

Module Handbook

TUK MODHB Homepage

Course of Study "Mathematics International" (M.Sc.)

[MAT-88.706-SG]

Department	[MAT] Mathematik
Degree	[M.Sc.] Master (M.Sc.)
Course of Study	Mathematics International
Short Name	M.Sc. Mathematics International
State	[NORM] Active
Additional informations	Examination regulations [DE] Homepage of the Course of Study

Section *Pure Mathematics*

Core Modules (non specialised)

In this section, modules amounting to 18 - 21 credit points (CP) from the list below are to be successfully completed. With approval of the examination board, other modules from the area of Pure Mathematics may be selectable.

The choice of the modules is limited by the chosen mathematical specialisation:

- Modules that are directly attributable to the chosen specialisation may not be included in the section "Pure Mathematics".
- In the sections "Pure Mathematics" and "Applied Mathematics", a total of modules amounting to at least 18 CP must be provided outside the focus area which the specialisation belongs to.
- When choosing a specialization that is wholly or partially attributable to the field of stochastics (e.g. "Stochastic Analysis", "Financial Mathematics" or "Statistics"), at least 24 CP must be provided in the sections "Pure Mathematics", "Applied Mathematics" and "Specialisation" outside of stochastics.

WP	MAT-40-11-M-4	Commutative Algebra Not possible if the chosen specialisation is "Algebra and Number Theory" or "Algebraic Geometry and Computer Algebra".	9.0 CP
WP	MAT-40-14-M-4	Cryptography	9.0 CP
WP	MAT-40-28-M-4	Plane Algebraic Curves Not possible if the chosen specialisation is "Algebraic Geometry and Computer Algebra".	4.5 CP
WP	MAT-60-11-M-4	Probability Theory Not possible if the chosen specialisation is "Financial Mathematics", "Statistics" or "Stochastic Analysis".	9.0 CP
WP	MAT-70-11-M-4	Functional Analysis Not possible if the chosen specialisation is "Stochastic Analysis".	9.0 CP
WP	MAT-80-11B-M-4	Introduction to PDE Not possible if the chosen specialisation is "Modelling and Scientific Computing", "Partial Differential Equations", or "Systems and Control Theory".	4.5 CP
WP	MAT-40-24-M-4	p-adic Numbers Not possible if the chosen specialisation is "Algebra and Number Theory".	4.5 CP
WP	MAT-40-25-M-4	Character Theory of Finite Groups Not possible if the chosen specialisation is "Algebra and Number Theory".	4.5 CP
WP	MAT-40-29-M-4	Quadratic Number Fields Not possible if the chosen specialisation is "Algebra and Number Theory".	4.5 CP
WP	MAT-40-16-M-6	Algebraic Topology	9.0 CP
WP	MAT-40-19-M-6	Elliptic Functions and Elliptic Curves	3.0 CP
WP	MAT-40-20-M-6	Multilinear Algebra	3.0 CP
WP	MAT-40-21-M-6	Manifolds	9.0 CP
WP	MAT-40-26-M-6	Riemannian Surfaces	3.0 CP
WP	MAT-40-27-M-6	Elliptic Curves in Positive Characteristics	3.0 CP
WP	MAT-49-11-M-6	Categories	3.0 CP
WP	MAT-49-15-M-6	Introduction to Tensor Categories	3.0 CP
WP	MAT-RM-MPOOL-7	Pure Mathematics (Advanced Modules M.Sc.)	[4.5 - 9.0] CP

Section *Applied Mathematics*

Core Modules (non specialised)

In this section, modules amounting to 24 - 27 credit points (CP) from the list below are to be successfully completed. With approval of the examination board, other modules from the area of Applied Mathematics may be selectable.

The choice of the modules is limited by the chosen mathematical specialisation:

- Modules that are directly attributable to the chosen specialisation may not be included in the section "Applied Mathematics".
- In the sections "Pure Mathematics" and "Applied Mathematics", a total of modules amounting to at least 18 CP must be provided outside

the focus area which the specialisation belongs to.

- When choosing a specialisation that is wholly or partially attributable to the field of stochastics (e.g. "Stochastic Analysis", "Financial Mathematics" or "Statistics"), at least 24 CP must be provided in the sections "Pure Mathematics", "Applied Mathematics" and "Specialisation" outside of stochastics.

