

Subdivided Module Catalogue for the Module studies (Bachelor)

Mathematics

Examination regulations version: 2019 Responsible: Faculty of Mathematics and Computer Science Responsible: Institute of Mathematics

JMU Würzburg • generated 19-Apr-2025 • exam. reg. data record MB|105|-|-|H|2019

Abbreviations used

UNIVERSITÄT

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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:

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

15-May-2019 (2019-36) 27-Jun-2019 (2019-41) 14-Nov-2019 (2019-52) 22-Jan-2020 (2020-13) 06-May-2020 (2020-39) 22-Jul-2020 (2020-57) 17-Dec-2020 (2020-110) 10-Mar-2021 (2021-17)

Mathematics (2019)



09-Jun-2021 (2021-58) 22-Dec-2021 (2021-85) 05-Jul-2022 (2022-52) 31-Jan-2023 (2022-86) 15-Jun-2023 (2023-58) 13-Dec-2023 (2023-107) 07-Aug-2024 (2024-82) 22-Jan-2025 (2025-1)

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

The subject is divided into

Abbreviation	Module title		Method of	nage	
	Module IIIe		grading	page	
Summer Term 2019	~				
10-M-SEM2-152-m01	Supplementary Seminar Mathematics	4	B/NB	17	
Winter Term 2019					
10-M-SEM2-152-m01	Supplementary Seminar Mathematics	4	B/NB	17	
Summer Term 2020					
10-M-ANA1-152-m01	Analysis 1	8	B/NB	7	
10-M-VHB1-152-m01	E-Learning and Blended Learning Mathematics 1	2	B/NB	19	
10-M-VHB2-152-m01	E-Learning and Blended Learning Mathematics 2	2	B/NB	20	
10-M-LNA1-152-m01	Linear Algebra 1	8	B/NB	14	
Winter Term 2020					
10-M-ANA1-152-m01	Analysis 1	8	B/NB	7	
10-M-ASM-152-m01	Reasoning and Writing in Mathematics	2	B/NB	9	
10-M-VHB1-152-m01	E-Learning and Blended Learning Mathematics 1	2	B/NB	19	
10-M-VHB2-152-m01	E-Learning and Blended Learning Mathematics 2	2	B/NB	20	
10-M-GBM-152-m01	Basic Notions and Methods of Mathematical Reasoning	2	B/NB	13	
10-M-LNA1-152-m01	Linear Algebra 1	8	B/NB	14	
Summer Term 2021	•				
10-M-ANA1-152-m01	Analysis 1	8	B/NB	7	
10-M-ASM-152-m01	Reasoning and Writing in Mathematics	2	B/NB	9	
10-M-VHB1-152-m01	E-Learning and Blended Learning Mathematics 1	2	B/NB	19	
10-M-VHB2-152-m01	E-Learning and Blended Learning Mathematics 2	2	B/NB	20	
10-M-GBM-152-m01	Basic Notions and Methods of Mathematical Reasoning	2	B/NB	13	
10-M-LNA1-152-m01	Linear Algebra 1	8	B/NB	14	
10-M-SEM2-152-m01	Supplementary Seminar Mathematics	4	B/NB	17	
Winter Term 2021	·				
10-M-ANA1-152-m01	Analysis 1	8	B/NB	7	
10-M-ASM-152-m01	Reasoning and Writing in Mathematics	2	B/NB	9	
10-M-FAN-152-m01	Introduction to Functional Analysis	9	B/NB	11	
10-M-FANP-152-m01	Introduction to Functional Analysis for Mathematical Physics	10	NUM	12	
10-M-ZTH-152-m01	Introduction to Number Theory	9	B/NB	21	
10-M-ZTHP-152-m01	Introduction to Number Theory for Mathematical Physics	10	NUM	22	
10-M-VHB1-152-m01	E-Learning and Blended Learning Mathematics 1	2	B/NB	19	
10-M-VHB2-152-m01	E-Learning and Blended Learning Mathematics 2	2	B/NB	20	
10-M-SEM2-152-m01	Supplementary Seminar Mathematics	4	B/NB	17	
10-M-GBM-152-m01	GBM-152-mo1 Basic Notions and Methods of Mathematical Reasoning 2		B/NB	13	
10-M-LNA1-152-m01	Linear Algebra 1 8		B/NB	14	
10-M-SEM-152-m01 Seminar Mathematics		5	NUM	16	
Summer Term 2022					
10-M-ANA1-152-m01	Analysis 1	8	B/NB	7	
10-M-ASM-152-m01	M-ASM-152-mo1 Reasoning and Writing in Mathematics		B/NB	9	
10-M-VHB1-152-mo1 E-Learning and Blended Learning Mathematics 1 2			B/NB	19	
10-M-VHB2-152-m01	E-Learning and Blended Learning Mathematics 2	2	B/NB	20	
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mathematics (2019)	Jino wurzburg • generateu 19-Apr-2025 • exam. reg. data reco	u mp 105 - - I	ilsoità hage	:4/22	

