MATH-337 **Combinatorial number theory**

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Cursus	Sem.	Type
Mathematics	BA6	Opt.

Language of teaching	English
Credits	5
Session	Summer
Semester	Spring
Exam	Written
Workload	150h
Weeks	14
Hours	**4 weekly**
Lecture	2 weekly
Exercises	2 weekly
Number of positions	

Summary

This is an introductory course to combinatorial number theory. The main objective of this course is to learn how to use combinatorial, probabilistic, and analytic methods to solve problems in number theory.

Content

Combinatorial number theory is a field of research in mathematics that has seen tremendous growth in recent years. It is a very interdisciplinary subject, incorporating ideas from a wide range of different areas: harmonic analysis, graph theory, number theory, ergodic theory, discrete geometry, probability theory, and even theoretical computer science. But rest assured, you don't need any prerequisites from these areas to take this course, because we will develop everything we need along the way. We will cover various results in Ramsey theory (such as Schur's Theorem, van der Waerden's Theorem, or the Erdos-Szekeres Theorem) and in additive combinatorics (such as Hindman's Theorem and Roth's Theorem).

Keywords

Combinatorial number theory, additive combinatorics, arithmetic combinatorics, additive number theory, Ramsey theory

Learning Prerequisites

Required courses

first year math courses

Learning Outcomes

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

- Apply tools from combinatorics, probability theory, and discrete harmonic analysis to solve problems in number theory
- Prove results in additive combinatorics and Ramsey theory

Transversal skills

- Use a work methodology appropriate to the task.
- Continue to work through difficulties or initial failure to find optimal solutions.
- Demonstrate a capacity for creativity.
- Demonstrate the capacity for critical thinking

Teaching methods

weekly leactures and exercises classes

Assessment methods

Written homework assignments, written final exam

Supervision

Office hours	No
Assistants	Yes
Forum	Yes

Resources

Notes/Handbook

Lecture notes will be provided

Moodle Link

- https://go.epfl.ch/MATH-337