

# 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



## Contents

The subject is divided into	4
Learning Outcomes	5
Abbreviations used, Conventions, Notes, In accordance with	6
Compulsory Electives	
	7
Mathematics	8
Applied Analysis	9
Topics in Algebra	11
Differential Geometry	12
Complex Analysis Geometric Structures	13
Industrial Statistics 1	14
Lie Theory	15 16
Numeric of Large Systems of Equations	10
Basics in Optimization	10
Control Theory	20
Stochastic Models of Risk Management	20
Stochastical Processes	22
Topology	23
Insurance Mathematics 1	24
Time Series Analysis 1	25
Number Theory	26
Giovanni Prodi Lecture (Master)	28
Selected Topics in Analysis	30
Algebraic Topology	31
Selected Topics in Financial Mathematics	32
Groups and their Representations	33
Geometrical Mechanics	34
Industrial Statistics 2	36
Field Arithmetics	37
Numeric of Partial Differential Equations	38
Selected Topics in Optimization	39
Statistical Analysis	40
Insurance Mathematics 2	41
Time Series Analysis 2	42
Discrete Mathematics	43
Dynamical Systems	44
Aspects of Geometry	45
Mathematical Continuum Mechanics	46
Mathematical Imaging	47
Selected Topics in Mathematical Physics	48
Selected Topics in Control Theory	49
Inverse Problems Module Theory	50
Non-linear Analysis	51
Optimal Control	52
Networked Systems	53
Complex Geometry	54
Partial Differential Equations of Mathematical Physics	55 56
Pseudo Riemannian and Riemannian Geometry	58
Functional Analysis	60
Applied Differential Geometry	61
Giovanni Prodi Lecture Selected Topics (Master)	62
Giovanni Prodi Lecture Advanced Topics (Master)	64
	~+

Giovanni Prodi Lecture Modern Topics (Master)	66
Research in Groups and Seminars	68
Research in Groups - Algebra	69
Research in Groups - Discrete Mathematics	70
Research in Groups - Dynamical Systems and Control Theory	71
Research in Groups - Complex Analysis	72
Research in Groups - Geometry and Topology	73
Research in Groups - Mathematics in Context	74
Research in Groups - Mathematics in the Sciences	75
Research in Groups - Measure and Integral	76
Research in Groups - Numerical Mathematics and Applied Analysis	77
Research in Groups - Robotics, Optimization and Control Theory	78
Research in Groups - Time Series Analysis	79
Research in Groups - Statistics	80
Research in Groups - Number Theory	81
Research in Groups - Control Theory of Quantum Mechanical Systems	82
Research in Groups - Differential Geometry	83
Research in Groups - Deformation Quantization	84
Research in Groups - Non-linear Analysis	85
Research in Groups - Operator Algebras	86
Seminar in Applied Differential Geometry	87
Seminar in Algebra	88
Seminar in Dynamical Systems and Control	89
Seminar in Complex Analysis	90
Seminar in Financial and Insurance Mathematics	91
Seminar in Geometry and Topology	92
Giovanni Prodi Seminar (Master)	93
Interdisciplinary Seminar	95
Seminar Mathematics in the Sciences	96
Seminar in Numerical Mathematics and Applied Analysis	97
Seminar in Optimization	98
Seminar in Statistics	99
Seminar in Non-linear Analysis	100
Thesis	101
Master Thesis Mathematics International	102

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## The subject is divided into

section / sub-section	ECTS credits	starting page
Compulsory Electives	90	7
Mathematics	30	8
Research in Groups and Seminars	20	68
Thesis	30	101

### Learning Outcomes

#### Scientific qualification

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- 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:

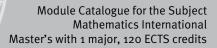
#### ASPO2015

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.





## **Compulsory Electives**

(90 ECTS credits)



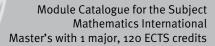


## Mathematics

(30 ECTS credits)

Module title				Abbreviation		
Applied Analysis			10-M=AAANin-152-r	m01		
Module	e coord	inator		Module offered by		
Dean o	fStudi	es Mathematik (Mathen	natics)	Institute of Mathem	atics	
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					
theory of particul theory of theory of the theory of theory of the theory of the theory of the theory of the theor	In-depth study of functional analysis and operator theory, Sobolev spaces and partial differential equations, theory of Hilbert spaces and Fourier analysis, spectral theory and quantum mechanics, numerical methods (in particular FEM methods), principles of functional analysis, function spaces, embedding theorems, compactness, theory of elliptic, parabolic and hyperbolic partial differential equations with methods from functional analysis. Recommended previous knowledge:					
		ning outcomes				
The stu to estal	dent is blish a	acquainted with the fu connection between hi ther natural and engine	s/her acquired skills a			
Course	<b>S</b> (type, n	umber of weekly contact hours	, language — if other than Ge	rman)		
V (4) + Module		t in: English				
		<b>essment</b> (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	on on whether
<ul> <li>a) written examination (approx. 90 to 120 minutes, usually chosen) or</li> <li>b) oral examination of one candidate each (approx. 20 minutes) or</li> <li>c) oral examination in groups (groups of 2, 15 minutes per candidate)</li> <li>Language of assessment: English</li> <li>Assessment offered: In the semester in which the course is offered and in the subsequent semester creditable for bonus</li> </ul>						
Allocat						
Additio	nal inf	ormation				
Worklo	ad					
300 h						
Teachir	ıg 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)						
	-	Mathematics International	JMU Würzburg ● g	enerated 18-Apr-2025 • exam o ECTS) Mathematics Internat	-	page 9 / 102
(2015)			Coru Master (12)	s cors) mathematics interfial	ional - 2015	





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

Module title			Abbreviation		
Topics in Algebra				10-M=AALGin-152-m01	
Module	coord	inator		Module offered by	
Dean of	fStudie	es Mathematik (Mathema	tics)	Institute of Mathem	atics
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
10	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten					
algebra		topics in algebra, for exa d previous knowledge:	imple coding theory,	elliptic curves, alget	oraic combinatorics or computer
Basic k "Applie			l, such as can be acq	uired in the modules	s "Introduction to Algebra" and
Intende	ed learr	ning outcomes			
		acquainted with fundam se skills to complex ques		nethods in a contem	porary field of algebra, and is ab-
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (4) + I Module		t in: English			
		<b>essment</b> (type, scope, langua <sub>)</sub> le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
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 if 2, 15 minutes per ca	tes) 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					
	Master's degree (1 major) Mathematics International (2015) Master's degree (1 major) Mathematics International (2021)				
	-	ee (1 major) Mathematics			
	-	ee (1 major) Mathematics			
				· · · · · · · · · · · · · · · · · · ·	

Module title			Abbreviation			
Differential Geometry			10-M=ADGMin-152-	m01		
Module	e coord	inator		Module offered by		
Dean o	f Studi	es Mathematik (Mather	natics)	Institute of Mathem	atics	
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					
folds. Recom	mende	dvanced results in diffe d previous knowledge: lge from the modules "				
		s" is recommended. ning outcomes				
The stu	dent is	acquainted with conce hese methods and kno				
Course	<b>S</b> (type, r	umber of weekly contact hours	s, language — if other than Ge	rman)		
V (4) + Module		t in: English				
Method	d of ass	e <b>essment</b> (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	on on whether
b) oral c) oral e Langua	examir examin ge 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 minu 5 of 2, 15 minutes per c	utes) or andidate)	ıbsequent semester	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
300 h						
Teachir	ng cycl	e				
<b>Referred to in LPO I</b> (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)						
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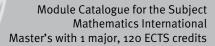
Module title			Abbreviation			
Complex Analysis			10-M=AFTHin-152-m	101		
Module	e coord	inator		Module offered by		
Dean o	f Studi	es Mathematik (Mathen	natics)	Institute of Mathem	atics	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
10	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
geomet ons (e. Recom	In-depth study of mapping properties of analytic functions and their generalisations with modern analytic and geometric methods. Structural properties of families of holomorphic and meromorphic functions. Special functi- ons (e. g. elliptic functions). Recommended previous knowledge: Basic knowledge of the contents of the module "Introduction to Complex Analysis" is recommended.					
Intende	ed lear	ning outcomes				
ticulart	the (ge	acquainted with the fu ometric) mapping prop ner acquired skills and o	erties of holomorphic f	unctions. He/She is	able to establish a c	onnection
Course	<b>S</b> (type, r	number of weekly contact hours	, language — if other than Gei	man)		
V (4) + Module		t in: English				
module is	creditab	<b>sessment</b> (type, scope, langu le for bonus)			t every semester, informati	on on whether
<ul> <li>a) written examination (approx. 90 to 120 minutes, usually chosen) or</li> <li>b) oral examination of one candidate each (approx. 20 minutes) or</li> <li>c) oral examination in groups (groups of 2, 15 minutes per candidate)</li> <li>Language of assessment: English</li> <li>Assessment offered: In the semester in which the course is offered and in the subsequent semester creditable for bonus</li> </ul>						
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
300 h						
Teachir	ng cycl	e				
<b>Referred to in LPO I</b> (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)						
Master's wi (2015)	th 1 majo	r Mathematics International		enerated 18-Apr-2025 • exam ECTS) Mathematics Internat	-	page 13 / 102

Module title				Abbreviation	
Geometric Structures				10-M=AGMSin-152-m01	
Module	coord	inator		Module offered by	
Dean of	fStudie	es Mathematik (Mathema	atics)	Institute of Mathem	atics
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
10	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate			
Conten	ts				
ang cor	dition	generalised polygons or s, classification results. d previous knowledge:	related geometric str	uctures, automorph	isms, BN pairs in groups, Mouf-
	nowled		troduction to Differen	tial Geometry" and "	Introduction to Topology" is re-
Intende	ed learr	ning outcomes			
structu	re. He/		connection between	these results and b	oncerning a type of geometric roader theories, and learns
Courses	<b>5</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (4) + l Module		t in: English			
		e <b>ssment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
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
Allocati	ion of p	olaces			
Additio	nal info	ormation			
Worklo	ad				
300 h					
Teaching cycle					
<b>Referred to in LPO I</b> (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 ee (1 major) Mathematics			
musici					

Module title				Abbreviation	
Industrial Statistics 1				10-M=AISTin-152-m01	
coord	inator		Module offered by		
fStudie	es Mathematik (Mathema	atics)	Institute of Mathem	atics	
Metho	od of grading	Only after succ. com	pl. of module(s)		
nume	rical grade				
n	Module level	Other prerequisites			
ster	graduate				
ts					
ed learr	ning outcomes				
dent m	asters the fundamental s	statistical methods fo	or industrial applicati	ions.	
<b>5</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
	t in: English				
		ge — if other than German, e	examination offered — if no	t every semester, information on whether	
examin examin ge of a ment o	ation of one candidate e ation in groups (groups c ssessment: English ffered: In the semester in	ach (approx. 20 minu of 2, 15 minutes per ca	ites) or andidate)	ıbsequent semester	
nal info	ormation				
ad					
300 h Teaching cycle					
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)					
Module appears in					
Master's degree (1 major) Mathematics International (2015)					
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	ial Stat ial Stat coordi f Studie Metho numer n ster ts of para analysi ed learr dent m s (type, n U (2) taught i dag t (2) tau	ial Statistics 1 ial Statistics 1 coordinator f Studies Mathematik (Mathema Method of grading numerical grade n Module level ster graduate ts of parameter and domain estim analysis, comparative analysis, ed learning outcomes dent masters the fundamental es f (type, number of weekly contact hours, le U (2) taught in: English l of assessment (type, scope, langua creditable for bonus) en examination (approx. 90 to 1 examination of one candidate e examination in groups (groups of ge of assessment: English ment offered: In the semester in ble for bonus ion of places nal information ad to in LPO I (examination regulations s degree (1 major) Mathematics s degree (1 major) Mathematics s degree (1 major) Mathematics	ial Statistics 1  coordinator  f Studies Mathematik (Mathematics)  Method of grading Numerical grade n Module level Other prerequisites  ster graduate ts  of parameter and domain estimates, tests for statistic analysis, comparative analysis, statistical product te ed learning outcomes dent masters the fundamental statistical methods for S (type, number of weekly contact hours, language — if other than Gerr U (2) taught in: English I of assessment (type, scope, language — if other than German, e rereditable for bonus) en examination (approx. 90 to 120 minutes, usually 0 examination of one candidate each (approx. 20 minutes examination in groups (groups of 2, 15 minutes per ca ge of assessment: English ment offered: In the semester in which the course is ble for bonus ion of places  nal information ad  s degree (1 major) Mathematics International (2021) s degree (1 major) Mathematics International (2021) s degree (1 major) Mathematics International (2021) s degree (1 major) Mathematics International (2022)	ial Statistics 1       Module offered by         is coordinator       Institute of Mathematics)       Institute of Mathematics)         is fitudies Mathematik (Mathematics)       Institute of Mathematics)       Institute of Mathematics)         in Module level       Only after succ. compl. of module(s)       Institute of Mathematics         n       Module level       Other prerequisites         ster       graduate          ts       of parameter and domain estimates, tests for statistical estimates, distrianalysis, comparative analysis, statistical product testing, survey samplied learning outcomes         determing outcomes       determing outcomes         determing outcomes	

Module title			Abbreviation			
Lie Theory			10-M=ALTHin-152-n	101		
Module	e coord	inator		Module offered by		
Dean o	f Studi	es Mathematik (Mathen	natics)	Institute of Mathem	atics	
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					
exampl Recom Basic k	les, app mende mowleo	ups and their Lie algebr olications, e.g. in physi d previous knowledge: dge of the contents of th nermore, basic knowled	cs and control theory. ne modules "Functiona	l Analysis" and "Intro	oduction to Topology	/" is recom-
Intende	ed lear	ning outcomes				
	hese to	acquainted with the fu common problems, an				
Course	<b>S</b> (type, r	number of weekly contact hours	, language — if other than Ge	rman)		
V (4) + Module		t in: English				
		sessment (type, scope, langule for bonus)	uage — if other than German,	examination offered — if no	t every semester, informat	on on whether
<ul> <li>a) written examination (approx. 90 to 120 minutes, usually chosen) or</li> <li>b) oral examination of one candidate each (approx. 20 minutes) or</li> <li>c) oral examination in groups (groups of 2, 15 minutes per candidate)</li> <li>Language of assessment: English</li> <li>Assessment offered: In the semester in which the course is offered and in the subsequent semester</li> <li>creditable for bonus</li> </ul>						
Allocat	ion of J	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) 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 wi (2015)	пп т тајо	r Mathematics International		enerated 18-Apr-2025 • exam c ECTS) Mathematics Internat	-	page 16 / 102





