MATH-311

Rings and modules

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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

The final grade will be assigned based on the cumulative points of the student obtained from handed in homework solutions and from the written exam. The weights of the two parts are:
25% - homework
75 % - written exam
There will be 4 homeworks that students will be required to hand in on dates to be determined at the start of the course.
Dans le cas de l’art. 3 al. 5 du Règlement de section, l’enseignant décide de la forme de l’examen qu’il communique aux étudiants concernés.

Resources

Notes/Handbook

There will be pdf notes provided for the course.