

Master in Mechanics

Mécanique



Target level
Baccalaureate
+5



ECTS
120 credits



Duration
2 years



Component
UFR PhITEM
(physique,
ingénierie, terre,
environnement,
mécanique),
Grenoble
INP - Ense3
(Energie, eau,
environnement),
UGA



Language(s) of
instruction
French, English

Subprograms

- > Applied Mechanics 1st year
- > Mechanical engineering 1st and 2nd year
- > Simulation and instrumentation in mechanics 1st and 2nd year
- > Environmental fluid mechanics 2nd year
- > Fluid mechanics and energetics 2nd year
- > Turbulences : Méthodes et Applications 2nd year

Presentation

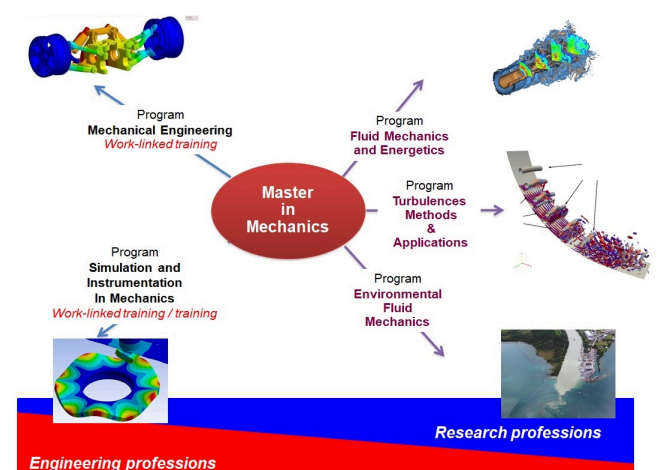
Course co-accredited by the National Polytechnic Institute of Grenoble and Université Grenoble Alpes

The master in Mechanics is structured around four programs: Simulation and instrumentation in mechanics (SIM), Mechanical engineering (GM), Environmental fluid mechanics (EFM) and Fluid mechanics and energetics (FME), Turbulence, Methods & Applications (TMA).

The second year of the SIM and GM programs involve work-linked training in a company or research laboratory. Teaching is given in French.

The EFM and FME programs welcome international students. Teaching is given in English.

The TMA program is open to an international public and is taught in French and English.

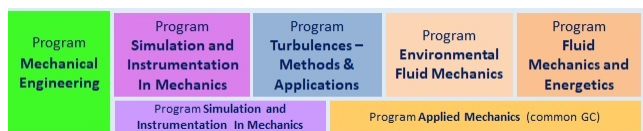


The two programs SIM and GM, consist of:

- A foundation program (over the 2 years) of 30 ECTS
- Specialised classes for each program (60 ECTS)
- Work-linked training through an internship (30 ECTS)

The 1st year Applied mechanics is entirely common to the two specialisations Civil engineering and Mechanics and leads to three international programs, including EFM and FME and also the TMA programme.

The EFM and FME programs consist of a foundation program of 45 ECTS, specialised classes for each program (45 ECTS), and an internship (30 ECTS).



[More information from](#)

The objectives of the master in Mechanics are :

- **SIM program:** The aim of this program is to train managers with a very high level of expertise in simulation and instrumentation applied to fluid and solid mechanics, who will be responsible for research and development in major groups and SMEs in various sectors such as aviation, automotive, rail, environment etc
- **GM program:** The main purpose of this program is to train managers with scientific, technical and professional knowledge in the fields of mechanical engineering, especially in the design and production of mechanical systems. The professions targeted by this program are managers responsible for developing and making industrial products (numerical simulation, R&D, production, design, quality management, project management etc) in major groups and SMEs in the engineering industry, in various sectors such as aviation, automotive, nuclear, agri-food and plastics processing
- **TMA program:** The objective is to offer an original training on a complex and essential scientific theme. The pedagogical approach is innovative in that it first refocuses teaching on the scientific discipline, in this case turbulence. Straddling three majors (Physics, Mathematics and Applications, Mechanics), the TMA course focuses on all methods of analysis of turbulence with a unique interdisciplinary vision: fluid mechanics, mathematics,

internal and external geophysics, physics, astrophysics and chemistry. Specialisation will be achieved at the end of the course through a choice of application modules and a 5-month M2 internship in a research laboratory or R&D research centre. Students who choose this course will want to become experts in fluid mechanics and turbulence before moving on to an application in a specific field.

