

Module Catalogue

for the Subject

Mathematics

with the degree "Erweiterungsprüfung für das Lehramt an
Realschulen"
(ECTS credits)

Examination regulations version: 2015

Responsible: Faculty of Mathematics and Computer Science

Responsible: Institute of Mathematics

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The subject is divided into

section / sub-section	ECTS credits	starting page
Scientific Discipline	60	5
Area 1	60	6
Teaching	12	16
Area 1	12	17
Freier Bereich (general as well as subject-specific electives)	0-15	20
Mathematics		21

Abbreviations used

Course types: **E** = field trip, **K** = colloquium, **O** = conversatorium, **P** = placement/lab course, **R** = project, **S** = seminar, **T** = tutorial, **Ü** = exercise, **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:

LASPO2015

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

05-Oct-2015 (2015-189)

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.

Scientific Discipline

(60 ECTS credits)

Area 1

(60 ECTS credits)

Module title		Abbreviation
Elementary Number Theory		10-M-ELZT-152-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
6	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Introduction to fundamental techniques in mathematics. Approach to the number as a basic theme in mathematics, basic topics in elementary number theory and the structure of the number system.		
Intended learning outcomes		
The student knows the basic ways of thinking and working in mathematics, as well as the fundamental mathematical proof methods. He/She is able to apply these skills to basic problems in the fields of number theory and the structure of the number system.		
Courses (type, number of weekly contact hours, language — if other than German)		
V (4) + Ü (2)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
written examination (approx. 60 to 90 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate) and written exercises (approx. 12 exercise sheets, approx. 3 exercises per sheet).		
Allocation of places		
--		
Additional information		
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Workload		
180 h		
Teaching cycle		
--		
Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 51 I Nr. 3		

Module title			Abbreviation
Elementary Geometry			10-M-ELGE-152-m01
Module coordinator		Module offered by	
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics	
ECTS	Method of grading	Only after succ. compl. of module(s)	
6	numerical grade	--	
Duration	Module level	Other prerequisites	
1 semester	undergraduate	--	
Contents			
Fundamental topics in elementary and Euclidean geometry: axiomatic foundations of Euclidean geometry, congruence geometry, imaging geometry, similarity geometry, basics in analytic geometry in $\mathbb{R}^3$, introduction to basic mathematical techniques.			
Intended learning outcomes			
The student knows the basic ways of thinking and working in mathematics, as well as the fundamental mathematical proof methods. He/She is able to apply these skills to basic problems in Euclidean geometry.			
Courses (type, number of weekly contact hours, language — if other than German)			
V (4) + Ü (2)			
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)			
written examination (approx. 60 to 90 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate) and written exercises (approx. 12 exercise sheets, approx. 3 exercises per sheet).			
Allocation of places			
--			
Additional information			
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Workload			
180 h			
Teaching cycle			
--			
Referred to in LPO I (examination regulations for teaching-degree programmes)			
§ 51 I Nr. 3			

Module title		Abbreviation
Elementary Stochastics		10-M-ELST-152-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Fundamental topics in elementary stochastics: descriptive statistics, probability theory, combinatorics, inferential statistics, stochastic modelling, introduction to basic mathematical techniques.		
Intended learning outcomes		
The student knows the basic ways of thinking and working in mathematics, as well as the fundamental mathematical proof methods. He/She is able to apply these skills to basic problems in stochastics.		
Courses (type, number of weekly contact hours, language — if other than German)		
V (3) + Ü (1)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
written examination (approx. 60 to 90 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate) and written exercises (approx. 12 exercise sheets, approx. 3 exercises per sheet).		
Allocation of places		
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Additional information		
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Workload		
150 h		
Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 51 I Nr. 3		

