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 essentially divided in 3 tracks:

- Modeling, Scientific Computing and Image analysis (MSCI)
- Data Science (DS), with the following two orientations: fundamentals of data science (FDS) / Large-Scale Data Science (LSDS)

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
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Toutes les informations de cette page sont indicatives et n'ont pas de valeur contractuelle - Mis à jour le 14 mai 2020
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Programme

Master Industrial and applied math 1re année

Semestre 7

<table>
<thead>
<tr>
<th>UE</th>
<th>ECTS</th>
<th>Heures</th>
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<tbody>
<tr>
<td>UE Algorithms and software tools</td>
<td>3</td>
<td>36</td>
</tr>
<tr>
<td>UE Partial differential equations and numerical methods</td>
<td>6</td>
<td>54</td>
</tr>
<tr>
<td>UE Signal and image processing</td>
<td>6</td>
<td>54</td>
</tr>
<tr>
<td>UE Geometric Modelling</td>
<td>6</td>
<td>54</td>
</tr>
<tr>
<td>UE Applied probability and statistics</td>
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<td>48</td>
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1 élément(s) au choix parmi 2
UE Français langue étrangère
UE English

Semestre 8

<table>
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<tr>
<th>UE</th>
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<tbody>
<tr>
<td>UE Computing science for bid data and HPC</td>
<td>6</td>
<td>54</td>
</tr>
<tr>
<td>UE Numerical optimisation</td>
<td>6</td>
<td>54</td>
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<tr>
<td>UE Project</td>
<td>3</td>
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<td>UE Internship</td>
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2 élément(s) au choix parmi 5
UE Variational methods applied to modelling              | 6    | 54     |
UE 3D Graphics                                           | 6    | 54     |
UE Computer Algebra and Cryptology                        | 6    | 51     |
UE Operations Research                                    | 3    | 36     |
UE Operations Research Complementary                      | 3    |        |

Semestre 9

10 élément(s) au choix parmi 13
UE Optimal transport, levelset : applications to image   | 3    | 18     |
UE Advanced imaging                                      | 3    | 18     |
UE Inverse methods and data assimilation                  | 3    | 30     |
UE Medical imaging: tomography and 3D reconstruction from 2D projections | 3 | 30 |
UE Modeling seminar and projects                          | 3    | 48     |
UE Efficient methods in optimization                      | 3    | 18     |
UE Software development tools and methods                 | 3    | 39     |
UE High performance computing for mathematical models     | 3    | 18     |
UE Numerical optimal transport and geometry               | 3    | 18     |
UE Wavelets and applications                              | 3    | 18     |
UE Convex and distributed optimization                    | 3    | 36     |
UE Model exploration for approximation of complex, high-dimensional problems | 3 | 18 |
UE GPU Computing                                          | 3    | 18     |

Semestre 10

UE MA research project                                    | 30   |        |

Master MSIAM-Fundamental of Data Science (FDS) 2e année

Semestre 9

10 élément(s) au choix parmi 16
### Semestre 9

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<tr>
<th>UE Data science seminar</th>
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<td>UE Data Challenges</td>
<td>3 ECTS</td>
<td>60h</td>
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<tr>
<td>UE Advanced learning models</td>
<td>3 ECTS</td>
<td>18h</td>
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<tr>
<td>UE Advanced algorithms for machine learning and data mining</td>
<td>3 ECTS</td>
<td>18h</td>
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<tr>
<td>UE Computational biology</td>
<td>3 ECTS</td>
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<tr>
<td>UE Machine learning fundamentals</td>
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<tr>
<td>UE Machine learning fundamentals</td>
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<tr>
<td>UE Software development tools and methods</td>
<td>3 ECTS</td>
<td>39h</td>
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<tr>
<td>UE Numerical optimal transport and geometry</td>
<td>3 ECTS</td>
<td>18h</td>
</tr>
<tr>
<td>UE Information access and retrieval</td>
<td>3 ECTS</td>
<td>18h</td>
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<tr>
<td>UE Information visualization</td>
<td>3 ECTS</td>
<td>18h</td>
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<tr>
<td>UE Category learning and object recognition</td>
<td>3 ECTS</td>
<td>18h</td>
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### Semestre 10

<table>
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<tr>
<th>UE MA research project</th>
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**Master MSIAM-Large-Scale Data Science (LSDS) 2e année**

### Semestre 9

<table>
<thead>
<tr>
<th>UE Convex and distributed optimization</th>
<th>3 ECTS</th>
<th>36h</th>
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<tbody>
<tr>
<td>UE Data management in large-scale distributed systems</td>
<td>3 ECTS</td>
<td>18h</td>
</tr>
<tr>
<td>UE Distributed system</td>
<td>3 ECTS</td>
<td>18h</td>
</tr>
<tr>
<td>UE Fundamentals of probabilistic data mining</td>
<td>3 ECTS</td>
<td>18h</td>
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<tr>
<td>UE High performance computing for mathematical models</td>
<td>3 ECTS</td>
<td>18h</td>
</tr>
<tr>
<td>UE Model selection for large-scale learning</td>
<td>3 ECTS</td>
<td>18h</td>
</tr>
<tr>
<td>UE GPU Computing</td>
<td>3 ECTS</td>
<td>18h</td>
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