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

Numeric of Large Systems of Equations         10-M=ANGGin-152-m01           Module correlinator         Module offered by           Dean of Studies Mathematik (Mathematics)         Institute of Mathematics           COT         Method of grading         Only after succ. comp L of module(S)           In umerical grade	Module title				Abbreviation	
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           Discretisation of elliptic differential equations, classical iteration methods, preconditioners, multigrid methods.         Recommended previous knowledge:       Basic knowledge of numerical mathematics, such as that acquired in the modules "Numerical Mathematics 1" and "Numerical Mathematics 2", is required. Knowledge of the contents of the module "Basics in Optimization" is also recommended.         Intended learning outcomes          The student is acquainted with the most important methods for solving large systems of equations, and knows the most efficient way to solve a given system of equations.         Courses dype, number of weekly contact hours, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus         a) written examination (approx. yo to 120 minutes, usually chosen) or       b) oral examination of one candidate each (approx. 20 minutes) or         c) oral examination in groups [grups]       2, 15 minutes per candidate)          Language of assessment (free, using high mathematics for eaching degree programmes)         <	Numeric of Large Systems of Equations			10-M=ANGGin-152-m01		
ECTS       Method of grading       Only after succ. compl. of module(s)         10       numerical grade	Module	coord	inator		Module offered by	
10       numerical grade          Duration       Module level       Other prerequisites         1 semester       graduate          Contents           Discretisation of elliptic differential equations, classical iteration methods, preconditioners, multigrid methods.         Recommended previous knowledge:       Basic knowledge of numerical mathematics, such as that acquired in the modules "Numerical Mathematics 1" and "Numerical Mathematics 2", is required. Knowledge of the contents of the module "Basics in Optimization" is also recommended.         Intended learning outcomes	Dean of	fStudie	es Mathematik (Mathema	itics)	Institute of Mathem	atics
Duration         Module level         Other prerequisites           1 semester         graduate            Contents	ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
1 semester       graduate          Contents         Discretisation of elliptic differential equations, classical iteration methods, preconditioners, multigrid methods.         Recommended previous knowledge:       Basic knowledge of numerical mathematics, such as that acquired in the modules "Numerical Mathematics 1" and "Numerical Mathematics 2", is required. Knowledge of the contents of the module "Basics in Optimization" is also recommended.         Intended learning outcomes       Intended learning outcomes         The student is acquainted with the most important methods for solving large systems of equations, and knows the most efficient way to solve a given system of equations.         Courses (type, number of weekly contact hours, language – if other than German)       V (a) + 0 (a)         Module taught in: English       Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)         a) written examination (approx, 90 to 120 minutes, usually chosen) or b) 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            Referred to In LPO I (examination regulations for teaching-degree programmes) <t< td=""><td>10</td><td>nume</td><td>rical grade</td><td></td><td></td><td></td></t<>	10	nume	rical grade			
Contents         Discretisation of elliptic differential equations, classical iteration methods, preconditioners, multigrid methods.         Recommended previous knowledge:         Basic knowledge of numerical mathematics, such as that acquired in the modules "Numerical Mathematics 1" and "Numerical Mathematics 2", is required. Knowledge of the contents of the module "Basics in Optimization" is also recommended.         Intended learning outcomes         The student is acquainted with the most important methods for solving large systems of equations, and knows the most efficient way to solve a given system of equations.         Courses (type, number of weekly contact hours, language – if other than German)         V (a) + 0 (2)         Module taught in: English         Method of assessment (type, scope, language – if other than German, examination offered – if not every senseter, information on whether module is creditable for bonus)         a) written examination (approx. 90 to 120 minutes, usually chosen) or         b) 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         -         -         Motificanal information         -         -         Motificanal information         - <tr< td=""><td>Duratio</td><td>n</td><td>Module level</td><td>Other prerequisites</td><td></td><td></td></tr<>	Duratio	n	Module level	Other prerequisites		
Discretisation of elliptic differential equations, classical iteration methods, preconditioners, multigrid methods. Recommended previous knowledge: Basic knowledge of numerical mathematics, such as that acquired in the modules "Numerical Mathematics 1" and "Numerical Mathematics 2", is required. Knowledge of the contents of the module "Basics in Optimization" is also recommended. Intended learning outcomes The student is acquainted with the most important methods for solving large systems of equations, and knows the most efficient way to solve a given system of equations. Courses (type, number of weekly contact hours, language – if other than German) V (4) + 0 (2) Module taught in: English Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) a) written examination of one candidate each (approx. 20 minutes) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination of one candidate each (approx. 20 minutes) or c) oral examination of nore candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, 15 minutes per candidate) Language of assessment: English Adssessment offered: In the semester in which the course is offered and in the subsequent semester c- Additional information  Workload 300 h Teaching cycle  Referred to in LPO1 (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 (2021) Master's degree (1 major) Mathematics International (2022)	1 seme	ster	graduate			
Recommended previous knowledge: Basic knowledge of numerical mathematics, such as that acquired in the modules "Numerical Mathematics 1" and "Numerical Mathematics 2", is required. Knowledge of the contents of the module "Basics in Optimization" is also recommended. Intended learning outcomes The student is acquainted with the most important methods for solving large systems of equations, and knows the most efficient way to solve a given system of equations. Courses (type, number of weekly contact hours, language – if other than German) V (a) + Ü (2) Module taught in: English Method of assessment (type, scope, language – if other than German, examination offered – if not every senester, information on whether module is creditable for 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  Motkload 300 h Teaching cycle  Referred to in LPO 1 (examination regulations for teaching-degree programmes)  Madule appears in Master's degree (1 major) Mathematics International (2015) Master's degree (1 major) Mathematics International (2022)	Conten	ts				
Intended learning outcomes         The student is acquainted with the most important methods for solving large systems of equations, and knows the most efficient way to solve a given system of equations.         Courses (type, number of weekly contact hours, language – if other than German)         V (a) + Ü (z)         Module taught in: English         Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)         a) written examination (approx. 90 to 120 minutes, 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            Morkload         300 h            Mokload saves for teaching-degree programmes)            Mokload         300 h         Teaching cycle            Module appears in         Master's degree (1 major) Mathematics International (2015)         Master's degree (1 major) Mathematics International (2021)	Recomr Basic k and "Ni	nendeo nowled umerica	d previous knowledge: Ige of numerical mathem al Mathematics 2", is req	atics, such as that ac	quired in the modul	es "Numerical Mathematics 1"
The student is acquainted with the most important methods for solving large systems of equations, and knows the most efficient way to solve a given system of equations. 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 semester, information on whether module is creditable for homus) 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 homus Allocation of places Additional information Workload 300 h Teaching cycle Referred to in LPO I (examination for teaching-degree programmes) Module appears in Master's degree (1 major) Mathematics International (2015) Master's degree (1 major) Mathematics International (2022)						
V (4) + Ü (2) Module taught in: English Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) a) written examination (approx. 90 to 120 minutes, 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  Motkload 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 (2022)	The stu	dent is	acquainted with the mos		for solving large sys	stems of equations, and knows
Module taught in: English Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) a) written examination (approx. 90 to 120 minutes, 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) Mathematics International (2022)	Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
module is creditable for 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 (2021) Master's degree (1 major) Mathematics International (2022)			t in: English			
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) Mathematics International (2022)				ge — if other than German, e	examination offered — if no	t every semester, information on whether
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 Asseessment 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) Mathematics International (2022)	· · · · · · · · · · · · · · · · · · ·		,			
Additional information Morkload 300 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in Master's degree (1 major) Mathematics International (2015) Master's degree (1 major) Mathematics International (2021) Master's degree (1 major) Mathematics International (2022)	b) oral ( c) oral ( Langua Assess	examin examin ge of a ment o	ation of one candidate e ation in groups (groups c ssessment: English ffered: In the semester in	ach (approx. 20 minu if 2, 15 minutes per ca	tes) or andidate)	ıbsequent semester
 Workload 300 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in Master's degree (1 major) Mathematics International (2015) Master's degree (1 major) Mathematics International (2021) Master's degree (1 major) Mathematics International (2022)	Allocat	ion of p	olaces			
 Workload 300 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in Master's degree (1 major) Mathematics International (2015) Master's degree (1 major) Mathematics International (2021) Master's degree (1 major) Mathematics International (2022)						
300 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in Master's degree (1 major) Mathematics International (2015) Master's degree (1 major) Mathematics International (2021) Master's degree (1 major) Mathematics International (2022)	Additio	nal info	ormation			
300 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in Master's degree (1 major) Mathematics International (2015) Master's degree (1 major) Mathematics International (2021) Master's degree (1 major) Mathematics International (2022)						
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)	Worklo	ad				
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)	300 h					
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)	Teaching cycle					
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 (2015) Master's degree (1 major) Mathematics International (2021) Master's degree (1 major) Mathematics International (2022)	Referred to in LPO I (examination regulations for teaching-degree programmes)					
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 (2021) Master's degree (1 major) Mathematics International (2022)						
Master's degree (1 major) Mathematics International (2022)						
-						
		-				

Module title			Abbreviation		
Basics in Optimization				10-M=AOPTin-152-m01	
Module	coord	inator		Module offered by	
Dean of	fStudie	es Mathematik (Mathema	atics)	Institute of Mathem	atics
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
10	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate			
Conten	ts				
					optimization, conditions for opti- eering sciences as well as econo-
Intende	ed learr	ning outcomes			
		nows the fundamental me ecide which method is th			lge their strengths and weaknes-
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (4) + l Module		t in: English			
		e <b>essment</b> (type, scope, langua; le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
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	ites) or andidate)	ıbsequent semester
Allocati					
Additio	nal info	ormation			
Worklo	ad				
300 h					
Teaching cycle					
<b>Referred to in LPO I</b> (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			
mastel	Master's degree (1 major) Mathematics International (2025)				

Module title				Abbreviation	
Control Theory					10-M=ARTHin-152-m01
Module	coord	inator		Module offered by	
Dean of	fStudie	es Mathematik (Mathema	atics)	Institute of Mathem	atics
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
10	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme		graduate			
Conten					
bility, b	asics i	n optimal control.	theory: stability, cont	rollability and obser	vability, state feedback and sta-
		d previous knowledge: lge of the contents of the	module "Ordinary Di	fferential Equations'	' is useful.
		ing outcomes	,	1	
The stu blish a	dent is connec	acquainted with the fund			theory. He/She is able to esta- It the interactions of geometry
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (4) + I Module		t in: English			
		e <b>essment</b> (type, scope, langua; le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
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	ites) or andidate)	ibsequent semester
Allocat	ion of p	olaces			
Additio	nal info	ormation			
Worklo	ad				
300 h					
Teachir	ng cycl	9			
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)				
Module	annea	urs 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	
Stochastic Models of Risk Management					10-M=ASMRin-152-m01	
Module	coord	inator		Module offered by		
Dean of	fStudie	es Mathematik (Mathema	atics)	Institute of Mathem	atics	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
10	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
res, val la, mod estimat series a	ue at ri lelling o es of s analysis	sk, conditional value at r of functional interrelation hortfall measures, estima	isk, axiomatic of risk is, regression models ates of value at risk a al smoothing, predict	measures, modellin , basics in time serie nd conditional value ions and prediction	ent in auditing, shortfall measu- g of interdependencies, copu- es modelling, aggregated losses, e at risk, basics in empirical time domains, estimates of value at ls.	
Intende	ed learr	ning outcomes				
The stu	dent is	acquainted with the fun	damental methods of	f stochastic risk anal	lysis.	
Courses	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V (4) + I Module		t in: English				
			ge — if other than German, e	examination offered — if no	t every semester, information on whether	
· · · · · · · · · · · · · · · · · · ·		le for bonus) nination (approx. 90 to 1		shocop) or		
b) oral ( c) oral ( Langua	examin examin ge of a ment o	ation of one candidate e ation in groups (groups c ssessment: English ffered: In the semester in	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 cycl	e				
Referre	d to in	LPOI (examination regulations	s for teaching-degree progra	mmes)		
Module	e appea	ars in				
	-	ee (1 major) Mathematics				
	-	ee (1 major) Mathematics ee (1 major) Mathematics				
	-	ee (1 major) Mathematics				

Module title					Abbreviation	
Stochastical Processes					10-M=ASTPin-152-m01	
Module coordinator				Module offered by		
Dean of	fStudie	es Mathematik (Mathema	atics)	Institute of Mathem	atics	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
10	numei	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
Markov	chains	s, queues, stochastic pro	cesses in C[0,1], Brov	vnian motion, Donsk	er's theorem, projective limits.	
Basic k	nowled	d previous knowledge: lge of stochastics is requ f the module "Stochastic			astics 1" module. Knowledge of	
Intende	ed learr	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	<b>5</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V (4) + I Module		t in: English				
			ge — if other than German, e	examination offered — if no	t every semester, information on whether	
		le for bonus)				
		nination (approx. 90 to 1				
		ation of one candidate e ation in groups (groups o		-		
Langua	ge of a	ssessment: English				
Assess credital		ffered: In the semester in	which the course is	offered and in the su	bsequent semester	
Allocat						
	•					
Additio	nal info	ormation				
Worklo	ad					
300 h						
Teachir	ng cyclo	e				
Referre	<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)					
Module	appea	irs 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)					

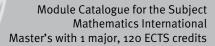
Module title					Abbreviation	
Topology					10-M=ATOPin-152-m01	
Module	coord	inator		Module offered by		
Dean of	fStudie	es Mathematik (Mathema	atics)	Institute of Mathem	atics	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
10	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate				
Conten	ts					
		opology, topological inva ing spaces.	ariants (e. g. fundame	ental 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	
Courses	<b>5</b> (type, n	umber of weekly contact hours, la	anguage — if other than Ger	man)		
V (4) + l Module		t in: English				
Method	l of ass		ge — if other than German, e	examination offered — if no	t every semester, information on whether	
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	ites) or andidate)	ıbsequent semester	
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
300 h						
Teachir	ng cycl	e				
Referre	d to in	LPO I (examination regulations	for teaching-degree progra	mmes)		
Module						
	-	ee (1 major) Mathematics	-			
	-	ee (1 major) Physics Inter ee (1 major) Mathematics				
	-	ee (1 major) Mathematics				
	-	ee (1 major) Physics Inter				
		ee (1 major) Mathematics				

Module title				Abbreviation	
Insuran	ice Mat	hematics 1			10-M=AVSMin-152-m01
Module	coord	inator		Module offered by	
Dean of	fStudie	es Mathematik (Mathema	atics)	Institute of Mathem	atics
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
10	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate			
Conten	ts				
types o	f benef		tion principle, premiu	Im calculation, comr	bles, life table approximations, nutation functions, reserves and n.
Depend	ling on	d previous knowledge: the content, basic and a e of doubt, it is recomme			of statistics or stochastics is re-
Intende	ed learn	ning outcomes			
		acquainted with the fund actical problems.	damental notions and	d methods of life ins	urance mathematics and can ap-
Courses	<b>S</b> (type, n	umber of weekly contact hours, la	anguage — if other than Ger	man)	
V (4) + Í Module		t in: English			
		e <b>essment</b> (type, scope, languag le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
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 o ssessment: English ffered: In the semester in bonus	ach (approx. 20 minu of 2, 15 minutes per ca	ites) or andidate)	ibsequent semester
Allocati	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
300 h					
Teachir	ng cycl	9			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module					
	-	ee (1 major) Mathematics			
	-	ee (1 major) Mathematics ee (1 major) Mathematics			
	-	ee (1 major) Mathematics			
	-				

Module title					Abbreviation
Time Series Analysis 1					10-M=AZRAin-152-m01
Module	coord	inator		Module offered by	
Dean of	fStudie	es Mathematik (Mathema	atics)	Institute of Mathem	atics
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
10	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
Recomr Basic k	nendeo nowled	d previous knowledge:	ired, such as that acc	quired in the "Stocha	rocesses, Box-Jenkins method. astics 1" module. Knowledge of
		ning outcomes			
	dent is	-	damental methods of	f time series analysis	and can apply them to practical
Course	<b>5</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (4) + I Module		t in: English			
		e <b>essment</b> (type, scope, langua <sub>)</sub> le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
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	ites) or andidate)	ıbsequent semester
Allocat	ion of p	olaces			
Additio	nal info	ormation			
Worklo	ad				
300 h					
Teachir	ng cycl	9			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module					
	-	ee (1 major) Mathematics			
Master'	Master's degree (1 major) Mathematics International (2021)				

Module title Abbreviation						
Number Theory					10-M=AZTHin-152-n	101
Module	coord	inator		Module offered by		
Dean of	fStudie	es Mathematik (Mathen	natics)	Institute of Mathem	atics	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
10	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate				
Conten	ts					
applica overvie Recomr Basic k	tions to w of th mendeo nowled	etic functions and their o prime number distribu e development of mode d previous knowledge: lge of algebra and num , "Introduction to Numb	ution and diophantine rn number theory. ber theory is assumed,	equations; discussion, such as can be acqu	on of the Riemann hy	ypothesis,
	-	ning outcomes				
The stu structur	dent is res in n	acquainted with the fu umber theory and knov evelopments in numbe	vs methods for the sol			
Courses	<b>S</b> (type, n	umber of weekly contact hours	, language — if other than Ger	man)		
V (4) + Í Module		t in: English				
Method	l of ass	<b>essment</b> (type, scope, langu	uage — if other than German, o	examination offered — if no	t every semester, informati	on on whether
module is	creditab	le for bonus)				
b) oral ( c) oral ( Langua	examin examin ge 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 minu of 2, 15 minutes per c	utes) or andidate)	ıbsequent semester	
Allocati						
Additio	nal inf	ormation				
Worklo	ad					
300 h						
Teachir	ng cycl	e				
Referre	d to in	LPOI (examination regulation	ns for teaching-degree progra	mmes)		
	Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module	appea	rs in				
		ee (1 major) Mathematio	s International (2015)			
	-	ee (1 major) Physics Inte				
	-	ee (1 major) Mathematic				
	-	ee (1 major) Mathematio ee (1 major) Physics Inte				
	-	Mathematics International		enerated 18-Apr-2025 • exam	. reg. data re-	page 26 / 102
(2015)				ECTS) Mathematics Internat	-	,,