10-M-GBM-152-m01	Basic Notions and Methods of Mathematical Reasoning	2	B/NB	13		
10-M-LNA1-152-m01	Linear Algebra 1	8	B/NB	14		
Winter Term 2022				2		
10-M-ANA1-152-m01	Analysis 1	8	B/NB	7		
10-M-ASM-152-m01	Reasoning and Writing in Mathematics	2	B/NB	9		
10-M-VHB1-152-m01	E-Learning and Blended Learning Mathematics 1	2	B/NB	19		
10-M-VHB2-152-m01	E-Learning and Blended Learning Mathematics 2	2	B/NB	20		
10-M-SEM2-152-m01	Supplementary Seminar Mathematics	4	B/NB	17		
10-M-GBM-152-m01	Basic Notions and Methods of Mathematical Reasoning	2	B/NB	13		
10-M-LNA1-152-m01	Linear Algebra 1	8	B/NB	14		
10-M-SEM-152-m01	Seminar Mathematics	5	NUM	16		
Summer Term 2023						
10-M-ANA1-152-m01	Analysis 1	8	B/NB	7		
10-M-ANA2-152-m01	Analysis 2	8	B/NB	8		
10-M-ASM-152-m01	Reasoning and Writing in Mathematics	2	B/NB	9		
10-M-GBM-152-m01	Basic Notions and Methods of Mathematical Reasoning	2	B/NB	13		
10-M-LNA1-152-m01	Linear Algebra 1	8	B/NB	14		
10-M-LNA2-152-m01	Linear Algebra 2	8	B/NB	15		
10-M-VHB1-152-m01	E-Learning and Blended Learning Mathematics 1	2	B/NB	19		
10-M-VHB2-152-m01	E-Learning and Blended Learning Mathematics 2	2	B/NB	20		
Winter Term 2023						
10-M-ANA1-152-m01	Analysis 1	8	B/NB	7		
10-M-ANA2-152-m01	Analysis 2	8	B/NB	8		
10-M-ASM-152-m01	Reasoning and Writing in Mathematics	2	B/NB	9		
10-M-VHB1-152-m01	E-Learning and Blended Learning Mathematics 1	2	B/NB	19		
10-M-VHB2-152-m01	E-Learning and Blended Learning Mathematics 2	2	B/NB	20		
10-M-DGL-152-m01	Ordinary Differential Equations	9	B/NB	10		
10-M-GBM-152-m01	Basic Notions and Methods of Mathematical Reasoning	2	B/NB	13		
10-M-LNA1-152-m01	Linear Algebra 1	8	B/NB	14		
10-M-LNA2-152-m01	Linear Algebra 2	8	B/NB	15		
10-M-VAN-152-m01	Advanced Analysis	7	NUM	18		
Summer Term 2024						
10-M-ANA1-152-m01	Analysis 1	8	B/NB	7		
10-M-ANA2-152-m01	Analysis 2	8	B/NB	8		
10-M-ASM-152-m01	Reasoning and Writing in Mathematics	2	B/NB	9		
10-M-VHB1-152-m01	E-Learning and Blended Learning Mathematics 1	2	B/NB	19		
10-M-VHB2-152-m01	E-Learning and Blended Learning Mathematics 2	2	B/NB	20		
10-M-GBM-152-m01	Basic Notions and Methods of Mathematical Reasoning	2	B/NB	13		
10-M-LNA1-152-m01	Linear Algebra 1	8	B/NB	14		
10-M-LNA2-152-m01	Linear Algebra 2	8	B/NB	15		
Winter Term 2024						
10-M-ANA1-152-m01	Analysis 1	8	B/NB	7		
10-M-ANA2-152-m01	Analysis 2	8	B/NB	8		
10-M-ASM-152-m01	Reasoning and Writing in Mathematics	2	B/NB	9		
10-M-VHB1-152-m01	E-Learning and Blended Learning Mathematics 1	2	B/NB	19		
10-M-VHB2-152-m01	E-Learning and Blended Learning Mathematics 2	2	B/NB	20		
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10-M-DGL-152-m01	Ordinary Differential Equations	9	B/NB	10
10-M-GBM-152-m01	Basic Notions and Methods of Mathematical Reasoning	2	B/NB	13
10-M-LNA1-152-m01	Linear Algebra 1	8	B/NB	14
10-M-LNA2-152-m01	Linear Algebra 2	8	B/NB	15
10-M-VAN-152-m01	Advanced Analysis	7	NUM	18

