Studi	es Mathematik (Mathema	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				
Selecte	ed mod	ern topics in geometry an	id topology.		
Intend	ed lear	ning outcomes			
		ains insight into contemp ques in this field and car			d topology. He/She masters ad-
Course	es (type	, number of weekly conta	ct hours, language –	- if other than Germa	an)
V (2) +	S (2)				
Module	e taugh	t in: English			
ster, in	format	sessment (type, scope, la ion on whether module ca o minutes)			ition offered — if not every seme-
Langua	age of a	ssessment: English ffered: In the semester in	which the course is	offered and in the su	ubsequent semester
Allocat	tion of _l	olaces			
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 - Measure and Integral 10-M=GMAlin-152-mo1					
Module coordinator Module off					<u> </u>	
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathen	natics	
ECTS	Methe	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					
functio	ns and		cted applications, e.	g. product measure	me and measure, measurable s (with Fubini's theorem and the cal spaces.	
Intende	ed lear	ning outcomes				
		ains insight into contemp d techniques in this field			l integration theory. He/She ma- ns.	
Course	s (type	, number of weekly conta	ct hours, language –	- if other than Germa	an)	
V (2) + Module	• •	t in: English				
		essment (type, scope, la on on whether module ca			ation offered — if not every seme-	
		o minutes) ssessment: English				
Assess	ment o	ffered: In the semester in	which the course is	offered and in the s	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-	degree programmes))	
Module	e appea	urs in				
		ee (1 major) Mathematics	International (2015)			
Master	's degr	ee (1 major) Mathematics	International (2021)			
	-	ee (1 major) Mathematics				
Master	's degr	ee (1 major) Mathematics	International (2025)			

Module title					Abbreviation	
Research in Groups - Mathematics in Context					10-M=GMCXin-152-mo1	
Module coordinator M				Module offered I	by	
Dean	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	a histo		ic region or a particula	ar field of mathem	art of the history of mathematics, g natics. Other possibilities arise fron edia.	
Intend	ed 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 i	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				
	ing cycl					
	ad to in	LPO I (examination regu	lations for teaching	legree programm	مد)	
				icsice programmi		
	0.3000	are in				
	e appea	ree (1 major) Mathematic	c International (acto			
NA~~+~	i s uegr					
	r's daar					
Maste	-	ree (1 major) Mathematic ree (1 major) Mathematic ree (1 major) Mathematic	s International (2021)			

Module title Abbreviation					
Research in Groups - Mathematics in the Sciences 10-M=GMSCin-152-mo1					
Modul	e coord	linator		Module offered by	
Dean o	of Studi	es Mathematik (Mathema	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			
Conter	ts				
Recom Basic k	mende	ic in mathematics in the s d previous knowledge: dge from the modules "O recommended, as well a	rdinary Differential Ec	•	duction to Partial Differential
		ning outcomes		Tunctional analysis.	
The stu	ıdent g				in the sciences. He/She masters
Course	e s (type	, number of weekly conta	act hours, language –	- if other than Germa	n)
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) Issessment: English Iffered: In the semester ir	n which the course is	offered and in the su	ubsequent semester
Allocat	ion of	places			
Additio	onal inf	ormation			
Worklo	ad				
300 h					
	ng cycl	e			
Teachi					
leachi					
	ed to in	LPO I (examination regu	llations for teaching-o	legree programmes)	
	ed to in	LPOI (examination regu	llations for teaching-o	legree programmes)	
 Referre			llations for teaching-o	degree programmes)	
 Referre Module	e appea	ars in			
 Referre Module Master	e appe a 's degr		5 International (2015)		
 Referre Module Master Master	e appe a 's degr 's degr	ars in ee (1 major) Mathematics	s International (2015) 5 International (2021)		

Module title					Abbreviation	
Research in Groups - Non-linear Analysis 10-M=GNLAin-152-mo1						
Module	e coord	linator		Module offered by		
Dean o	f Studi	es Mathematik (Mat	hematics)	Institute of Mathema	atics	
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)		
10	nume	rical grade				
Duratio	on	Module level	Other prerequisites	i		
1 seme	ster	graduate				
Conten	ts					
Recom Depend	mende ding or	lern topics in non-lir d previous knowled n the content, basic commended to cons	ge: and advanced knowledge	from different areas o	f analysis is required. In case of	
		ning outcomes				
The stu	ıdent g	ains insight into cor	ntemporary research probl an apply them to complex		alysis. He/She masters advan-	
Course	s (type	, number of weekly	contact hours, language –	- if other than German)	
V (2) + Module		it in: English				
			pe, language — if other th ule can be chosen to earn		ion offered — if not every seme-	
Langua	age of a	o minutes) assessment: English offered: In the semes	ster in which the course is	offered and in the sul	osequent semester	
Allocat	ion of	places				
Additio	onal inf	ormation				
Worklo	ad					
300 h						
Teachi	ng cvcl	e				
Referre	ed to in	LPOI (examination	regulations for teaching-	degree programmes)		
Module	e anne:	ars in				
			natics International (2015)			
	-	ree (1 major) Mathen				
	· · · · · · · · · · · · · · · · · · ·		1alius IIIleIIIaliuIIal (2021)			
	's degr		natics International (2021)			

Module title					Abbreviation
Resear	ch in G	iroups - Numerical N	Nathematics and Applied A	Analysis	10-M=GNMAin-152-m01
Modul	e coord	linator		Module offered b	Py
Dean o	of Studi	es Mathematik (Mat	hematics)	Institute of Math	ematics
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
10	nume	rical grade			
Duration Module level Other prerequisites					
1 seme	ster	graduate			
Conten	its				
Recom Depen	mende ding or	d previous knowled the content, basic		from different are	as of analysis and/or numerical ma
		ning outcomes			
	_		ontemporary research pro	hlems in numerica	Il mathematics or applied analysis.
			ques in this field and can		
			contact hours, language –		
V (2) +		,			
• •	• •	it in: English			
			pe, language — if other th ule can be chosen to earn		nation 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	subsequent semester
Allocat	ion of	places			
	-				
Additic	onal inf	ormation			
Worklo	ad				
300 h					
Teachi	ng cvc	e			
	0.75				
Referre	ed to in	LPOI (examination	regulations for teaching.	<u>degree nrogramm</u>	25)
Referre	ed to in	LPOI (examination	regulations for teaching-	degree programme	25)
			regulations for teaching-	degree programme	25)
 Module	e appea	ars in			25)
 Module Master	e appe a 's degr	ars in ee (1 major) Mathen	natics International (2015)		25)
 Module Master Master	e appe 's degr 's degr	ars in ee (1 major) Mathen ee (1 major) Mathen			25)