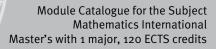




Master's degree (1 major) Mathematics International (2025)

Module title					Abbreviation	
Giovan	Giovanni Prodi Lecture (Master)					m01
Module	Module coordinator			Module offered by		
Dean o	f Studi	es Mathematik (Mathe	matics)	Institute of Mathem	atics	
ECTS	1	od of grading	Only after succ. con	pl. of module(s)		
5		rical grade				
Duratio		Module level	Other prerequisites			
1 seme		graduate				
Conten		Sidudite				
-		a specialized topic in	mathematics by an int	ornational oxport		
				emational expert.		
		ning outcomes				
themat	tics. He		undamental concepts a sh a connection betwee subjects.			
Course	<b>S</b> (type, r	number of weekly contact hour	s, language — if other than Ger	man)		
V (3) +	-					
Module	e taugh	t in: English				
		essment (type, scope, lang le for bonus)	guage — if other than German, o	examination offered — if no	t every semester, informati	ion on whether
Langua Assess credita	age of a ment o ble for	ssessment: English ffered: In the semester bonus	s of 2, approx. 10 minut		ubsequent semester	
Allocat	ion of <sub>l</sub>	olaces				
Additio	onal inf	ormation				
Worklo	ad					
150 h						
Teachi	ng cycl	e				
Referre	ed to in	LPO I (examination regulati	ons for teaching-degree progra	mmes)		
Module	e appea	urs in				
			ics International (2015)			
	-	ee (1 major) Mathemat				
Master's degree (1 major) Mathematical Physics (2016)						
Master's degree (1 major) Computational Mathematics (2016)						
Master's degree (1 major) Computational Mathematics (2019)						
	-	ee (1 major) Mathemat	-			
	Master's degree (1 major) Mathematical Physics (2020) Master's degree (1 major) Mathematics International (2021)					
	-	-	onal Mathematics (2021)	2)		
	-	ee (1 major) Kathemat		<i>~)</i>		
Master's w (2015)	ith 1 majo	r Mathematics International		enerated 18-Apr-2025 • exam ECTS) Mathematics Internat	-	page 28 / 102

#### Julius-Maximilians-UNIVERSITÄT WÜRZBURG



Master's degree (1 major) Mathematical Physics (2022) 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
Selected Topics in Analysis					10-M=VANAin-152-m01
Module	coord	inator		Module offered by	
Dean of	fStudie	es Mathematik (Mathema	itics)	Institute of Mathem	atics
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
10	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate			
Conten	ts				
with oth	her mat	ission of a specialised to thematical concepts. d previous knowledge:	pic in analysis taking	into account recent	developments and interrelations
Depend	ling on			from different areas	of analysis is required. In case of
Intende	ed learr	ning outcomes			
The stu comple			ed results in a selecte	ed topic in analysis,	and is able to apply these to
Courses	<b>5</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (4) + l Module		t in: English			
			ge — if other than German, e	examination offered — if no	t every semester, information on whether
		le for bonus)			
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 if 2, 15 minutes per ca	ites) or andidate)	ıbsequent semester
Allocati	ion of p	olaces			
Additio	nal info	ormation			
Worklo	ad				
300 h					
Teachir	ng cycl	9			
Referre	d to in	LPOI (examination regulations	for teaching-degree progra	mmes)	
Module					
		ee (1 major) Mathematics			
	-	ee (1 major) Mathematics ee (1 major) Mathematics			
	-	ee (1 major) Mathematics			

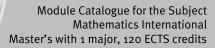
Module title				Abbreviation	
Algebraic Topology					10-M=VATPin-152-m01
Module	coord	inator		Module offered by	
Dean of	fStudie	es Mathematik (Mathema	atics)	Institute of Mathem	atics
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
10	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
spaces	•	motopy invariance, exact d previous knowledge:	sequences, cohomo	logy, application to t	the topology of Euclidean
Basic k	nowlec	lge of topology is assume	ed, such as can be ac	quired in the module	e "Introduction to Topology".
	H	ning outcomes			
The stu	dent is	acquainted with advanc	ed results in algebrai	c topology.	
		umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (4) + I Module		t in: English			
		s <b>essment</b> (type, scope, langua) le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
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	ites) or andidate)	ıbsequent semester
Allocat	ion of p	olaces			
Additio	nal info	ormation			
Worklo	ad				
300 h					
Teachir	ng cycl	9			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module	appea	irs in			
Master' Master' exchan	Master's degree (1 major) Mathematics International (2015) Master's degree (1 major) Mathematics International (2021) Master's degree (1 major) Mathematics International (2022) exchange program Mathematics (2023) Master's degree (1 major) Mathematics International (2025)				

Module	title				Abbreviation
Selecte	ed Topi	cs in Financial Mathemat	ics	,	10-M=VFNMin-152-m01
Module	coord	inator		Module offered by	
		es Mathematik (Mathema	atics)	Institute of Mathem	natics
ECTS		od of grading	Only after succ. con		
10		rical grade	only after succ. con		
Duratio		Module level	Other prerequisites		
1 seme		graduate			
Conten		Sidudate	<u> </u>		
of asse stochas Recom Familia	t pricin stic inte mende rity wit	g in discrete time for finit egration, stochastic differ d previous knowledge:	te spaces, American rential equations and	put, Snell envelope, I Ito calculus, Black-	tingales, fundamental theorem stopping time, optimal stopping, Merton-Scholes model. al Mathematics" and "Stochastics
Intende	ed leari	ning outcomes			
		-			She gains the ability to work on er skills to complex problems.
_	<u> </u>	umber of weekly contact hours, l		•••	· · ·
V (4) + Module		t in: English			
		<b>sessment</b> (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	ot every semester, information on whether
b) oral c) oral e Langua	examin 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 c	ıtes) or andidate)	ubsequent semester
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
300 h					
Teachir	ng cycl	e			
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module	e appea	ars in			
Master' Master'	Master's degree (1 major) Mathematics International (2015) Master's degree (1 major) Mathematics International (2021) Master's degree (1 major) Mathematics International (2022) Master's degree (1 major) Mathematics International (2025)				

Module title Abbreviation						
Groups and their Representations					10-M=VGDSin-152-1	n01
Module	e coord	inator		Module offered by		
Dean o	f Studi	es Mathematik (Mather	natics)	Institute of Mathem	atics	
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					
the S-ri Recom Basic k	ngs of mende nowled	d previous knowledge: Ige of algebra is assum				
"Applie	_					
	-	ning outcomes				
		asters advanced algeb questions in group theo				
Course	<b>S</b> (type, r	number of weekly contact hour	s, language — if other than Ger	rman)		
V (4) + Module		t in: English				
		<b>sessment</b> (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	on on whether
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 bonus	each (approx. 20 minu 5 of 2, 15 minutes per c	utes) or andidate)	ıbsequent semester	
Allocat	ion of <sub>l</sub>	olaces				
Additio	nal inf	ormation				
Worklo	ad					
300 h						
Teachi	ng cycl	е				
Referre	ed to in	LPO I (examination regulation	ons for teaching-degree progra	immes)		
Module	e appea	urs in				
Master Master Master Master Master	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)					
Master s wi (2015)	iai i iliajo			o ECTS) Mathematics Internat	•	page 33 / 102

Module	e title		Abbreviation						
Geome	trical N	lechanics		10-M=VGEMin-152-mo1					
Module coordinator				Module offered by					
Dean of Studies Mathematik (Mathema		natics)	atics) Institute of Mathematics						
ECTS	ECTS Method of grading		Only after succ. compl. of module(s)						
10	nume	rical grade							
Duration Module level			Other prerequisites						
1 semes	ster	graduate							
Contents									
The module builds on the topics covered in module 10-M=ADGM and discusses these in more detail: symplec- tic geometry, cotangent bundles and other examples of symplectic manifolds, symmetries and Noether theorem, phase space reduction, normal forms, introduction to Poisson geometry. Recommended previous knowledge: Advanced knowledge of differential geometry is required, such as can be acquired in the module "Differential Geometry". Knowledge of the contents of the module "Introduction to Topology" is also recommended. Knowled- ge of theoretical mechanics can also be useful.									
Intended learning outcomes The student is acquainted with selected advanced applications of differential geometry to geometric mechanics. He/She is able to establish a connection between his/her acquired skills and other branches of mathematics and questions in physics.									
<b>Courses</b> (type, number of weekly contact hours, language — if other than German)									
V (4) + Ü (2) Module taught in: English									
<b>Method of assessment</b> (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)									
<ul> <li>a) written examination (approx. 90 to 120 minutes, usually chosen) or</li> <li>b) oral examination of one candidate each (approx. 20 minutes) or</li> <li>c) oral examination in groups (groups of 2, 15 minutes per candidate)</li> <li>Language of assessment: English</li> <li>Assessment offered: In the semester in which the course is offered and in the subsequent semester creditable for bonus</li> </ul>									
Allocation of places									
Additio	nal inf	ormation							
Worklo	ad								
300 h									
Teaching cycle									
Referre	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 with 1 major Mathematics International (2022) Master's with 1 major Mathematics International JMU Würzburg • generated 18-Apr-2025 • exam. reg. data re-									
(2015)	an i major	manemates international		ECTS) Mathematics Internat		Pube 34/ 102			





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

Module	title		Abbreviation						
Industr	ial Sta	tistics 2		10-M=VISTin-152-m01					
Module	coord	inator		Module offered by					
Dean of Studies Mathematik (Mathema			atics)	Institute of Mathematics					
ECTS Method of grading			Only after succ. compl. of module(s)						
10	nume	rical grade							
Duration Module level		Other prerequisites							
1 semester graduate									
Contents									
Linear models, regression analysis, nonlinear regression, experimental design, basics in time series model- ling, basics in empirical time series analysis, methods of exponential smoothing, predictions and prediction do- mains, statistical process monitoring.									
Intended learning outcomes									
The student masters advanced statistical methods for industrial applications.									
<b>Courses</b> (type, number of weekly contact hours, language — if other than German)									
V (4) + Ü (2) Module taught in: English									
<b>Method of assessment</b> (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)									
<ul> <li>a) written examination (approx. 90 to 120 minutes, usually chosen) or</li> <li>b) oral examination of one candidate each (approx. 20 minutes) or</li> <li>c) oral examination in groups (groups of 2, 15 minutes per candidate)</li> <li>Language of assessment: English</li> <li>Assessment offered: In the semester in which the course is offered and in the subsequent semester creditable for bonus</li> </ul>									
Allocation of places									
Additional information									
 Worklo	ad								
300 h									
Teaching cycle									
<b>Referred to in LPO I</b> (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		
Field Arithmetics		10-M=VKARin-152-m01	
Module coordinator		Module offered by	
Dean of Studies Mathematik (Mathematic	cs)	Institute of Mathem	atics
ECTS Method of grading O	nly after succ. com	pl. of module(s)	
10 numerical grade			
Duration Module level Of	ther prerequisites		
1 semester graduate			
Contents			
Combination of Galois theory, group theor ber theory, e.g. topics around Hilbert's irr ture) and the inverse problem in Galois th	reducibility theorem		
Recommended previous knowledge: Basic knowledge of algebra is assumed, s "Applied Algebra".	such as can be acq	uired in the modules	s "Introduction to Algebra" and
Intended learning outcomes			
The student masters advanced algebraic or rary research questions in algebra and ca			
Courses (type, number of weekly contact hours, lang	guage — if other than Gerr	nan)	
V (4) + Ü (2) Module taught in: English			
Method of assessment (type, scope, language – module is creditable for bonus)	— if other than German, e	xamination offered — if no	t every semester, information on whether
a) written examination (approx. 90 to 120 b) oral examination of one candidate each c) oral examination in groups (groups of 2 Language of assessment: English Assessment offered: In the semester in wh creditable for bonus	h (approx. 20 minu 2, 15 minutes per ca	tes) or Indidate)	ıbsequent semester
Allocation of places			
Additional information			
Workload			
300 h			
Teaching cycle			
Referred to in LPO I (examination regulations for	r teaching-degree prograr	nmes)	
Module appears in			
Master's degree (1 major) Mathematics In			
Master's degree (1 major) Mathematics In Master's degree (1 major) Mathematics In			
Master's degree (1 major) Mathematics In			

Module title			Abbreviation			
Numeric of Partial Differential Equations			10-M=VNPEin-152-r	n01		
Module coordinator Module offered			Module offered by	by		
Dean o	of Studi	es Mathematik (Mathe	matics)	Institute of Mathem	natics	
ECTS	1	od of grading	Only after succ. con			
10		rical grade				
Duratio		Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
(numer discon Recom	rical me tinuous mende	ethods for elliptic, para 5 Gelerkin finite elemer d previous knowledge:	s, qualitative properties bolic and hyperbolic pa ts method, finite differ	artial differential equ ences and finite volu	ations; finite eleme ume methods).	nts method,
			unctional analysis and unctional Analysis" an			an be acqui-
Intend	ed lear	ning outcomes				
The stu	udent is	acquainted with adva	nced methods for discr	etising partial differe	ential equations.	
Course	<b>S</b> (type, r	number of weekly contact hour	s, language — if other than Gei	rman)		
V (4) + Module		t in: English				
			uage — if other than German,	examination offered — if no	nt even comester informati	ion on whether
		le for bonus)	uage – Il other than German,		it every semester, mormati	
b) oral c) oral Langua Assess	examir examin age of a	ation of one candidate ation in groups (group ssessment: English ffered: In the semester	o 120 minutes, usually o each (approx. 20 minu s of 2, 15 minutes per c in which the course is	utes) or andidate)	ubsequent semester	
Allocat	ion of <b>j</b>	olaces				
		-				
Additio	onal inf	ormation				
Worklo						
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 degr	ee (1 major) Mathemat	cs International (2025)			
Mactaria	ith a m - !	Mathomatics International	18411 \475	operated 40 Apr and a	v rog data ra	noge =0./
Master's w (2015)	nii 1 majo	r Mathematics International		enerated 18-Apr-2025 • exam DECTS) Mathematics Internat	-	page 38 / 102

Module	e title				Abbreviation	
Selected Topics in Optimization 10-M=VOPTin-152-mo1					10-M=VOPTin-152-mo1	
Module	e coord	inator		Module offered by		
Dean o	fStudi	es Mathematik (Mathema	atics)	Institute of Mathem	natics	
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)		
10	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
		s in optimization, e.g. in timization with differentiation		emidefinite progran	ns, non-smooth optimization, ga-	
Intende	ed lear	ning outcomes				
		acquainted with advanc research questions in co		,	He gains the ability to work on	
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)		
V (4) + Module	• •	t in: English				
		<b>sessment</b> (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	ot every semester, information on whether	
c) oral Langua	examin Ige of a ment o	ation of one candidate e ation in groups (groups c ssessment: English ffered: In the semester in bonus	of 2, 15 minutes per c	andidate)	ubsequent semester	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
300 h						
Teachi	ng cycl	e				
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)						
Module	e appea	urs in				
Master	's degr	ee (1 major) Mathematics	International (2015)			
Master's degree (1 major) Mathematics International (2021)						
	-	ee (1 major) Mathematics				
Master	's degr	ee (1 major) Mathematics	international (2025)			

