SCIENCES, TECHNOLOGIES AND HEALTH

Science in industrial and applied mathematics (MSIAM)

Master in Mathematics and applications

Target level
Baccalaureate +5

ECTS
120 credits

Duration
2 years

Component
UFR IM2AG (informatique, mathématiques et mathématiques appliquées), Grenoble INP - Ensimag (Informatique, mathématiques appliquées et télécommunications), UGA

Language(s) of instruction
English, French

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.

M2 MSIAM Website

International education : Internationally-oriented programmes

International dimension

The training is entirely in English and is open to an international audience.

Admission

Access conditions

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)

Candidature / Application

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

Prerequisites

Language requirements :

- Students are required to provide evidence of Competence in English.
  English scores required for the 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

Useful info

Contacts

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Course location(s) - City

Grenoble

Campus

Grenoble - University campus

Program

Specifics of the program

Program under construction - awaiting CFVU vote

Master applied mathematics 1st year

Semester 7

	Nature	CM	TD	TP	Crédits
UE Object-oriented and software design	Teaching Unit (UE)				3 credits
UE Partial differential equations and numerical methods	Teaching Unit (UE)	16,5h	16,5h	16,5h	6 credits
Partial differential equations and numerical methods	OTHER	16,5h	16,5h		
Partial differential equations and numerical methods complementary	OTHER			16,5h	
UE Signal and image processing	Teaching Unit (UE)			16,5h	6 credits
UE Geometric modelling	Teaching Unit (UE)			16,5h	6 credits
UE English	Teaching Unit (UE)		24h		3 credits
UE Applied probability and statistics	Teaching Unit (UE)				6 credits
UE Systèmes dynamiques	Teaching Unit (UE)	12h	9h	3h	3 credits
UE Instability and Turbulences	Teaching Unit (UE)				3 credits
UE Turbulence	Teaching Unit (UE)	12h		18h	3 credits

Semester 8

	Nature	CM	TD	TP	Crédits
UE Computing science for big data and HPC	Teaching Unit (UE)			15,5h	6 credits
HPC	OTHER			9h	
Introduction to database	OTHER			7,5h	3 credits

UE Project	Teaching Unit (UE)				3 credits
UE Internship	Teaching Unit (UE)				3 credits
UE Numerical optimisation	Teaching Unit (UE)			16,5h	6 credits
UE Operations Research (AM)	Teaching Unit (UE)				6 credits
UE Operations Research	Teaching Unit (UE)	16,5h	16,5h		3 credits
Operations Research Complementary	OTHER	16,5h	16,5h		
UE Introduction to cryptology (AM)	Teaching Unit (UE)				6 credits
UE Introduction to cryptology	Teaching Unit (UE)	16,5h	13,5h	3h	3 credits
Introduction to cryptology complementary	OTHER		16,5h		
UE 3D Graphics (AM)	Teaching Unit (UE)				6 credits
UE 3D graphics	Teaching Unit (UE)	16,5h	16,5h		3 credits
3D Graphics Complementary	OTHER			16,5h	
UE Turbulences	Teaching Unit (UE)				6 credits
Plasmas Astrophysiques et de Fusion	Teaching Unit (UE)	24h	3h		
Experimental techniques in fluid mechanics	Teaching Unit (UE)	6h		24h	
UE Statistical analysis and document mining	Teaching Unit (UE)				6 credits
Statistical analysis and document mining	OTHER	16,5h		25,5h	
Statistical analysis and document mining Complementary	EPREUVE		7,5h	9h	3 credits
UE Variational methods applied to modelling	Teaching Unit (UE)	16,5h	16,5h	16,5h	6 credits
Variational methods applied to modelling	OTHER	16,5h	16,5h		
Variational methods applied to modelling Complementary	OTHER			16,5h	