Module title					Abbreviation	
Resear	rch in G	iroups - Number The	bry		10-M=GNTHin-152-m01	
Modul	e coord	linator		Module offered by	<u> </u>	
Dean of Studies Mathematik (Mathematics)			nematics)	Institute of Mathem	natics	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
10	o numerical grade					
Duration Module level Other prerequisites						
1 seme	ster	graduate				
Conter	nts					
Recom Basic k	mende knowle	d previous knowledg dge of algebra and n	ge:	, such as can be acq	ar forms, diophantine analysis). uired in the modules "Introducti	
		ning outcomes	<u></u>			
The stu	udent g	ains insight into con	temporary research probl them to complex problem		. He/She masters advanced tecl	
Course	es (type	, number of weekly o	ontact hours, language –	- if other than Germa	n)	
V (2) +	S (2)					
Modul	e taugł	nt in: English				
			be, language — if other th ule can be chosen to earn		tion 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 su	ıbsequent semester	
Allocat					· · ·	
-						
Additio	onal inf	formation				
Additio	onal inf	formation				
 Additic Worklo		formation				
 Worklo		formation				
 Worklo 300 h	oad					
 Worklo	oad					
 Worklo 300 h Teachi 	oad ng cyc	le	regulations for teaching.	degree programmes)		
 Worklo 300 h Teachi Referre	oad ng cyc	le	regulations for teaching-	degree programmes)		
 Worklo 300 h Teachi Referro	ng cycl ed to in	le LPOI (examination	regulations for teaching-	degree programmes)		
 Worklo 300 h Teachi Referre Module	oad ng cycl ed to in e appe	le LPOI (examination ars in				
 Worklo 300 h Teachi Referre Module	oad ng cycl ed to in e appe	le LPOI (examination ars in ree (1 major) Mathem	atics International (2015)			
 Worklo 300 h Teachi Referre Module Master Master	ed to in e appe	le LPOI (examination ars in ree (1 major) Mathem ree (1 major) Mathem				

Module title Abbreviation					Abbreviation	
Resear	ch in G	roups - Operator Alge	bras		10-M=GOPAin-152-mo1	
Module coordinator Module offered by					<u> </u>	
		es Mathematik (Mathe	matics)	Institute of Mathem	natics	
ECTS		od of grading	Only after succ. con			
10						
Duration Module level Other prerequisites						
1 seme	ster	graduate				
Conten	ts					
Recom	mende	ern topics in operator d previous knowledge	:			
	-	the contents of the mo mmended.	odules "Functional Anal	ysis" and "Algebra a	nd Dynamics of Quantum Sy-	
Intende	ed lear	ning outcomes				
			mporary research probl ly them to complex prol		ebras. He/She masters advanced	
Course	s (type	, number of weekly co	ntact hours, language –	- if other than Germa	ın)	
V (2) + Module	• •	t in: English				
			, language — if other th e can be chosen to earn		tion offered — if not every seme-	
Langua	ge of a	o minutes) ssessment: English ffered: In the semeste	r 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 cvcl	e				
	5 7 %					
Referre	d to in	LPO I (examination re	gulations for teaching-	degree programmes)		
			<u> </u>			
Module	appea	urs in				
			ics International (2015)			
	-		ics International (2021)			
			ics International (2022)			
Master	's degr	ee (1 major) Mathemat	ics International (2025)			

Module title					Abbreviation
Resear	ch in G	roups - Robotics, Optim	ization and Control Th	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 Method of grading Only after succ. compl. of module(s)					
10 numerical 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			_		1
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					Abbreviation			
Research in Groups - Statistics					10-M=GSTAin-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)				
10 numerical grade								
Duration Module level Other prerequisites								
	1 semester graduate							
	Contents							
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					Abbreviation	
Resear	rch in G	roups - Time Series	Analysis		10-M=GTSAin-152-m01	
Modul	e coord	inator		Module offered by	<u> </u>	
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	rical grade				
Duration Module level Other prerequisites						
1 seme	ster	graduate				
Conten	Its					
Recom Basic k	mende mowlee		ge:		astics 1" module. Knowledge of	
	-	ning outcomes				
The stu	ıdent g	ains insight into con	temporary research probl an apply them to complex		nalysis. He/She masters advan	
Course	e 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		ation offered — if not every seme	
Langua	age of a	o minutes) ssessment: English ffered: In the semes	ter in which the course is	offered and in the s	ubsequent semester	
Allocat	ion of	places				
Additic	onal inf	ormation				
Manlat	ad					
worklo						
300 h	ng cvcl	e				
300 h	ng cycl	e				
300 h Teachi 			regulations for teaching.	legree programmes		
300 h Teachi 			regulations for teaching-o	degree programmes)).	
300 h Teachi Referre	ed to in	LPOI (examination	regulations for teaching-	degree programmes)	
 Module	ed to in e appea	LPOI (examination)	
300 h Teachi Referre Module Master	ed to in e appea	LPO I (examination ars in ee (1 major) Mathem	natics International (2015))	
300 h Teachi Referre Module Master Master	ed to in e appea 's degr	LPO I (examination ars in ee (1 major) Mathem ee (1 major) Mathem)	

Module	e title				Abbreviation
Master	Thesis	Mathematics Internatio	nal		10-M=MAMI-152-m01
Module	e coord	inator		Module offered by	
		es Mathematik (Mathema	atics)	Institute of Mathem	natics
ECTS Method of grading Only after succ. compl. of module(s)					
30 numerical grade					
Duration 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-	legree 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	
Semina	ar in Ap	plied Differential Geome	etry		10-M=SADGin-152-m01	
Module	e coord	inator		Module offered by	l	
Dean of Studies Mathematik (Mathematics) Institute of Ma				Institute of Mathem	natics	
ECTS	Methe	od of grading	Only after succ. com	pl. of module(s)		
5	numerical grade					
Duratio	Duration Module level Other prerequisites					
1 seme	ster	graduate				
Conten	ts					
Recom Advanc Geome	mende ced kno try". Kr	nowledge of the contents	ometry is required, su of the modules "App	ied Differential Geo	red in the module "Differential metry", "Geometric Mechanics",	
		annian and Riemannian ning outcomes	Geometry" and "Lie I	neory" is also recorr	imended.	
			emporary research to	pic. This includes co	omprehending and structuring of	
				•	ate in a scientific discussion.	
Course	s (type	, number of weekly conta	act hours, language —	if other than Germa	ın)	
		t in: English	anguage — if other the	an German, examina	tion offered — if not every seme-	
		ion on whether module c				
Langua	ige of a	o minutes) ssessment: English ffered: In the semester ir	n which the course is	offered and in the su	ubsequent semester	
Allocat					· · ·	
Additio	nal inf	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	ars in				
	••	ee (1 major) Mathematics	s International (2015)			
	-	ee (1 major) Mathematics				
	-	ee (1 major) Mathematics				
master	Jucsi	ee (1 majoi) mathematics	s International (2022)			

Module	Module title Abbreviation							
Semina	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	Duration Module level Other prerequisites							
1 semester graduate								
Contents								
Recomr	A modern topic in algebra. Recommended previous knowledge: Basic knowledge of algebra is assumed, such as can be acquired in the modules "Introduction to Algebra" and							
		ning outcomes						
The stu	dent is	able to elaborate a conte			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						
		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			
Allocati	ion of p	olaces						
Additio	nal info	ormation						
Worklo	ad							
150 h								
Teachin	ng cycl	9						
	<u> </u>							
Referre	d to in	LPOI (examination regu	lations for teaching-c	legree programmes)				
			0					
Module	appea	irs in						
Master' Master' Master'	s degre 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
Semina	ar in Co	mplex Analysis			10-M=SCOAin-152-m01
Module	e coord	inator		Module offered by	
Dean o	fStudie	es Mathematik (Mat	hematics)	Institute of Mathem	atics
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
5 numerical grade					
Duration Module level Other prerequisites					
1 seme	ster	graduate			
Conten	ts				
Recom Basic k	mende	-	ge:	on to Complex Analy	sis" and " Complex Analysis" is
		ning outcomes			
The stu	dent 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	n)
S (2) Module	e taugh	t in: English			
			pe, language — if other th ule can be chosen to earn		tion 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 su	ibsequent semester
Allocat					1
Additio	nal inf	ormation			
Worklo	ad				
150 h					
Teachi		٩			
	Scyce				
Doforro	d to in	IPOL (ovamination	regulations for teaching-	dograa programmaa)	
Referre				regree programmes)	
 Modula	annos	ure in			
 Module			natice International (and)		
Master	's degr	ee (1 major) Mathen	natics International (2015)		
Master Master	's degre 's degre	ee (1 major) Mathen ee (1 major) Mathen	natics International (2015) natics International (2021) natics International (2022)		