Module title		Abbreviation
Basic Linear Analysis		10-M-GRLA-152-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
9	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Basics in linear algebra: groups, rings, fields, systems of linear equations, vector spaces, matrices and determinants, linear maps, examples and applications.		
Intended learning outcomes		
The student is acquainted with the basic methods and concepts of linear algebra. He/She is able to comprehend the central proof methods, can perform easy mathematical arguments and present them in written form. He/She can analyse basic mathematical problems and employ methods of linear algebra to solve them.		
Courses (type, number of weekly contact hours, language — if other than German)		
V (4) + Ü (2)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
written examination (approx. 60 to 90 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate). creditable for bonus		
Allocation of places		
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Additional information		
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Workload		
270 h		
Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 51 I Nr. 2		

Module title			Abbreviation
Basic Analysis			10-M-GRAN-152-m01
Module coordinator		Module offered by	
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics	
ECTS	Method of grading	Only after succ. compl. of module(s)	
12	numerical grade	--	
Duration	Module level	Other prerequisites	
2 semester	undergraduate	--	
Contents			
Convergence and divergence of sequences and series, functions, continuity, differentiation and integration (Riemann integral), Taylor approximation and power series, functions in several variables, total and partial differentiability, inverse and implicit function theorem, curves in $\mathbb{R}^n$, curve integrals, integration theorems in higher dimensions (Fubini's theorem, transformation rule), examples and applications.			
Intended learning outcomes			
The student is acquainted with methods and concepts in analysis of one and several variables. He/She is able to comprehend the central proof methods, can perform easy mathematical arguments and present them in written form. He/She can analyse basic mathematical problems and employ methods of analysis in one and several variables to solve them.			
Courses (type, number of weekly contact hours, language — if other than German)			
$V(4) + \ddot{U}(2) + V(2) + \ddot{U}(2)$			
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)			
written examination (approx. 60 to 120 minutes). If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate). creditable for bonus			
Allocation of places			
--			
Additional information			
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Workload			
360 h			
Teaching cycle			
--			
Referred to in LPO I (examination regulations for teaching-degree programmes)			
§ 51 I Nr. 1			

Module title		Abbreviation
Analytic Geometry		10-M-ANGE-152-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
6	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Applications of linear algebra to analytic geometry: quadrics, characterisation of affine maps and isometries, discussion of Euclidean spaces (scalar products, arcs, orthonormal bases).		
Intended learning outcomes		
The students is acquainted with advanced methods, concepts and results in linear algebra and analytic geometry. He/She is able to comprehend the central proof methods, can perform easy mathematical arguments and present them orally and in written form. He/She can analyse basic mathematical problems and employ methods of linear algebra and analytic geometry to solve them.		
Courses (type, number of weekly contact hours, language — if other than German)		
V (4) + Ü (2)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
written examination (approx. 60 to 90 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate). creditable for bonus		
Allocation of places		
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Additional information		
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Workload		
180 h		
Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 51 I Nr. 2		

Module title		Abbreviation
Basic Differential Equations		10-M-GRDG-152-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Examples and natural appearances of ordinary differential equations, existence and uniqueness theorems (Picard-Lindelöf, Peano), systems of linear differential equations, applications and examples.		
Intended learning outcomes		
The student is acquainted with methods and concepts of ordinary differential equations. He/She is able to comprehend the central proof methods, can perform easy mathematical arguments and present them in written form. He/She can analyse basic mathematical problems and employ methods of differential equations to solve them.		
Courses (type, number of weekly contact hours, language — if other than German)		
V (3) + Ü (2)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
written examination (approx. 60 to 90 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate). creditable for bonus		
Allocation of places		
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Additional information		
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Workload		
150 h		
Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 51 I Nr. 1		

Module title			Abbreviation
Consolidation of Mathematics (German Realschule)			10-M-M4R-152-mo1
Module coordinator		Module offered by	
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics	
ECTS	Method of grading	Only after succ. compl. of module(s)	
6	numerical grade	--	
Duration	Module level	Other prerequisites	
1 semester	undergraduate	--	
Contents			
Discussion of a selected topic in mathematics to extend and consolidate the knowledge and skills acquired in modules 10-M-M1GHR and 10-M-M2GHR.			
Intended learning outcomes			
The student has advanced knowledge in a selected field of mathematics.			
Courses (type, number of weekly contact hours, language — if other than German)			
V (3) + Ü (2)			
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)			
written examination (approx. 60 to 90 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate). creditable for bonus			
Allocation of places			
--			
Additional information			
--			
Workload			
180 h			
Teaching cycle			
--			
Referred to in LPO I (examination regulations for teaching-degree programmes)			
§ 51 special branch of science without assignment			

