Module title	Abbreviation
Applied Mathematics and Stochastics for Teaching Degree Mathematics (German Gymnasium)	10-M-ASL-122-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)
16	numerical grade	--

Duration	Module level	Other prerequisites
2 semester	undergraduate	By way of exception, additional prerequisites are listed in the section on assessments.

Contents

Stochastics for teaching degree (Discrete statistics, in particular stochastic modelling, motivation of conceptualisation and discussion of basic assumptions: basic notions of descriptive statistics, discrete probability spaces, random variables, important discrete distributions, elements of combinatorics, principle of inclusion and exclusion, multistage experiments, conditional probability, stochastic independence, common distributions, expected value and variance, covariance and correlation, waiting time problems, law of the large numbers, central limit theorem, confidence intervals and statistical tests in binomial models, stochastic paradoxes)
and either
Introduction to Discrete Mathematics (Techniques from combinatorics, introduction to graph theory including applications, cryptographic methods, error-correcting codes), or
Numerical Mathematics 1 (Solution of systems of linear equations and curve fitting problems, nonlinear equations and systems of equations, interpolation with polynomials, splines and trigonometric functions, numerical integration), or
Numerical Mathematics 2 (Solution methods and applications for eigenvalue problems, linear programming, initial value problems for ordinary differential equations, boundary value problems).

Intended learning outcomes

The student is acquainted with the basic concepts and methods in applied mathematics and stochastics, which are required for teaching mathematics in high school (German Gymnasium). He/She is acquainted with the central concepts and algorithms in this field, can apply them independently and knows about the possibilities and limitations of their applicability.

Courses (type, number of weekly contact hours, language — if other than German)

This module has 5 components; information on courses listed separately for each component.
- 10-M-DIM-L-122, 10-M-NUM1-L-122, 10-M-NUM2-L-122, and 10-M-STO-L-122: V + Ü (no information on language and number of weekly contact hours available)
- 10-M-ASL-P-122: M (no information on language and number of weekly contact hours available)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

This module has the following 5 assessment components. To pass this module, students must pass the two assessment components 10-M-ASL-P and 10-M-STO-L- and one of the remaining three assessment components.

Assessment in module component 10-M-DIM-L-122: Einführung in die Diskrete Mathematik für Lehramt Gymnasium (Introduction to Discrete Mathematics for Students Pursuing a Teaching Degree Gymnasium), **in module component 10-M-NUM1-L-122:** Numerische Mathematik 1 (Numerical Mathematics 1), **in module component 10-M-NUM2-L-122:** Numerische Mathematik 2 (Numerical Mathematics 2), **in module component 10-M-STO-L-122:** Stochastik für Lehramt Gymnasium (Stochastics for Students Pursuing a Teaching Degree Gymnasium)
- 7 ECTS credits (10-M-STO-L-122: 6 ECTS credits), pass / fail
- written examination (approx. 90 to 180 minutes). If announced by the lecturer, 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. 30 minutes). The module component will also be considered successfully completed if it is selected as subject of the oral examination covering several modules (separate module component for assessment purposes (Prüfungsteilmodul)) and this examination is passed.
- Language of assessment: German; English if agreed upon with examiner(s)

- Additional prerequisites: To qualify for admission to assessment, students must meet certain prerequisites. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

Assessment in module component 10-M-ASL-P-122: Prüfung Angewandte Mathematik und Stochastik für Lehramt Gymnasium (Assessment Applied Mathematics and Stochastics for Students Pursuing a Teaching Degree Gymnasium)

- 3 ECTS credits, numerical grading
- oral examination of one candidate each (approx. 30 minutes). Assessment will have reference to the topics covered in module 10-M-STO-L and in the module component selected by students.
- Language of assessment: German; English if agreed upon with examiner(s)
- Only after successful completion of module components: Module component 10-M-ASL-P can only be taken by students who passed the written examination in one of the other four module components.

Allocation of places
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Additional information
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Workload
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Teaching cycle
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Referred to in LPO I (examination regulations for teaching-degree programmes)
§ 73 (1) 3. Mathematik Stochastik § 73 (1) 5. Mathematik Angewandte Mathematik

Module appears in
First state examination for the teaching degree Gymnasium Mathematics (2012)