Module title			Abbreviation			
Statistical Analysis				10-M=VSTAin-152-m01		
Module	coord	inator		Module offered by		
Dean of	fStudie	es Mathematik (Mathema	atics)	Institute of Mathem	atics	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
10	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
crimina	nt func	ables, categorical regress tion analysis, cluster and d previous knowledge:			factorial variance analysis, dis- or analysis.	
Basic k the con	nowlec tents o	lge of stochastics is requ f the module "Stochastic			astics 1" module. Knowledge of	
Intende	ed learr	ning outcomes				
The stu probler		acquainted with the fund	damental methods in	statistical analysis	and can apply them to practical	
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V (4) + Module		t in: English				
		e <b>essment</b> (type, scope, langua; le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
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	ites) or andidate)	ıbsequent semester	
Allocat	ion of p	olaces				
Additio	nal info	ormation				
Worklo	ad					
300 h						
Teaching cycle						
Referre	<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)					
Module	Module appears in					
	-	ee (1 major) Mathematics				
Master	Master's degree (1 major) Mathematics International (2021)					

Module	title				Abbreviation		
Insurance Mathematics 2				10-M=VVSMin-152-m01			
Module coordinator Module offered by			Module offered by				
Dean of	Studie	es Mathematik (Mathema	atics)	Institute of Mathem	atics		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)			
10	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 semes	ster	graduate					
Conten	ts						
lives: m Markov ons, joi Recomr Familia matics"	This module discusses modern valuation approaches and multiple decrement models regarding one life or two lives: modern valuation in life insurance mathematics, axiomatic derivation of the product measure approach, Markov chain models, Kolmogorov's differential equations, Thiele's differential equations, numerical applicati- ons, joint life policies. Recommended previous knowledge: Familiarity with the contents of the modules "Insurance Mathematics 1" and "Selected Topics in Financial Mathe- matics" is strongly recommended.						
		ning outcomes					
					e gains the ability to work on ner skills to complex problems.		
	· · · · ·	umber of weekly contact hours, l			· · · · ·		
V (4) + Ü Module		t in: English					
		e <b>ssment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
b) oral e c) oral e Langua	examin examin ge of a nent o	nination (approx. 90 to 1 ation of one candidate e ation in groups (groups c ssessment: English ffered: In the semester in bonus	ach (approx. 20 minu of 2, 15 minutes per ca	ites) or andidate)	ıbsequent semester		
Allocati	on of p	olaces					
Additio	nal inf	ormation					
Worklo	ad						
300 h							
Teachin	ig cycl	e					
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)							
Module	appea	rs in					
	-	ee (1 major) Mathematics					
	-	ee (1 major) Mathematics					
	-	ee (1 major) Mathematics					
master	s uegre	ee (1 major) Mathematics	international (2025)				

Module title Abbreviation					Abbreviation
Time So	eries A	nalysis 2			10-M=VZRAin-152-m01
Module	e coord	inator		Module offered by	<u> </u>
Dean of	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	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
State-s varianc			juency spaces, Fourie	er analysis, periodog	rams, characterisation of autoco-
Intende	ed lear	ning outcomes			
		acquainted with advanc earch questions in this fi		eries analysis. He ga	ains the ability to work on con-
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Gei	man)	
V (4) + Module		t in: English			
		<b>sessment</b> (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether
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	utes) or andidate)	ubsequent semester
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
300 h					
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module appears in					
Master's degree (1 major) Mathematics International (2015) Master's degree (1 major) Mathematics International (2021)					

Module title				Abbreviation	
Discrete Mathematics			10-M=VDIMin-152-m01		
Module coor	linator		Module offered by		
Dean of Stud	ies Mathematik (Mathema	atics)	Institute of Mathem	atics	
ECTS Meth	od of grading	Only after succ. com	pl. of module(s)		
5 nume	erical grade				
Duration	Module level	Other prerequisites			
1 semester	graduate				
Contents					
graph theory Recommende	ethods and results in a sel or combinatorics) ed previous knowledge: dge of the contents of the		-	coding theory, cryptography, natics" is required.	
Intended lear	ning outcomes				
The student i	s acquainted with advanc	ed results in a select	ed topic in discrete r	nathematics.	
Courses (type,	number of weekly contact hours, l	anguage — if other than Ger	man)		
V (3) + Ü (1) Module taugi	nt in: English				
Method of as module is credita		ge — if other than German, e	examination offered — if no	t every semester, information on whether	
c) oral exami Language of Assessment	nation of one candidate e nation in groups (groups o assessment: English or 	of 2, approx. 10 minut	tes per candidate)	ıbsequent semester	
creditable for					
Allocation of	places				
 Additional in	formation				
Additional III					
Workload		· · · · · · · · · · · · · · · · · · ·			
150 h					
Teaching cyc	le				
Referred to in	LPOI (examination regulation	s for teaching-degree progra	mmes)		
Module appears in					
Master's degree (1 major) Mathematics International (2015) Master's degree (1 major) Physics International (2020) Master's degree (1 major) Quantum Engineering (2020) Master's degree (1 major) Mathematics International (2021) Master's degree (1 major) Mathematics International (2022) Master's degree (1 major) Quantum Engineering (2024) Master's degree (1 major) Physics International (2024) Master's degree (1 major) Mathematics International (2025)					

	Module title				
Dynamical Systems	10-M=VDSYin-152-m01				
Module coordinator		Module offered by			
Dean of Studies Mathematik (Mathema	tics)	Institute of Mathem	atics		
ECTS Method of grading	Only after succ. com	pl. of module(s)			
5 numerical grade					
Duration Module level	Other prerequisites				
1 semester graduate					
Contents					
Fundamentals of dynamical systems, e. Recommended previous knowledge: Basic knowledge of the contents of the					
Intended learning outcomes					
The student masters the mathematical quality.	methods in the theor	ry of dynamic system	ns, and is able to analyse their		
Courses (type, number of weekly contact hours, la	anguage — if other than Ger	man)			
V (3) + Ü (1) Module taught in: English					
Method of assessment (type, scope, languag module is creditable for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
a) written examination (approx. 60 to 9 b) oral examination of one candidate ea c) oral examination in groups (groups o Language of assessment: English Assessment offered: In the semester in creditable for bonus	ach (approx. 15 minu f 2, approx. 10 minut	tes) or es per candidate)	ıbsequent semester		
Allocation of places					
Additional information					
Workload					
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					
Master's degree (1 major) Mathematics					

Module title				Abbreviation		
Aspects of Geometry			10-M=VGEOin-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. con	pl. of module(s)		
5		rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
with ot Recom	her ma mende	thematical structures, e. d previous knowledge:	g. topological geome	tries, diagram geom	velopments and interrelations etries. Topology" is recommended.	
		ning outcomes			Topology is recommended.	
	dent is	acquainted with advanc	ed results in a select	ed field of geometry	and can apply his/her skills to	
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)		
V (3) +	• •					
		t in: English				
		<b>sessment</b> (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	t every semester, information on whether	
b) oral c) oral Langua	examir examin Ige of a ment o	mination (approx. 60 to 9 nation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester in bonus	ach (approx. 15 minu of 2, approx. 10 minut	tes) or tes per candidate)	ıbsequent semester	
Allocat						
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teachi	Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	e appea	ars in				
	-	ee (1 major) Mathematics	-			
	Master's degree (1 major) Mathematics International (2021)					
	Master's degree (1 major) Mathematics International (2022) Master's degree (1 major) Mathematics International (2025)					
master	s uegi	ee (1 major) Mathematics	miemational (2025)			

Module title			Abbreviation			
Mathematical Continuum Mechanics				10-M=VKOMin-152-m01		
Module	coord	inator		Module offered by		
Dean of	fStudie	es Mathematik (Mathema	atics)	Institute of Mathem	atics	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate				
Conten	ts					
Recomr	nendeo	ntial equations and/or va d previous knowledge:			nuum mechanics. Juction to Partial Differential	
		recommended, as well as				
Intende	ed learr	ning outcomes				
		asters the mathematical application.	methods in mathema	atical continuum me	chanics and knows about their	
Courses	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V (3) + ĺ Module		t in: English				
			ge — if other than German, e	examination offered — if no	t every semester, information on whether	
		<sup>le for bonus)</sup> nination (approx. 60 to 9	o minutos usually d	accon) or		
		ation of one candidate e				
		ation in groups (groups c	of 2, approx. 10 minut	es per candidate)		
		ssessment: English ffered: In the semester in	which the course is	offered and in the cu	beaquant comostor	
credital			which the course is	onereu anu în the su	ibsequent semester	
Allocati	ion of p	olaces				
Additio	nal info	ormation				
Worklo	ad					
150 h						
Teachir	Teaching cycle					
<b>Referred to in LPO I</b> (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				
mastel	Master's degree (1 major) Mathematics International (2025)					

Module title				Abbreviation	
Mathematical Imaging			10-M=VMBVin-152-m01		
Module	coord	inator		Module offered by	
Dean of	fStudie	es Mathematik (Mathema	tics)	Institute of Mathem	atics
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate			
Conten	ts				
camera ra pictu	model res; al	s and camera calibration gorithms; module might a	, rigid and non-rigid r	egistration, reconsti	elementary projective geometry, ruction of 3D objects from came- methods and tomography.
		d previous knowledge: Ige of functional analysis	, such as that taught	in the module "Func	tional Analysis", is recommen-
Intende	ed learn	ning outcomes			
The stu fields o			methods in the theor	y of image processi	ng and knows about their main
Courses	<b>5</b> (type, n	umber of weekly contact hours, la	anguage — if other than Ger	man)	
V (3) + ĺ Module		t in: English			
Method	l of ass	<b>essment</b> (type, scope, langua	ge — if other than German, e	xamination offered — if no	t every semester, information on whether
module is	creditab	le for bonus)			
		nination (approx. 60 to 9			
		ation of one candidate e ation in groups (groups o			
Langua	ge of a	ssessment: English			
Assessi		ffered: In the semester in	which the course is o	offered and in the su	ıbsequent semester
Allocati					
Additio	nal inf	ormation			
Worklo	ad				
150 h					
Teachir	ng cycl	9			
Referre	d to in	LPOI (examination regulations	for teaching-degree program	mmes)	
Module					
	-	ee (1 major) Mathematics			
	-	ee (1 major) Mathematics ee (1 major) Mathematics			
	-	ee (1 major) Mathematics			
			× 3/		

Module title				Abbreviation			
Selected Topics in Mathematical Physics					10-M=VMPHin-152-m01		
Module	coord	inator		Module offered by			
Dean of	fStudie	es Mathematik (Mathema	atics)	Institute of Mathem	atics		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)			
10	nume	rical grade		-			
Duratio		Module level	Other prerequisites				
1 semes	ster	graduate					
Conten	ts	5					
terial so Recomr Depend	ciences nende ling on	s, geometric field theory, d previous knowledge:	advanced topics in q dvanced knowledge f	uantum theory.	id dynamics, mathematical ma- of analysis is required. In case of		
Intende	ed learı	ning outcomes					
		-	-		She is able to establish a and questions in physics.		
Courses	<b>5</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)			
V (4) + Í Module	• •	t in: English					
module is	creditab	le for bonus)			t every semester, information on whether		
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	ites) or andidate)	ibsequent semester		
Allocati	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	ad						
300 h							
Teachir		۵					
Teacini	ig cycl	6					
Poforro							
Referred to in LPO I (examination regulations for teaching-degree programmes)							
			International (act-)				
	Master's degree (1 major) Mathematics International (2015)						
	Master's degree (1 major) Physics International (2020) Master's degree (1 major) Mathematics International (2021)						
	-	ee (1 major) Mathematics					
	-	ee (1 major) Physics Inter					
	-	ee (1 major) Mathematics					

Module	e title				Abbreviation
Selecte	ed Topi	cs in Control Theory			10-M=VTRTin-152-m01
Module	e coord	inator		Module offered by	
Dean o	f Studi	es Mathematik (Mathem	atics)	Institute of Mathem	atics
ECTS	Methe	od of grading	Only after succ. con	pl. of module(s)	
10		rical grade		•	
Duratio		Module level	Other prerequisites		
1 seme	ster	graduate			
Conten			1		
bilinea Recom	r syster mende	ms. d previous knowledge:			ntrol systems, controllability of ntrol Theory" is required.
		ning outcomes			
The stu	dent g				y. He/She masters advanced
Course	<b>S</b> (type, r	number of weekly contact hours,	language — if other than Ger	rman)	
V (4) + Module		t in: English			
			age — if other than German.	examination offered — if no	t every semester, information on whether
		ole for bonus)	<b>,</b>		, ,
		mination (approx. 90 to			
		nation of one candidate o nation in groups (groups		-	
		issessment: English	or 2, 15 minutes per c	anuluale)	
Assess	ment o	offered: In the semester i	n which the course is	offered and in the su	ubsequent semester
credita	ble for	bonus			
Allocat	ion of <sub>l</sub>	places	_		
Additio	nal inf	ormation			
Worklo	ad				
300 h					
Teachi	ng cycl	e			
Referre	d to in	LPO I (examination regulation	ns for teaching-degree progra	mmes)	
Module	e appea	ars in			
Master	's degr	ee (1 major) Mathematic	s International (2015)		
	-	ee (1 major) Mathematic			
Master	-	ee (1 major) Mathematic	s International (2022)		
		ee (1 major) Mathematic			

Module title   A					Abbreviation
Inverse Problems					10-M=VIPRin-152-m01
Module	coord	inator		Module offered by	
Dean of	Studie	es Mathematik (Mathema	atics)	Institute of Mathem	atics
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate			
Conten	ts				
sation r	nethoo	or equations, ill-posed pro ls, examples of ill-posed d previous knowledge:		n theory, Tikhonov r	egularisation, iterative regulari-
			, such as that taught	in the module "Func	tional Analysis", is recommen-
Intende	d learı	ning outcomes			
		, ,	• •	•	ne can apply regularisation me- th selected inverse problems.
Courses	<b>5</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (3) + l Module		t in: English			
		s <b>essment</b> (type, scope, langua; le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
b) oral ( c) oral ( Langua)	examin examin ge of a ment o	nination (approx. 60 to 9 lation of one candidate e ation in groups (groups c ssessment: English ffered: In the semester in bonus	ach (approx. 15 minu of 2, approx. 10 minut	tes) or tes per candidate)	ıbsequent semester
Allocati	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
150 h					
Teachir	ıg cycl	e			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module	appea	irs in			
	-	ee (1 major) Mathematics			
Master'	Master's degree (1 major) Mathematics International (2021)				

Module title Abbreviation					Abbreviation
Module Theory					10-M=VMTHin-152-m01
Module	e coord	inator		Module offered by	
Dean of	fStudie	es Mathematik (Mathema	atics)	Institute of Mathem	atics
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
semi-si rems.	mple a	nd complex modules, mo			n and representations, simple, ion theorems, reduction theo-
	nowlec		l, such as can be acq	uired in the modules	s "Introduction to Algebra" and
Intende	ed learn	ning outcomes			
The stu	dent m	asters mathematical met	hods in module theo	ry and is able to ana	lyse their quality.
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (3) + Í Module		t in: English			
		<b>essment</b> (type, scope, langua) le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
b) oral ( c) oral ( Langua	examin examin ge of a ment o	nination (approx. 60 to 9 lation of one candidate e ation in groups (groups c ssessment: English ffered: In the semester in bonus	ach (approx. 15 minu of 2, approx. 10 minut	tes) or es per candidate)	ıbsequent semester
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
150 h					
Teachir	ng cycl	8			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module					
	-	ee (1 major) Mathematics ee (1 major) Mathematics			
	-	ee (1 major) Mathematics			
	-	ee (1 major) Mathematics			