Module title		Abbreviation
Review Course Mathematics (German Grundschule/Mittelschule/Realschule)		10-M-M3GMR-152-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
5	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Revision and consolidation of the topics in analysis, ordinary differential equations, linear algebra and analytic geometry by completing exercises and answering past state examination questions.		
Intended learning outcomes		
The student has advanced knowledge in the topics stated in LPO I (examination regulations for teaching degree programmes), §51 (2) 1, 2, and is able to apply them on the level of the state examination.		
Courses (type, number of weekly contact hours, language — if other than German)		
Ü (4)		
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) talk (approx. 45 minutes) or b) project (10 to 15 pages)		
Allocation of places		
--		
Additional information		
--		
Workload		
150 h		
Teaching cycle		
--		
Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 51 special branch of science without assignment		

Teaching

(12 ECTS credits)

Area 1

(12 ECTS credits)

Module title			Abbreviation
Didactics of Mathematics - Geometry (German Mittelschule/Realschule)			10-M-DGMR1-152-m01
Module coordinator		Module offered by	
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics	
ECTS	Method of grading	Only after succ. compl. of module(s)	
5	numerical grade	--	
Duration	Module level	Other prerequisites	
1 semester	undergraduate	--	
Contents			
Topics in geometry at Mittelschule and Realschule are discussed, taking didactic aspects into account: goals of teaching geometry, constructions, proofs, problem solving and conceptualisation in geometry.			
Intended learning outcomes			
The student is acquainted with mathematical ways of thinking and working techniques in geometry, and is able to take into account the students' perception of mathematical topics. He/She knows important aspects of planning and analysing teaching of geometry, masters different strategies for teaching and learning und can assess them.			
Courses (type, number of weekly contact hours, language — if other than German)			
V (2) + Ü (2)			
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)			
written examination (approx. 60 to 90 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate). creditable for bonus			
Allocation of places			
--			
Additional information			
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Workload			
150 h			
Teaching cycle			
--			
Referred to in LPO I (examination regulations for teaching-degree programmes)			
§ 51 I Nr. 4			

Module title		Abbreviation
Didactics of Mathematics - Stochastics and Algebra (German Mittelschule/Realschule)		10-M-DGMR2-152-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
7	numerical grade	--
Duration	Module level	Other prerequisites
2 semester	undergraduate	--
Contents		
Topics in algebra didactics (goals of teaching algebra, numbers, terms, functions, equations) and stochastics (goals of teaching stochastics, descriptive statistics, probability theory, combinatorics, basics in inferential statistics) in Sekundarstufe I at Mittelschule and Realschule.		
Intended learning outcomes		
The student is acquainted with mathematical ways of thinking and working techniques in algebra and stochastics, and is able to take into account the students' perception of mathematical topics. He/She knows important aspects of planning and analysing teaching of mathematics, masters different strategies for teaching and learning and can assess them.		
Courses (type, number of weekly contact hours, language — if other than German)		
V (2) + Ü (1) + V (2) + Ü (2)		
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) oral examination of one candidate each (approx. 30 minutes) or b) oral examination in groups (groups of 2, approx. 15 minutes per candidate) or c) written examination (60 to 120 minutes)		
Allocation of places		
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Additional information		
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Workload		
210 h		
Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 51 I Nr. 4		

Freier Bereich (general as well as subject-specific electives)

(0-15 ECTS credits)

Mathematics

(ECTS credits)

(Freier Bereich (general as well as subject-specific electives) -- subject specific)

