Master's degree in Advanced Mathematics and Mathematical Engineering (MAMME)

The master's degree in Advanced Mathematics and Mathematical Engineering (MAMME) is a master program in mathematics offered at School of Mathematics and Statistics (FME).

The courses offered in MAMME allow our students to design their curriculum, with two different orientations: a pure mathematics curriculum (oriented to research in fundamental mathematics) or an applied mathematics curriculum (preparing them for applied mathematics research and for interdisciplinary team working, in collaboration with engineers, physicists, biologists, economists, etc).

The curriculum comprises a total of 60 ECTS, divided in 45 ECTS for courses and 15 ECTS for the master’s thesis. It is intended to be completed in one academic year. In addition, MAMME offers the possibility of registering up to 22.5 ECTS in other masters in mathematics or statistics, or in other UPC master programs, opening the path for an interdisciplinary curriculum based on selected courses in masters in engineering and applied sciences. See the MAMME focus proposals at http://mamme.masters.upc.edu/en.

INTRODUCTION

Duration and start date
One academic year, 60 ECTS credits. Starting September and February

Timetable and delivery
Afternoons. Face-to-face

Fees and grants
Approximate fees for the master’s degree, excluding academic fees and degree certificate fee, €3,147 (€4,720 for non-EU residents).
This master has been selected in the Masters of Excellence scholarship grant program the Catalunya La Pedrera Foundation for the year 2017-2018 course. More information at the Foundation website.
More information about fees and payment options
More information about grants and loans

Language of instruction
English

Location
School of Mathematics and Statistics (FME)

Official degree
Recorded in the Ministry of Education's degree register

Double-degree agreements
Double-degree pathways with universities around the world
• Master's degree in Advanced Mathematics and Mathematical Engineering (FME) + Master of Science in Applied Mathematics (Illinois Institute of Technology). (Only FME students to Illinois, not vice versa)
ADMISSION

General requirements
Academic requirements for admission to master's degrees

Specific requirements
This master is addressed to students with good abstract reasoning, interest in problem solving, strong work habits and a liking for mathematics.

A scientific background is required, with basic mathematical foundations. For this reason, a bachelor in mathematics, statistics, physics, engineering, economics or science is recommended. This list is non-exclusive, and all applications will be reviewed on an individual basis.

Admission criteria
The following elements will be taken into consideration during the evaluation process: academic record, CV, statement of purpose and, if deemed necessary, personal interview and recommendation letters.

Places
30

Pre-enrolment
Pre-enrolment closed (consult the new pre-enrolment periods in the academic calendar).
How to pre-enrol

Enrolment
How to enrol

Legalisation of foreign documents
All documents issued in non-EU countries must be legalised and bear the corresponding apostille.

PROFESSIONAL OPPORTUNITIES

Professional opportunities
Some of the career prospects of master graduates are academic research (by pursuing a PhD in mathematics, science or engineering, for instance), mathematical modeling in industry, finance, statistics, applied research (biomedical research centers, computer vision, etc.)

Competencies

Generic competencies
Generic competencies are the skills that graduates acquire regardless of the specific course or field of study. The generic competencies established by the UPC are capacity for innovation and entrepreneurship, sustainability and social commitment, knowledge of a foreign language (preferably English), teamwork and proper use of information resources.

Specific skills
1. (Research). Read and understand advanced mathematical papers. Use mathematical research techniques to produce and transmit new results.
2. (Modelling). Formulate, analyse and validate mathematical models of practical problems by using the appropriate mathematical tools.
3. (Calculus). Obtain (exact or approximate) solutions for these models with the available resources, including computational means.
4. (Critical assessment). Discuss the validity, scope and relevance of these solutions; present results and defend
conclusions.
5. (Teaching). Teach mathematics at university level.

**ORGANISATION**

**UPC school**
*School of Mathematics and Statistics (FME)*

**Academic coordinator**
*Sonia Fernández Méndez*

**Academic calendar**
*General academic calendar for bachelor’s, master’s and doctoral degrees courses*

**Academic regulations**
*Academic regulations for master’s degree courses at the UPC*

**CURRICULUM**

<table>
<thead>
<tr>
<th>Subjects</th>
<th>ECTS credits</th>
<th>Type</th>
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<tbody>
<tr>
<td><strong>FIRST SEMESTER</strong></td>
<td></td>
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<tr>
<td>Codes and Cryptography</td>
<td>7.5</td>
<td>Optional</td>
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<tr>
<td>Commutative Algebra</td>
<td>7.5</td>
<td>Optional</td>
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<tr>
<td>Discrete and Algorithmic Geometry</td>
<td>7.5</td>
<td>Optional</td>
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<tr>
<td>Graph Theory</td>
<td>7.5</td>
<td>Optional</td>
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<tr>
<td>Mathematical Modelling with Partial Differential Equations</td>
<td>7.5</td>
<td>Optional</td>
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<tr>
<td>Mathematical Models in Biology</td>
<td>7.5</td>
<td>Optional</td>
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<tr>
<td>Non-Commutative Algebra</td>
<td>7.5</td>
<td>Optional</td>
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<tr>
<td>Number Theory</td>
<td>7.5</td>
<td>Optional</td>
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<tr>
<td>Numerical Methods for Dynamical Systems</td>
<td>7.5</td>
<td>Optional</td>
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<tr>
<td>Numerical Methods for Partial Differential Equations</td>
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<td>Optional</td>
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<tr>
<td>Quantitative and Qualitative Methods in Dynamical Systems</td>
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<tr>
<td><strong>SECOND SEMESTER</strong></td>
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<tr>
<td>Advanced Course in Partial Differential Equations</td>
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<tr>
<td>Algebraic Geometry</td>
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<tr>
<td>Combinatorics</td>
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<tr>
<td>Computational Mechanics</td>
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<tr>
<td>Differentiable Manifolds</td>
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<td>Optional</td>
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<tr>
<td>Hamiltonian Systems</td>
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<td>Optional</td>
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