- **EFM program:** The aim of this program is to give students scientific and technical skills in environmental fluid mechanics (lakes, rivers, ocean, atmosphere etc) from theoretical, numerical and experimental perspectives. The content of each course ranges from fundamental aspects through to applications. This research program offers two main career opportunities : doctoral studies in environmental fluid mechanics, either in France or abroad, with a view to pursuing a career as teacher-researcher in a university, researcher in a large public organisation (CNRS/INRA, CEA etc), or R&D engineer within a company in the water or environmental engineering sectors
- **FME program:** On completion of this program, students should have acquired scientific and technical skills in fluid mechanics and transfers (thermal, chemical) from theoretical, numerical and experimental perspectives. This program is mainly intended for students wishing to prepare for doctoral studies in fluid mechanics and transfers (thermal, chemical), either in France or abroad, with a view to pursuing a career as teacher-researcher in a university, researcher in a large public organisation (CNRS, CEA etc), or R&D engineer within a company in sectors such as energy or transport

International education : Internationally-oriented programmes

Admission

Access conditions


- The first year of the master's degree is accessible on file (and / or interview) to candidates with a national diploma conferring the degree of license in a field compatible with that of the master or via a validation of studies or acquired

according to the conditions determined by the university or training


- The 2nd year is accessible on file (and / or interview) to candidates who have validated the 1st year of a compatible path or through a validation of studies or acquired according to the conditions determined by the university or training

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

Would you like to apply and register ? Be aware that the procedure differs depending on the diploma, the degree obtained, or the place of residence for foreign students. Let us guide you simply by following this  link

Fees

Tuition fees 2023-2024 : 243 € + 100€ CVEC

And after

Professional integration statistics

Occupational integration : The latest surveys (30 months after graduation) show :

- A 93% occupational integration rate
- A median duration of access to the first filling of 3 months
- A stable employment rate of 86%

- 98% are hired full time
- 99% on positions of middle management and intermediate professions

Additional information

Occupational integration :

- At 6 months: 66% are employed and 82% of them have a stable job ; 13% pursue a PhD ; 9% continue their studies to obtain complementary skills
- At 30 months: 93% have a job and 86% of them have a stable job. 99% are executives
- The median duration of access to the first job is 3 months

Useful info

Contacts

Program director

Gregory Chagnon

✉ Gregory.Chagnon@univ-grenoble-alpes.fr

Program director

Henri Paris

✉ henri.paris@univ-grenoble-alpes.fr

Program administration

Registrar's Office for the Master in Mechanics

✉ phitem.master.mecanique@univ-grenoble-alpes.fr

Program administration

Application

✉ phitem.candidature.etudiant@univ-grenoble-alpes.fr

Course location(s) - City

 Grenoble

Campus

 Grenoble - University campus

Program

Applied Mechanics 1st year

Master applied mechanics 1st year

Semester 7

	Nature	CM	TD	TP	Crédits
UE Solid mechanics	Teaching Unit (UE)	24h			3 credits
UE Fluid mechanics	Teaching Unit (UE)			6h	3 credits
UE Experimental techniques and methods 1	Teaching Unit (UE)				3 credits
UE Numerical methods in solid and fluid mechanics 1	Teaching Unit (UE)			12h	3 credits
UE Image and signal processing	Teaching Unit (UE)				3 credits
UE English	Teaching Unit (UE)				3 credits
UE French as a foreign language	Teaching Unit (UE)				3 credits
UE Plastic analysis of structures	Teaching Unit (UE)				3 credits
UE Physics of granular media	Teaching Unit (UE)				3 credits
UE Convection in industrial and geophysical flows	Teaching Unit (UE)				3 credits
UE Instabilities and turbulence	Teaching Unit (UE)				3 credits
UE Basic geomechanics	Teaching Unit (UE)				3 credits
UE Introduction of geophysical fluids dynamics	Teaching Unit (UE)				3 credits

UE Mechanics of material	Teaching Unit (UE)			3 credits
UE Multiphysical couplings (THCM)	Teaching Unit (UE)			3 credits
UE Environmental flows	Teaching Unit (UE)	16h	8h	3 credits
UE Wave in fluids	Teaching Unit (UE)			3 credits
GS_GREEN_UE Climate and Energy for a Sustainable Transition	Teaching Unit (UE)			3 credits
UE Research project 1	Teaching Unit (UE)		30h	6 credits
GS_Soft-Nano_UE-Research Methodologies	Teaching Unit (UE)			6 credits

Semester 8

	Nature	CM	TD	TP	Crédits
UE Experimental techniques and methods 2	Teaching Unit (UE)				3 credits
UE Numerical methods in solid and fluid mechanics 2	Teaching Unit (UE)	5h	10h	9h	3 credits
UE English	Teaching Unit (UE)				3 credits
UE French as a foreign language - Semester 8	Teaching Unit (UE)				3 credits
UE Plastic analysis of structures	Teaching Unit (UE)				3 credits
UE Physics of granular media	Teaching Unit (UE)				3 credits
UE Convection in industrial and geophysical flows	Teaching Unit (UE)				3 credits
UE Instabilities and turbulence	Teaching Unit (UE)				3 credits
UE Basic geomechanics	Teaching Unit (UE)				3 credits

