

MATH-563

**Student seminar in pure mathematics**

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Cursus	Sem.	Type
Ing.-math	MA1, MA3	Opt.
Mathématicien	MA1, MA3	Opt.

Language of teaching	English
Credits	5
Session	Winter
Semester	Fall
Exam	During the semester
Workload	150h
Weeks	14
<b>Hours</b>	<b>4 weekly</b>
Lecture	2 weekly
Exercises	2 weekly
<b>Number of positions</b>	

**Summary**

This seminar will be an introduction to homological algebra, a tool widely used in topology, algebraic geometry and many other modern areas of mathematics.

**Content**

- Abelian categories, derived functors
- Spectral sequences
- Derived categories
- Applications in topology, geometry and group theory

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

- Rings and Modules
- Homology

**Learning Outcomes**

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

- Apply tools provided by homological algebra

**Transversal skills**

- Make an oral presentation.
- Write a scientific or technical report.
- Access and evaluate appropriate sources of information.

**Teaching methods**

Each participant will lecture on a subject in homological algebra. The lecture is complemented by the professor and exercise sessions.

**Expected student activities**

Prepare lectures, write lecture notes and solutions to exercises. Active participation during class and exercise sessions.

**Assessment methods**

The grade will depend on the participants oral presentation and written reports. There will be no final exam.

## Resources

### Bibliography

An Introduction to Homological Algebra by C. Weibel

### Ressources en bibliothèque

- [Toric Varieties / Cox](#)

### Moodle Link

- <https://go.epfl.ch/MATH-563>