Module title					Abbreviation	
Analys	is 1				10-M-ANA1-152-m01	
Modul	e coord	inator		Module offered by		
Dean o	f Studi	as Mathematik (Mathema	atics)	Institute of Mathem	natics	
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)	latics	
8	(not) s	successfully completed				
Duratio	on	Module level	Other prerequisites			
1 seme	ester	undergraduate				
Conter	nts					
Real nu ries; po one va	umbers ower se riable (and completeness; basi ries and Taylor series; ba Riemann integral and imj	c topological notions isics in differential ca proper integral).	; convergence and d lculus in one variab	ivergence of sequences and se- le; basics of integral calculus in	
Intend	ed lear	ning outcomes				
The stu central mather form.	ident ki proof r matical	nows and masters the es nethods in analysis and arguments independent	sential methods and can employ them to s ly and to express mat	notions of analysis. solve easy problems hematical argument	He/She is acquainted with the . He/she is able to perform easy ts precisely and clearly in written	
Course	s (type	, number of weekly conta	ct hours, language —	· if other than Germa	ın)	
V (4) +	Ü (2)					
Metho ster, in	d of ass formati	s essment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
written exercis Langua	examin ses eacl age of a	nation (approx. 90 to 180 1) ssessment: German and,	minutes) and writter /or English	ı exercises (approx.	12 exercise sheets with approx. 4	
Allocat	tion of p	olaces				
Additional information						
Workload						
240 h						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						

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Module title					Abbreviation	
Analys	is 2				10-M-ANA2-152-m01	
Module	e coord	inator		Module offered by		
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
8	(not) s	successfully completed				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
Further implicit	topolo t functi	gical considerations, bas on theorem.	sics in differential cal	culus in several vari	ables, inverse function theorem,	
Intende	ed lear	ning outcomes				
The stu central mather form.	ident ki proof r natical	nows and masters the es nethods in analysis and arguments independent	sential methods and can employ them to s ly and to express mat	notions of analysis. olve easy problems. hematical argument	He/She is acquainted with the . He/she is able to perform easy ts precisely and clearly in written	
Course	s (type	, number of weekly conta	ct hours, language –	· if other than Germa	n)	
V (4) +	Ü (2)					
Methoo ster, in	d of ass formati	essment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
written exercis Langua	examines each	nation (approx. 90 to 180 1) ssessment: German and,	minutes) and writter	1 exercises (approx.	12 exercise sheets with approx. 4	
Allocat	ion of p	olaces				
Additio	onal inf	ormation				
Workload						
240 h						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						