Module title					Abbreviation	
Semina	ar in Dy	namical Systems and	d Control		10-M=SDSCin-152-m01	
Module	e coord	inator		Module offered by	J	
Dean o	f Studi	es Mathematik (Math	ematics)	Institute of Mather	natics	
ECTS	CTS Method of grading Only after succ. compl. of module(s)					
5	numerical grade					
Duratio	Duration Module level Other prerequisites					
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 Fir	nancial and Insuran	ce Mathematics		10-M=SFIMin-152-m01
Module	e coord	linator		Module offered by	
Dean o	f Studi	es Mathematik (Mat	thematics)	Institute of Mather	natics
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)	
5	nume	rical grade			
Duration Module level Other prerequisites					
1 seme	ster	graduate			
Conten	ts				
Recom Familia	mende rity wit	d previous knowled		o Stochastic Financi	al Mathematics" and "Stochastic:
		ning outcomes			
The stu	ident is	s 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) Module	e taugh	it in: English			
			pe, language — if other th Iule can be chosen to earn		ation offered — if not every seme-
Langua	ige 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	nal inf	ormation			
Worklo	ad				
150 h					
Teachi	ng cvcl	e			
	.5 .9				
Referre	d to in	IPOI (examination	regulations for teaching-	degree programmes)
)
Module	anne	ars in			
			natics International (2015)		
	-		natics International (2013)		
Master		ee (I majon mathem	natics International (2022))	

Module	e title				Abbreviation		
Giovanni Prodi Seminar (Master)					10-M=SGPCin-152-r	n01	
						-	
Module coordinator				Module offered by			
Dean of Studies Mathematik (Mathe		-		Institute of Mathem	natics		
ECTS	Method of gradin	ıg	Only after succ. com	pl. of module(s)			
5	numerical grade						
Duratio		Module level Other prerequisites					
1 seme	emester graduate						
Conten	ts						
A mode	ern topic in the res	earch experti	se of the current hold	er of the Giovanni Pı	rodi Chair.		
Intende	ed learning outcon	nes					
	-		temporary research to	pic. This includes co	omprehending and s	tructuring of	
			preparing a talk and the				
			act hours, language –	· · · ·			
S (2)							
• •	e taught in: English	ı					
			anguage — if other tha	an German, examina	tion offered — if not	everv seme-	
			an be chosen to earn			every seme	
	o to 120 minutes)						
•	ge of assessment:	: English					
Assess	ment offered: In th	ne semester i	n which the course is	offered and in the su	ubsequent semester		
Allocat	ion of places						
	<u>.</u>						
Additio	nal information						
Additio							
Worklo	ad						
150 h							
	ng cycle						
reaciiii							
		• .•					
Referre	d to in LPO I (exa	mination regi	ulations for teaching-o	legree programmes)			
Module	e appears in						
			s International (2015)				
	's degree (1 major)						
	's degree (1 major)						
	's degree (1 major)						
			nal Mathematics (201				
			nal Mathematics (201	9)			
	's degree (1 major) 's degree (1 major)						
	's degree (1 major) 's degree (1 major)		al Physics (2020) s International (2021)				
	's degree (1 major)						
			nal Mathematics (202	2)			
	's degree (1 major)			_,			
	's degree (1 major)						
			s International (2022)				
	's degree (1 major)						
	th 1 major Mathematics In			enerated 18-Apr-2025 • exam	. reg. data re-	page 49 / 93	
(2015)				ECTS) Mathematics Internat	-		

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

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	e title				Abbreviation	
Seminar in Geometry and Topology 10-M=SGTOin-152-mo1					10-M=SGTOin-152-m01	
Module	o coord	inator		Module offered by		
Dean of Studies Mathematik (Mathematics)			natics)	Institute of Mathem	natics	
ECTS	1	od of grading	Only after succ. com			
5	1	rical grade				
Duratio		Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts	•	_			
A mode	ern top	ic in geometry and topol	ogv.			
Basic k	nowled	d previous knowledge: dge of the contents of th ommended.	e modules "Introducti	on to Differential Ge	ometry" and "Introduction to To-	
		ning outcomes				
The stu	ident is	able to elaborate a con			omprehending and structuring of ate in a scientific discussion.	
		, number of weekly cont	<u>.</u>			
S (2)		t in: English				
		sessment (type, scope, l ion on whether module			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					•	
Additio	onal inf	ormation				
Worklo	ad	·				
150 h						
Teachi	ng cvrl	e				
	- <u>5</u> - y - i	-				
Referre	d to in	LPOI (examination reg	ulations for teaching.	legree programmes)		
Referre						
Module		ars in				
		ee (1 major) Mathematic	s International (2015)			
muster	-					
Master	Master's degree (1 major) Mathematics International (2021)					
	-	ee (1 major) Mathematic ee (1 major) Mathematic				

Module	e title				Abbreviation
Interdisciplinary Seminar 10-M=SIDCin-152-mo1					
Module coordinator				Module offered by	
	Dean of Studies Mathematik (Mathematics)			Institute of Mathem	atics
ECTS	-	od of grading	Only after succ. con		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	
Semina	r Math	10-M=SMSCin-152-m01				
Module coordinator Module				Module offered by		
Dean of Studies Mathematik (Mathematics)				Institute of Mathem	atics	
ECTS		od of grading	Only after succ. com			
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate				
Conten	ts					
A mode	rn topi	c in mathematics in the s	sciences.			
Pocomr	nondo	d previous knowledge:				
			dinary Differential Eq	uations" and "Introd	duction to Partial Differential	
		recommended, as well as				
Intende	ed leari	ning outcomes				
					mprehending and structuring of	
					ate in a scientific discussion.	
	s (type	, number of weekly conta	ct nours, language —	If other than Germa	n)	
S (2) Module	taugh	t in: English				
		-	nguage — if other tha	an German, examina	tion offered — if not every seme-	
		on on whether module ca				
		o minutes)				
		ssessment: English ffered: In the semester in	which the course is	offered and in the cu	ibsoquent comester	
Allocati			which the course is t		absequent semester	
		Jaces				
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teachir	ng cycl	6				
	<u> </u>					
Referre	d to in	LPOI (examination regu	lations for teaching-d	legree programmes)		
		· · ·	5	<u> </u>		
Module	appea	irs 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			
Seminar in Non-linear Analysis 10-M=SNLAin-152-m01								
Module coordinator M				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 seme		graduate						
Conten								
Recomr Depenc	A modern topic in non-linear analysis. Recommended previous knowledge: Depending on the content, basic and advanced knowledge from different areas of analysis is required. In case of doubt, it is recommended to consult the lecturer.							
Intende	ed learr	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	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
Semina	ar in Nu	merical Mathemati	cs and Applied Analysis		10-M=SNMAin-152-m01
Modul	e coord	inator		Module offered by	
Dean o	of Studie	es Mathematik (Mat	hematics)	Institute of Mathen	natics
ECTS	Metho	d of grading	Only after succ. con	npl. of module(s)	
5	nume	ical grade			
Duratio	on	Module level	Other prerequisites	;	
1 seme	ster	graduate			
Conten	Its				
Recom Depen	mendeo ding on	d previous knowled the content, basic		from different areas	of analysis and/or numerical ma
		ing outcomes			
The stu	udent is	able to elaborate a			omprehending and structuring of ate in a scientific discussion.
			contact hours, language –		
S (2)		tin: English			
			pe, language — if other th ule can be chosen to earn		ation offered — if not every seme
Langua	age of a	minutes) ssessment: English ffered: In the semes	ster in which the course is	offered and in the s	ubsequent semester
	ion of p				•
		laces			
		laces			
	onal info				
	onal info	prmation			
 Additic					
 Additic Workla					
 Additic Worklo 150 h	ad	ormation			
 Additic Worklo 150 h		ormation			
 Additic Worklo 150 h Teachi 	oad ng cycle	ormation	regulations for teaching.	degree programmes	
 Additic Worklo 150 h Teachi 	oad ng cycle	ormation	regulations for teaching-o	degree programmes))
 Additic 150 h Teachi Referre	ng cycle ed to in	prmation e LPOI (examination	regulations for teaching-o	degree programmes))
 Additic 150 h Teachi Referre Module	oad ng cyclo ed to in e appea	prmation e LPOI (examination rs in			
 Additic 150 h Teachi Referre Module	ng cyclo ed to in e appea	prmation P LPOI (examination rs in ee (1 major) Mathen	natics International (2015))
 Additic Worklo 150 h Teachi Referre Modulo Master Master	ed to in e appea	prmation e LPOI (examination rs in ee (1 major) Mathen ee (1 major) Mathen			