Module title					Abbreviation
Non-linear Analysis					10-M=VNANin-152-mo1
Module	coord	inator		Module offered by	
Dean of	fStudie	es Mathematik (Mathema	atics)	Institute of Mathem	atics
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	numei	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
Method	ls in no	onlinear analysis (e. g. top	oological methods, m	ionotony and variation	onal methods) with applications.
We reco	ommen	d previous knowledge: d basic knowledge of fur lules "Introduction to Fur			quations, such as can be acqui-
Intende	ed learr	ning outcomes			
		acquainted with the con cal problems.	cepts of non-linear a	nalysis, can compare	e them and assess their applica-
Course	<b>5</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (3) + I					
		t in: English			
		s <b>essment</b> (type, scope, langua; le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
		nination (approx. 60 to 9 ation of one candidate e			
		ation in groups (groups c		-	
		ssessment: English		· · · · · ·	
Assessi		ffered: In the semester in bonus	which the course is o	offered and in the su	ibsequent semester
Allocati					
Additio	nal info	ormation			
Worklo	ad				
150 h					
Teachir	ng cyclo	9			
Referre	d to in	LPOI (examination regulations	s for teaching-degree progra	mmes)	
Module	appea	in			
	-	ee (1 major) Mathematics			
		ee (1 major) Mathematics			
	-	ee (1 major) Mathematics			
master	s aegre	ee (1 major) Mathematics	international (2025)		

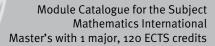
Module title		Abbreviation			
Optimal Cont	rol		10-M=VOSTin-152-m01		
Module coord	inator		Module offered by		
Dean of Studi	es Mathematik (Mathema	itics)	Institute of Mathem	atics	
ECTS Metho	od of grading	Only after succ. com	pl. of module(s)		
	rical grade				
Duration	Module level	Other prerequisites			
1 semester	graduate				
Contents					
	mal control of ordinary ar ethods for numerical solu		equations, theory of	optimal control, conditions for	
We recommer quired in the r		Functional Analysis"	and "Ordinary Differ	equations, such as can be ac- ential Equations". Knowledge of	
Intended lear	ning outcomes				
	acquainted with advanc questions in continuous o		al control. He gains t	he ability to work on contempo-	
Courses (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)		
V (3) + Ü (1) Module taugh	t in: English				
Method of ass module is creditab		ge — if other than German, e	examination offered — if no	t every semester, information on whether	
b) oral examir c) oral examin Language of a	mination (approx. 60 to 9 nation of one candidate e ation in groups (groups o ssessment: English ffered: In the semester in bonus	ach (approx. 15 minut of 2, approx. 10 minut	tes) or es per candidate)	ıbsequent semester	
Allocation of	olaces				
Additional inf	ormation				
Workload					
150 h					
Teaching cycl	e				
Referred to in	LPO I (examination regulations	for teaching-degree program	mmes)		
Module appea					
-	ee (1 major) Mathematics ee (1 major) Mathematics				
-	-				
-	Aaster's degree (1 major) Mathematics International (2022) Aaster's degree (1 major) Mathematics International (2025)				

Module title					Abbreviation
Networ	ked Sy	stems			10-M=VVSYin-152-m01
Module	e coord	inator		Module offered by	
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts	<u>.</u>			
system Recom	s); ana mende	lysis of control-theoretica d previous knowledge:	al aspects (controllab	bility, accessibility, e	
		dge of the contents of the ning outcomes	module "Ordinary D	ifferential Equations	" IS USEFUI.
The stu	dent is				tems. He gains the ability to work
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)	
V (3) + Module		t in: English			
		<b>Sessment</b> (type, scope, langua ole for bonus)	ge — if other than German, o	examination offered — if no	ot every semester, information on whether
b) oral c) oral Langua	examir examin Ige of a ment o	mination (approx. 60 to 9 nation of one candidate e nation in groups (groups o 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	places			
Additio	nal inf	ormation			
Worklo	ad				
150 h					
Teachi	ng cycl	e			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module	e appea	ars in			
Master	's degr	ee (1 major) Mathematics	International (2015)		
	-	ee (1 major) Mathematics			
	-	ee (1 major) Mathematics			
Master	's degr	ee (1 major) Mathematics	s international (2025)		

Module	title				Abbreviation
Comple	x Geor	netry			10-M=VKGEin-152-m01
Module coordinator				Module offered by	
Dean of	Studie	es Mathematik (Mathema	atics)	Institute of Mathem	atics
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
10	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate			
Content	ts				
calculus Kähler), Recomm	s, com , differe nendee	plex structures and comp ential operators on comp d previous knowledge:	lex manifolds, metric lex manifolds, classif	s on complex manif ication of complex n	
		ige of the contents of the omplex Analysis" is recom		on to Complex Analy	sis" and " Complex Analysis" or
Intende	d learr	ning outcomes			
					erential geometry. He is familiar methods independently.
Courses	<b>5</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (4) + Ü Module		t in: English			
		s <b>essment</b> (type, scope, langua <sub>)</sub> le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
b) oral e c) oral e Langua	examin examin ge of a ment o	nination (approx. 90 to 1 lation of one candidate e ation in groups (groups c ssessment: English ffered: In the semester in bonus	ach (approx. 20 minu of 2, 15 minutes per ca	ites) or andidate)	ıbsequent semester
Allocati	ion of p	olaces			
Additio	nal inf	ormation			
Workloa	ad				
300 h					
Teachin	ig cycl	e			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module					
		ee (1 major) Mathematics ee (1 major) Mathematics			
	s degre	ee (1 major) Mathematics	International (2022)		

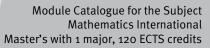
	e title				Abbreviation	
Partial	Differe	ntial Equations of Matl	nematical Physics		10-M=VPDPin-152-m01	
Module	e coord	inator		Module offered by		
Dean o	of Studi	es Mathematik (Mather	natics)	Institute of Mathematics		
			Only after succ. con			
10	1	rical grade				
Duratio		Module level	Other prerequisites			
1 seme		graduate		•		
Conten		Sidduite				
examp ons an Recom Basic k	les; init d gene mende mowled	tial and boundary value ralisations; Hilbert space d previous knowledge: dge from the modules "	e problems; well-posed ce methods; Sobolev s Ordinary Differential Ec	l and ill-posed proble paces and Fourier tra quations" and "Introd	nd wave equation as sta ems; solution methods; e ansforms. duction to Partial Differer	extensi-
		recommended, as well ning outcomes	as basic knowledge of	functional analysis.		
The stu equatio	udent is ons, as	acquainted with funda	ples from mathematica	al physics. He/She is	the theory of partial diffe able to establish a conn ons in physics.	
Course	<b>S</b> (type, r	number of weekly contact hours	s, language — if other than Ge	rman)		
V (4) + Module		t in: English				
Metho	d of ass	sessment (type, scope, lang	uage — if other than German,	examination offered — if no	t every semester, information on	whether
		le for bonus)	-			
b) oral c) oral Langua	examir examin age of a sment o	mination (approx. 90 to nation of one candidate nation in groups (groups issessment: English iffered: In the semester	each (approx. 20 minu 5 of 2, 15 minutes per c	utes) or andidate)	ıbsequent semester	
	ble for	honus				
credita						
credita						
credita Allocat 	tion of <sub>l</sub>	places				
credita Allocat 	tion of <sub>l</sub>					
credita Allocat  Additic	tion of ponal inf	places				
credita Allocat  Additic  Worklo	tion of ponal inf	places				
credita Allocat  Additic  Worklo 300 h	tion of ponal inf	ormation				
credita Allocat  Additic  Worklo 300 h	tion of ponal inf	ormation				
credita Allocat  Additic  Worklo 300 h	tion of ponal inf	ormation				
credita Allocat  Additio  Worklo 300 h Teachin 	tion of p pnal inf pad	ormation	ons for teaching-degree progra	ammes)		
credita Allocat  Additio  Worklo 300 h Teachin 	tion of p pnal inf pad	places ormation e	ons for teaching-degree progra	ammes)		
credita Allocat  Additio  Worklo 300 h Teachin  Referre	tion of p pnal inf pad ng cycl ed to in	ormation e LPOI (examination regulation	ons for teaching-degree progra	ammes)		
credita Allocat  Additic  Worklo 300 h Teachi  Referre  Modulo	tion of p onal inf oad ng cycl ed to in	ormation e LPOI (examination regulation				
credita Allocat  Additic  Worklo 300 h Teachi  Referre  Modulo	tion of p onal inf oad ng cycl ed to in e appea	ormation e LPOI (examination regulation ars in	cs International (2015)			
credita Allocat  Additio  Worklo 300 h Teachin  Referre Modulo Master Master	tion of p onal inf oad ng cycl ed to in e appea d's degr	places formation e LPOI (examination regulation ars in ee (1 major) Mathemati	cs International (2015) ernational (2020)			
credita Allocat  Additic  Worklo 300 h Teachin  Referre  Module Master Master Master Master	tion of p onal inf oad ng cycl ed to in e appea d's degr d's degr d's degr	e e LPOI (examination regulation ars in ee (1 major) Mathemati ee (1 major) Mathemati ee (1 major) Mathemati ee (1 major) Mathemati	cs International (2015) ernational (2020) cs International (2021) cs International (2022)			
credita Allocat  Additic  Worklo 300 h Teachin  Referre  Module Master Master Master Master	tion of p onal inf oad ng cycl ed to in e appea d's degr d's degr d's degr	e e PODI (examination regulation ars in ee (1 major) Mathemati ee (1 major) Mathemati ee (1 major) Mathemati	cs International (2015) ernational (2020) cs International (2021) cs International (2022)			





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

Module title Abbreviation						
Pseudo Riemannian and Riemannian Geometry					10-M=VPRGin-152-r	no1
Module	e coord	inator		Module offered by		
Dean o	f Studi	es Mathematik (Mathen	natics)	Institute of Mathem	natics	
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)		
10		rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme		graduate				
Conten						
nian an map, Ja Laplace theory. Recom Advance Geome	nd pseu acobi fi e opera mende ced kno try". Kr	uilds on the topics cove ido-Riemannian manifo elds, comparison theory tors, causal structure o d previous knowledge: weledge of differential g	lds, Levi-Civita connec ems in Riemannian geo f Lorenz manifolds, Eir eometry is required, su	tion and curvature, g ometry, submanifold ostein equations and uch as can be acquir	geodesics and the ex ls, integration, d'Ale l applications in gen red in the module "D	(ponential mbert and eral relativity ifferential
		also recommended.				
The stu manifo themat	ident is lds. He ics and	acquainted with advar /She is able to establis I questions in physics.	h a connection betwee	n his/her acquired s		
· · · · · · · · · · · · · · · · · · ·		number of weekly contact hours	, language — if other than Ger	man)		
V (4) + Module		t in: English				
		<b>sessment</b> (type, scope, lang le for bonus)	uage — if other than German, o	examination offered — if no	ot every semester, informat	ion on whether
b) oral c) oral Langua	examir examin Ige of a ment o	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	ion of <sub>l</sub>	olaces				
Additio	onal inf	ormation				
	-					
Worklo	ad					
300 h						
Teachi	ng cycl	e				
Referre	d to in	LPO I (examination regulation	ns for teaching-degree progra	mmes)		
Module						
	-	ee (1 major) Mathemati ee (1 major) Physics Inte				
Master's wi (2015)	ith 1 majo	r Mathematics International		enerated 18-Apr-2025 • exam • ECTS) Mathematics Internat		page 58 / 102

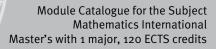


Master's degree (1 major) Mathematics International (2021) Master's degree (1 major) Mathematics International (2022) Master's degree (1 major) Physics International (2024) Master's degree (1 major) Mathematics International (2025)

Module title					Abbreviation
Functio	nal An	alysis			10-M=AFANin-152-m01
Module	e coord	inator		Module offered by	
Dean of Studies Mathematik (Mathematics)			atics)	Institute of Mathem	natics
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
10	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts	<u>.</u>			
functio Recom	nal ana mende	lilbert spaces, bounded o alysis and applications to d previous knowledge: th the contents of the mod	other fields of math	ematics.	s, further contemporary topics in
		ning outcomes		ysis is strongly rece	innenaca.
		acquainted with fundam e to apply these skills to		methods in a contem	porary field of functional analy-
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)	
V (4) + Module	• •	t in: English			
		s <b>essment</b> (type, scope, langua ole for bonus)	ge — if other than German, o	examination offered — if no	ot every semester, information on whether
b) oral c) oral Langua	examir examin ge of a ment o	mination (approx. 90 to 1 nation of one candidate e nation in groups (groups o 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	places			
Additio	nal inf	ormation			
Worklo	ad				
300 h					
Teachi	ng cycl	e			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	immes)	
Module	e appea	ars in			
Master	's degr	ee (1 major) Mathematics	International (2015)		
	-	ee (1 major) Mathematics			
	-	ee (1 major) Mathematics			
Master	s degr	ee (1 major) Mathematics	s international (2025)		

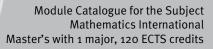
Module title Abbreviation							
Applied	l Differ	ential Geometry			10-M=VADGin-152-r	n01	
Module	coord	inator		Module offered by			
Dean of	fStudie	es Mathematik (Mathen	natics)	Institute of Mathem	atics		
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)			
10	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 semes	ster	graduate					
Content	ts						
tial geo timisati Recomr Advanc Geomet	The module builds on the topics covered in module 10-M=ADGM and discusses selected applications of differen- tial geometry, e. g. at the interface of control theory and mechanics (subriemannian geometry), in the smooth op- timisation on manifolds or applications in physics. Recommended previous knowledge: Advanced knowledge of differential geometry is required, such as can be acquired in the module "Differential Geometry". Knowledge of the contents of the modules "Applied Differential Geometry", "Geometric Mechanics",						
		annian and Riemannian	Geometry" and "Lie I	heory" is also recom	mended.		
		ning outcomes		one of differential	omotry Up/Chairs	blo to osta	
		acquainted with select tion between his/her a					
Courses	<b>5</b> (type, n	umber of weekly contact hours	, language — if other than Ger	man)			
V (4) + ĺ Module		t in: English					
		s <b>essment</b> (type, scope, langu le for bonus)	lage — if other than German, o	examination offered — if no	t every semester, information	on on whether	
b) oral e c) oral e Langua	examin examin ge 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 minu of 2, 15 minutes per c	utes) or andidate)	ıbsequent semester		
Allocati	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	ad						
300 h							
Teachin	ng cycl	e					
Referre	d to in	LPO I (examination regulatio	ns for teaching-degree progra	mmes)			
Module	appea	irs in					
		ee (1 major) Mathematio	s International (2015)				
	-	ee (1 major) Mathematio					
	-	ee (1 major) Mathematic					
		ee (1 major) Mathematio					
Master's wit (2015)	th 1 major	Mathematics International		enerated 18-Apr-2025 • exam • ECTS) Mathematics Internat		page 61 / 102	

Module title Abbreviation						
Giovan	ni Prod	li Lecture Selected Top	ics (Master)		10-M=VGPSin-152-r	n01
Module	e coord	inator		Module offered by		
Dean o	f Studi	es Mathematik (Mathe	matics)	Institute of Mathem	natics	
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)		
10	1	rical grade	,,, _,, _			
Duratio		Module level	Other prerequisites			
1 seme		graduate				
Conten		Siddate				
		n a specialised topic in	mathematics by an int	ernational expert		
		ning outcomes	mathematics by an int			
	-		 undamental concepts a	nd mothods of a con	tomporary recearch	topic in ma
themat	ics. He		sh a connection betwee			
Course	<b>S</b> (type, r	number of weekly contact hour	s, language — if other than Gei	man)		
V (4) +	Ü (2)					
Module	e taugh	t in: English				
Metho	d of ass	<b>Sessment</b> (type, scope, lang	guage — if other than German,	examination offered — if no	ot every semester, informati	ion on whether
		le for bonus)	o 120 minutes, usually (			
c) oral Langua	examin age of a ment o	ation in groups (group ssessment: English ffered: In the semester	e each (approx. 20 minus s of 2, 15 minutes per c r in which the course is	andidate)	ubsequent semester	
Allocat	ion of <sub>l</sub>	olaces				
Additio	onal inf	ormation				
Worklo	ad					
300 h						
Teachi	ng cvcl	e				
Referre	d to in	<b>IPOI</b> (examination regulation	ons for teaching-degree progra	mmec)		
				inites)		
Module	annea	ars in				
			ics International (2015)			
	-	ee (1 major) Mathemat				
	-	ee (1 major) Mathemat				
	-	-	onal Mathematics (201	6)		
	-		onal Mathematics (201	9)		
	-	ee (1 major) Mathemat				
	-	ee (1 major) Mathemat	-			
	-	-	ics International (2021)	2)		
	-	ee (1 major) Computati ee (1 major) Mathemat	onal Mathematics (202 ics (2022)	2)		
Imaster	Jucgi					
Master's w (2015)	ith 1 majo	r Mathematics International		enerated 18-Apr-2025 • exam DECTS) Mathematics Internat	-	page 62 / 102



