

MATH-311

Rings and modules

Patakfalvi Zsolt

Cursus	Sem.	Type
Mathematics	BA5	Opt.

Language of teaching	English
Credits	5
Session	Winter
Semester	Fall
Exam	Written
Workload	150h
Weeks	14
Hours	4 weekly
Courses	2 weekly
Exercises	2 weekly
Number of positions	

Summary

The students are going to solidify their knowledge of ring and module theory with a major emphasis on commutative algebra and a minor emphasis on homological algebra.

Content

- basic definitions of module theory
- the fundamental theorem of finitely generated modules over a principal ideal domain
- Jordan normal form
- homological algebra
- Hilbert's nullstellensatz
- Krull dimension
- transcendence degree
- localization
- tensor product
- integral extensions
- Noether normalization
- going up theorem
- going down theorem
- primary decomposition

Learning Prerequisites**Required courses**

- Linear algebra
- Théorie des groupes
- Anneaux et corps

Learning Outcomes

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

- Manipulate modules over rings.
- Distinguish between properties of modules and rings
- Characterize finitely generated modules over a PID.
- Analyze rings and modules

- Apply the main theorems of the class

Teaching methods

ex chatedra course with exercise session

Assessment methods

- 1.) Written final exam.
- 2.) Bonus exercises to be handed in during the semestre, worth up to 30% of the final grade.

Resources

Notes/Handbook

There will be pdf notes provided for the course.

Moodle Link

- <https://go.epfl.ch/MATH-311>