Module title Abbreviation					Abbreviation
Seminar in Optimization					10-M=SOPTin-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)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	Its				
A mode	ern topi	ic in optimisation.			
Intend	ed lear	ning outcomes			
					omprehending and structuring of ate in a scientific discussion.
Course	e s (type	, number of weekly conta	ct hours, language –	- if other than Germa	ın)
S (2) Module	e taugh	t in: English			
		sessment (type, scope, la ion on whether module ca			tion 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 the su	ubsequent semester
Allocat					·
Additio	onal inf	ormation			
Worklo	ad				
150 h					
Teachi	ng cvcl	e			
	0.99				
Referre	ed to in	LPOI (examination regu	lations for teaching-	degree programmes)	
Module	e appez	ars in			
		ee (1 major) Mathematics	International (2015)		
	-	ee (1 major) Mathematics	-		
Master	's degr	ee (1 major) Mathematics	International (2022)		
Master	's degr	ee (1 major) Mathematics	International (2025)		

Module title Abbrevia					Abbreviation	
Seminar in Statistics					10-M=SSTAin-152-m01	
Module	e coordi	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 graduate	Other prerequisites			
Conten	I	glauuale				
A mode	ern topi	c in statistics.				
Recom	mender	d previous knowledge:				
			ired, such as that acc	uired in the "Stocha	astics 1" module. Knowledge of	
the con	tents o	f the module "Stochastic	s 2" is also recomme	nded. Depending or	the content of the course, other	
		ge may also be helpful; c	onsultation with the l	ecturer is recommer	nded.	
		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)						
		t in: English	· · · · · · · · · · · · · · · · · · ·			
		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 su	ıbsequent semester	
Allocat	ion of p	olaces				
Additio	nal info	ormation				
Worklo	ad					
150 h						
Teachir	ng cycl	9				
Referre	d to in	LPOI (examination regu	lations for teaching-d	legree programmes)		
Module	e appea	rs in				
	-	ee (1 major) Mathematics	-			
	-	ee (1 major) Mathematics				
	-	ee (1 major) Mathematics ee (1 major) Mathematics				
musici	Master's degree (1 major) Mathematics International (2025)					

Modul	e title				Abbreviation	
Applie	d Differ	ential Geometry			10-M=VADGin-152-m01	
Module coordinator				Module offered by		
Dean of Studies Mathematik (Mathematic			natics)	Institute of Mathem	natics	
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	ester	graduate				
Conter	nts					
tial geo timisat Recom Advano Geome	ometry, tion on mende ced knc etry". Kr	e.g. at the interface of manifolds or application d previous knowledge: wledge of differential g nowledge of the content	control theory and me ns in physics. eometry is required, si s 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",	
		annian and Riemanniar	Geometry" and "Lie T	heory" is also recom	imended.	
		ning outcomes				
					eometry. He/She is able to esta- ematics and questions in phy-	
Course	s (type	, number of weekly cont	act hours, language –	- if other than Germa	ın)	
V (4) + Module		t in: English				
		sessment (type, scope, l ion on whether module			tion offered — if not every seme-	
b) oral c) oral Langua Assess	examir examin age of a	mination (approx. 90 to nation of one candidate ation in groups (groups ssessment: English ffered: In the semester 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 cycl	e				
Referre	ed to in	LPOI (examination reg	ulations for teaching-	degree programmes)		
			3	<u> </u>		
Modul	e appea	ars in				
Master Master Master	's degr 's degr 's degr	ee (1 major) Mathematic ee (1 major) Mathematic ee (1 major) Mathematic ee (1 major) Mathematic	s International (2021) s International (2022))		

Module	e title				Abbreviation
Selected Topics in Analysis					10-M=VANAin-152-m01
Module coordinator				Module offered by	
		es Mathematik (Mathema	atics)	Institute of Mathem	natics
ECTS		od of grading	Only after succ. com		
10	î	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
Depend	ding on			from different areas	of analysis is required. In case of
Intende	ed leari	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	in)
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 c	ites) 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	LPOI (examination regu	lations for teaching-o	legree programmes)	
 Module		ve in			
Module		ee (1 major) Mathematics	International (2015)		
	-	ee (1 major) Mathematics			
	-	ee (1 major) Mathematics			
	-	ee (1 major) Mathematics			

Module	e title				Abbreviation	
Algebraic Topology					10-M=VATPin-152-m01	
Module coordinator Module offered by					<u> </u>	
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)		
10	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	Its					
spaces	•	motopy invariance, exact d previous knowledge:	sequences, cohomo	logy, application to	the topology of Euclidean	
Basic k	nowled	lge of topology is assume	ed, such as can be ac	quired in the modul	e "Introduction to Topology".	
		ning outcomes				
The stu	ident is	acquainted with advanc	ed results in algebrai	c topology.		
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	an)	
V (4) +	• •					
		t in: English				
		s essment (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 ca	ites) or andidate)	ubsequent semester	
Allocat	ion of p	olaces				
	. <u> </u>					
Additio	onal info	ormation				
Worklo	ad					
300 h						
Teachi	ng cycl	9				
Referre	ed to in	LPO I (examination regu	lations for teaching-c	legree programmes)		
Module	e appea	irs in				
Master Master exchan	's degre 's degre ige prog	ee (1 major) Mathematics ee (1 major) Mathematics ee (1 major) Mathematics gram Mathematics (2023)	International (2021) International (2022)			
Master	's degre	ee (1 major) Mathematics	International (2025)			

fter succ. cor	Module offered by	10-M=VDIMin-152-m01
		<u> </u>
	I Institute of Mathem	natics
		laties
prerequisites		
prerequisites		
	-	coding theory, cryptography,
e "Introductio	on to Discrete Mather	matics" is required.
	1	
	ed topic in discrete r	
s, language –	- if other than Germa	in)
hosen to earn tes, usually c prox. 15 minu prox. 10 minu	a bonus) hosen) or ites) or tes per candidate)	ition offered — if not every sem
for teaching-	degree programmes)	