Module title		Abbreviation
Computers in Mathematical Teaching		10-M-DCMU-152-mo1
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
3	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Discussion of possible ways to use computers in teaching mathematics as well as discussion of common computer tools.		
Intended learning outcomes		
The student is acquainted with basic possibilities for the employment of computers in the teaching of mathematics, as well as with the potential and limitations of computer tools.		
Courses (type, number of weekly contact hours, language — if other than German)		
V (2)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
project (10 to 15 pages) Assessment offered: Every two years, winter semester		
Allocation of places		
--		
Additional information		
--		
Workload		
90 h		
Teaching cycle		
--		
Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 22 II Nr. 2 f) § 22 II Nr. 1 h) § 22 II Nr. 3 f)		

Module title		Abbreviation
Methodology of Teaching in Mathematics (German Realschule)		10-M-DMRS-152-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
3	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Discussion of selected methods for teaching mathematics in Realschule.		
Intended learning outcomes		
The student is acquainted with different methods of teaching mathematics at German Realschule, can assess their respective advantages and disadvantages, and can select and employ an appropriate method depending on the situation and the subject.		
Courses (type, number of weekly contact hours, language — if other than German)		
S (2)		
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) talk (approx. 45 minutes) or b) term paper (5 to 10 pages) or c) project (10 to 15 pages) Assessment offered: Every two years, winter semester		
Allocation of places		
--		
Additional information		
--		
Workload		
90 h		
Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 22 II Nr. 2 f)		

Module title			Abbreviation
E-Learning and Blended Learning in Mathematical Teaching (virtual Course)			10-M-DVHB-152-m01
Module coordinator		Module offered by	
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics	
ECTS	Method of grading	Only after succ. compl. of module(s)	
3	(not) successfully completed	--	
Duration	Module level	Other prerequisites	
1 semester	undergraduate	--	
Contents			
In a course offered by Virtuelle Hochschule Bayern (vhb), the student becomes acquainted with and reflects on techniques in e-learning and blended learning for teaching mathematics.			
Intended learning outcomes			
The student is acquainted with basic methods of e-learning and blended learning in teaching methematics, as well as their potentials and limitations.			
Courses (type, number of weekly contact hours, language — if other than German)			
Ü (2) Course type: eLearning, mostly Virtuelle Hochschule Bayern (vhb)			
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)			
project (web-based, 15 to 20 hours) Assessment offered: Once a year, winter semester			
Allocation of places			
--			
Additional information			
--			
Workload			
90 h			
Teaching cycle			
--			
Referred to in LPO I (examination regulations for teaching-degree programmes)			
§ 22 II Nr. 1 h)			
§ 22 II Nr. 2 f)			
§ 22 II Nr. 3 f)			

Module title		Abbreviation
Basics in Arithmetics (virtual course)		10-M-VHBari-152-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
2	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Basic topics on teaching arithmetics in school, e. g. divisability theory, prime numbers, set theory.		
Intended learning outcomes		
The student learns basic topics in the teaching of arithmetics and the related mathematical backgrounds and proofs. He/She is acquainted with the employment of new technologies for teaching arithmetic in school.		
Courses (type, number of weekly contact hours, language — if other than German)		
Ü (2) Course type: eLearning, mostly Virtuelle Hochschule Bayern (vhb)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
project (web-based, 15 to 20 hours) Assessment offered: Once a year, winter semester		
Allocation of places		
--		
Additional information		
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Workload		
60 h		
Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 22 II Nr. 1 h) § 22 II Nr. 2 f) § 22 II Nr. 3 f)		

Module title		Abbreviation
Basics in School Geometry (virtual course)		10-M-VHBGeo-152-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
2	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Revision and consolidation of the fundamental topics in elementary geometry that are prerequisites for the subject-specific and didactic courses (in particular teaching degrees Grundschule, Hauptschule, Realschule) in geometry.		
Intended learning outcomes		
The student has basic knowledge of school geometry, as required for the study of mathematics and its didactics. He/She is acquainted with the employment of new technologies for teaching geometry in school.		
Courses (type, number of weekly contact hours, language — if other than German)		
Ü (2) Course type: eLearning, mostly Virtuelle Hochschule Bayern (vhb)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
project (web-based, 15 to 20 hours) Assessment offered: Once a year, summer semester		
Allocation of places		
--		
Additional information		
--		
Workload		
60 h		
Teaching cycle		
--		
Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 22 II Nr. 1 h) § 22 II Nr. 2 f) § 22 II Nr. 3 f)		