UE Introduction of geophysical fluids dynamics	Teaching Unit (UE)			3 credits
UE Multiphysical couplings (THCM)	Teaching Unit (UE)			3 credits
UE Mechanics of material	Teaching Unit (UE)			3 credits
UE Environmental flows	Teaching Unit (UE)	16h	8h	3 credits
UE Wave in fluids	Teaching Unit (UE)			3 credits
GS_GREEN_UE_Energy Systems for the Transition	Teaching Unit (UE)			3 credits
UE Research Internship M1 AM	Teaching Unit (UE)			6 credits
GS_Soft-Nano_UE_Internship	Teaching Unit (UE)			6 credits
UE Research project 2	Teaching Unit (UE)		60h	12 credits

Mechanical engineering 1st and 2nd year

Simulation and instrumentation in mechanics 1st and 2nd year

Environmental fluid mechanics 2nd year

Master 2nd year

Semester 9

	Nature	CM	TD	TP	Crédits
UE Turbulence, diffusion and transport	Teaching Unit (UE)	42h			6 credits
UE Scientific computing	Teaching Unit (UE)		12h	9h	3 credits

UE English	Teaching Unit (UE)	24h		3 credits
UE Transversal teaching of choice	Teaching Unit (UE)			3 credits
UE French as a foreign language - Semester 9	Teaching Unit (UE)			3 credits
UE Signal and information processing in fluid mechanics	Teaching Unit (UE)			3 credits
UE Atmospheric boundary layer : from fundamentals to air quality 1	Teaching Unit (UE)	24h		3 credits
UE Atmospheric boundary layer : from fundamentals to air quality 2	Teaching Unit (UE)	24h		3 credits
UE Exchanges across air-water interface	Teaching Unit (UE)	24h		3 credits
UE Renewable marine energy	Teaching Unit (UE)	14h	12h	3 credits
UE Ocean dynamics	Teaching Unit (UE)	24h		3 credits
UE Wave dynamics	Teaching Unit (UE)	24h		3 credits
UE Sediment transport	Teaching Unit (UE)	24h		3 credits
UE Flow measurement science and technology	Teaching Unit (UE)	15h	8h	3 credits
UE Data assimilation	Teaching Unit (UE)	21h	9h	3 credits
UE Machine learning for environmental sciences	Teaching Unit (UE)			3 credits
UE in another program or specialisation	SUBJECT			

Semester 10

	Nature	CM	TD	TP	Crédits
UE Stage (Internship)	Teaching Unit (UE)				30 credits

Fluid mechanics and energetics 2nd year

Master 2nd year

Turbulences : Méthodes et Applications 2nd year

Master 2nd year

Semester 9

	Nature	CM	TD	TP	Crédits
UE Physique theorique de la turbulence	Teaching Unit (UE)				3 credits
UE Ecoulements diphasiques turbulents	Teaching Unit (UE)				3 credits
UE Effet dynamo et rotation en turbulence	Teaching Unit (UE)	9h	12h		3 credits
UE Bilinguisme Anglais/Français compréhension	Teaching Unit (UE)			9h	3 credits
UE Méthodes expérimentales avancées	Teaching Unit (UE)	3h	12h	9h	3 credits
UE Méthodes numériques avancées	Teaching Unit (UE)				3 credits
UE Dynamique des plasmas astrophysiques	Teaching Unit (UE)				3 credits
UE Turbulence compressible	Teaching Unit (UE)				3 credits
UE Turbulence d'ondes	Teaching Unit (UE)				3 credits
UE Turbulence en couche limite atmosphérique	Teaching Unit (UE)				3 credits
UE Advanced Machine Learning in Earth Sciences	Teaching Unit (UE)			15h	3 credits
UE Dynamique des fluides géophysiques	Teaching Unit (UE)				6 credits
UE Controle et turbulence de paroi	Teaching Unit (UE)				3 credits
UE GPU Computing	Teaching Unit (UE)	18h		18h	6 credits

UE Data assimilation in geosciences	Teaching Unit (UE)			3 credits
UE Advanced Simulation Tools for Mechanics and the Environment	Teaching Unit (UE)		4h	6 credits
UE Transfert de chaleur	Teaching Unit (UE)	40h	40h	6 credits

Semester 10

	Nature	CM	TD	TP	Crédits
UE Internship - 5 months	Teaching Unit (UE)				30 credits