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 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.

Toutes les informations de cette page sont indicatives et n’ont pas de valeur contractuelle - Mis à jour le 17 février 2020
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 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**

  [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
Jean-Baptiste Durand
jean-baptiste.durand@imag.fr
Secrétariat de scolarité
Bérengère Duc
04.76.63.57.89
berengere.duc@univ-grenoble-alpes.fr
Carine Beaujolais
04.76.63.57.22
carine.beaujolais@univ-grenoble-alpes.fr

Programme

Master Industrial and Applied Math 1re année

Semestre 7
UE Algorithms and software tools 3 ECTS 36h
UE Partial differential equations and numerical methods 6 ECTS 54h
UE Signal and image processing 6 ECTS 54h
UE Geometric Modelling 6 ECTS 54h
UE Applied probability and statistics 6 ECTS 48h

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 Numerical optimisation 6 ECTS 54h
UE Project 3 ECTS
UE Internship 3 ECTS

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

UE Operations Research 3 ECTS 36h
UE Operations Research Complementary 3 ECTS

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

Semestre 9
10 élément(s) au choix parmi 13
UE Optimal transport, levelset : applications to image 3 ECTS 18h
UE Advanced imaging 3 ECTS 18h
UE Inverse methods and data assimilation 3 ECTS 30h
UE Medical imaging: tomography and 3D reconstruction from 2D projections 3 ECTS 30h
UE Modeling seminar and projects 3 ECTS 48h
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 Numerical optimal transport and geometry 3 ECTS 18h
UE Wavelets and applications 3 ECTS 18h
### Master MSIAM-Fundamental of Data Science (FDS) 2e année

**Semestre 9**

<table>
<thead>
<tr>
<th>Cours</th>
<th>ECTS</th>
<th>Hôraire</th>
</tr>
</thead>
<tbody>
<tr>
<td>UE Advanced learning models</td>
<td>3 ECTS</td>
<td>18h</td>
</tr>
<tr>
<td>UE Computational biology</td>
<td>3 ECTS</td>
<td>18h</td>
</tr>
<tr>
<td>UE Machine learning fundamentals</td>
<td>3 ECTS</td>
<td>30h</td>
</tr>
<tr>
<td>UE Fundamentals of probabilistic data mining</td>
<td>3 ECTS</td>
<td>18h</td>
</tr>
<tr>
<td>UE Stochastic calculus and applications to finance</td>
<td>3 ECTS</td>
<td>18h</td>
</tr>
<tr>
<td>UE Wavelets and applications</td>
<td>3 ECTS</td>
<td>18h</td>
</tr>
<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>
</tr>
<tr>
<td>UE High performance computing for mathematical models</td>
<td>3 ECTS</td>
<td>18h</td>
</tr>
<tr>
<td>UE Bayesian statistics</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 Advanced algorithms for machine learning and data mining</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>
</tr>
<tr>
<td>UE Modeling seminar and projects</td>
<td>3 ECTS</td>
<td>48h</td>
</tr>
<tr>
<td>UE Model exploration for approximation of complex, high-dimensional problems</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>
</tbody>
</table>

**Semestre 10**

<table>
<thead>
<tr>
<th>Cours</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>UE MA research project</td>
<td>30 ECTS</td>
</tr>
</tbody>
</table>

### Master MSIAM-Large-Scale Data Science (LSDS) 2e année

**Semestre 9**

<table>
<thead>
<tr>
<th>Cours</th>
<th>ECTS</th>
<th>Hôraire</th>
</tr>
</thead>
<tbody>
<tr>
<td>UE Convex and distributed optimization</td>
<td>3 ECTS</td>
<td>36h</td>
</tr>
<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>
</tr>
<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>
</tr>
<tr>
<td>UE Data science seminar</td>
<td>3 ECTS</td>
<td>14h</td>
</tr>
<tr>
<td>UE Data Challenges</td>
<td>3 ECTS</td>
<td>60h</td>
</tr>
<tr>
<td>UE Advanced learning models</td>
<td>3 ECTS</td>
<td>18h</td>
</tr>
<tr>
<td>UE Advanced algorithms for machine learning and data mining</td>
<td>3 ECTS</td>
<td>18h</td>
</tr>
<tr>
<td>UE Computational biology</td>
<td>3 ECTS</td>
<td>18h</td>
</tr>
<tr>
<td>UE Machine learning fundamentals</td>
<td>3 ECTS</td>
<td>30h</td>
</tr>
<tr>
<td>UE Software development tools and methods</td>
<td>3 ECTS</td>
<td>39h</td>
</tr>
<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>
</tr>
<tr>
<td>UE Information vizualisation</td>
<td>3 ECTS</td>
<td>18h</td>
</tr>
<tr>
<td>UE Category learning and object recognition</td>
<td>3 ECTS</td>
<td>18h</td>
</tr>
</tbody>
</table>

**Semestre 10**

<table>
<thead>
<tr>
<th>Cours</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>UE MA research project</td>
<td>30 ECTS</td>
</tr>
</tbody>
</table>

*Toutes les informations de cette page sont indicatives et n'ont pas de valeur contractuelle - Mis à jour le 17 février 2020*