

MATH-521 **Advanced analytic number theory**

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
<b>Hours</b>	<b>4 weekly</b>
Lecture	2 weekly
Exercises	2 weekly
<b>Number of positions</b>	

**Remark**

pas donné en 2024-25. Cours donné en alternance tous les deux ans

**Summary**

We will present the work of James Maynard (MF 2022) on the existence of bounded gaps between primes

**Content**

Recollections on L-functions  
 Landau's theorem, Siegels' theorem  
 The large sieve  
 The Bombieri-Vinogradov Theorem on primes in arithmetic progressions  
 Selberg's sieve and Maynard weights

**Keywords**

zeta and L-functions

**Learning Prerequisites****Required courses**

MATH-100  
 MATH-105  
 MATH-200  
 MATH-313

**Recommended courses**

MATH-337

**Learning Outcomes**

- Quote the main results of the course
- Use the main results of the course
- Prove the main results of the course

**Teaching methods**

Ex cathedra lecture and exercises in the classroom

### Expected student activities

Attendance to the lectures and active participation to the exercise sessions

### Assessment methods

Oral exam

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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	moodle

### Resources

#### Bibliography

Kowalski, Emmanuel Gaps between prime numbers and primes in arithmetic progressions [after Y. Zhang and J. Maynard]. *Astérisque* No. 367-368 (2015), Exp. No. 1084  
Kowalski-Iwaniec: Analytic Number Theory  
James Maynard: Small gaps between primes. *Ann. of Math. (2)* 181 (2015)  
Maynard James: Lateralus

#### Ressources en bibliothèque

- [Small gaps between primes / Manyard](#)
- [Gaps between prime numbers and primes in arithmetic progressions / Kowalski](#)
- [Analytic Number Theory / Kowalski-Iwaniec](#)

#### Références suggérées par la bibliothèque

- [Lateralus / Maynard \(Tool\) : page wikipedia](#)

#### Moodle Link

- <https://go.epfl.ch/MATH-521>

### Prerequisite for

Fields medal