

Module Handbook (<https://modhb.uni-kl.de/>)

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Module MAT-40-19-M-6

Elliptic Functions and Elliptic Curves (M, 3.0 LP)

Module Identification

Module Number	Module Name	CP (Effort)
MAT-40-19-M-6	<i>Elliptic Functions and Elliptic Curves</i>	3.0 CP (90 h)

Basedata

CP, Effort	3.0 CP = 90 h
Position of the semester	1 Sem. irreg.
Level	[6] Master (General)
Language	[EN] English
Module Manager	Decker, Wolfram, Prof. Dr. (PROF DEPT: MAT) (/staff/8/)
Lecturers	Decker, Wolfram, Prof. Dr. (PROF DEPT: MAT) (/staff/8/) Zintl, Jörg, PD Dr. (EXT DEPT: MAT) (/staff/43/)
Area of study	[MAT-AGCA] Algebra, Geometry and Computer Algebra
Reference course of study	[MAT-88.105-SG] M.Sc. Mathematics (/mhb/FB-MAT/cos-538/)
Lifecycle-State	[NORM] Active

Courses

Type/SWS	Course Number	Choice in Module-Part	SL	PL	CP	Sem.
2V	MAT-40-19-K-6 (/mhb/courses/MAT-40-19-K-6/)	P	-	PL1	3.0	irreg.

- About [MAT-40-19-K-6]: Title: "Elliptic Functions and Elliptic Curves"; Presence-Time: 28 h; Self-Study: 62 h

Examination achievement PL1

- Form of examination: **oral examination (20-30 Min.)**
- Examination Frequency: irregular (by arrangement)

- Examination number: 84151 ("Elliptic Functions and Elliptic Curves")

Evaluation of grades

The grade of the module examination is also the module grade.

Contents

From [MAT-40-19-K-6] Elliptic Functions and Elliptic Curves (/mhb/courses/MAT-40-19-K-6/):

- elliptic functions, Weierstrass P-function,
- complex tori,
- plane geometry and geometric construction of a group structure,
- elliptic curves,
- modular forms, modular curves, and classification theory of elliptic curves.

Competencies / intended learning achievements

Upon successful completion of this module, the students have expanded their knowledge in interdisciplinary mathematics. They have studied elliptic curves, which like a few others, is a class of mathematical objects that is relevant to almost the entire spectrum of mathematics. This ranges from number theory (e.g. Theorem of Fermat) to computational data processing (e.g. encryption algorithms). Exemplarily, the students have learnt how to approach a general problem from a priori very different specialized disciplines (here: using analytic, topological, geometric and/or algebraic methods), and to compare the results across different disciplines. They understand the proofs presented in the lecture and are able to comprehend and explain them.

Literature

From [MAT-40-19-K-6] Elliptic Functions and Elliptic Curves (/mhb/courses/MAT-40-19-K-6/):

- W. Fischer, I. Lieb: Funktionentheorie,
- G. Fischer: Ebene algebraische Kurven,
- J. Silverman: The Arithmetic of Elliptic Curves.

Requirements for attendance (informal)

Modules:

- [MAT-10-1-M-2] Fundamentals of Mathematics (M, 28.0 LP) (/mhb/modules/MAT-10-1-M-2/)

Courses

- [MAT-12-11-K-2] Algebraic Structures (2V+2U, 5.5 LP) (/mhb/courses/MAT-12-11-K-2/)
- [MAT-12-22-K-3] Introduction to Algebra (2V+1U, 4.5 LP) (/mhb/courses/MAT-12-22-K-3/)
- [MAT-12-24-K-3] Introduction to Complex Analysis (2V+1U, 4.5 LP) (/mhb/courses/MAT-12-24-K-3/)

Requirements for attendance (formal)

None

References to Module / Module Number [MAT-40-19-M-6]

Course of Study	Section	Choice/Obligation
[MAT-88.105-SG] M.Sc. Mathematics (/mhb/FB-MAT/cos-538/)	Pure Mathematics	[WP] Compulsory Elective
[MAT-88.706-SG] M.Sc. Mathematics International (/mhb/FB-MAT/cos-553/)	Pure Mathematics	[WP] Compulsory Elective
Module-Pool	Name	
[MAT-GM-MPOOL-5 (/mhb/modulepools/MAT-GM-MPOOL-5/)]	General Mathematics (Introductory Modules M.Sc.)	