Master Mathématiques et applications

Parcours Master of Science in Industrial and Applied Mathematics (MSIAM)

Présentation

Currently, applied mathematics is an area that provides many job opportunities, in industry and in the academic world. There is a great demand for mathematical engineers on topics such as scientific computation, big data analysis, imaging and computer graphics, with applications in many fields such as physics, medicine, biology, engineering, finance, environmental sciences.

The Master of Science in Industrial and Applied Mathematics (MSIAM) offers a large spectrum of courses, covering areas where the research in applied math in Grenoble is at the best level. Our graduates are trained to become experts and leaders in scientific and technological projects where mathematical modeling and computing issues are central, in industry or research. A large and distinguished graduate Faculty participate in the program, bringing their expertise in a wide range of areas of mathematics including applied analysis, numerical analysis and scientific computing, probability theory and statistics, computational graphics, image analysis and processing, and applied geometry.

The academic program is a two-year master program (120 ECTS), fully taught in English. It combines three semesters of courses and laboratory work (90 ECTS) with a six-month individual research project (30 ECTS).

In the second year, the first semester is divided in 2 tracks:

- Modeling, Scientific Computing and Image analysis (MSCI)
- Data Science (DS)

The second semester is devoted to the master thesis project.

Site web du M2 MSIAM

Admission

To be admitted to the program, candidates must have previously completed their undergraduate studies and been awarded a bachelor degree in Mathematics or Applied mathematics, or equivalent. MSIAM is a two-years master degree. Students can apply to 1st year or directly to second year.

- Admission in MSIAM 1st year: anyone holding a 3rd year or bachelor degree in mathematics or applied mathematics or an equivalent degree, interested in pursuing a high level mathematical education and motivated by the applications of mathematics. The minimum requirement is to have earned at least the equivalent of 180 ECTS credits
- Admission in MSIAM 2nd year: anyone holding a first year of master (60 ECTS credits) in mathematics or applied mathematics or an equivalent degree, interested in pursuing a high level mathematical education and motivated by the applications of mathematics. The minimum requirement is to have earned at least the equivalent of 240 ECTS credits.

Important notes:
Students from related backgrounds (physics, computer science, engineering...) may also apply provided they possess outstanding mathematical qualifications and are highly motivated by applications.

Eligibility: only individuals who have an excellent academic record will be considered. Applications from students from traditionally underrepresented groups are particularly encouraged.

Academic standing: Fellows must maintain full-time status in the master's program, and must be engaged in full-time coursework or research during the academic year (September 1st – July 31st).

Language requirements:

- Students from countries where English language is not the primary language are required to provide evidence of Competence in English. The requirement is waived for applicants from English speaking countries as well as applicants whose previous degree is from a program taught in English. English scores required: TOEFL IBT 100 min / TOEIC 750 min / IELTS 6.5 min. This is equivalent to the CEFR CEFR level B2, although we will consider applicants with a B1 level and who have an excellent academic record.
- An A2 level in French is recommended.

Public continuing education: You are in charge of continuing education:

- If you resume your studies after 2 years of interruption of studies.
- Or if you followed a formation under the regime formation continue one of the 2 preceding years.
- Or if you are an employee, job seeker, self-employed.

If you do not have the diploma required to integrate the training, you can undertake a validation of personal and professional achievements (VAPP).

Vous souhaitez candidater et vous inscrire ? Sachez que la procédure diffère selon le diplôme envisagé, le diplôme obtenu, ou le lieu de résidence pour les étudiants étrangers.


Candidater sur études en France et sur FSA
Pour les autres candidats
Candidater

Infos pratiques:

- Composante: Grenoble INP, UFR IM2AG (informatique, mathématiques et mathématiques appliquées)
- Durée: 2 ans
- Type de formation: Formation initiale / continue
- Lieu: Grenoble - Domaine universitaire
- Contacts:

  Responsable(s) pédagogique(s)

  Edouard Oudet
  edouard.oudet@univ-grenoble-alpes.fr

  Pierre Etore
  pierre.etore@univ-grenoble-alpes.fr
# Programme

## Master Industrial and applied math 1re année

### Semestre 7

| UE | Object-oriented and software design | 3 ECTS | 18h |
| UE | Applied probability and statistics | 6 ECTS | 48h |
| UE | Partial differential equations and numerical methods | 6 ECTS | 54h |
| UE | Signal and image processing | 6 ECTS | 54h |
| UE | Geometric Modelling | 6 ECTS | 54h |

1 élément(s) au choix parmi 2

- UE Français langue étrangère
- UE English

### Semestre 8

| UE | Computing science for bid data and HPC | 6 ECTS | 54h |
| UE | Project | 3 ECTS | 40h |
| UE | Internship | 3 ECTS |
| UE | Numerical optimisation | 6 ECTS | 54h |

2 élément(s) au choix parmi 6

- UE Computer Algebra and Cryptology | 6 ECTS | 51h |
- UE Variational methods applied to modelling | 6 ECTS | 54h |
- UE 3D Graphics | 6 ECTS | 54h |
- UE Operations Research | 3 ECTS | 36h |
- UE Operations Research Complementary | 3 ECTS |

- UE Statistical analysis and document mining | 6 ECTS | 49,5h |

## Master MSIAM-Modeling, Scientific Computing and Image analysis (MSCI) 2e année

### Semestre 9

10 élément(s) au choix parmi 12

- UE Advanced imaging | 3 ECTS | 18h |
- UE An introduction to shape and topology optimization | 3 ECTS | 18h |
- UE Congestion Phenomena and Compressibility for Granular Media | 3 ECTS | 18h |
- UE Efficient methods in optimization | 3 ECTS | 18h |
- UE Geophysical imaging | 3 ECTS | 18h |
- UE GPU Computing | 3 ECTS | 18h |
- UE Level set methods and optimization algorithms with applications in imaging | 3 ECTS | 18h |
- UE Model exploration for approximation of complex, high-dimensional problems | 3 ECTS | 18h |
- UE Modeling seminar and projects | 6 ECTS | 60h |
- UE Numerical optimal transport and geometry | 3 ECTS | 18h |
- UE Software development tools and methods | 3 ECTS | 39h |
- UE Wavelets and applications | 3 ECTS | 18h |

### Semestre 10

- UE MA research project | 30 ECTS |

## Master MSIAM-Data science 2e année

### Semestre 9

10 élément(s) au choix parmi 21
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<thead>
<tr>
<th>UE Advanced algorithms for machine learning and data mining</th>
<th>3 ECTS</th>
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<tr>
<td>UE An introduction to shape and topology optimization</td>
<td>3 ECTS</td>
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<tr>
<td>UE Computational biology</td>
<td>3 ECTS</td>
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<td>UE Data science seminar</td>
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<tr>
<td>UE Efficient methods in optimization</td>
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<tr>
<td>UE Fundamentals of probalistic data mining</td>
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<td>UE Geophysical imaging</td>
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<td>UE Information access and retrieval</td>
<td>3 ECTS</td>
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<td>UE Introduction to extreme-value analysis</td>
<td>3 ECTS</td>
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<td>UE Kernel methods for machine learning</td>
<td>3 ECTS</td>
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<tr>
<td>UE Machine Learning for Computer Vision and Audio Processing</td>
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<td>UE Machine learning fundamentals</td>
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<td>3 ECTS</td>
<td>18h</td>
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<tr>
<td>UE Stochastic calculus and applications to finance</td>
<td>3 ECTS</td>
<td>18h</td>
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<tr>
<td>UE Wavelets and applications</td>
<td>3 ECTS</td>
<td>18h</td>
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Semestre 10

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