Module title				Abbreviation		
Reason	Reasoning and Writing in Mathematics				10-M-ASM-152-m01	
Module	coord	inator		Module offered by		
Dean of	f Studio	es Mathematik (Mathema	atics)	Institute of Mathem	atics	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
2	(not) s	successfully completed		-		
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
Introdu themat duction	ction to ical wri 1.	o fundamental methods o ting;insight into example	of thinking and provir es of abstracts conce	ng, basic techniques pts in mathematics;	in mathematics as well as ma- approach to axiomatic and de-	
Intende	ed lear	ning outcomes				
The stu form ea oral for	dent is isy mat m.	acquainted with the bas hematical arguments inc	ic proof methods and lependently and pres	d techniques in math ent them adequately	nematics. He/She is able to per- y and reasonably in written and	
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)	
V (1) + Ü	Ü (1)					
Methoo ster, inf	l of ass formati	sessment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
project Langua	(10 to ge of a	20 pages) ssessment: German and,	or English			
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Workload						
60 h						
Teaching cycle						
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)					
L						

Module title				Abbreviation	
Ordina	Ordinary Differential Equations				10-M-DGL-152-m01
Modul	e coord	inator		Module offered by	·
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
9	(not) s	successfully completed			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conter	Its				
Exister ferenti	nce and al equa	uniqueness theorem; co tions; matrix exponential	ntinuous dependenc series; linear differe	e of solutions on ini ntial equations of hi	tial values; systems of linear dif- gher order.
Intend	ed lear	ning outcomes			
The stu equation	ıdent is ons. He	acquainted with the fun /she is able to apply the	damental concepts a se methods to praction	nd methods of the tl cal problems.	neory of ordinary differential
Course	s (type	, number of weekly conta	ct hours, language –	- if other than Germa	in)
V (4) +	Ü (2)				
Metho ster, in	d of ass formati	essment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-
a) writt b) oral c) oral Langua credita	en exan examir examin age of a ble for	mination (approx. 90 to 1 nation of one candidate e ation in groups (groups c ssessment: German and, bonus	80 minutes, usually (ach (15 to 30 minutes of 2, 10 to 15 minutes /or English	chosen) or 5) or per candidate)	
Allocat	ion of p	olaces			
Additional information					
Workload					
270 h					
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					

Module title					Abbreviation	
Introdu	Introduction to Functional Analysis				10-M-FAN-152-m01	
Module	e coord	inator		Module offered by		
Dean o	f Studie	es Mathematik (Mathema	atics)	Institute of Mathem	atics	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
9	(not) s	successfully completed				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
Banach	space	s and Hilbert spaces, bou	unded operators, prir	nciples of functional	analysis.	
Intende	ed leari	ning outcomes				
The stu methoo broad a	dent kı İs, is al applica	nows the fundamental co ole to apply methods fror bility of the theory to oth	ncepts and methods n linear algebra and a er branches of mathe	of functional analys analysis to functiona matics.	is as well as the pertinent proof al analysis, and realises the	
Course	s (type	, number of weekly conta	ct hours, language —	· if other than Germa	n)	
V (4) +	Ü (2)					
Methoo ster, in	d of ass formati	essment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
a) writt b) oral c) oral Langua credita	en exar examin examin ge of a ble for	nination (approx. 90 to 1 lation of one candidate e ation in groups (groups c ssessment: German and, bonus	80 minutes, usually o ach (15 to 30 minutes of 2, 10 to 15 minutes /or English	chosen) or 6) or per candidate)		
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Workload						
270 h						
Teaching cycle						
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)					
§ 22	Nr. 3 f)					