Module title			Abbreviation
Stochastics in Sekundarstufe I (virtual course)			10-M-VHBSto-152-m01
Module coordinator		Module offered by	
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics	
ECTS	Method of grading	Only after succ. compl. of module(s)	
2	(not) successfully completed	--	
Duration	Module level	Other prerequisites	
1 semester	undergraduate	--	
Contents			
Revision and consolidation of the fundamental topics in stochastics that are prerequisites for the subject-specific and didactic courses in stochastics.			
Intended learning outcomes			
The student has basic knowledge of stochastics, as required for the study of mathematics and its didactics.He/She is acquainted with the employment of new technologies for teaching stochastics in school.			
Courses (type, number of weekly contact hours, language — if other than German)			
Ü (2) Course type: eLearning, mostly Virtuelle Hochschule Bayern (vhb)			
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)			
project (web-based, 15 to 20 hours) Assessment offered: Once a year, winter semester			
Allocation of places			
--			
Additional information			
--			
Workload			
60 h			
Teaching cycle			
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Referred to in LPO I (examination regulations for teaching-degree programmes)			
§ 22 II Nr. 1 h)			
§ 22 II Nr. 2 f)			
§ 22 II Nr. 3 f)			

Module title		Abbreviation
Mathematics in grade 10 (virtual course)		10-M-VHBM10-152-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
2	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Basic topics on teaching mathematics in tenth grade in Hauptschule, Realschule and Gymnasium.		
Intended learning outcomes		
The student learns basic topics in the teaching of mathematics in tenth form at German Mittelschule and Realschule, as well as the related mathematical backgrounds and proofs. He/She is acquainted with the employment of new technologies for teaching mathematics in tenth form.		
Courses (type, number of weekly contact hours, language — if other than German)		
Ü (2) Course type: eLearning, mostly Virtuelle Hochschule Bayern (vhb)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
project (web-based, 15 to 20 hours) Assessment offered: Once a year, summer semester		
Allocation of places		
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Additional information		
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Workload		
60 h		
Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 22 II Nr. 1 h) § 22 II Nr. 2 f) § 22 II Nr. 3 f)		

Module title		Abbreviation
Didactics of Elementary School Mathematics for Teachers at German Mittelschule and Special Education		10-M-DGMS-152-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
2	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Discussion of selected methods for teaching mathematics in Mittelschule.		
Intended learning outcomes		
The student is acquainted with different methods of teaching mathematics at German Mittelschule, can assess their respective advantages and disadvantages, and can select and employ an appropriate method depending on the situation and the subject.		
Courses (type, number of weekly contact hours, language — if other than German)		
S (2)		
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) talk (approx. 45 minutes) or b) term paper (5 to 10 pages) or c) project (10 to 15 pages) Assessment offered: Every two years, winter semester		
Allocation of places		
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Additional information		
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Workload		
60 h		
Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 22 II Nr. 2 f) § 22 II Nr. 1 h)		

Module title		Abbreviation
Basic Notions and Methods of Mathematical Reasoning		10-M-GBM-152-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
2	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Introduction to the basic notions and proof techniques in mathematics: approach to sets, formal logic and maps.		
Intended learning outcomes		
The student gets acquainted with the basic working techniques which are prerequisites for the further courses in the Bachelor's degree study programme.		
Courses (type, number of weekly contact hours, language — if other than German)		
V (1) + Ü (1)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
project (10 to 15 pages) Language of assessment: German and/or English		
Allocation of places		
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Additional information		
Additional information on module duration: block taught prior to the beginning of the lecture period.		
Workload		
60 h		
Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 22 II Nr. 1 h) § 22 II Nr. 2 f)		