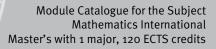
Master's degree (1 major) Mathematical Physics (2022) Master's degree (1 major) Mathematics International (2022) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) Mathematics (2024) Master's degree (1 major) Mathematics International (2025) Master's degree (1 major)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

Module title					Abbreviation		
Giovan	ni Prod	i Lecture Advanced To	pics (Master)		10-M=VGPAin-152-r	n01	
Module coordinator				Module offered by			
Dean o	f Studi	es Mathematik (Mathe	matics)	Institute of Mathem	natics		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
10		rical grade		, ,,			
Duratio		Module level	Other prerequisites				
1 seme		graduate					
Conten		Sidduite					
		o a specialised topic in	mathomatics by an int	ornational oxport			
		ning outcomes					
	-						
themat	ics. He	acquainted with the fu /She is able to establis l applications in other :	h a connection betwee				
Course	<b>S</b> (type, r	number of weekly contact hour	s, language — if other than Ge	rman)			
V (4) +	Ü (2)						
Module	e taugh	t in: English					
Metho	d of ass	<b>sessment</b> (type, scope, lang	uage — if other than German,	examination offered — if no	ot every semester, informati	ion on whether	
		le for bonus) mination (approx. 90 to					
c) oral Langua Assess	<ul> <li>b) oral examination of one candidate each (approx. 20 minutes) or</li> <li>c) oral examination in groups (groups of 2, 15 minutes per candidate)</li> <li>Language of assessment: English</li> <li>Assessment offered: In the semester in which the course is offered and in the subsequent semester creditable for bonus</li> </ul>						
Allocat	Allocation of places						
Additio	onal inf	ormation					
Worklo	ad						
300 h							
-	Teaching cycle						
Poforra	d to in	LPO I (examination regulati	and for toaching dogroe progr	mmac)			
Referre				annies)			
Module appears in Master's degree (1 major) Mathematics International (2015)							
Master's degree (1 major) Mathematics international (2015) Master's degree (1 major) Mathematics (2016)							
Master's degree (1 major) Mathematical Physics (2016)							
Master's degree (1 major) Computational Mathematics (2016)							
Master	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)							
Master's degree (1 major) Mathematics (2022)							
Master's w (2015)	Master's with 1 major Mathematics International     JMU Würzburg • generated 18-Apr-2025 • exam. reg. data re- cord Master (120 ECTS) Mathematics International - 2015     page 64						



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

Module ti	itle	Abbreviation					
Giovanni	Prodi Lecture Modern Te	10-M=VGPMin-152-	m01				
Module c	oordinator		Module offered by				
Dean of S	Studies Mathematik (Mat	hematics)	Institute of Mathem	atics			
ECTS N	Aethod of grading	Only after succ. con	npl. of module(s)				
	umerical grade		• • • •				
Duration	Module level	Other prerequisites					
1 semeste							
Contents	15	<u> </u>					
		c in mathematics by an int	ornational ovport				
	· · ·		emational expert.				
	learning outcomes						
thematics		e fundamental concepts a blish a connection betwee er subjects.					
Courses (†	type, number of weekly contact l	nours, language — if other than Ge	rman)				
V (4) + Ü ( Module ta	(2) aught in: English						
Method o	of assessment (type, scope,	language — if other than German,	examination offered — if no	t every semester, informat	ion on whether		
· · · · · ·	reditable for bonus)	o to 120 minutes, usually					
Language Assessme	e of assessment: English	ups of 2, 15 minutes per c		ibsequent semester			
Allocation of places							
Additiona	al information						
Workload	Workload						
300 h							
Teaching	Teaching cycle						
	•						
Referred	Referred to in LPO I (examination regulations for teaching-degree programmes)						
Modulo appears in							
Module appears in Master's degree (1 major) Mathematics International (2015)							
Master's degree (1 major) Mathematics international (2015) Master's degree (1 major) Mathematics (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) Compu	tational Mathematics (202					
Master's		tational Mathematics (202					



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



# Research in Groups and Seminars

(20 ECTS credits)

Module title					Abbreviation	
Research in Groups - Algebra10-M=GALGin-152-m01						
Module	e coord	inator		Module offered by		
Dean o	f Studie	es Mathematik (Mathema	atics)	Institute of Mathem	natics	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
10		rical grade		-		
Duratio		Module level	Other prerequisites			
1 seme	ster	graduate				
Conten		3	<u>.</u>			
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 Intende		ning outcomes				
The stu	dent ga				She masters advanced techni-	
•		umber of weekly contact hours, l	· · ·			
V (2) +	S (2)					
Module	e taugh	t in: English				
		<b>essment</b> (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	t every semester, information on whether	
Langua	ige of a	) minutes) ssessment: English ffered: In the semester in	which the course is	offered and in the su	ıbsequent semester	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
300 h						
Teachi	ng cycl	9				
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)		
Module	e appea	in in				
	-	ee (1 major) Mathematics	-			
	-	ee (1 major) Mathematics				
	-	ee (1 major) Mathematics				
Master	's degr	ee (1 major) Mathematics	s international (2025)			

Module title					Abbreviation	
Research in Groups - Discrete Mathematics         10-M=GDIMin-152-mo1						
Modul	e coord	inator		Module offered by	l	
Dean c	of Studi	es Mathematik (Mathem	natics)	Institute of Mathen	natics	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
10	nume	rical grade				
			Other prerequisites	i		
1 semester graduate						
Conter	nts	~				
Select	ed mod	ern topics in discrete m	athematics.			
Intend	ed lear	ning outcomes				
		ains insight into contem es in this field and can a			hematics. He/She masters advan	
Course	<b>es</b> (type, r	number of weekly contact hours	, language — if other than Ge	rman)		
V (2) +	• •					
		t in: English	_			
		sessment (type, scope, langu ale for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether	
		o minutes)				
		ssessment: English ffered: In the semester i	n which the course is	offered and in the s	ubsequent semester	
	tion of					
			_			
Additio	onal inf	ormation	_			
Worklo	oad					
300 h						
-	ng cycl	e				
		-				
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)						
			use a second sec	/		
Modul	e appea	ars in				
		ee (1 major) Mathematic	s International (2015)			
Master	r's degr	ee (1 major) Mathematic	s International (2021)			
	Master's degree (1 major) Mathematics International (2022)					
Master	r's degr	ee (1 major) Mathematic	s International (2025)			

Module title Abbreviation						
Research in Groups - Dynamical Systems and Control Theory       10-M=GDSCin-152-m01						
Modul	e coord	inator		Module offere	d by	
Dean o	of Studi	es Mathematik (Mathema	atics)	Institute of Ma	athematics	
ECTS	Meth	od of grading	Only after succ. con		s)	
10	nume	rical grade				
Durati		Module level	Other prerequisites			
1 seme	ester	graduate				
Conte	nts		,			
		ern topics in dynamical s	systems and control t	heorv.		
		d previous knowledge:				
Knowl	edge of	the contents of the mode	ule "Mathematical Co	ntrol Theory" o	r "Control Theory" is required.	
Intend	led lear	ning outcomes				
		ains insight into contemp advanced techniques in t			cal systems and control theory. He/ plex problems.	
Course	<b>es</b> (type, 1	number of weekly contact hours,	language — if other than Gei	rman)		
V (2) + Modul		t in: English				
		S <b>essment</b> (type, scope, langua ole for bonus)	age — if other than German,	examination offered	— if not every semester, information on whether	
Langu	age of a	o minutes) Issessment: English Iffered: In the semester ir	n which the course is	offered and in	the subsequent semester	
	tion of					
Additi	onal inf	ormation				
Workl	oad					
300 h						
Teaching cycle						
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)						
	0.2000					
Modul	e appe	ars m				
<b>Modul</b> Maste			s International (2015)			
Maste	r's degr	ee (1 major) Mathematics ee (1 major) Mathematics				
Maste Maste	r's degr r's degr	ee (1 major) Mathematics	s International (2021)			

Module title Research in Groups - Complex Analysis					Abbreviation 10-M=GCOAin-152-mo1	
Dean o	f Studie	es Mathematik (Mathem	atics)	Institute of Mathem	natics	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
10	nume	rical grade				
Duratio	n	Module level	Other prerequisites	i		
1 seme	ster	graduate				
Conten		0	1			
geomet Recomi Depenc	tric con mende ding on	nplex analysis, value dis d previous knowledge: the current focus of the	tribution theory).	om different areas o	ential theory, complex dynamics, f analysis is required. Consultati	
		cturer at the beginning o	f the course is recom	mended.		
		ning outcomes	,,	· 1		
		ains insight into contem this field and can apply			lysis. He/She masters advanced	
	·	number of weekly contact hours,				
V (2) +	S (2)					
Module	e taugh	t in: English				
		<b>sessment</b> (type, scope, langua le for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether	
Langua	ge of a	) minutes) ssessment: English ffered: In the semester ii	n which the course is	offered and in the su	ubsequent semester	
Allocat					•	
	•		-			
Additio	nal inf	ormation	-			
Worklo	ad					
300 h						
Teachi	ng cycl	e				
Referre	d to in	LPOI (examination regulation	is for teaching-degree progra	ammes)		
Module	e appea	urs in				
		ee (1 major) Mathematic	s International (2015)			
	-	ee (1 major) Mathematic				
Master	Master's degree (1 major) Mathematics International (2022)					
Master	's degr	ee (1 major) Mathematic	s International (2025)	)		

Module title					Abbreviation	
Research in Groups - Geometry and Topology					10-M=GGMTin-152-m01	
Module coordinator Module offer					y	
Dean c	of Studi	es Mathematik (Math	nematics)	Institute of Mathe	matics	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
10	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ester	graduate				
Conter	nts					
Selecte	ed mod	ern topics in geomet	ry and topology.			
Intend	ed lear	ning outcomes				
			temporary research probl d can apply them to comp		nd topology. He/She masters ad-	
Course	<b>S</b> (type, r	number of weekly contact h	ours, language — if other than Gei	rman)		
V (2) +	• •					
Modul	e taugh	t in: English				
		<b>Sessment</b> (type, scope, la ole for bonus)	anguage — if other than German,	examination offered — if	not every semester, information on whether	
		o minutes)				
		ssessment: English	ter in which the course is	offered and in the	subsequent semester	
	tion of					
		Jaces				
Additio	nal inf	ormation				
 Worklo	ad					
300 h						
-	ng cycl	۵				
	ing cycl	~				
Referre	ad to in	IPOL (ovamination same	lations for teaching-degree progra	mmoc)		
Modul	e appea	ars in				
			atics International (2015)			
	-	-	atics International (2013)			
	Master's degree (1 major) Mathematics International (2022)					
Mactor	's dear	ee (1 major) Mathem	- t <sup>1</sup> 1 - t t <sup>1</sup> 1 ( )			

Module title Abbreviation					
Research in Groups - Mathematics in Context					10-M=GMCXin-152-mo1
Module	e coord	inator	Module offered by	<u> </u>	
Dean o	f Studi	es Mathematik (Mather	natics)	Institute of Mathen	natics
ECTS	Metho	od of grading	Only after succ. cor	npl. of module(s)	
10	nume	rical grade		-	
Duratio	on .	Module level	Other prerequisites	;	
1 seme	ster	graduate			
Conten	Its				
ven by the cor	a histo nnectio	rical period, a geograp n of mathematics with	hic region or a particul	ar field of mathemat	of the history of mathematics, gi- ics. Other possibilities arise from a.
		ning outcomes			
The stu	ident re	ealises the cultural dim	ension of mathematics	and its relation to c	other cultural fields.
Course	<b>S</b> (type, r	number of weekly contact hour	s, language — if other than Ge	rman)	
V (2) + Module	• •	t in: English			
		<b>sessment</b> (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if n	ot every semester, information on whether
Langua	age of a	o minutes) ssessment: English ffered: In the semester	in which the course is	offered and in the s	ubsequent semester
Allocat					
Additio	onal inf	ormation			
Worklo	ad				
300 h					
Teachi	ng cycl	e			
Referre	ed to in	LPOI (examination regulati	ons for teaching-degree progra	ammes)	
Module	e appea	ars in			
	-	ee (1 major) Mathemati			
	-	ee (1 major) Mathemati			
	-	ee (1 major) Mathemati			
waster	s aegr	ee (1 major) Mathemati	cs international (2025,	)	

Module title Abbreviation						
Research in Groups - Mathematics in the Sciences10-M=GMSCin-152-mo1					10-M=GMSCin-152-m01	
Module coordinator Module offered by						
Dean o	of Studi	es Mathematik (Mathen	natics)	Institute of Ma	athematics	
ECTS	Meth	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					
A mode	ern top	ic in mathematics in the	e sciences.			
Basic k Equatio	nowle ons" is	d previous knowledge: dge from the modules "( recommended, as well <b>ning outcomes</b>		•	'Introduction to Partial Differential lysis.	
		ains insight into conten hniques in this field and			natics in the sciences. He/She masters s.	
Course	<b>S</b> (type, 1	number of weekly contact hours	, language — if other than Ge	rman)		
Metho module is talk (60	e taugh <b>d of as</b> s creditat o to 120	ole for bonus) O minutes)	uage — if other than German, 	examination offered	I — if not every semester, information on whether	
Assess	ment c		in which the course is	offered and in	the subsequent semester	
Allocat	tion of	places				
	onal inf	ormation				
	-					
Worklo	ad					
300 h						
Teachi	ng cycl	e				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Modul						
Master	's degr	ee (1 major) Mathemati ee (1 major) Mathemati ee (1 major) Mathemati	cs International (2021)			
	Master's degree (1 major) Mathematics International (2022) Master's degree (1 major) Mathematics International (2025)					

Module title					Abbreviation
Research in Groups - Measure and Integral 10-					10-M=GMAlin-152-mo1
Module coordinator Modu				Module offered by	Į
Dean c	of Studi	es Mathematik (Mathema	atics)	Institute of Mathen	natics
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
10	nume	rical grade			
Durati	on	Module level	Other prerequisites		
1 seme	ester	graduate			
Conter	nts	·			
functio	ons and		cted applications, e.	g. product measure	me and measure, measurable s (with Fubini's theorem and the cal spaces.
Intend	ed lear	ning outcomes			
		ains insight into contemp d techniques in this field			l integration theory. He/She ma- is.
Course	es (type, i	number of weekly contact hours, l	anguage — if other than Gei	rman)	
V (2) + Modul		t in: English			
		<b>sessment</b> (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether
Langua	age of a	o minutes) Issessment: English Iffered: In the semester in	which the course is	offered and in the s	ubsequent semester
	tion of				
Additio	onal inf	ormation			
Worklo	bad				
300 h					
	ng cycl	e			
Referre	ed to in	LPO I (examination regulations	s for teaching-degree progra	immes)	
Modul	e appea	ars in			
		ee (1 major) Mathematics	International (2015)		
	-	ee (1 major) Mathematics			
	-	ee (1 major) Mathematics			
Master	r's degr	ee (1 major) Mathematics	International (2025)		