Module	Module title Abbreviation					
Basic N	Basic Notions and Methods of Mathematical Reasoning 10-M-GBM-152-m01					
Module	e coord	inator		Module offered by		
Dean of	f Studie	es Mathematik (Mathema	atics)	Institute of Mathem	atics	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
2	(not) s	successfully completed				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
Introdu	ction to	o the basic notions and p	roof techniques in m	athematics: approad	ch to sets, formal logic and maps.	
Intende	ed learı	ning outcomes	,			
The stu the Bac	dent ge helor's	ets acquainted with the b degree study programm	asic working techniq e.	ues which are prere	quisites for the further courses in	
Course	s (type	, number of weekly conta	ct hours, language —	· if other than Germa	n)	
V (1) + Ü	Ü (1)					
Methoo ster, inf	d of ass formati	sessment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
project Langua	(10 to ge of a	15 pages) ssessment: German and,	/or English			
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Additio	nal info	ormation on module dura	tion: block taught pr	ior to the beginning	of the lecture period.	
Workload						
60 h	60 h					
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
§ 22 Nr. 1 h) § 22 Nr. 2 f)						

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Module title				Abbreviation		
Linear /	Algebra	a 1			10-M-LNA1-152-m01	
Module	coord	inator		Module offered by		
Dean of	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	atics	
ECTS	Metho	od of grading	Only after succ. com	nol. of module(s)		
8	(not)	successfully completed				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
Basic n termina	otions ants.	and structures; vector sp	aces, linear maps, sy	stems of linear equa	ations; theory of matrices and de-	
Intende	ed lear	ning outcomes	,			
The stu ted with to perfo	dent k n the co orm sin	nows and masters the ba entral proof methods in li 1ple mathematical argum	sic notions and esse near algebra and car ents independently,	ntial methods of line apply them to solve and can present the	ear algebra. He/She is acquain- e easy problems. He/She is able m adequately in written form.	
Course	s (type	, number of weekly conta	ct hours, language –	· if other than Germa	n)	
V (4) +	Ü (2)					
Methoo ster, inf	l of ass formati	sessment (type, scope, la ion on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
written exercise Langua	exami es eacl ge of a	nation (approx. 90 to 180 h) ssessment: German and,	minutes) and writter	n exercises (approx.	12 exercise sheets with approx. 4	
Allocat	ion of p	olaces	Ŭ			
Additio	nal inf	ormation				
Workload						
240 h						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						

Module title				Abbreviation	
Linear /	Algebra	12			10-M-LNA2-152-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	npl. of module(s)	
8	(not) s	successfully completed			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
Eigenva	alue the	eory, bilinear forms, Eucl	idean and unitary veo	ctor spaces, diagona	lisation and Jordan normal form.
Intende	ed learı	ning outcomes			
The stu ted with to perfo	dent ki h the co orm sim	nows and masters the ba entral proof methods in li iple mathematical argum	sic notions and esse near algebra and car ents independently,	ntial methods of line apply them to solve and can present the	ear algebra. He/She is acquain- e easy problems. He/She is able m adequately in written form.
Course	s (type	, number of weekly conta	ct hours, language —	- if other than Germa	n)
V (4) + I	Ü (2)				
Methoo ster, inf	l of ass formati	s essment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-
written exercise Langua	examines each ge of a	nation (approx. 90 to 180 ז) ssessment: German and,	minutes) and writter /or English	n exercises (approx.	12 exercise sheets with approx. 4
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Workload					
240 h					
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					

Module title					Abbreviation	
Seminar Mathematics					10-M-SEM-152-m01	
Module coordinator				Module offered by		
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
A selec	ted top	ic in mathematics.				
Intende	ed lear	ning outcomes				
The stu of a giv ly in a s	ident g en topi scientif	ains first experience with ic using selected literatur ic discussion.	independent scienti re, and prepares a tal	fic work. He/She ma k on the subject. He	sters elaboration and structuring /She is able to participate active-	
Course	s (type	, number of weekly conta	ct hours, language –	· if other than Germa	ın)	
S (2)						
Methoo ster, int	d of ass formati	sessment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
talk (60 Langua	o to 120 Ige of a	o minutes) ssessment: German and,	/or English			
Allocat	Allocation of places					
Additio	nal inf	ormation				
Workload						
150 h						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
§ 22	§ 22 Nr. 3 f)					

