Master Mathématiques et applications

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).

The first year is composed of a common core which provides theoretical and practical grounds in probability and statistics, PDE and modelling, images and geometry as well as computer sciences, optimisation and cryptology.

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.

The course is labelled "Core AI" by   MIAI.

   Site web du master 2e année MSIAM

Admission

Conditions d'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 yearor 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)

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)

Candidature

Do you want to apply and register? Note that the procedure differs depending on the degree considered, the degree obtained, or the place of residence for foreign students.

Find out which procedure applies to me and apply

Pré-requis obligatoires

Language requirements :

  • Students are required to provide evidence of Competence in English.
English scores required MSIAM programs: TOEFL IBT 78, CBT 210, Paper 547 / TOEIC 700 / Cambridge FCE / IELTS 6.0 min.
This is equivalent to CEFR level B2.
     If you have successfully completed a degree (or equivalent) course at a University in one of the following countries then you meet the English requirement automatically: Australia, Canada, Guyana, Ireland, New Zealand, South Africa, United Kingdom, United States of America, West Indies.
  • An A2 level in French is recommended

Infos pratiques :

  >   Composante : UFR IM2AG (informatique, mathématiques et mathématiques appliquées), Grenoble INP - Ensimag (Informatique, mathématiques appliquées et télécommunications)
  >   Niveau : Bac +5
  >   Durée : 2 ans
  >   Type de formation : Formation initiale / continue
  >   Lieu : Grenoble - Domaine universitaire

Contacts

Responsables pédagogiques

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Programme

Master applied mathematics 1re année

Semestre 7

UE Object-oriented and software design	3 ECTS
UE Partial differential equations and numerical methods	6 ECTS
- Partial differential equations and numerical methods - Partial differential equations and numerical methods Complementary	
UE Signal and image processing	6 ECTS
UE Geometric Modelling	6 ECTS
UE English	
UE Applied probability and statistics	6 ECTS
UE Systèmes dynamiques	3 ECTS
UE Instabilities and Turbulences	3 ECTS
UE Dynamiques des fluides turbulents	3 ECTS

Semestre 8

UE Computing science for big data and HPC	6 ECTS
- HPC - Introduction to database	
UE Project	3 ECTS
UE Internship	3 ECTS
UE Numerical optimisation	6 ECTS

2 option(s) au choix parmi 2

UE Operations Research (MG et AM)	6 ECTS
- UE Operations Research - Operations Research Complementary	3 ECTS
UE Introduction to cryptology (AM)	6 ECTS
- UE Introduction to cryptology - Introduction to cryptology complementary	3 ECTS
UE 3D Graphics (AM)	6 ECTS
- UE 3D Graphics - 3D Graphics Complementary	3 ECTS
UE Turbulences	6 ECTS
- Plasmas Astrophysiques et Fusion - Experimental techniques in fluid mechanics	
UE Statistical analysis and document mining	6 ECTS
- Statistical analysis and document mining - Statistical analysis and document mining complementary	
UE Variational methods applied to modelling	6 ECTS
- Variational methods applied to modelling - Variational methods applied to modelling complementary	

Master applied mathematics 1ere année parcours Graduate School

Semester 7

UE Object-oriented and software design	3 ECTS
UE Partial differential equations and numerical methods	6 ECTS
- Partial differential equations and numerical methods	

- Partial differential equations and numerical methods Complementary

UE Signal and image processing	6 ECTS
UE Geometric Modelling	6 ECTS
UE Applied probability and statistics	6 ECTS
UE English	

Semester 8

UE Computing science for big data and HPC	6 ECTS

- HPC
- Introduction to database

UE Project	3 ECTS
UE Numerical optimisation	6 ECTS
UE GS_MSTIC_Démarche Scientifique	6 ECTS

1 option(s) au choix parmi 1

UE Introduction to cryptology (AM)	6 ECTS
- UE Introduction to cryptology	3 ECTS
- Introduction to cryptology complementary	
UE Operations Research (MG et AM)	6 ECTS
- UE Operations Research	3 ECTS
- Operations Research Complementary	
UE 3D Graphics (AM)	6 ECTS
- UE 3D Graphics	3 ECTS
- 3D Graphics Complementary	
UE Turbulences	6 ECTS

