MATH-417 **Topics in number theory**

Lin Yongxiao, Raju Chandra Sekhar

Cursus	Sem.	Type
Ing.-math	MA2, MA4	Opt.
Mathématicien	MA2	Opt.

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

Summary

This year's topic is "Advanced Analytic Number Theory": this is a continuation of the course MATH-313 "Introduction to Analytic Number Theory". We will cover primes in arithmetic progressions, the Landau-Siegel zero, the Bombieri-Vinogradov Theorem and Vinogradov's three primes theorem (itp).

Content

This year, we will continue the course "Introduction to Analytic Number Theory" with more advanced topics:
- Primes in arithmetic progressions : the Hadamard/de la Vallee-Poussin zero-free regions for Dirichlet L-functions.
-The Landau-Siegel zero and the Siegel-Walfisz Theorem.
-Primes in large arithmetic progressions: the large Sieve and the Bombieri-Vinogradov Theorem.
-Ternary additive problems: introduction to the circle method and Vinogradov's Three Primes Theorem:

- **Every sufficiently large odd integer is the sum of three prime numbers.**

Keywords

Primes numbers
Arithmetic progressions
L-functions and zero-free regions
The large Sieve
The circle method

Learning Prerequisites

Required courses

Analysis III & IV
Introduction to Analytic Number Theory.

Recommended courses

Important concepts to start the course

-Good knowledge of analysis in particular Fourier theory and theory of the complex variable.

Learning Outcomes

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

- Synthesize the analytic aspects of the theory of numbers
- Solve advanced problems in analytic number theory

Transversal skills

- Access and evaluate appropriate sources of information.
- Make an oral presentation.
- Demonstrate the capacity for critical thinking

Teaching methods

Ex-Cathedra Course

Expected student activities

We expect a proactive attitude during the courses and the exercises sessions (possibly with individual presentation of the solution of various problems).

Assessment methods

Oral Exam
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.

Supervision

Office hours	No
Assistants	Yes
Forum	No
Others	a moodle with ressources for the course will be maintained

Resources

Bibliography

Davenport: Multiplicative Number Theory
Iwaniec-Kowalski: Analytic Number Theory

Ressources en bibliothèque

- Multiplicative Number Theory / Davenport
- Analytic Number Theory / Iwaniec-Kowalski

Prerequisite for

Current research in number theory