

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

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Course MAT-40-12-K-7

Algebraic Geometry (4V+2U, 9.0 LP)

Course Type

SWS	Type	Course Form	CP (Effort)	Presence-Time / Self-Study
-	K	Lecture with exercise classes (V/U)	9.0 CP	186 h
4	V	Lecture		56 h
2	U	Exercise class (in small groups)		28 h
(4V+2U)			9.0 CP	84 h
				186 h

Basedata

SWS	4V+2U
CP, Effort	9.0 CP = 270 h
Position of the semester	1 Sem. in WiSe
Level	[7] Master (Advanced)
Language	[EN] English
Lecturers	Gathmann, Andreas, Prof. Dr. (PROF DEPT: MAT) (/staff/14/) Schulze, Mathias, Prof. Dr. (PROF DEPT: MAT) (/staff/33/)
Area of study	[MAT-AGCA] Algebra, Geometry and Computer Algebra
Additional informations	Informations about the course (https://www.mathematik.uni-kl.de/agag/lehre/)
Lifecycle-State	[NORM] Active

Contents

Compulsory Topics:

- affine and projective varieties (especially: dimension, morphisms, smooth and singular points, blow-ups of points, applications and examples),
- sheaves and sheaf cohomology with applications (Riemann-Roch Theorem for curves, projective embedding of a curve).

In addition, a selection of the following topics is covered:

- schemes,
- differential forms,
- further aspects of Algebraic Geometry.

Literature

- D. Cox, J. Little, D. O'Shea: Ideals, Varieties, and Algorithms,
- I. Dolgachev: Introduction to Algebraic Geometry,
- J. Harris: Algebraic Geometry,
- R. Hartshorne: Algebraic Geometry,
- D. Mumford: The Red Book of Varieties and Schemes,
- H.A. Nielsen, Algebraic Varieties,
- M. Reid: Undergraduate Algebraic Geometry,
- I. R. Shafarevich: Basic Algebraic Geometry 1: Varieties in Projective Space.

Materials

Further literature will be announced in the lecture(s); exercise material is provided.

Requirements for attendance (informal)

Knowledge from the course [MAT-40-28-K-4] (/mhb/courses/MAT-40-28-K-4/) is useful but not necessarily required.

Modules:

- [MAT-10-1-M-2] Fundamentals of Mathematics (M, 28.0 LP) (/mhb/modules/MAT-10-1-M-2/)
- [MAT-40-11-M-4] Commutative Algebra (M, 9.0 LP) (/mhb/modules/MAT-40-11-M-4/)

Requirements for attendance (formal)

None

References to Course [MAT-40-12-K-7]

Module	Name	Context
[MAT-40-12-M-7 (/mhb/modules/MAT-40-12-M-7/)]	Algebraic Geometry	P: Obligatory 4V+2U, 9.0 LP