Master applied mathematics 1 st year Graduate School program

Semester 7

	Nature	CM	TD	TP	Crédits

UE Object-oriented and software design	Teaching Unit (UE)			18h	3 credits
UE Partial differential equations and numerical methods	Teaching Unit (UE)	16,5h	16,5h	16,5h	6 credits
Partial differential equations and numerical methods	OTHER	16,5h	16,5h		
Partial differential equations and numerical methods complementary	OTHER			16,5h	
UE Signal and image processing	Teaching Unit (UE)			16,5h	6 credits
UE Geometric modelling	Teaching Unit (UE)			16,5h	6 credits
UE Applied probability and statistics	Teaching Unit (UE)	22,5h	18h	9h	6 credits
UE English	Teaching Unit (UE)		24h		3 credits

Semester 8

	Nature	CM	TD	TP	Crédits
UE Computing science for big data and HPC	Teaching Unit (UE)			15,5h	6 credits
HPC	OTHER			9h	
Introduction to database	OTHER			7,5h	3 credits
UE Project	Teaching Unit (UE)				3 credits
UE Internship	Teaching Unit (UE)				3 credits
UE Numerical optimisation	Teaching Unit (UE)			16,5h	6 credits
UE GS_MSTIC_Scientific approach	Teaching Unit (UE)				6 credits
UE Operations Research (AM)	Teaching Unit (UE)				6 credits
UE Operations Research	Teaching Unit (UE)	16,5h	16,5h		3 credits
Operations Research Complementary	OTHER	16,5h	16,5h		
UE Introduction to cryptology (AM)	Teaching Unit (UE)				6 credits
UE Introduction to cryptology	Teaching Unit (UE)	16,5h	13,5h	3h	3 credits
Introduction to cryptology complementary	OTHER		16,5h		

UE 3D Graphics (AM)	Teaching Unit (UE)				6 credits
UE 3D graphics	Teaching Unit (UE)	16,5h	16,5h		3 credits
3D Graphics Complementary	OTHER			16,5h	
UE Turbulences	Teaching Unit (UE)				6 credits
Plasmas Astrophysiques et de Fusion	Teaching Unit (UE)	24h	3h		
Experimental techniques in fluid mechanics	Teaching Unit (UE)	6h		24h	
UE Variational methods applied to modelling	Teaching Unit (UE)	16,5h	16,5h	16,5h	6 credits
Variational methods applied to modelling	OTHER	16,5h	16,5h		
Variational methods applied to modelling Complementary	OTHER			16,5h	
UE Statistical analysis and document mining	Teaching Unit (UE)				6 credits
Statistical analysis and document mining	OTHER	16,5h		25,5h	
Statistical analysis and document mining Complementary	EPREUVE		7,5h	9h	3 credits

Master MSIAM modeling, scientific computing and image analysis (MSCI) 2nd year

Semester 9

	Nature	CM	TD	TP	Crédits
UE Differential Calculus, Wavelets and Applications	Teaching Unit (UE)	36h			6 credits
UE An Introduction to Shape and Topology Optimization	Teaching Unit (UE)	18h			3 credits
UE Efficient methods in optimization	Teaching Unit (UE)	36h			3 credits
UE Computational biology	Teaching Unit (UE)	36h			3 credits
UE Fluid Mechanics and Granular Materials	Teaching Unit (UE)				6 credits
UE GPU Computing	Teaching Unit (UE)	18h		18h	6 credits
UE Software development tools and methods	Teaching Unit (UE)	9h		30h	3 credits

UE Geophysical imaging	Teaching Unit (UE)	18h			3 credits
UE Handling uncertainties in (large-scale) numerical models	Teaching Unit (UE)	36h			6 credits
UE Modeling seminar and projects	Teaching Unit (UE)		36h	24h	6 credits
UE Quantum Information & Dynamics	Teaching Unit (UE)	36h			6 credits
UE Optimal transport: theory, applications and related numerical methods	Teaching Unit (UE)	36h			6 credits
UE Statistical learning: from parametric to nonparametric models	Teaching Unit (UE)	36h			6 credits
UE Temporal, spatial and extreme event analysis	Teaching Unit (UE)	36h			6 credits