Module	e title			Abbreviation			
Dynam	ical Sys	stems		10-M=VDSYin-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							
Fundan	nentals	of dynamical systems, e	.g. stability theory, e	rgodic theory, Hamil	ltonian systems.		
Recom	mender	d previous knowledge:					
		lge of the contents of the	module "Ordinary Di	fferential Equations'	" is useful.		
Intende	ed learr	ning outcomes					
The stu quality.		asters the mathematical	methods in the theor	y of dynamic system	ns, and is able to analyse their		
		number of weekly conta	ct hours, language —	if other than Germa	n)		
V (3) +		number of weekly conta					
		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	of 2, approx. 10 minut	es per candidate)			
		ssessment: English	which the course is	ffored and in the cu	he aguest comostor		
credita		ffered: In the semester in bonus	which the course is o	Shered and in the St	ibsequent semester		
Allocat	ion of p	olaces					
Additio	nal info	ormation					
Worklo	ad						
150 h							
Teachi	ng cycl	e					
Referre	d to in	LPOI (examination regu	lations for teaching-d	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	Master's degree (1 major) Mathematics International (2025)						

Module	e title				Abbreviation
Selecte	ed Topi	cs in Financial Mathema	itics		10-M=VFNMin-152-m01
Module	coord	inator		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					
Teachi	ng cycl	e			
Referre	d to in	LPOI (examination reg	ulations for teaching-c	legree programmes)	
Module	e appea	ars in			
		ee (1 major) Mathematic	s International (2015)		
	-	ee (1 major) Mathematic			
Master	-	ee (1 major) Mathematic	s International (2022)		
	's degr				

Module	e title		Abbreviation		
-		eir Representations	10-M=VGDSin-152-m01		
Module	e coord	inator		Module offered by	
Dean o	f Studie	es Mathematik (Mathema	atics)	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 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	ars in			
Master	's degr	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	mternational (2025)		

Modul	e title			Abbreviation		
Geome	etrical Mechanics			10-M=VGEMin-152-m01		
Modul	e coordinator		Module offered by			
	of Studies Mathematik (Mathe	matics)	Institute of Mathematics			
ECTS	Method of grading	r ·	Only after succ. compl. of module(s)			
10	numerical grade					
Duratio		Other prerequisites	•			
1 semester graduate						
Conter	1 -					
tic geo phase Recom Advand Geome ge of th	metry, cotangent bundles and space reduction, normal form mended previous knowledge: ced knowledge of differential g etry". Knowledge of the conten heoretical mechanics can also	other examples of syn s, introduction to Poiss geometry is required, s ts of the module "Intro	nplectic manifolds, s son geometry. uch as can be acquir	these in more detail: symplec- ymmetries and Noether theorem red in the module "Differential ' is also recommended. Knowled		
Intend	ed learning outcomes					
He/Sh	udent is acquainted with selec e is able to establish a connec uestions in physics.			eometry to geometric mechanics ther branches of mathematics		
Course	es (type, number of weekly con	itact hours, language –	– if other than Germa	n)		
V (4) + Module	Ü (2) e taught in: English					
Metho	d of assessment (type, scope,	language — if other th	an German, examina	tion offered — if not every seme-		
ster, in	formation on whether module	can be chosen to earn	ı a bonus)			
b) oral c) oral Langua Assess	ten examination (approx. 90 to examination of one candidate examination in groups (group age of assessment: English sment offered: In the semester able for bonus	e each (approx. 20 min s of 2, 15 minutes per c	utes) or candidate)	ubsequent semester		
	tion of places					
Allocal		· · · · · · · · · · · · · · · · · · ·				
Additid	onal information					
Auuitit						
Worklo	Jau					
300 h						
Teachi	ng cycle					
Referre	ed to in LPO I (examination re	gulations for teaching-	degree programmes)			
Modul	e appears in					
	's degree (1 major) Mathemati					
Master	's degree (1 major) Physics Int					
	r's degree (1 major) Mathemati	ics International (2021))			
Master		an Indone attain 17	\			
Master Master	r's degree (1 major) Mathemati r's degree (1 major) Physics Int)			



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

Module	e title				Abbreviation
Aspect	s of Ge	ometry			10-M=VGEOin-152-m01
Module	e coord	inator		Module offered by	
Dean o	fStudie	es Mathematik (Mathema	atics)	Institute of Mathem	atics
ECTS		od of grading	Only after succ. com		
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
with ot Recom	her mat mende	thematical structures, e. d previous knowledge:	g. topological geome	tries, diagram geom	
		-	fferential Geometry"	and "Introduction to	Topology" is recommended.
		ning outcomes			
	ident is ex probl		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	n)
V (3) +					
		t in: English			
		s essment (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. 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	onal info	ormation			
Worklo	ad				
150 h					
Teachi	ng cycl	9			
Referre	ed to in	LPO I (examination regu	lations for teaching-o	degree programmes)	
Module	e 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)		

Modul	e title				Abbreviation	
Giovan	ni Prodi Lecture Ac	dvanced Top	ics (Master)		10-M=VGPAin-152-	m01
Modul	e coordinator			Module offered by		
	of Studies Mathema	tik (Mathom	atics)			
ECTS	Method of gradin		Only after succ. con		Iducs	
10	numerical grade	5				
Duratio						
1 seme	·					
Conter						
		ad tania in s		amatianal avnart		
	· · · · · ·		nathematics by an int	ernational expert.		
	ed learning outcom					
themat		e to establish	ndamental concepts a a connection betwee ubjects.			
Course	es (type, number of	weekly cont	act hours, language –	if other than Germa	ın)	
V (4) + Module	Ü (2) e taught in: English	I				
			anguage — if other the carn be chosen to earn		ition offered — if not	every seme-
c) oral Langua Assess	examination in gro age of assessment:	ups (groups English	each (approx. 20 minu of 2, 15 minutes per c n which the course is	andidate)	ubsequent semester	
Allocat	tion of places		-			
Additio	onal information		_			
Worklo	nad					
300 h						
-	ng gyclo					
Teacin	ng cycle		_			
Referre	ed to in LPO I (exar	nination reg	ulations for teaching-o	legree programmes)		
Modul	e appears in					
			s International (2015)			
	r's degree (1 major)					
	r's degree (1 major)		•			
			nal Mathematics (201			
			nal Mathematics (201	9)		
	r's degree (1 major) r's dogroo (1 major)		-			
	r's degree (1 major) r's degree (1 major)		s International (2021)			
			nal Mathematics (2021)	2)		
	r's degree (1 major)	•		~)		
	r's degree (1 major)					
Master's w	vith 1 major Mathematics In	ternational	IMII Würzhura ● a	enerated 18-Apr-2025 • exam	n reg. data re-	page 68 / 93
(2015)	i major mathematics in			ECTS) Mathematics Internat	-	Page 00 / 95

