

CS-437

Algebraic coding theory

Cursus	Sem.	Type
Computer science	MA2	Opt.
Cyber security minor	E	Opt.
SC master EPFL	MA2, MA4	Opt.

Language of teaching	English
Credits	4
Session	Summer
Semester	Spring
Exam	During the semester
Workload	120h
Weeks	14
Hours	4 weekly
Courses	2 weekly
Exercises	2 weekly
Number of positions	

Remark

pas donné en 2017-18

Summary

This course is a brief introduction to algebraic coding theory and is intended to provide the students with a basic understanding of methods for the construction, evaluation and application of algebraic error-correcting codes.

Content

- Linear Algebraic codes
- Evaluation codes
- Reed-Solomon codes and their (list)-decoding algorithms
- Efficient decoding: the displacement method
- Codes from algebraic geometry

Keywords

- Algebraic codes
- Reed-Solomon codes
- BCH codes
- Algebraic geometric codes
- List-decoding algorithms

Learning Prerequisites**Required courses**

Obligatory courses of the first year in IN and SC

Recommended courses

Algebra for Communications

Important concepts to start the course

General mathematical maturity

Finite fields

Learning Outcomes

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

- Design algebraic error-correcting codes with simple parameters
- Know encoding/decoding algorithms for these codes
- Have a basic understanding of evaluation codes and their applications
- Have a basic understanding of list-decoding algorithms

Teaching methods

Ex cathedra lectures

Expected student activities

Attendance at lectures and exercises

Assessment methods

Written exam

Only the grade on the final exam counts

Supervision

Office hours	Yes
Assistants	No
Forum	Yes

Resources

Bibliography

- The Theory of Error-Correcting Codes by F.J. MacWilliams and N.J.A. Sloane
- Introduction to Coding Theory by J.H. van Lint

Ressources en bibliothèque

- [Introduction to Coding Theory / Lint](#)
- [Theory of Error-Correcting Codes / MacWilliams & Sloane](#)