Module title		Abbreviation
Introduction to Hands-on Mathematics		10-M-PRM1-152-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
3	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Elaboration of a school project on a topic in mathematics, e. g. for project days, school term papers (Facharbeiten), Pluskurse (additional courses for the in-depth study of areas of special interest), workshops. In the theoretical phase, the students formulate the subject-specific and didactic requirements of the topic, search for a suitable topic, elaborate this topic for the project and draw up a project plan. This is done in groups with students providing each other with advice as well as challenging and reflecting on each other's work.		
Intended learning outcomes		
The student is able to select a suitable mathematical topic for a school project and elaborate it.		
Courses (type, number of weekly contact hours, language — if other than German)		
S (2)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
project (10 to 15 pages) Assessment offered: Every two years, winter semester		
Allocation of places		
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Additional information		
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Workload		
90 h		
Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 22 II Nr. 2 f) § 22 II Nr. 3 f)		

Module title		Abbreviation
Practical Course Hands-on Mathematics		10-M-PRM2-152-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
3	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Implementation of a school project on a topic in mathematics, e. g. for project days, school term papers (Facharbeiten), Pluskurse (additional courses for the in-depth study of areas of special interest), workshops. In the practical phase the students prepare the implementation, realise the project with pupils and afterwards reflect the planning and implementation.		
Intended learning outcomes		
The student is able to perform a school project with a suitable mathematical topic. He/She is acquainted with different aspects of project planning and management, and can reflect the process critically.		
Courses (type, number of weekly contact hours, language — if other than German)		
P (2)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
project: drawing up a project plan (5 to 10 pages) and practical implementation with pupils Assessment offered: Every two years, summer semester		
Allocation of places		
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Additional information		
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Workload		
90 h		
Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 22 II Nr. 2 f) § 22 II Nr. 3 f)		

Module title			Abbreviation
Didactics of Geometry (virtual course)			10-M-VHBDG-152-m01
Module coordinator		Module offered by	
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics	
ECTS	Method of grading	Only after succ. compl. of module(s)	
2	(not) successfully completed	--	
Duration	Module level	Other prerequisites	
1 semester	undergraduate	--	
Contents			
Geometry didactics is about learning and teaching geometry. This course focuses on topics which are central and important for all of geometry and mathematics, namely proving and problem solving. It also addresses topics which are usually discussed only briefly or not at all in university lectures and in the literature. Among these are chapters on space geometry, trigonometry and similarity geometry.			
Intended learning outcomes			
The students are acquainted with the subject-specific contents of school geometry, and are able to structure the notions and methods within a conceptual map. They know strategies of short, middle and long term development of understanding of the central concepts of geometry in teaching mathematics. They are able to develop and justify learning units and learning sequences for the important topics in school geometry independently. They are able to assess and value the importance of digital technology with respect to today's and future design of instruction. They know various fields of application of geometric concepts, and are able to perform modelling (in the sense of modelling cycles) independently.			
Courses (type, number of weekly contact hours, language — if other than German)			
Ü (2) Course type: eLearning, mostly Virtuelle Hochschule Bayern (vhb)			
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)			
project (web-based, 15 to 20 hours) Assessment offered: Once a year, summer semester			
Allocation of places			
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Additional information			
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Workload			
60 h			
Teaching cycle			
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Referred to in LPO I (examination regulations for teaching-degree programmes)			
§ 22 II Nr. 1 h) § 22 II Nr. 2 f) § 22 II Nr. 3 f)			

Module title		Abbreviation
Didactics of Algebra (virtual course)		10-M-VHBDA-152-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
2	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Algebra didactics is about learning and teaching algebra. This course focuses on the central and important topics in school algebra: extensions of number domains, variables and terms, equations and functions.		
Intended learning outcomes		
The students are acquainted with the subject-specific contents of school algebra, and are able to structure the notions and methods within a conceptual map. They know strategies of short, middle and long term development of understanding of the central concepts of algebra in teaching mathematics. They are able to develop and justify learning units and learning sequences for the important topics in school algebra independently. They are able to assess and value the importance of digital technology with respect to today's and future design of instruction. They know various fields of application of algebraic concepts, and are able to perform modelling (in the sense of modelling cycles) independently.		
Courses (type, number of weekly contact hours, language — if other than German)		
Ü (2) Course type: eLearning, mostly Virtuelle Hochschule Bayern (vhb)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
project (web-based, 15 to 20 hours) Assessment offered: Once a year, winter semester		
Allocation of places		
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Additional information		
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Workload		
60 h		
Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 22 II Nr. 1 h), § 22 II Nr. 2 f) § 22 II Nr. 3 f)		

