

Master in Mathematics and applications

Science in industrial and applied mathematics (MSIAM)

Presentation

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. The 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 third semester is divided in 2 tracks :

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

The semester 10 is devoted to the master thesis project.

The course is labelled "Core AI" by [MIAI](#).

Registration and scholarships

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 master 1st year or directly to second year.

- Admission in 1st year : Anyone holding a 3rd year licence 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 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 \(VAPP\)](#)

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](#)

Practicals informations :

- > Component : UFR IM2AG (informatique, mathématiques et mathématiques appliquées), Grenoble INP - Ensimag (Informatique, mathématiques appliquées et télécommunications)
- > level : Bacalauréat +5
- > Duration : 2 years
- > Course type : Initial and Continuing Education
- > Location(s) : Grenoble - University campus

Contacts

Program director

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Program administration

Crozier Numa

Program

Program under construction - awaiting CFVU vote

Master industrial and applied math 1st year

Semester 7

UE Object-oriented and software design	3 ECTS
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UE Partial differential equations and numerical methods	6 ECTS
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- 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	3 ECTS
UE Applied probability and statistics	6 ECTS
UE Systèmes dynamiques	3 ECTS
UE Dynamiques des fluides turbulents	3 ECTS
UE Instabilities and Turbulences	3 ECTS

Semester 8

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

2 option(s) to choose from 6

UE Operations Research (AM)	6 ECTS
- UE Operations Research	3 ECTS
- Operations Research Complementary	
UE Introduction to cryptology (AM)	6 ECTS
- UE Introduction to cryptology	3 ECTS
- Introduction to cryptology complementary	
UE 3D Graphics (AM)	6 ECTS
- UE 3D graphics	3 ECTS
- 3D Graphics Complementary	
UE Turbulences	6 ECTS
- Plasmas Astrophysiques et de Fusion	
- Experimental techniques in fluid mechanics	
UE Statistical analysis and document mining	6 ECTS
- Statistical analysis and document mining	
- UE Statistical analysis and document mining Complementary	3 ECTS
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) 2nd year

Semester 9

UE Modeling seminar and projects	6 ECTS
UE Advanced imaging	3 ECTS

UE Wavelets and applications	3 ECTS
UE Efficient methods in optimization	3 ECTS
UE Software development tools and methods	3 ECTS
UE Model exploration for approximation of complex	3 ECTS
UE GPU Computing	6 ECTS
UE Geophysical imaging	3 ECTS
UE An Introduction to Shape and Topology Optimization	3 ECTS
UE Congestion phenomena and Compressibility for Granular media	3 ECTS
UE Refresh courses	
UE Non-smooth convex optimization methods	3 ECTS
UE Level set methods and optimization algorithms with applications in imaging	3 ECTS
UE Numerical optimal transport and geometry	3 ECTS

Semester 10

UE Research projects	30 ECTS
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Master MSIAM data science (DS) 2nd year

Semester 9

UE Temporal and spatial point process	3 ECTS
UE Wavelets and applications	3 ECTS
UE Efficient methods in optimization	3 ECTS
UE Software development tools and methods	3 ECTS
UE Modeling seminar and projects	6 ECTS
UE Data science seminar	3 ECTS
UE Model exploration for approximation of complex	3 ECTS
UE Model selection for large-scale learning	3 ECTS
UE GPU Computing	6 ECTS
UE An Introduction to Shape and Topology Optimization	3 ECTS
UE Introduction to extreme value analysis	3 ECTS
UE Fundamentals of probabilistic data mining	3 ECTS

UE Machine learning fundamentals	3 ECTS
UE Advanced algorithms for machine learning and data mining	3 ECTS
UE Information access and retrieval	3 ECTS
UE Refresh courses	
UE Statistical methods for forecasting	3 ECTS
UE Kernel methods for machine learning	3 ECTS
UE Computational biology	3 ECTS
UE Reinforcement learning	3 ECTS
UE Numerical optimal transport and geometry	3 ECTS
UE Inverse problem and data assimilation: variational and Bayesian approaches	3 ECTS
UE Non-smooth convex optimization methods	3 ECTS

Semester 10

UE Research projects	30 ECTS
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