Module title					Abbreviation	
Research in Groups - Numerical Mathematics and Applied Analysis					10-M=GNMAin-152-m01	
Module coordinator Module offe					ed by	
Dean o	f Studi	es Mathematik (Mathem	atics)	Institute of N	lathematics	
ECTS	Meth	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	ts		<u>,</u>			
Recom Depend	mende ding or	cs in numerical mathema d previous knowledge: the content, basic and a equired. In case of doubt	advanced knowledge	from different	areas of analysis and/or numerical ma-	
Intend	ed lear	ning outcomes				
		ains insight into a conter ers advanced techniques			erical mathematics or applied analysis. complex problems.	
Course	<b>S</b> (type, 1	number of weekly contact hours,	- language — if other than Ge	rman)	· · · ·	
Metho module is talk (60 Langua	e taugh d of as s creditat o to 120 age of a	ole for bonus) D minutes) Issessment: English			d — if not every semester, information on whether the subsequent semester	
Allocat	ion of	places				
Additio	onal inf	ormation				
			_			
Worklo	ad		_			
300 h						
Teachi	ng cvcl	e				
	0.99					
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	(mmes)		
Module		ars in				
		ee (1 major) Mathematics	s International (2015)			
	-	ee (1 major) Mathematic				
	-	ee (1 major) Mathematics				
Master	's degr	ee (1 major) Mathematics	s International (2025)			

Module title Abbreviation					
Research in Groups - Robotics, Optimization and Control T				neory	10-M=GROCin-152-mo1
Modul	le coord	inator		Module offer	ed by
Dean o	of Studi	es Mathematik (Mathema	atics)	Institute of N	lathematics
ECTS	Meth	od of grading	Only after succ. con	npl. of module	(s)
10	nume	rical grade		-	
Durati	on	Module level	Other prerequisites		
1 seme	ester	graduate			
Conte	nts				
Select	ed mod	ern topics in robotics, op	timisation and contro	ol theory.	
		d previous knowledge: the contents of the modu	ule "Mathematical Co	ntrol Theory"	or "Control Theory" is required.
	_	ning outcomes		,	, ,
			orary research probl	ems in robotio	s, optimization and control theory. He/
		dvanced techniques in t			
Course	<b>es</b> (type, r	number of weekly contact hours, l	language — if other than Ge	man)	
V (2) +	- S (2)				
Modul	le taugh	t in: English			
		<b>sessment</b> (type, scope, langua ole for bonus)	ge — if other than German,	examination offere	d — if not every semester, information on whether
		o minutes)			
		ssessment: English	which the course is	offorod and in	the subsequent semester
				onereu anu m	the subsequent semester
Alloca	tion of <sub>l</sub>	places			
Additi	onal inf	ormation			
Workl	oad				
300 h					
Teach	ing cycl	e			
Referred to in LPO I (examination regulations for teaching-degree programmes)					
	le appea				
	-	ee (1 major) Mathematics			
	-	ee (1 major) Mathematics			
	-	ee (1 major) Mathematics			
Master's degree (1 major) Mathematics International (2025)					

Module	e title	Abbreviation				
Research in Groups - Time Series Analysis10-M=GTSAin-152-m01					10-M=GTSAin-152-m01	
Module coordinator Module offered by						
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathe	ematics	
ECTS	Meth	od of grading	Only after succ. com	pl. of module(s)		
10	1	rical grade				
Duratio		Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts		<u>,</u>			
Selecte	ed mod	ern topics in time series	analysis.			
Basic k	nowled	d previous knowledge: dge of stochastics is requ of the module "Stochastic			hastics 1" module. Knowledge of	
Intend	ed lear	ning outcomes				
		ains insight into contemp es in this field and can ap			analysis. He/She masters advan-	
		number of weekly contact hours, l	· · ·	•		
V (2) + Module	• •	t in: English				
		<b>sessment</b> (type, scope, langua ole for bonus)	ge — if other than German, e	examination offered — if	not every semester, information on whether	
Langua	ige of a	o minutes) ssessment: English ffered: In the semester ir	which the course is	offered and in the	subsequent semester	
Allocat	ion of	olaces				
Additio	onal inf	ormation				
Worklo	ad					
300 h						
Teachi	ng cycl	e				
Referre	ed to in	LPOI (examination regulation	s for teaching-degree progra	mmes)		
			ac2.cc p/05/d	/		
Module	e appez	ars 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 - Statistics				10-M=GSTAin-152-m01		
Module coor	dinator		Module offered by			
Dean of Stuc	ies Mathematik (Mathema	atics)	Institute of Mathem	atics		
ECTS Met	nod of grading	Only after succ. com	pl. of module(s)			
10 num	erical grade					
Duration	Module level	Other prerequisites				
1 semester	graduate					
Contents						
Recommend Basic knowle the contents		s 2" is also recomme	nded. Depending or	astics 1" module. Knowledge of 1 the content of the course, other 1 ded.		
Intended lea	rning outcomes					
	gains insight into contemp field and can apply them to		ems in statistics. He	/She masters advanced techni-		
Courses (type	number of weekly contact hours, l	anguage — if other than Ger	man)			
V (2) + S (2) Module taug	ht in: English					
Method of as module is credita		ge — if other than German, e	examination offered — if no	t every semester, information on whether		
	o minutes) assessment: English offered: In the semester in	which the course is	offered and in the su	ıbsequent semester		
Allocation of	places					
Additional in	formation					
Workload						
300 h						
Teaching cy	le					
Referred to i	Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module appe						
-	ree (1 major) Mathematics					
-	ree (1 major) Mathematics ree (1 major) Mathematics					
-	ree (1 major) Mathematics					

Module title					Abbreviation		
Research in Groups - Number Theory					10-M=GNTHin-152-m01		
Module	coord	inator		Module offered by			
Dean of	fStudie	es Mathematik (Mathema	atics)	Institute of Mathem	atics		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)			
10	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	ts						
Recomr Basic k	nende nowlec	d previous knowledge: Ige of algebra and numbe	er theory is assumed,	such as can be acq	ar forms, diophantine analysis). uired in the modules "Introducti-		
		, "Introduction to Numbe	er Theory" and "Applie	ed Algebra".			
	H	ning outcomes					
		ains insight into contemp field and can apply them			. He/She masters advanced tech-		
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)			
V (2) + S Module		t in: English					
		e <b>ssment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
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 info	ormation					
Worklo	ad						
300 h							
Teachir	ng cycl	e					
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)							
Module	Module appears in						
	-	ee (1 major) Mathematics	-				
	-	ee (1 major) Mathematics					
	-	ee (1 major) Mathematics					
master	Master's degree (1 major) Mathematics International (2025)						

Module title Abbreviation						
Resear	Research in Groups - Control Theory of Quantum Mechanical Systems         10-M=GCQSin-152-mo1					
Module	e coord	inator		Module offere	d by	
Dean o	f Studio	es Mathematik (Mathem	atics)	Institute of Ma	athematics	
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					
Selecte	d mod	ern topics in control the	ory of quantum mecha	anical systems.		
Intende	ed lear	ning outcomes				
					theory of quantum mechanical sy- em to complex problems.	
Course	<b>S</b> (type, r	number of weekly contact hours,	language — if other than Ge	rman)		
V (2) +	S (2)					
Module	e taugh	t in: English				
		<b>sessment</b> (type, scope, langu le for bonus)	age — if other than German,	examination offered	— if not every semester, information on whether	
		o minutes)				
-	-	ssessment: English	n which the course is	offered and in t	the subsequent semester	
Allocat				onereu anu in t		
Allocal		Jiaces				
Additio	nal inf	ormation				
Auditio						
Worklo	ad					
300 h	uu					
Teachi	ng cvcl	P				
	-5 -y -t	•				
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	mmes)		
Module	appea	urs in				
		ee (1 major) Mathematic	s International (2015)			
	-	ee (1 major) Mathematic				
Master	's degr	ee (1 major) Mathematic	s International (2022)			

Module title					Abbreviation	
Research in Groups - Differential Geometry10-M=GDGEin-152					10-M=GDGEin-152-mo1	
Module coordinator Module offere						
Dean o	of Studio	es Mathematik (Math	ematics)	Institute of Mathen	natics	
ECTS	Metho	od of grading	Only after succ. cor	npl. of module(s)		
10	nume	rical grade				
Duratio	on	Module level	Other prerequisites	5		
1 seme	ster	graduate				
Conten	Its					
Selecte	ed mod	ern topics in different	ial geometry.			
Advano Geome "Pseud	ced kno etry". Kr lo-Riem	nowledge of the conte annian and Riemanni	geometry is required, s	olied Differential Geo	red in the module "Differential ometry", "Geometric Mechanics", nmended.	
	-	ning outcomes				
			emporary research prob apply them to complex		Geometry. He/She masters advan	
Course	<b>S</b> (type, r	number of weekly contact ho	urs, language — if other than Ge	rman)		
V (2) +	• •					
	_	t in: English				
		<b>sessment</b> (type, scope, lan le for bonus)	nguage — if other than German,	examination offered — if n	ot every semester, information on whether	
		o minutes) ssessment: English				
-	-	-	er in which the course is	offered and in the s	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 regula	tions for teaching-degree progr	ammes)		
Modul	e appea	nrs in				
Master	's degr	ee (1 major) Mathema	tics International (2015)	)		
	-		tics International (2021)			
	-	-	tics International (2022			
Master	's degr	ee (1 major) Mathema	tics International (2025	)		

Module title Abbreviation						
Research in Groups - Deformation Quantization10-M=GDFQin-152-mo1					10-M=GDFQin-152-m01	
Module coordinator Module offered by						
Dean c	of Studi	es Mathematik (Mathema	atics)	Institute of Math	ematics	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
10	1	rical grade				
Durati		Module level	Other prerequisites			
1 seme	ester	graduate				
Conter		0				
		lern topics in deformatior	n quantization			
		d previous knowledge: the contents of the mode	ules "Differential Geo	metry" and "Geon	netric Mechanics" is recommended.	
Intend	ed lear	ning outcomes				
		ains insight into contemp hniques in this field and			on Quantization. He/She masters	
Course	<b>es</b> (type,	number of weekly contact hours,	language — if other than Ge	rman)		
V (2) +						
Modul	e taugł	it in: English				
		<b>sessment</b> (type, scope, langua ole for bonus)	age — if other than German,	examination offered — i	f not every semester, information on whether	
Langua	age of a	o minutes) assessment: English offered: In the semester ir	n which the course is	offered and in the	e subsequent semester	
Alloca	tion of	places	-		· · · · · · · · · · · · · · · · · · ·	
			,			
Additio	onal inf	ormation	-			
Worklo	ad					
300 h						
-	ng cyc	e				
Referre	<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)					
Modul	e appe	ars in				
		ee (1 major) Mathematics	s International (2015)			
	-	ree (1 major) Mathematics				
	-	ree (1 major) Mathematics				
	-	ee (1 major) Mathematics				

Module title					Abbreviation	
Research in Groups - Non-linear Analysis					10-M=GNLAin-152-mo1	
Module coordinator Module offere					, ,	
Dean o	f Studi	es Mathematik (Mathem	atics)	Institute of Mather	natics	
ECTS	Methe	od of grading	Only after succ. com	pl. of module(s)		
10		rical grade		•		
Duratio		Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts		,			
Selecte	d mod	ern topics in non-linear a	analysis.			
Recomi	mende	d previous knowledge:				
Depend	ding on	the content, basic and a		from different areas	s of analysis is required. In case of	
		commended to consult th	ne lecturer.			
Intende	ed lear	ning outcomes				
		ains insight into contem es in this field and can ap			nalysis. He/She masters advan-	
Course	<b>S</b> (type, r	number of weekly contact hours,	language — if other than Ger	man)		
V (2) +						
		t in: English				
		S <b>essment</b> (type, scope, langua ole for bonus)	age — if other than German, e	examination offered — if r	ot every semester, information on whether	
Langua	ge of a	o minutes) Issessment: English Iffered: In the semester in	n which the course is	offered and in the s	ubsequent semester	
Allocat		-			· · ·	
Additio	nal inf	ormation				
Worklo	ad					
300 h						
Teachin	ıg cycl	e				
Referre	<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)					
Module		ars in				
		ee (1 major) Mathematic	s International (2015)			
	-	ee (1 major) Mathematic				
	-	-				
	Master's degree (1 major) Mathematics International (2022) Master's degree (1 major) Mathematics International (2025)					

Module title Abbreviation					
Resear	rch in G	roups - Operator Algebra	35		10-M=GOPAin-152-mo1
Module coordinator Module offered by					1
Dean o	of Studi	es Mathematik (Mathema	atics)	Institute of Mather	natics
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
10	nume	rical grade			
Duratio		Module level	Other prerequisites		
1 seme	ester	graduate			
Conter	nts				
Recom Knowle	mende edge of			ysis" and "Algebra a	and Dynamics of Quantum Sy-
		ommended. ning outcomes			
			orary research probl	ems in Operator alg	ebras. He/She masters advanced
	-	this field and can apply		• –	eblas. He/ She masters advanced
		number of weekly contact hours,			
Metho module i	e taugh <b>d of ass</b> s creditab	t in: English <b>sessment</b> (type, scope, langua ele for bonus) o minutes)	age — if other than German,	examination offered — if n	ot every semester, information on whether
Langua Assess	age of a sment o	ssessment: English ffered: In the semester in	n which the course is	offered and in the s	ubsequent semester
Allocat	tion of <sub>l</sub>	places			
Additio	onal inf	ormation			
Worklo	ad				
300 h			_		
Teachi	ng cycl	e			
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)					
Modul	e appea	ars in			
Master's degree (1 major) Mathematics International (2015) Master's degree (1 major) Mathematics International (2021) Master's degree (1 major) Mathematics International (2022) Master's degree (1 major) Mathematics International (2025)					
	-				

Module title					Abbreviation	
Seminar in Applied Differential Geometry 10-M=SADGin-152-mo1						
Module coordinator Module offered by					, ,	
Dean o	f Studi	es Mathematik (Math	ematics)	Institute of Mather	natics	
ECTS	Meth	od of grading	Only after succ. co	mpl. of module(s)		
5	nume	rical grade				
Duratio		Module level	Other prerequisites	5		
1 seme	ster	graduate				
Conten	ts		U			
A mode	ern top	ic in applied different	ial geometry.			
Geome "Pseud	try". Kr lo-Riem	nowledge of the conte annian and Riemann		olied Differential Geo	red in the module "Differential ometry", "Geometric Mechanics", nmended.	
		ning outcomes			1 II	
				•	omprehending and structuring of bate in a scientific discussion.	
Course	<b>S</b> (type, r	number of weekly contact ho	urs, language — if other than Ge	erman)		
S (2) Module	e taugh	t in: English				
			nguage — if other than German	examination offered — if n	ot every semester, information on whether	
		le for bonus)			·····	
		o minutes)				
-	-	ssessment: English				
			er in which the course is	offered and in the s	ubsequent semester	
Allocat	ion of p	olaces				
Additio	onal inf	ormation				
Worklo	ad					
150 h						
Teachi	ng cycl	e				
Referre	ed to in	LPO I (examination regul	ations for teaching-degree progr	ammes)		
Module	e appea	ars in				
Master	's degr	ee (1 major) Mathema	atics International (2015)	)		
	-		atics International (2021)			
	-		atics International (2022			
Master	's degr	ee (1 major) Mathema	atics International (2025	)		

Module title Abbreviation						
Seminar in Algebra					10-M=SALGin-152-m01	
Module	coord	inator		Module offered	by	
Dean of	f Studi	es Mathematik (Mathema	atics)	Institute of Math	nematics	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
A mode	ern topi	c in algebra.				
Basic k "Applie	nowleo d Alge		d, such as can be acc	juired in the mod	ules "Introduction to Algebra" and	
			omporany rosparch to	nic This includes	s comprehending and structuring of	
					cipate in a scientific discussion.	
· · ·		number of weekly contact hours, l		· · ·		
S (2) Module	taugh	t in: English				
		<b>sessment</b> (type, scope, langua le for bonus)	ge — if other than German,	examination offered —	if not every semester, information on whether	
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	ion of <b>j</b>	olaces				
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teachir	ıg cycl	e				
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)						
Module	appea	irs in				
		ee (1 major) Mathematics	International (2015)			
	-	ee (1 major) Mathematics				
	-	ee (1 major) Mathematics				
Master'	s degr	ee (1 major) Mathematics	International (2025)			