Module title		Abbreviation
Exam Tutorial Didactics of Mathematics (virtual course)		10-M-VHBEx-152-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
2	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Revision of basics (definitions of mathematical notions, formulation and proving of theorems) in preparation for the Erstes Staatsexamen für Lehramt Gymnasium (first state examination for teaching at a Gymnasium) as well as basic guidelines for answering exam questions (with a special focus on the state examination in Bavaria).		
Intended learning outcomes		
The student learns about the structure of the state exams and different methods for solving the exam problems.		
Courses (type, number of weekly contact hours, language — if other than German)		
Ü (2) Course type: eLearning, mostly Virtuelle Hochschule Bayern (vhb)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
project (web-based, 15 to 20 hours) Assessment offered: Once a year, winter semester		
Allocation of places		
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Additional information		
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Workload		
60 h		
Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 22 II Nr. 1 h) § 22 II Nr. 2 f) § 22 II Nr. 3 f)		

Module title		Abbreviation
Mathematics 1 (virtual course)		10-M-VHBMa1-152-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
2	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Discussion of basic topics on teaching mathematics in a Gymnasium, in particular verbal and subject-specific fundamentals concerning the organisation of classes.		
Intended learning outcomes		
The student is able to discuss selected topics and questions on teaching mathematics at German Gymnasium, considering both subject-related and methodical aspects.		
Courses (type, number of weekly contact hours, language — if other than German)		
Ü (2) Course type: eLearning, mostly Virtuelle Hochschule Bayern (vhb)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
project (web-based, 15 to 20 hours) Assessment offered: Every two years, winter semester		
Allocation of places		
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Additional information		
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Workload		
60 h		
Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 22 II Nr. 1 h) § 22 II Nr. 2 f) § 22 II Nr. 3 f)		

Module title		Abbreviation
Mathematics 2 (virtual course)		10-M-VHBMa2-152-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
2	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Discussion of central topics on teaching mathematics in a Gymnasium, in particular didactic analyses and possibilities of implementation in the classroom.		
Intended learning outcomes		
The student is able to discuss and analyse selected topics and questions on teaching mathematics at German Gymnasium from a didactical point of view.		
Courses (type, number of weekly contact hours, language — if other than German)		
Ü (2) Course type: eLearning, mostly Virtuelle Hochschule Bayern (vhb)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
project (web-based, 15 to 20 hours) Assessment offered: Every two years, summer semester		
Allocation of places		
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Additional information		
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Workload		
60 h		
Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 22 II Nr. 1 h) § 22 II Nr. 2 f) § 22 II Nr. 3 f)		

Module title		Abbreviation
School Mathematics from a Higher Perspective		10-M-SCH-152-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
5	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Discussion of selected topics in school mathematics with respect to their integration into wider theories and their didactic implementation at both school and university levels.		
Intended learning outcomes		
By means of selected examples, the student gains insight into the interrelation between school mathematics and advanced mathematical theories. He/She is able to discuss these under mathematical, didactical and methodical aspect.		
Courses (type, number of weekly contact hours, language — if other than German)		
V (2) + Ü (2)		
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) talk (approx. 45 minutes) or b) term paper (10 to 15 pages) or c) project work (15 to 25 hours) Language of assessment: German and/or English Assessment offered: In the semester in which the course is offered and in the subsequent semester		
Allocation of places		
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Additional information		
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Workload		
150 h		
Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 22 II Nr. 1 h) § 22 II Nr. 2 f) § 22 II Nr. 3 f)		