Module title					Abbreviation	
Supplementary Seminar Mathematics					10-M-SEM2-152-m01	
Module coordinator				Module offered by		
Dean o	f Studie	es Mathematik (Mathema	atics)	Institute of Mathematics		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
4	(not) s	successfully completed				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
A selec	ted top	ic in mathematics.				
Intende	ed learı	ning outcomes				
The stu of a giv ly in a s	ident ga en topi scientif	ains first experience with c using selected literatur ic discussion.	independent scienti re, and prepares a tal	fic work. He/She ma k on the subject. He	sters elaboration and structuring /She is able to participate active-	
Course	s (type	, number of weekly conta	ict hours, language –	· if other than Germa	n)	
S (2)						
Methoo ster, in	d of ass formati	essment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
talk (60 Langua	o to 120 Ige of a	o minutes) ssessment: German and,	/or English			
Allocat	ion of p	olaces				
Additional information						
-						
Workload						
120 h						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						

Module title Abbreviation					Abbreviation		
Advanced Analysis					10-M-VAN-152-m01		
Module coordinator				Module offered by			
Dean of Studies Mathematik (Mathematics)			atics)	Institute of Mathematics			
ECTS	Metho	od of grading	Only after succ. com	ıpl. of module(s)			
7	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 semes	ster	undergraduate					
Content	ts						
Continu	ation o	of analysis in several vari	ables, integration the	eorems.			
Intende	d learn	ning outcomes					
The stuc she is a	dent is ble to	acquainted with advanc understand the construc	ed topics in analysis. tion of a complex ma	. Taking the example thematical concept.	of the Lesbegue integral, he or		
Courses	s (type,	, number of weekly conta	ct hours, language –	· if other than Germa	n)		
V (4) + Ü	Ü (2)						
Method ster, inf	Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus)						
a) writte b) oral e c) oral e Languag creditab	a) written examination (approx. 90 to 180 minutes, usually chosen) or b) oral examination of one candidate each (15 to 30 minutes) or c) oral examination in groups (groups of 2, 10 to 15 minutes per candidate) Language of assessment: German and/or English creditable for bonus						
Allocati	on of p	olaces					
Additional information							
Workload							
210 h							
Teaching cycle							
Referred	Referred to in LPO I (examination regulations for teaching-degree programmes)						

Module title					Abbreviation	
E-Learning and Blended Learning Mathematics 1 10-M-VHB1-152-mo1					10-M-VHB1-152-m01	
Module coordinator M				Module offered by	Module offered by	
Dean of	f Studie	es Mathematik (Mathema	atics)	Institute of Mathematics		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
2	(not) s	successfully completed				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
Becomi	ing fam	iliar with and reflecting t	echniques in e-learni	ng and blended lear	ning in mathematics.	
Intende	ed learr	ning outcomes				
The stu	dent is	able to employ basic me	thods of e-learning a	nd blended learning	in mathematics-	
Course	s (type,	, number of weekly conta	ct hours, language —	if other than Germa	n)	
Ü (2)						
Course	type: e	Learning, mostly Virtuell	e Hochschule Bayern	(vhb)		
Method ster, inf	l of ass formati	e ssment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
project Assessi	(web-b ment o	ased, 15 to 20 hours) ffered: Once a year, winte	er semester			
Allocat	ion of p	olaces				
Additional information						
Workload						
60 h						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						

