

MATH-535

**Algebraic geometry III - selected topics**

Schlegel Mejia Sebastian

Cursus	Sem.	Type
Ing.-math	MA2, MA4	Opt.
Mathématicien	MA2	Opt.

Language of teaching	English
Credits	5
Session	Summer
Semester	Spring
Exam	Oral
Workload	150h
Weeks	14
<b>Hours</b>	<b>4 weekly</b>
Courses	2 weekly
Exercises	2 weekly
<b>Number of positions</b>	

**Summary**

This course is an introduction to the theory of algebraic curves and surfaces. An important aim of the course is to develop geometric intuition while using the language of schemes developed in the basic algebraic geometry course, thus building a solid foundation for further study.

**Content**

- Recap: Divisors, sheaf cohomology and morphisms to projective spaces
- Riemann-Roch and Serre duality for curves
- Riemann-Hurwitz
- Classification of curves
- Embedding of curves in projective spaces
- Algebraic surfaces
- Intersection theory on smooth surfaces
- Blow-ups
- Fibrations of surfaces

**Keywords**

Algebraic geometry, algebraic curves, algebraic surfaces

**Learning Prerequisites****Required courses**

- Linear algebra
- Group Theory
- Rings and Modules
- Modern Algebraic geometry

**Recommended courses**

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**Learning Outcomes**

By the end of the course, the student must be able to:

- Analyze basic problems in algebraic geometry of curves and surfaces and solve them.
- Use the statements of basic theorems like Riemann-Roch, Serre duality, etc, and understand their proofs.
- Reason intuitively about the geometry and topology of curves over the complex and finite fields.
- Compute geometric and birational invariants of curves and surfaces in basic examples.

### Teaching methods

2h lectures+2h exercise sessions weekly.

### Assessment methods

Oral Exam

### Supervision

Office hours	Yes
Assistants	Yes
Forum	No

### Resources

#### Bibliography

We will follow mainly

- Hartshorne, *Algebraic Geometry*
- Vakil, *The Rising Sea: Foundations of Algebraic Geometry*
- Görtz-Wedhorn, *Algebraic Geometry I & II*

#### Ressources en bibliothèque

- [Algebraic Geometry / Hartshorne](#)
- [Algebraic Geometry I & II / Görtz-Wedhorn](#)

#### Références suggérées par la bibliothèque

- [The Rising Sea: Foundations of Algebraic Geometry / Vakil](#)

#### Moodle Link

- <https://go.epfl.ch/MATH-535>