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

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					Abbreviation		
Giova	nni Prod	li Lecture Modern Topic	cs (Master)		10-M=VGPMin-152-	m01	
Modul	le coord	inator		Module offered by			
		es Mathematik (Mather	matics)	Institute of Mathematics			
ECTS				npl. of module(s)	laties		
10		rical grade					
Durati		Module level	Other prerequisites				
1 seme		graduate					
Conte	nts						
		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 nours, language –	- If other than Germa	in)		
V (4) + Modul		t in: English					
		sessment (type, scope,		an Corman, ovamina	tion offered — if not	ovory como	
		ion on whether module				every serife	
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 j	olaces					
Additi	onal inf	ormation					
Workl	oad						
300 h							
-	ing cycl	e					
Roforr	ed to in	LPOI (examination reg		degree programmes	1		
Modul	le appea	are in					
		ee (1 major) Mathemati	cs International (2015)				
	-	ee (1 major) Mathemati ee (1 major) Mathemati					
	-	ee (1 major) Mathemati					
	-	ee (1 major) Computati	•	6)			
Maste	r's degr	ee (1 major) Computatio	onal Mathematics (201	9)			
	-	ee (1 major) Mathemati	-				
	-	ee (1 major) Mathemati	-				
	-	ee (1 major) Mathemati					
		ee (1 major) Computatio ee (1 major) Mathemati		2)			
	-	ee (1 major) Mathemati ee (1 major) Mathemati					
			-	en evete d + C. Arring	vez dete		
/laster's v 2015)	with 1 majo	r Mathematics International		enerated 18-Apr-2025 • exam c ECTS) Mathematics Interna	-	page 70 / 93	

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

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)

Modu	le title				Abbreviation		
Giova	nni Proc	li Lecture Selected Top	ics (Master)		10-M=VGPSin-152-r	no1	
Modul	le coord	linator		Module offered by			
			matics)	Institute of Mathematics			
ECTS					latics		
10	_	rical grade					
Durati	-	Module level	Other prerequisites				
1 sem		graduate					
Conte	nts						
		o a specialised topic in	mathematics by an int	ernational expert			
		ning outcomes		emational expert.			
The st thema thema	udent is atics. He atics and	s 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) +		the Frank I					
		t in: English					
		sessment (type, scope, ion on whether module			ation offered — if not	every seme	
c) oral Langu Asses	l examir lage of a	nation of one candidate nation in groups (groups issessment: English offered: In the semester bonus	s of 2, 15 minutes per c	andidate)	ubsequent semester		
Alloca	ation of	places					
Additi	ional inf	ormation					
Workl	oad						
300 h							
Teach	ing cycl	e					
Referr	red to in	LPOI (examination reg	gulations for teaching-	degree programmes)			
		· · ·	<u> </u>				
Modul	le appea	ars in					
		ee (1 major) Mathemati	cs International (2015)				
	-	ee (1 major) Mathemati					
	-	ee (1 major) Mathemati					
	-	ee (1 major) Computatio					
	-	ee (1 major) Computati		9)			
	-	ee (1 major) Mathemati	-				
	-	ee (1 major) Mathemati	-				
	-	ee (1 major) Mathemati ee (1 major) Computatio					
		ee (1 major) Computatio ee (1 major) Mathemati		<i>∠</i>)			
	-	ee (1 major) Mathemati					
	with 1 majo	r Mathematics International		enerated 18-Apr-2025 • exan	-	page 72 / 93	
2015)			cord Master (120	o ECTS) Mathematics Interna	tional - 2015		

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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 Problems					10-M=VIPRin-152-m01		
Module coordinator				Module offered by			
	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							
sation	method	ls, examples of ill-posed		n theory, Tikhonov r	egularisation, iterative regulari-		
		d previous knowledge: Ige of functional analysis	, such as that taught	in the module "Func	tional Analysis", is recommen-		
Intende	ed leari	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) + Module		t in: English					
		s 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	mination (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	150 h						
Teachi	Teaching cycle						
Referre	d to in	LPOI (examination regu	lations for teaching-c	legree programmes)			
Module	e appea	irs in					
Master	's degr	ee (1 major) Mathematics	International (2015)				
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 Arithmetics					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 mowled	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	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 (2025)					

Module	title				Abbreviation	
Complex Geometry					10-M=VKGEin-152-m01	
Module coordinator				Module offered by		
Dean of Studies Mathematik (Mathematics)			atics)	Institute of Mathem	atics	
ECTS		od of grading	Only after succ. com			
10		rical grade				
Duratio		Module level	Other prerequisites			
1 semes		graduate				
Conten	ts	-				
calculu Kähler) Recomr	s, com , differ mende	plex structures and comp ential operators on comp d previous knowledge:	olex manifolds, metric lex manifolds, classif	s on complex manif ication of complex r	these in more detail: Wirtinger folds (e.g. conformal, hermitian, nanifolds. rsis" and " Complex Analysis" or	
		mplex Analysis" is recon		· · · · · ·	·	
Intende	ed lear	ning outcomes				
					erential geometry. He is familiar methods independently.	
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)	
V (4) + I Module	• •	t in: English				
		s 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	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)	ıbsequent semester	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
300 h						
Teachir	ng cvcl	e				
	5 7 %					
Referre	d to in	LPO I (examination regu	lations for teaching-d	legree programmes)		
Module	e appea	in				
Master' Master'	Moule 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 degr	ee (1 major) Mathematics	International (2025)			

Module	e title				Abbreviation
Mathe	matical	Continuum Mechanics			10-M=VKOMin-152-m01
Module coordinator				Module offered by	
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 conti	nuum mechanics.
Recom	mende	d previous knowledge:			
Basic k	nowled	lge from the modules "Oi			duction to Partial Differential
Equation	ons" is	recommended, as well as	s basic knowledge of	functional analysis.	
Intend	ed learı	ning outcomes			
		asters the mathematical application.	methods in mathema	atical continuum me	echanics and knows about their
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	in)
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	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	LPO I (examination regu	lations for teaching-c	legree programmes)	
Module	e appea	irs in			
		ee (1 major) Mathematics	International (2015)		
Master	's degr	ee (1 major) Mathematics	International (2021)		
		ee (1 major) Mathematics			
Master	's degr	ee (1 major) Mathematics	International (2025)		

Mather	e title				Abbreviation	
Mathematical Imaging					10-M=VMBVin-152-m01	
Module coordinator				Module offered by	Module offered by	
Dean of Studies Mathematik (Mathematics)			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		

Module t	itle			Abbreviation
Selected Topics in Mathematical Physics				10-M=VMPHin-152-m01
Module coordinator			Module offered by	
Dean of Studies Mathematik (Mathematics)			Institute of Mathem	natics
	Nethod of grading	Only after succ. com		
	umerical grade		1	
Duration	Module level	Other prerequisites		
1 semest	er graduate			
Contents	÷			
terial scie Recomme Dependir	ences, geometric field theory, ended previous knowledge:	advanced topics in q dvanced knowledge	uantum theory.	uid dynamics, mathematical ma- of analysis is required. In case of
	learning outcomes			
	ent is acquainted with an adva	ancod tonic in mathe	matical physics Hal	Sho is able to establish a
	on between his/her acquired s			
	(type, number of weekly conta			· · ·
V (4) + Ü	<i>,</i> ,			,
	aught in: English			
	of assessment (type, scope, la rmation on whether module ca			tion offered — if not every seme-
c) oral ex Language Assessm	amination of one candidate e amination in groups (groups o e of assessment: English ent offered: In the semester ir e for bonus	of 2, 15 minutes per c	andidate)	ubsequent semester
Allocatio	n of places			
Additiona	al information			
Workload	1			
300 h				
Teaching	cycle			
Referred	to in LPO I (examination regu	lations for teaching-o	legree programmes)	
Module a	ppears in			
	degree (1 major) Mathematics	International (2015)		
	degree (1 major) Physics Inter	-		
Master's	degree (1 major) Mathematics	International (2021)		
	degree (1 major) Mathematics			
	degree (1 major) Physics Inter	-		
masters	degree (1 major) Mathematics	international (2025)		