Module title Abbreviation							
Seminar in Dynamical Systems and Control 10-M=SDSCin-152-mo1							
Modul	e coord	inator		Module offered by	1		
Dean o	of Studi	es Mathematik (Mathema	atics)	Institute of Mather	natics		
ECTS	1	od of grading	Only after succ. con	pl. of module(s)			
5	1	rical grade					
Duratio		Module level	Other prerequisites				
1 seme	ster	graduate					
Conter	nts						
A mod	ern top	ic in dynamical systems a	ind control.				
		d previous knowledge:					
	_	the contents of the modu	ile "Mathematical Co	ntrol Theory" or "Co	ntrol Theory" is required.		
	-	ning outcomes					
					omprehending and structuring of ate in a scientific discussion.		
Course	<b>S</b> (type, 1	number of weekly contact hours, l	anguage — if other than Gei	man)			
S (2) Module	e taugh	t in: English					
		<b>sessment</b> (type, scope, langua ole for bonus)	ge — if other than German,	examination offered — if n	ot every semester, information on whether		
		o minutes)					
		ssessment: English ffered: In the semester in	which the course is	offered and in the s	ubsequent semester		
Allocat	tion of	places					
Additio	onal inf	ormation					
Worklo	ad						
150 h							
Teachi	ng cycl	e					
Referre	<b>Referred to in LPO I</b> (examination regulations 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)				

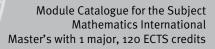
Module title Abbreviation							
Seminar in Complex Analysis 10-M=SCOA					10-M=SCOAin-152-m01		
Module	e coord	inator		Module offered by			
Dean of	f Studi	es Mathematik (Mathema	atics)	Institute of Mather	natics		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
5		rical grade		•			
Duratio		Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	ts		L				
Recom	mende nowled		modules "Introducti	on to Complex Anal	ysis" and " Complex Analysis" is		
		ning outcomes					
The stu	dent is	able to elaborate a conte			omprehending and structuring of bate in a scientific discussion.		
		number of weekly contact hours, l					
Method module is talk (60 Langua	d of ass creditab to 120 ge of a ment o	<sup>le for bonus)</sup> 9 minutes) ssessment: English ffered: In the semester in			ot every semester, information on whether ubsequent semester		
Additio	nal inf	ormation					
		-					
Worklo	ad						
150 h							
Teachir	ıg cycl	e					
		-					
Referre	<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)						
Module	appea	ars in					
Module appears in Master's degree (1 major) Mathematics International (2015) Master's degree (1 major) Mathematics International (2021) Master's degree (1 major) Mathematics International (2022) Master's degree (1 major) Mathematics International (2025)							

Module title					Abbreviation	
Seminar in Financial and Insurance Mathematics					10-M=SFIMin-152-mo1	
Module coordinator Module offered by						
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mather		
ECTS	1	od of grading	Only after succ. con	npl. of module(s)		
5		rical grade		, ,,,		
Duratio		Module level	Other prerequisites	i		
1 seme	ster	graduate				
Conten		0	<u>.</u>			
		ic in financial and insurar	nce mathematics			
Familia 1" is str	rity wit	d previous knowledge: th the contents of the mor recommended. <b>ning outcomes</b>	dules "Introduction to	o Stochastic Financi	al Mathematics" and "Stochastics	
					omprehending and structuring of ate in a scientific discussion.	
Course	<b>S</b> (type, 1	number of weekly contact hours, l	anguage — if other than Ge	rman)		
<b>Method</b> module is talk (60 Langua Assess	d of ass creditation to to 120 ge of a ment o	ole for bonus) o minutes) Issessment: English Iffered: In the semester in			ot every semester, information on whether ubsequent semester	
Allocat	ion of	places				
	nal inf	ormation				
Worklo	au					
150 h						
Teachi	ng cycl	e				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module						
	-	ee (1 major) Mathematics				
	-	ee (1 major) Mathematics				
	-	ee (1 major) Mathematics				
master	s uegr	ee (1 major) Mathematics	sinternational (2025)			

Module title Abbreviation					
Seminar in Geometry and Topology 10-M=SGTOin-152-r					10-M=SGTOin-152-mo1
Module	e coord	inator		Module offere	d by
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Ma	athematics
ECTS	Metho	od of grading	Only after succ. con		s)
5		rical grade		•	·
Duratio		Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
A mode	ern topi	c in geometry and topolo	gV.		
Basic k pology	nowled is rec	d previous knowledge: lge of the contents of the ommended. <b>ning outcomes</b>	modules "Introducti	on to Differenti	al Geometry" and "Introduction to To-
			. ,	•	les comprehending and structuring of ticipate in a scientific discussion.
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Gei	rman)	
Method module is talk (60 Langua Assess	d of ass creditab to to 120 age of a ment o	<sup>le for bonus)</sup> 9 minutes) ssessment: English ffered: In the semester in			— if not every semester, information on whether the subsequent semester
Allocat	ion of <sub>l</sub>	olaces			
 Additio	onal inf	ormation			
Worklo	ad				
150 h					
Teachi	ng cycl	e			
Referre	ed to in	LPO I (examination regulations	s for teaching-degree progra	immes)	
		-			
Module	e appea	urs 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					Abbreviation		
Giovanni Prodi Seminar (Master) 10-M=SGPCin-152-mo1					n01		
Module coordinator Module offer							
Dean o	f Studi	es Mathematik (Mathem	atics)	Institute of Mathem	atics		
ECTS	1	od of grading	Only after succ. com				
	1	rical grade					
5							
Duratio		Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	ts						
A mode	ern topi	ic in the research expert	ise of the current hold	er of the Giovanni Pr	odi Chair.		
Intende	ed lear	ning outcomes					
		able to elaborate a con	- temporary research to	nic. This includes co	mprehending and st	ructuring of	
		the available literature,					
		number of weekly contact hours,					
S (2)	- (()pe, :						
	- taugh	t in: English					
			if other then Cormon (	wamination offered if no	t over comester informati	on on whathar	
		<b>sessment</b> (type, scope, langu ile for bonus)	age — If other than German, e	examination offered — if no	t every semester, informati	on on whether	
	-	o minutes)					
		ssessment: English					
		ffered: In the semester i	n which the course is	offered and in the su	ubsequent semester		
Allocat							
Additio	nal inf	ormation	_				
Additio	inat init						
Worklo	ad		-				
150 h							
Teachi	ng cycl	е					
Referre	ed to in	LPO I (examination regulatio	ns for teaching-degree progra	mmes)			
Module	2 20002	ars in					
			c International (2015)				
	-	ee (1 major) Mathematic					
	-	ee (1 major) Mathematic ee (1 major) Economathe					
	-	ee (1 major) Economatic					
	-		· · ·				
		ee (1 major) Computatio					
	-	ee (1 major) Computatio		9)			
	Master's degree (1 major) Mathematics (2019)						
	Master's degree (1 major) Mathematical Physics (2020)						
	Master's degree (1 major) Mathematics International (2021) Master's degree (1 major) Economathematics (2021)						
	-			2)			
	Master's degree (1 major) Computational Mathematics (2022)						
	-	ee (1 major) Mathematic					
		ee (1 major) Mathematic					
waster	s aegr	ee (1 major) Mathematic	s international (2022)				
Master's wi (2015)	ith 1 majo	r Mathematics International		enerated 18-Apr-2025 • exam ECTS) Mathematics Internat	-	page 93 / 102	

## Julius-Maximilians-UNIVERSITÄT WÜRZBURG



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

Module title Abbreviation					Abbreviation		
Interdisciplinary Seminar 10-M=SIDCin-152-mo1							
Module	e coord	inator		Module offered by			
Dean o	f Studie	es Mathematik (Mathema	itics)	Institute of Mathem	atics		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)			
5	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	ts						
A mode	ern topi	c in mathematics with in	terdisciplinary aspect	ts.			
Intende	ed learn	ning outcomes					
					mprehending and structuring of ate in a scientific discussion.		
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)			
S (2) Module	taugh	t in: English					
			no — if other than Corman	vamination offered — if no	t every semester, information on whether		
		le for bonus)	ge — II other than German, e		t every semester, mormation on whether		
Langua	ge of a	o minutes) ssessment: English ffered: In the semester in	which the course is	offered and in the su	ibcoquent comester		
Allocat							
Additio	nal inf	ormation					
Worklo	ad						
150 h							
Teachir	ng cycl	e					
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)							
Module	Module appears in						
	-	ee (1 major) Mathematics					
	-	ee (1 major) Mathematics					
	-	ee (1 major) Mathematics					
master	Master's degree (1 major) Mathematics International (2025)						

Module title					Abbreviation					
Seminar Mathematics in the Sciences					10-M=SMSCin-152-mo1					
Module coordinator Module offered by										
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathe						
ECTS	Meth	od of grading	Only after succ. con	pl. of module(s)						
5		rical grade		<u> </u>						
Duratio		Module level	Other prerequisites							
1 seme		graduate								
Conten		Siddate								
		ic in mathematics in the	sciences							
Basic k Equatio	nowled	d previous knowledge: dge from the modules "O recommended, as well a ning outcomes			oduction to Partial Differential s.					
			emporary research to	nic This includes	comprehending and structuring of					
					pate in a scientific discussion.					
Course	<b>S</b> (type, 1	number of weekly contact hours,	language — if other than Ger	man)	•					
Methoo module is	<b>d of as</b> creditat	t in: English <b>Sessment</b> (type, scope, langua ele for bonus) o minutes)	ge — if other than German, (	examination offered — if	not every semester, information on whether					
Langua	ige of a	ssessment: English ffered: In the semester ir	n which the course is	offered and in the	subsequent semester					
Allocat	ion of	places								
Additio	nal inf	ormation								
Worklo	ad									
150 h										
Teachi	ng cycl	e								
	- •									
Referre	d to in	<b>LPO I</b> (examination regulation	s for teaching-degree progra	mmes)						
Referred to in LPO I (examination regulations for teaching-degree programmes)										
Module	appe	ars in								
		ee (1 major) Mathematics	s 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 (2022) Master's degree (1 major) Mathematics International (2025)										

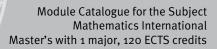
Module title Abbreviation					
Semina	Seminar in Numerical Mathematics and Applied Analysis				10-M=SNMAin-152-m01
Module coordinator Module offered by					y
Dean o	of Studi	es Mathematik (Mathema	atics)	Institute of Mathe	ematics
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade		-	
Duratio		Module level	Other prerequisites		
1 seme	ester	graduate			
Conten	nts		<u>.</u>		
		ic in numerical mathemat	tics or applied analys	sis	
Depen themat	ding on tics is r	d previous knowledge: the content, basic and a equired. In case of doubt ning outcomes			as of analysis and/or numerical ma- urer.
					comprehending and structuring of ipate in a scientific discussion.
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ge	rman)	
Metho module is talk (60 Langua Assess	d of ass s creditate o to 120 age of a sment o	ole for bonus) 5 minutes) 1ssessment: English 1fered: In the semester ir			not every semester, information on whether subsequent semester
Allocat		places			
Additio	onal inf	ormation			
Worklo	ad				
150 h					
Teachi	ng cycl	e			
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Modul	e appea	ars in			
	-	ee (1 major) Mathematics			
	-	ee (1 major) Mathematics			
	-	ee (1 major) Mathematics			
Master	rs degr	ee (1 major) Mathematics	s International (2025)		

Module title Abbreviation					Abbreviation		
Seminar in Optimization					10-M=SOPTin-152-m01		
Module coordinator				Module offered by			
Dean of	fStudie	es Mathematik (Mathema	atics)	Institute of Mathematics			
ECTS Method of grading Onl			Only after succ. com	Only after succ. compl. of module(s)			
5 numerical grade							
Duration Module level			Other prerequisites				
1 semester graduate		graduate					
Conten	ts						
A mode	ern topi	c in optimisation.					
Intende	ed leari	ning outcomes					
					mprehending and structuring of ate in a scientific discussion.		
Course	<b>S</b> (type, n	umber of weekly contact hours, la	anguage — if other than Ger	man)			
S (2) Module	taugh	t in: English					
<b>Method of assessment</b> (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)							
talk (60 to 120 minutes) Language of assessment: English Assessment offered: In the semester in which the course is offered and in the subsequent semester							
Allocation of places							
Additional information							
Workload							
150 h							
Teaching cycle							
<b>Referred to in LPO I</b> (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)						
Master's degree (1 major) Mathematics International (2025)							

Module title					Abbreviation	
Seminar in Statistics					10-M=SSTAin-152-m01	
Module coordinator				Module offered by		
Dean of Studies Mathematik (Mathematics)				Institute of Mathem	atics	
ECTS Method of grading			Only after succ. compl. of module(s)			
5 numerical grade						
Duratio	n	Module level	Other prerequisites			
1 semester gradua		graduate				
Content	ts					
A modern topic in statistics. Recommended previous knowledge: Basic knowledge of stochastics is required, such as that acquired in the "Stochastics 1" module. Knowledge of the contents of the module "Stochastics 2" is also recommended. Depending on the content of the course, other prior knowledge may also be helpful; consultation with the lecturer is recommended.						
		ning outcomes				
					mprehending and structuring of ate in a scientific discussion.	
Courses	<b>5</b> (type, n	umber of weekly contact hours, la	anguage — if other than Ger	man)		
S (2) Module	taugh	t in: English				
		<b>essment</b> (type, scope, languag le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
talk (60 to 120 minutes) Language of assessment: English Assessment offered: In the semester in which the course is offered and in the subsequent semester						
Allocation of places						
Additional information						
Workload						
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 (2022) Master's degree (1 major) Mathematics International (2025)					

Module title					Abbreviation	
Seminar in Non-linear Analysis					10-M=SNLAin-152-m01	
Module coordinator Mod				Module offere	Nodule offered by	
Dean o	f Studi	es Mathematik (Mathen	natics)	Institute of Ma	athematics	
ECTS	Methe	od of grading	Only after succ. cor	npl. of module(	s)	
5	nume	rical grade				
			Other prerequisites	ier prerequisites		
1 semester graduate			, , , , ,, , ,, , ,, , ,, , ,, , ,, , , , , , , , , , , , , , , , , , , ,			
Conten	ts	0	1			
A mode	ern top	ic in non-linear analysis				
Depend doubt,	ding on it is rea	d previous knowledge: the content, basic and commended to consult <b>ning outcomes</b>		from different a	areas of analysis is required. In case of	
					les comprehending and structuring of rticipate in a scientific discussion.	
Course	<b>S</b> (type, r	number of weekly contact hours	, language — if other than Ge	rman)		
Method module is talk (60 Langua Assess	d of ass creditate to to 120 ge of a ment o	le for bonus) o minutes) ssessment: English ffered: In the semester			— if not every semester, information on whether the subsequent semester	
Allocat	ion of p	olaces				
 Additio	nal inf	ormation				
	nat m					
Worklo	ad					
150 h						
Teaching cycle						
-						
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)						
Module	e appea	ars 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)					





## **Thesis** (30 ECTS credits)

Module title					Abbreviation	
Master Thesis Mathematics International         10-M=MAMI-152-mo1					10-M=MAMI-152-m01	
Modul	e coord	inator		Module offered by	<u>I</u>	
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathematics		
ECTS	Meth	od of grading	Only after succ. con			
30	nume	rical grade				
Duratio			Other prerequisites	)ther prerequisites		
1 semester graduate						
Conten	Its					
Indepe	ndentl	y researching and writing	on a topic in mather	natics selected in co	nsultation with the supervisor.	
Intend	ed lear	ning outcomes				
The student is able to work independently on a given mathematical topic and apply the skills and methods ob- tained during his/her studies in the master programme. He/She can write down the result of his/her work in Eng- lish language in a suitable form.						
Course	<b>S</b> (type, r	number of weekly contact hours, I	anguage — if other than Ge	rman)		
No cou	rses as	signed to module				
		<b>Sessment</b> (type, scope, langua ele for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
Master's thesis (750 to 900 hours total) Registration and assignment of topic in consultation with supervisor. Language of assessment: English						
Allocat	ion of <sub>l</sub>	places				
Additio	onal inf	ormation				
Time to	o comp	lete: 6 months				
Worklo	ad					
900 h						
Teaching cycle						
<b>Referred to in LPO I</b> (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)						
	-	ee (1 major) Mathematics				
Master	's degr	ee (1 major) Mathematics	s international (2025)			