MATH-310 **Algebra**

Lachowska Anna

Cursus	Sem.	Type
Chemistry	BA5	Opt.
Communication systems	BA5	Obl.
Computer science	BA3	Opt.
Cyber security minor	H	Opt.
HES - IC	H	Opt.

Language of teaching	English
Credits	4
Session	Winter
Semester	Fall
Exam	Written
Workload	120h
Weeks	14
Hours	**4 weekly**
Courses	2 weekly
Exercises	2 weekly
Number of positions	

Summary

This is an introduction to modern algebra: groups, rings and fields.

Content

Integer numbers, Bezout's theorem. Groups, dihedral and symmetric groups. Group homomorphisms. Classification of finite abelian groups. Rings, ideals. Polynomial rings. Integral domains and Euclidean domains. Finite fields.

Keywords

Group, homomorphism, subgroup, normal subgroup, quotient group, cyclic group, symmetric group, order of the group, order of an element in the group, finite abelian groups. Ring, ideal, principal ideal, maximal ideal, principal ideal domain, Euler's totient function, field, finite field, characteristic of a field.

Learning Prerequisites

Required courses

Linear algebra

Recommended courses

Linear Algebra I, Analyse I, Analyse II

Learning Outcomes

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

- Apply concepts and ideas of the course
- Reason rigorously using the notions of the course
- Choose an appropriate method to solve problems
- Identify the concepts relevant to each problem
- Apply concepts to solve problems similar to the examples shown in the course and in problem sets
- Solve new problems using the ideas of the course
- Implement appropriate methods to investigate the structure of a given group, ring or field, and study their properties
- Detect properties of algebraic objects
- Analyze finite abelian groups
- Formulate structure of a finite abelian group in terms of cyclic groups
- Analyze structure of a ring, in particular polynomial rings

Teaching methods

Lectures and exercise sessions

Assessment methods

Written exam

Supervision

Office hours	No
Assistant.e.s	Yes
Forum	Yes

Resources

Bibliography

1. D.S. Dummit, R. M. Foote, Abstract Algebra. Wiley, Third Edition
2. S. Lang, Undergraduate Algebra. Undergraduate texts in Mathematics. Springer-Verlag, Inc. New York, second edition, 1990.
3. L. Childs, A Concrete Introduction to Higher Algebra. Undergraduate texts in Mathematics, Springer-Verlag, Inc. New York, 1995.

Ressources en bibliothèque

- Find the references at the Library

Notes/Handbook

Complete lecture notes will be available in PDF

Moodle Link

- https://go.epfl.ch/MATH-310

Videos

- https://mediaspace.epfl.ch/channel/MATH-310+Algebra/30044/subscribe