- Plasmas Astrophysiques et Fusion
- Experimental techniques in fluid mechanics

UE Statistical analysis and document mining	6 ECTS

- Statistical analysis and document mining
- Statistical analysis and document mining complementary

UE Variational methods applied to modelling	6 ECTS

- Variational methods applied to modelling
- Variational methods applied to modelling complementary

Master MSIAM modeling, scientific computing and image analysis (MSCI) 2e année

Semestre 9

UE Differential Calculus, Wavelets and Applications	6 ECTS
UE An introduction to shape and topology optimization	3 ECTS
UE Efficient methods in optimization	6 ECTS
UE Computational biology	6 ECTS

UE Fluid Mechanics and Granular Materials	6 ECTS
UE GPU Computing	6 ECTS
UE Software development tools and methods	3 ECTS
UE Geophysical imaging	3 ECTS
UE Handling uncertainties in (large-scale) numerical models	6 ECTS
UE Modeling seminar and projects	6 ECTS
UE Quantum Information & Dynamics	6 ECTS
UE Optimal transport: theory, applications and related numerical methods	6 ECTS
UE Statistical learning: from parametric to nonparametric models	6 ECTS
UE Temporal, spatial and extreme event analysis	6 ECTS

Semestre 10

UE Research projects	30 ECTS

Master MSIAM data science (DS) 2e année

Semestre 9

UE Advanced Machine Learning: Applications to Vision, Audio and Text	6 ECTS
UE An introduction to shape and topology optimization	3 ECTS
UE Computational biology	6 ECTS
UE Data science seminars and Challenge	6 ECTS
UE Differential Calculus, Wavelets and Applications	6 ECTS
UE Efficient methods in optimization	6 ECTS
UE From Basic Machine Learning models to Advanced Kernel Learning	6 ECTS
UE Handling uncertainties in (large-scale) numerical models	6 ECTS
UE GPU Computing	6 ECTS
UE Learning, Probabilities and Causality	6 ECTS
UE Mathematical Foundations of Machine Learning	6 ECTS
UE Modeling seminar and projects	6 ECTS

UE Optimal transport: theory, applications and related numerical methods	6 ECTS
UE Natural Language Processing & Information Retrieval	6 ECTS
UE Statistical learning: from parametric to nonparametric models	6 ECTS
UE Software development tools and methods	3 ECTS
UE Temporal, spatial and extreme event analysis	6 ECTS

UE Statistical learning: from parametric to nonparametric models	6 ECTS
UE Learning, Probabilities and Causality	6 ECTS
UE Efficient methods in optimization	6 ECTS
UE Data science seminars and Challenge	6 ECTS
UE Computational biology	6 ECTS
UE Quantum Information & Dynamics	6 ECTS
UE Numerical Mechanics	6 ECTS

Semestre 10

UE Research projects	30 ECTS

Semestre 10

UE Research projects	30 ECTS

Master 2e année parcours Graduate School

Semestre 9

UE GS_MSTIC_Ethique de la recherche	6 ECTS
UE Software development tools and methods	3 ECTS
UE Modeling seminar and projects	6 ECTS
UE Geophysical imaging	3 ECTS
UE An introduction to shape and topology optimization	3 ECTS
UE Refresh courses	
UE GPU Computing	6 ECTS
UE Differential Calculus, Wavelets and Applications	6 ECTS
UE Optimal transport: theory, applications and related numerical methods	6 ECTS
UE Fluid Mechanics and Granular Materials	6 ECTS
UE Handling uncertainties in (large-scale) numerical models	6 ECTS
UE Temporal, spatial and extreme event analysis	6 ECTS
UE Advanced Machine Learning: Applications to Vision, Audio and Text	6 ECTS
UE Natural Language Processing & Information Retrieval	6 ECTS
UE From Basic Machine Learning models to Advanced Kernel Learning	6 ECTS
UE Mathematical Foundations of Machine Learning	6 ECTS