WP	MAT-40-14-M-4	Cryptography	9.0 CP
WP	MAT-50-11-M-4	Integer Programming: Polyhedral Theory and Algorithms Not possible if the chosen specialisation is "Optimisation".	9.0 CP
WP	MAT-50-12-M-4	Nonlinear Optimization Not possible if the chosen specialisation is "Optimisation".	9.0 CP
WP	MAT-60-11-M-4	Probability Theory Not possible if the chosen specialisation is "Financial Mathematics", "Statistics" or "Stochastic Analysis".	9.0 CP
WP	MAT-60-12-M-4	Regression and Time Series Analysis Not possible if the chosen specialisation is "Financial Mathematics" or "Statistics".	9.0 CP
WP	MAT-60-14-M-6	Monte Carlo Algorithms Not possible if the chosen specialisation is "Financial Mathematics" or "Statistics".	9.0 CP
WP	MAT-60-15-M-4	Foundations in Financial Mathematics Not possible if the chosen specialisation is "Financial Mathematics" or "Statistics".	3.0 CP
WP	MAT-70-11-M-4	Functional Analysis Not possible if the chosen specialisation is "Stochastic Analysis".	9.0 CP
WP	MAT-80-11-M-4	Differential Equations: Numerics of ODE & Introduction to PDE Not possible if the chosen specialisation is "Modelling and Scientific Computing", "Partial Differential Equations", or "Systems and Control Theory".	9.0 CP
WP	MAT-80-11A-M-4	Numerics of ODE Not possible if the chosen specialisation is "Modelling and Scientific Computing", "Partial Differential Equations", or "Systems and Control Theory".	4.5 CP
WP	MAT-80-11B-M-4	Introduction to PDE Not possible if the chosen specialisation is "Modelling and Scientific Computing", "Partial Differential Equations", or "Systems and Control Theory".	4.5 CP
WP	MAT-80-12A-M-4	Introduction to Systems and Control Theory Not possible if the chosen specialisation is "Modelling and Scientific Computing" or "Systems and Control Theory".	4.5 CP
WP	MAT-59-14-M-6	Mathematics of Quantum Computing	4.5 CP
WP	MAT-65-10-M-4	Foundations in Mathematical Image Processing Not possible if the chosen specialisation is "Image Processing and Data Analysis".	9.0 CP
WP	MAT-80-17-M-6	Dynamical Systems Not possible if the chosen specialisation is "Modelling and Scientific Computing".	4.5 CP
WP	MAT-80-18-M-4	Introduction to Systems and Control Theory & Dynamical Systems	9.0 CP

Not possible if the chosen specialisation is "Modelling and Scientific Computing" or "Systems and Control Theory".

WP	MAT-81-23-M-4	Differential-Algebraic Equations	4.5 CP
		Not possible if the chosen specialisation is "Modelling and Scientific Computing".	
WP	INF-14-56-M-6	Optimization in Fluid Mechanics	4.5 CP
WP	INF-14-55-M-6	Topology Optimization	4.5 CP
WP	MAT-70-10-M-6	Spline Functions	3.0 CP
WP	MAT-80-13A-M-4	Introduction to Neural Networks	4.5 CP
		Not possible if the chosen specialisation is "Modelling and Scientific Computing" or "Systems and Control Theory".	
WP	MAT-80-12-M-6	Systems and Control Theory	9.0 CP
		Not possible if the chosen specialisation is "Modelling and Scientific Computing" or "Systems and Control Theory".	
WP	MAT-AM-MPOOL-7	Applied Mathematics (Advanced Modules M.Sc.)	[4.5 - 13.5] CP

Section *Specialisation*

Specialisation

In this section, modules amounting to 24 - 28 credit points (CP) from the module catalogue for the chosen specialisation (see below) have to be completed .

In addition, reading courses amounting to 12 CP have to be completed. The latter usually take place with semester-changing topics that are often based on current mathematical research. Towards the end of the lecture period of each semester, the reading courses offered in the following semester for the respective specialisation areas will be presented as part of the information sessions of the individual research focuses.

Modules associated to lectures (with or without exercise classes)

WP	MAT-43-MPOOL-7	Specialisation Algebra and Number Theory (M.Sc.)	[4.5 - 9.0] CP
WP	MAT-41-MPOOL-7	Specialisation Algebraic Geometry and Computer Algebra (M.Sc.)	[4.5 - 9.0] CP
WP	MAT-52-MPOOL-7	Specialisation Mathematical Optimisation (M.Sc.)	[4.5 - 9.0] CP
WP	MAT-61-MPOOL-7	Specialisation Financial Mathematics (M.Sc.)	[4.5 - 13.5] CP
WP	MAT-62-MPOOL-7	Specialisation Statistics (M.Sc.)	[4.5 - 9.0] CP
WP	MAT-65-MPOOL-7	Specialisation Image Processing and Data Analysis (M.Sc.)	[4.5 - 9.0] CP
WP	MAT-70-MPOOL-7	Specialisation Stochastic Analysis (M.Sc.)	[4.5 - 13.5] CP
WP	MAT-8x-MPOOL-7	Specialisation Modelling and Scientific Computing (M.Sc.)	[4.5 - 9.0] CP
WP	MAT-81-MPOOL-7	Specialisation Partial Differential Equations (M.Sc.)	[4.5 - 9.0] CP
WP	MAT-82-MPOOL-7	Specialisation Systems and Control Theory (M.Sc.)	[4.5 - 9.0] CP

Reading Courses

P	MAT-RC-M-7	Reading Course (Mathematics)	12.0 CP
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Section *Seminare*

Core Modules (non specialised)

In this section, two seminars must be selected, at least one of which must be on a topic from the chosen mathematical specialisation.

P	MAT-VSEM-M-7	Seminar (Mathematical Specialisation)	3.0 CP
P	MAT-SEM-M-7	Seminar (Mathematics)	3.0 CP

Section *Master Thesis*

Thesis

P	MAT-MA-MAT-M-7	Master Thesis (Mathematics, M.Sc.)	30.0 CP
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Section *Non-mathematical Elective*

Subsidiary Topic

In the non-mathematical elective, elective modules amounting to 6 - 8 credit points (CP) must be completed, which promote the outer-mathematical qualification. The grades of these modules are not included in the calculation of the overall grade of the Master's examination.

Recommended are language courses, internships abroad or modules from non-mathematical subsidiary topics (minors) of the other mathematical study programmes are recommended. In the case of language courses, evidence must be provided by an examination recognised by a university or equivalent achievements.

If modules from other study programmes at TU Kaiserslautern are included, the achievements to be provided can be found in the examination regulations of the corresponding study programmes.