Module	e title				Abbreviation	
Module Theory					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	s aegr	ee (1 major) Mathematics	miternational (2025)			

					Abbreviation		
Non-linear Analysis				10-M=VNANin-152-m01			
Module coordinator				Module offered by			
Dean of Studies Mathematik (Mathematics)			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	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 (Mathematics)			nematics)	Institute of Mather	natics				
ECTS	1	od of grading	Only after succ. con						
10		rical grade		Ţ					
Duratio	on	Module level	Other prerequisites						
1 seme	ster	graduate							
Conten	nts	•	I						
(numer discon Recom We rec	rical me tinuous mende ommer	ethods for elliptic, pa s Gelerkin finite elem d previous knowledg nd basic knowledge o	rabolic and hyperbolic pa ents method, finite differ ge: of functional analysis and	artial differential equences and finite vol partial differential of	equations, such as can be acqui				
			o Functional Analysis" and	d "Applied Analysis'	•				
		ning outcomes							
The stu	udent is	acquainted with ad	vanced methods for discr	etising partial differ	ential equations.				
Course	s (type	, number of weekly o	ontact hours, language –	- if other than Germa	an)				
V (4) +									
		t in: English							
ster, in a) writt b) oral c) oral Langua Assess	format en exa examir examir age of a sment o	ion on whether modu mination (approx. 90 nation of one candida nation in groups (grou ssessment: English offered: In the semes	o to 120 minutes, usually ate each (approx. 20 minutes ups of 2, 15 minutes per c	a bonus) chosen) or utes) or andidate)	ation offered — if not every seme ubsequent semester				
credita									
Allocat	tion of	places							
Additio	onal inf	ormation							
Worklo	oad								
300 h	_								
Teachi	ng cycl	e							
Referre	ed to in	LPOI (examination	regulations for teaching-o	legree programmes)				
Module	e appea	ars in							
			atics International (2015)						
	-	ee (1 major) Physics							
	-		atics International (2021)						
Master	's degr	ee (1 maior) Mathem							
musici		ee (I major) maarem	Aaster's degree (1 major) Mathematics International (2022)						
	's degr	ee (1 major) Physics							

Selecte	e title				Abbreviation
Selected Topics in Optimization					10-M=VOPTin-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				
		s in optimization, e.g. ir timization with differenti		semidefinite progran	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	an)
V (4) + Module		t in: English			
		essment (type, scope, la on on whether module ca			ation offered — if not every seme-
			20 minutes, usually ach (approx, 20 minu		
b) oral c) oral Langua Assess	examir examin age of a ment o	ation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester ir	ach (approx. 20 minu of 2, 15 minutes per c	utes) or andidate)	ubsequent semester
b) oral c) oral Langua Assess credita	examir examin age of a ment o ble for	ation 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
b) oral c) oral Langua Assess credita	examir examin age of a ment o	ation 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
b) oral c) oral Langua Assess credita Allocat	examir examin age of a ment o ble for ion of p	ation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester ir bonus blaces	ach (approx. 20 minu of 2, 15 minutes per c	utes) or andidate)	ubsequent semester
b) oral c) oral Langua Assess credita Allocat	examir examin age of a ment o ble for ion of p	ation 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
b) oral c) oral Langua Assess credita Allocat	examir examin age of a ment o ble for tion of p	ation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester ir bonus blaces	ach (approx. 20 minu of 2, 15 minutes per c	utes) or andidate)	ubsequent semester
b) oral c) oral Langua Assess credita Allocat Additic	examir examin age of a ment o ble for tion of p	ation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester ir bonus blaces	ach (approx. 20 minu of 2, 15 minutes per c	utes) or andidate)	ubsequent semester
b) oral c) oral Langua Assess credita Allocat Morklo 300 h	examir examin age of a ment o ble for tion of p	ation of one candidate e ation in groups (groups of ssessment: English ffered: In the semester in bonus places	ach (approx. 20 minu of 2, 15 minutes per c	utes) or andidate)	ubsequent semester
b) oral c) oral Langua Assess credita Allocat Morklo 300 h	examir examin age of a ment o ble for ion of p onal info	ation of one candidate e ation in groups (groups of ssessment: English ffered: In the semester in bonus places	ach (approx. 20 minu of 2, 15 minutes per c	utes) or andidate)	ubsequent semester
b) oral c) oral Langua Assess credita Allocat Worklo 300 h Teachi 	examin examin age of a ment o ble for ion of p onal info pad	ation of one candidate e ation in groups (groups of ssessment: English ffered: In the semester in bonus places	ach (approx. 20 minu of 2, 15 minutes per c which the course is	utes) or andidate) offered and in the s	
b) oral c) oral Langua Assess credita Allocat Worklo 300 h Teachi 	examin examin age of a ment o ble for ion of p onal info pad	ation of one candidate e ation in groups (groups of ssessment: English ffered: In the semester in bonus blaces ormation	ach (approx. 20 minu of 2, 15 minutes per c which the course is	utes) or andidate) offered and in the s	
b) oral c) oral Langua Assess credita Allocat Worklo 300 h Teachi Referre	examin examin age of a ment o ble for ion of p onal info pad	ation of one candidate e ation in groups (groups of ssessment: English ffered: In the semester in bonus blaces ormation e LPO I (examination regu	ach (approx. 20 minu of 2, 15 minutes per c which the course is	utes) or andidate) offered and in the s	
b) oral c) oral Langua Assess credita Allocat Additic 300 h Teachi Referre Modulo	examin examin age of a ment o ble for ion of p onal info pad ed to in e appea	ation of one candidate e ation in groups (groups of ssessment: English ffered: In the semester in bonus olaces ormation e LPO I (examination regu	ach (approx. 20 minu of 2, 15 minutes per c which the course is lations for teaching-c	utes) or andidate) offered and in the s degree programmes	
b) oral c) oral Langua Assess credita Allocat Worklo 300 h Teachi Referro Modulo	examin age of a ment o ble for ion of p onal info onal info oad ed to in e appea	ation of one candidate e ation in groups (groups of ssessment: English ffered: In the semester in bonus blaces ormation e LPO I (examination regu	ach (approx. 20 minu of 2, 15 minutes per c which the course is lations for teaching-o	utes) or andidate) offered and in the s degree programmes)	
b) oral c) oral Langua Assess credita Allocat Morklo 300 h Teachi Referro Master Master Master Master	examin examin age of a ment o ble for ion of p onal info onal info	ation of one candidate e ation in groups (groups of ssessment: English ffered: In the semester in bonus places ormation e LPO I (examination regu	ach (approx. 20 minu of 2, 15 minutes per c which the course is a unit of the course is a lations for teaching-of b International (2015) b International (2022)	utes) or andidate) offered and in the s degree programmes)	

Module title					Abbreviation	
Optimal Control					10-M=VOSTin-152-m01	
Module coordinator				Module offered by		
Dean o	Dean of Studies Mathematik (Mathematics)		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 seme	ster	graduate				
Conten	ts					
optima Recomi	lity, me mende	ethods for numerical solu d previous knowledge:	tion.		optimal control, conditions for	
quired	in the r		Functional Analysis"	and "Ordinary Differ	equations, such as can be ac- ential Equations". Knowledge of	
Intende	ed lear	ning outcomes				
		acquainted with advanc questions in continuous (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) +	Ü (1)	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. 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 es per candidate)	ıbsequent semester	
Allocat	ion of _l	olaces				
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teachi	ng cvcl	e				
	<u> </u>					
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)					
Kerente	u to m					
Module	20002	ars in				
		ee (1 major) Mathematics	International (2015)			
	-	ee (1 major) Mathematics ee (1 major) Mathematics				
	-	ee (1 major) Mathematics				
	-	ee (1 major) Mathematics				