Semester 10

	Nature	CM	TD	TP	Crédits
UE Research projects	Teaching Unit (UE)				30 credits

Master MSIAM data science (DS) 2nd year

Semester 9

	Nature	CM	TD	TP	Crédits
UE Advanced Machine Learning: Applications to Vision, Audio and Text	Teaching Unit (UE)	36h			6 credits
UE An Introduction to Shape and Topology Optimization	Teaching Unit (UE)	18h			3 credits
UE Computational biology	Teaching Unit (UE)	36h			3 credits
UE Data Science Seminars and Challenge	Teaching Unit (UE)		36h		6 credits
UE Differential Calculus, Wavelets and Applications	Teaching Unit (UE)	36h			6 credits
UE Efficient methods in optimization	Teaching Unit (UE)	36h			3 credits

UE From Basic Machine Learning models to Advanced Kernel Learning	Teaching Unit (UE)	36h			6 credits
UE Handling uncertainties in (large-scale) numerical models	Teaching Unit (UE)	36h			6 credits
UE GPU Computing	Teaching Unit (UE)	18h		18h	6 credits
UE Learning, Probabilities and Causality	Teaching Unit (UE)	36h		18h	6 credits
UE Mathematical Foundations of Machine Learning	Teaching Unit (UE)	36h			3 credits
UE Modeling seminar and projects	Teaching Unit (UE)		36h	24h	6 credits
UE Optimal transport: theory, applications and related numerical methods	Teaching Unit (UE)	36h			6 credits
UE Natural Language Processing & Information Retrieval	Teaching Unit (UE)	36h			6 credits
UE Statistical learning: from parametric to nonparametric models	Teaching Unit (UE)	36h			6 credits
UE Software development tools and methods	Teaching Unit (UE)	9h		30h	3 credits
UE Temporal, spatial and extreme event analysis	Teaching Unit (UE)	36h			6 credits

Semester 10

	Nature	CM	TD	TP	Crédits
UE Research projects	Teaching Unit (UE)				30 credits

Master 2nd Graduate School program

Semester 9

	Nature	CM	TD	TP	Crédits
UE GS_MSTIC_Research ethics	Teaching Unit (UE)				6 credits
UE Software development tools and methods	Teaching Unit (UE)	9h		30h	3 credits

UE Modeling seminar and projects	Teaching Unit (UE)		36h	24h	6 credits
UE Geophysical imaging	Teaching Unit (UE)	18h			3 credits
UE An Introduction to Shape and Topology Optimization	Teaching Unit (UE)	18h			3 credits
UE Refresh courses	Teaching Unit (UE)	6h	6h	6h	0 credits
UE GPU Computing	Teaching Unit (UE)	18h		18h	6 credits
UE Differential Calculus, Wavelets and Applications	Teaching Unit (UE)	36h			6 credits
UE Optimal transport: theory, applications and related numerical methods	Teaching Unit (UE)	36h			6 credits
UE Fluid Mechanics and Granular Materials	Teaching Unit (UE)				6 credits
UE Handling uncertainties in (large-scale) numerical models	Teaching Unit (UE)	36h			6 credits
UE Temporal, spatial and extreme event analysis	Teaching Unit (UE)	36h			6 credits
UE Advanced Machine Learning: Applications to Vision, Audio and Text	Teaching Unit (UE)	36h			6 credits
UE Natural Language Processing & Information Retrieval	Teaching Unit (UE)	36h			6 credits
UE From Basic Machine Learning models to Advanced Kernel Learning	Teaching Unit (UE)	36h			6 credits
UE Mathematical Foundations of Machine Learning	Teaching Unit (UE)	36h			3 credits
UE Statistical learning: from parametric to nonparametric models	Teaching Unit (UE)	36h			6 credits
UE Learning, Probabilities and Causality	Teaching Unit (UE)	36h		18h	6 credits
UE Efficient methods in optimization	Teaching Unit (UE)	36h			3 credits
UE Data Science Seminars and Challenge	Teaching Unit (UE)		36h		6 credits
UE Computational biology	Teaching Unit (UE)	36h			3 credits

UE Quantum Information & Dynamics	Teaching Unit (UE)	36h			6 credits
UE Numerical Mechanics	Teaching Unit (UE)				6 credits

Semester 10

	Nature	CM	TD	TP	Crédits
UE Research projects	Teaching Unit (UE)				30 credits