Module	Module title Abbreviation					
E-Learning and Blended Learning Mathematics 2 10-M-VHB2-152-m01					10-M-VHB2-152-m01	
Module coordinator				Module offered by		
Dean of	fStudie	es Mathematik (Mathema	atics)	Institute of Mathematics		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
2	(not) s	successfully completed				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
Becomi	ing fam	iliar with and reflecting t	echniques in e-learni	ng and blended lear	ning in mathematics.	
Intende	ed learr	ning outcomes				
The stu	dent is	able to employ advance	d methods of e-learni	ing and blended lea	rning in mathematics-	
Course	s (type,	, number of weekly conta	ct hours, language —	if other than Germa	n)	
Ü (2) Course	type: e	learning mostly Virtuell	e Hochschule Bavern	(vbb)		
Mothor	l of acc	accment (type, scope la	if other the	(VIID)	tion offered if not even some	
ster, in	formati	on on whether module ca	an be chosen to earn	a bonus)	tion offered — if not every serile-	
project Assess	(web-b ment o	ased, 15 to 20 hours) ffered: Once a year, sum	mer semester			
Allocat	ion of p	olaces				
Additio	nal info	ormation				
Workload						
60 h						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						

Module title					Abbreviation	
Introduction to Number Theory					10-M-ZTH-152-m01	
Module coordinator				Module offered by		
Dean of Studies Mathematik (Mathema			atics)	s) Institute of Mathematics		
ECTS	TS Method of grading Only after succ. compl. of module(s)					
9	(not) s	successfully completed				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
Elemer tests a forms,	ntary pr nd met diopha	operties of divisibility, pr hods for factorisation, st ntine approximation and	ime numbers and pri ructure of the residue diophantine equatio	me number factorisa class rings, theory c ns.	ation, modular arithmetics, prime of quadratic remainder, quadratic	
Intend	ed lear	ning outcomes				
The stu ploy th	ıdent is e basic	acquainted with the fun methods and proof tech	damental concepts a niques independentl	nd methods of numb y.	per theory. He/she is able to em-	
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)	
V (4) +	Ü (2)					
Metho ster, in	d of ass formati	sessment (type, scope, la on on whether module ca	inguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
a) writt b) oral c) oral Langua credita	a) written examination (approx. 90 to 180 minutes, usually chosen) or b) oral examination of one candidate each (15 to 30 minutes) or c) oral examination in groups (groups of 2, 10 to 15 minutes per candidate) Language of assessment: German and/or English creditable for bonus					
Allocat	ion of p	olaces				
Additional information						
Workload						
270 h						
Teaching cycle						
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)					

Modul	Module title Abbreviation					
Introduction to Number Theory for Mathematical Physics					10-M-ZTHP-152-m01	
Module coordinator				Module offered by		
Dean of Studies Mathematik (Mathematics)			atics)	Institute of Mathem	natics	
ECTS	Metho	od of grading	Only after succ. com	Inly after succ. compl. of module(s)		
10	nume	rical grade		•		
Duratio	on	Module level	Other prerequisites	es		
1 seme	ester	undergraduate				
Conter	nts					
Elemer tests a forms,	ntary pr nd met diopha	operties of divisibility, pr hods for factorisation, st ntine approximation and	ime numbers and pri ructure of the residue diophantine equatio	me number factorisa class rings, theory o ns.	ation, modular arithmetics, prime of quadratic remainder, quadratic	
Intend	ed lear	ning outcomes				
The stu ploy th	udent is e basic	acquainted with the fun methods and proof tech	damental concepts a niques independentl	nd methods of numl y.	ber theory. He/she is able to em-	
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	ın)	
V (4) +	Ü (2)					
Metho ster, in	Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus)					
a) writt b) oral c) oral Langua credita	 a) written examination (approx. 90 to 180 minutes, usually chosen) or b) oral examination of one candidate each (15 to 30 minutes) or c) oral examination in groups (groups of 2, 10 to 15 minutes per candidate) Language of assessment: German and/or English creditable for bonus 					
Allocat	tion of p	olaces				
Additional information						
Workload						
300 h						
Teaching cycle						
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)					