Modul	e title			Abbreviation			
Partial	Differential Equations of Mat	hematical Physics	1	10-M=VPDPin-152-m01			
Module coordinator			Module offered by				
	of Studies Mathematik (Mathe	matics)	Institute of Mathema	tics			
ECTS	Method of grading	Only after succ. con					
10	numerical grade						
Duratio		Other prerequisites					
1 seme							
Conter	1-						
examp ons an Recom Basic k	, parabolic, and hyperbolic ed les; initial and boundary valu d generalisations; Hilbert spa mended previous knowledge knowledge from the modules ons" is recommended, as wel	e problems; well-posed ice methods; Sobolev s : "Ordinary Differential Ec	and ill-posed probler paces and Fourier trar quations" and "Introdu	ns; solution methods; extens isforms.			
Intend	ed learning outcomes						
equation between	udent is acquainted with fund ons, as well as standard exam en his/her acquired skills and	ples from mathematica other branches of math	Il physics. He/She is a nematics and question	ble to establish a connections in physics.			
	es (type, number of weekly con	ntact hours, language –	- if other than German)			
V (4) + Module	Ü (2) e taught in: English						
b) oral c) oral Langua Assess	ten examination (approx. 90 t examination of one candidate examination in groups (group age of assessment: English sment offered: In the semeste able for bonus	e each (approx. 20 minu s of 2, 15 minutes per c	utes) or andidate)	osequent semester			
Allocat	tion of places						
Additio	onal information						
Worklo	ad						
300 h							
-	ng cycle						
Teacin							
Referre	ed to in LPO I (examination re	gulations for teaching-	degree programmes)				
Modul	e appears in						
	r's degree (1 major) Mathemat	ics International (2015)					
Master	Master's degree (1 major) Physics International (2020)						
Master							
Master Master	r's degree (1 major) Mathemat	ics International (2021)					
Master Master Master	r's degree (1 major) Mathemat r's degree (1 major) Mathemat	ics International (2021) ics International (2022)					
Master Master Master Master	r's degree (1 major) Mathemat r's degree (1 major) Mathemat r's degree (1 major) Physics In	ics International (2021) ics International (2022) ternational (2024)					
Master Master Master Master Master	r's degree (1 major) Mathemat r's degree (1 major) Mathemat	ics International (2021) ics International (2022) ternational (2024) ics International (2025)		reg. data re- page 86 / g			

Module	title			Abbreviation			
Pseudo Riemannian and Riemannian Geometry				10-M=VPRGin-152-r	n01		
Module coordinator			Module offered by				
Dean of	Studies Mathematik (Mathen	natics)	Institute of Mathem	natics			
	Method of grading	Only after succ. con	npl. of module(s)				
10	numerical grade						
Duration	n Module level	Other prerequisites					
1 semes	ter graduate						
Content	S						
nian and map, Jao Laplace theory.	dule builds on the topics cove d pseudo-Riemannian manifo cobi fields, comparison theor operators, causal structure o nended previous knowledge:	lds, Levi-Civita connec ems in Riemannian ge	tion and curvature, g ometry, submanifold	geodesics and the ex ls, integration, d'Aler	ponential mbert and		
Advance Geomet	ed knowledge of differential g ry". Knowledge of the content ory" is also recommended.	, , , , , , , , , , , , , , , , , , , ,					
Intende	d learning outcomes						
manifol	dent is acquainted with advar ds. He/She is able to establis cs and questions in physics.						
Courses	(type, number of weekly con	tact hours, language –	- if other than Germa	ın)			
V (4) + Ü							
	taught in: English						
	of assessment (type, scope, ormation on whether module			ition offered — if not	every seme-		
b) oral e c) oral e Languag	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						
	on of places						
Addition	nal information						
Workloa	ad						
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) Physics International (2020) Master's degree (1 major) Mathematics International (2021)							
Master's wit (2015)	h 1 major Mathematics International		enerated 18-Apr-2025 • exam o ECTS) Mathematics Internat	-	page 87 / 93		



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	
Statistical Analysis					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	1	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	oonent 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	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			ation offered — if not every seme-	
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 I	olaces				
Additio	onal inf	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)						
Mastar	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 cvcl	9				
Referre	ed to in	LPOI (examination regu	lations for teaching-o	legree programmes)		
Module	e appea	irs in				
		ee (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 title					Abbreviation	
Insurance Mathematics 2					10-M=VVSMin-152-m01	
Module coordinator				Module offered by		
		es Mathematik (Math	ematics)	Institute of Mathem	natics	
ECTS	1	od of grading	Only after succ. con	•	lattes	
10		rical grade				
Duratio		Module level	Other prerequisites			
1 seme		graduate				
Conten		3.44440				
lives: n Markov ons, jo	nodern / chain int life	valuation in life insur	ance mathematics, axio s differential equations,	matic derivation of t	nodels regarding one life or two he product measure approach, equations, numerical applicati-	
		h the contents of the ongly recommended.	modules "Insurance Mat	hematics 1" and "Se	lected Topics in Financial Mathe-	
Intend	ed lear	ning outcomes				
					le gains the ability to work on her skills to complex problems.	
Course	s (type	, number of weekly co	ontact hours, language –	- if other than Germa	in)	
V (4) +	Ü (2)	t in: English				
			e, language — if other tha le can be chosen to earn		tion offered — if not every seme-	
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 _l	olaces				
Additio	onal inf	ormation				
Worklo	ad					
300 h						
-	ng cycl	e				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
			esatutions for teaching-(
Modula	e appea	urs in				
			tics International (2015)			
	-		itics International (2013)			
Master's degree (1 major) Mathematics International (2022)						
Master's degree (1 major) Mathematics International (2025)						

Module title					Abbreviation		
Networked Systems					10-M=VVSYin-152-m01		
Module coordinator				Module offered by			
		es Mathematik (Mathema	atics)	Institute of Mathem	atics		
ECTS	—	od of grading	Only after succ. com				
5	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	Its						
system	is); ana	topics in networked line lysis of control-theoretica d previous knowledge:			mogenous and non-homogenous tc.).		
Basic k	nowled	ge of the contents of the	module "Ordinary Di	fferential Equations	" is useful.		
Intend	ed learr	ning outcomes					
		acquainted with advanc ary research questions in			tems. He gains the ability to work		
Course	s (type	number of weekly conta	ct hours, language —	if other than Germa	n)		
V (3) +							
		t in: English					
		essment (type, scope, la on on whether module ca			tion offered — if not every seme-		
b) oral c) oral Langua Assess	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	ion 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's degree (1 major) Mathematics International (2025)							

Module title				Abbreviation		
Time Series Analysis 2					10-M=VZRAin-152-m01	
Module coordinator				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)		
10	nume	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				
		acquainted with advanc earch questions in this fi		eries analysis. He ga	ains the ability to work on con-	
Course	s (type,	, number of weekly conta	ct hours, language —	if other than Germa	n)	
V (4) + Module		t 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 						
Allocat	ion of p	olaces				
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 (201)					