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.

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 M1 (1st year) or directly to M2 (second year).

Admission in M1 (MSIAM 1st year):

- Anyone holding a L3 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 M2 (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.

Site web du M2 MSIAM
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 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 continues 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).

How to apply:

- Admission information
- Application form. The on-line application for admission will be open from early January 2016 till June 30, 2016 for the September 2016 academic year

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.

- Vous êtes un candidat non ressortissant de l'Union Européenne, résidant en Algérie, Argentine, Bénin, Brésil, Burkina Faso, Cameroun, Chili, Chine, Colombie, Comores, Congo, Corée du Sud, Côte d'Ivoire, Égypte, États-Unis, Gabon, Guinée, Inde, Indonésie, Iran, Japon, Liban, Madagascar, Mali, Maroc, Maurice, Mauritanie, Mexique, Pérou, Russie, Sénégal, Syrie, Taiwan, Togo, Tunisie, Turquie, Vietnam.

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
### Programme

**Master Industrial and Applied Math 1re année**

**Semestre 7**

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

UE English

**Semestre 8**

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

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

**Semestre 9**

10 élément(s) au choix parmi 13

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<tr>
<th>UE</th>
<th>ECTS</th>
<th>Horaire</th>
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<tr>
<td>UE Optimal transport, levelset : applications to image</td>
<td>3 ECTS</td>
<td>18h</td>
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<tr>
<td>UE Advanced imaging</td>
<td>3 ECTS</td>
<td>18h</td>
</tr>
<tr>
<td>UE Inverse methods and data assimilation</td>
<td>3 ECTS</td>
<td>30h</td>
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<tr>
<td>UE Medical imaging: tomography and 3D reconstruction from 2D projections</td>
<td>3 ECTS</td>
<td>30h</td>
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<tr>
<td>UE Modeling seminar and projects</td>
<td>3 ECTS</td>
<td>48h</td>
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<tr>
<td>UE Efficient methods in optimization</td>
<td>3 ECTS</td>
<td>18h</td>
</tr>
<tr>
<td>UE Software development tools and methods</td>
<td>3 ECTS</td>
<td>39h</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 Numerical optimal transport and geometry</td>
<td>3 ECTS</td>
<td>18h</td>
</tr>
<tr>
<td>UE Wavelets and applications</td>
<td>3 ECTS</td>
<td>18h</td>
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UE Convex and distributed optimization 3 ECTS 36h
UE Model exploration for approximation of complex, high-dimensional problems 3 ECTS 18h
UE GPU Computing 3 ECTS 18h

Semestre 10
UE MA research project 30 ECTS

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

Semestre 9
10 élément(s) au choix parmi 16
UE Advanced learning models 3 ECTS 18h
UE Computational biology 3 ECTS 18h
UE Machine learning fundamentals 3 ECTS 30h
UE Fundamentals of probabilistic data mining 3 ECTS 18h
UE Stochastic calculus and applications to finance 3 ECTS 18h
UE Wavelets and applications 3 ECTS 18h
UE Efficient methods in optimization 3 ECTS 18h
UE Software development tools and methods 3 ECTS 39h
UE High performance computing for mathematical models 3 ECTS 18h
UE Bayesian statistics 3 ECTS 18h
UE Numerical optimal transport and geometry 3 ECTS 18h
UE Advanced algorithms for machine learning and data mining 3 ECTS 18h
UE Inverse methods and data assimilation 3 ECTS 30h
UE Modeling seminar and projects 3 ECTS 48h
UE Model exploration for approximation of complex, high-dimensional problems 3 ECTS 18h
UE Model selection for large-scale learning 3 ECTS 18h
UE Model selection for large-scale learning 3 ECTS 18h
UE Advanced learning models for machine learning and data mining 3 ECTS 18h
UE Computational biology 3 ECTS 18h
UE Machine learning fundamentals 3 ECTS 30h
UE Software development tools and methods 3 ECTS 39h
UE Numerical optimal transport and geometry 3 ECTS 18h
UE Information access and retrieval 3 ECTS 18h
UE Information visualisation 3 ECTS 18h
UE Category learning and object recognition 3 ECTS 18h

Semestre 10
UE MA research project 30 ECTS