Master in Mathematics

- Specializations: (1) Pure Mathematics;
  (2) Agrégation (Higher education teaching certification)

Program objectives

The first year (M1) of the master's curriculum offers a solid training in Algebra and Analysis as well as in Probability and Statistics. It prepares students to both of the specializations offered in the second year (M2) of the master's degree: the "M2 Préparation au concours de l'agrégation de Mathématiques" (prepares students to pass the higher education teaching certification, only open to French or European Union citizens) and the "M2 Mathématiques Fondamentales" (Pure Mathematics), which offers each year high-level classes in topics researched in the department and prepares students to PhD programs. The research topics offered are: Diophantine and Algebraic Geometry, Algebraic Topology, Ergodic Theory and Dynamical Systems, Information and Image Processing Mathematics, Data Modeling and Analysis, Mathematical Physics and Partial Differential Equations, and Probability and Statistics.

Program overview

The first year (M1) consists of courses (Teaching Units or TUs) in Algebra, Analysis, Probability and Statistics. In the second semester, students must also write a thesis under the tutorship of a researcher from the department. Students must take an English class each semester.
Students specializing in pure mathematics ("M2 Mathématiques Fondamentales") must take two "foundational" classes and one "specialized" class chosen among those offered by the departments (classes offered may vary from one year to another and take place from September to March). They may take additional classes offered by other universities in Paris. After successfully taking these classes, students complete a research internship under a department researcher during the second semester. They must also take an English class each semester.
The curriculum of the "M2 Préparation au concours de l'agrégation de Mathématiques" is organized over two days a week (Wednesdays and Thursdays). Students prepare for the written exam from September to March and prepare year-long for the oral exam. Preparing for both exams is done through classes in Algebra, Analysis and Probability. Students take about ten mock written exams, for which they receive comments and grades. To prepare for the oral exam, students prepare all "lessons" taught in Algebra and Analysis and are offered specific training for the Data Modeling exam. The Université Paris 13 prepares to the Probability and Statistics Option.

Performance assessment

- Students take tests throughout the year and sit final exams at the end of each semester.
- The M1 thesis and M2 internship are assessed through a written report and an oral defense.

Admission requirements

- M1: for Paris 13 students, the admission is automatic after a Bachelor's degree (License) in Mathematics. Students for other universities must apply for admission after earning a Bachelor's degree (License) in Mathematics or a similar degree.
- M2: admission is conditional after a Master's first year (M1) in Mathematics or in a similar program.

Career placement

- Jobs: secondary or higher education teachers; research engineer.
- Fields: education, public or private research.

Further education

- PhD program

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SEMESTER 1

First week: basics review (10 h of Algebra and 10 h of Analysis).

TU 1
• Linear Algebra (5 ECTS credits)

TU 2
• Bilinear Algebra (5 ECTS credits)

TU 3
• Functional Analysis and Measure Theory (5 ECTS credits)

TU 4
• Complex Analysis and Operator Theory (5 ECTS credits)

TU 5
• Probability: Markov chains and discrete-time martingales (6 ECTS credits)

TU 6
• Communication and Writing Techniques (Text study, 2 ECTS credits)

TU 7
• English (2 ECTS credits)
• Thesis

SEMESTER 2

Classes

TU 1
• Class field theory (5 ECTS credits)

TU 2
• Representation theory of finite groups (4 ECTS credits)

TU 3
• Distributions and Sobolev spaces (5 ECTS credits)

TU 4
• Differentiable manifolds (4 ECTS credits)

TU 5
• Numerical Probability and Statistics (3 ECTS credits)

TU 6
• English (2 ECTS credits)

TU 7
• Thesis (7 ECTS credits)

SEMESTER 3

("M2 Mathématiques Fondamentales" – M2 Pure Mathematics)

TU 1 AND TU 2
• 2 foundational classes (9 ECTS credits each)

TU 3
• One specialized class (8 ECTS credits)

TU 4
• Communication and Writing Techniques (Text study, 2 ECTS credits)

TU 5
• English (2 ECTS credits)

SEMESTER 4

(M2 "Mathématiques Fondamentales" – M2 Pure Mathematics)

• Internship (30 ECTS credits)

SEMESTER 3 et 4

(M2 "Agrégation" – M2 Higher education teaching certification)

TU 1
• Written exam preparation (classes in Analysis, Algebra and Probabilities, 9 graded mock written exams, 30 ECTS credits)

TU 2
• Oral exam preparation (preparation of 90 lessons in Analysis and Algebra, preparation for the data modeling exam, mock oral exams, 30 ECTS credits).

For more information

> Program director: Julien BARRAL
> M1 and M2 Pure Mathematics: Pascal BOYER; M2 Agrégation: Francois BEGUIN
> Office: Séverine GIROD

Conception : direction de la communication - impression : reprographie centrale Université Paris 13 - février 2017