

# Natural Geological Hazards and Risks 1st and 2nd year

Master in Earth, planetary and environmental sciences



**Target level**  
Baccalaureate  
+5



**ECTS**  
120 credits



**Duration**  
2 years



**Component**  
UFR PhITEM  
(physique,  
ingénierie, terre,  
environnement,  
mécanique)



**Language(s) of instruction**  
English, French

## Presentation



Natural geological hazards (earthquakes, landslides, volcanoes, deformation of the earth's crust) are a major issue in our societies. This is reflected in a growing demand for understanding, controlling and managing telluric risks, both in France and internationally. The NATURAL GEOLOGICAL HAZARDS AND RISKS program was created to meet this need and trains students in the assessment of natural hazards using quantitative methods and geophysical tools. Students are prepared to work either for research (academic, semi-public or private), or for engineering offices in charge of natural hazard assessment or geophysical reconnaissance of surface terrain, or for local authorities.

The training is organized over two years and includes courses shared with the other programs of the master. It combines theoretical and practical approaches, and provides a range of cross-disciplinary skills for the various natural hazards.

The first-year courses allow students to master the use of geophysical, seismological, remote sensing and numerical modeling tools. In the second year, the focus is on the use of these tools for the quantification of seismic, landslide and volcanic hazards and risks. In the second year, a large number of training hours are given in the form of projects (a mix of lectures, case studies and applications, evaluation on reports and oral presentations).

Almost every year, the classes include foreign students. Thus, the teaching is done in English.

The program is also associated to a Thematic Program (PT Risk), which brings together UGA students working on risks in general (technological, natural, etc.). This opening is offered to students on selection from the first year, in order to deepen their knowledge of risk management. To know more on this PT Risk, follow this [link](#) or the [teasers](#).

Training in the field, in companies or in research laboratories, plays a key role in this program. The end-of-master's internship (lasting between 4 and 6 months) takes place either in an engineering office, or in academic research (~25% of students), or in local authorities, in France or abroad (~20% of students each year).

**International education** : Internationally-oriented programmes

## International dimension

## Study abroad as an exchange student

As part of this track, you have the opportunity to study for a semester or a year at a UGA partner University abroad.

The International Relations Officers of your faculty will be able to provide you with more information.

More information on : <https://international.univ-grenoble-alpes.fr/partir-a-l-international/partir-etudier-a-l-etranger-dans-le-cadre-d-un-programme-d-echanges> /

# Organisation

## Admission

### Access conditions

- The 1st year is open to students who have obtained a national diploma equivalent to a bachelor degree (licence) in a field compatible with that of the master, or via a validation of their studies or experience
- Entry to the 2nd year may be selective. It is open to candidates who have completed the 1st year of a Master in the field, subject to a review of their application

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 training under the continuous training regime one of the previous 2 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

You want to apply and sign up for a master ? Please be aware that the procedure differs depending on the diploma you want to take, the diploma you have already obtained and, for foreign students, your place of residence. Let us be your guide – simply follow this [link](#)

### Target

- Students in initial training who have obtained a bachelor degree (licence) in Earth, physical, or mechanical sciences
- Foreign students wishing to pursue their studies in the field of telluric risks in France
- Students in continuing education wishing to pursue advanced studies in the field of telluric risks

### Prerequisites

This course is intended for students in geosciences with a strong interest in working in the natural risks sector. Students have solid training in physics, geosciences and/or civil engineering.

## And after

### Further studies

This course prepares students either to continue in the private or semi-state sector (consultancies, EPIC, local authorities), or to go on to do a doctoral thesis. The skills acquired in this course will provide the student with the experience needed to successfully pursue either of these two directions.

### Reorientation

A reorientation to the Geophysics Programme is possible up to the end of the M1. Depending on the choice of UEs in semesters 7 and 8, reorientations to the Geodynamics or Georesources programmes are also possible.

## Useful info

### Contacts

#### Program director

Cecile Cornou

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#### Program director

Emeline Maufroy

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#### Program director

Pascal Lacroix

✉ [pascal.lacroix@univ-grenoble-alpes.fr](mailto:pascal.lacroix@univ-grenoble-alpes.fr)

#### Program administration

Registrar's Office of the Master in Earth,  
planetary and environmental sciences

✉ [phitem.master.stpe@univ-grenoble-alpes.fr](mailto:phitem.master.stpe@univ-grenoble-alpes.fr)

#### Program administration

Application

✉ [phitem.candidature.etudiant@univ-grenoble-alpes.fr](mailto:phitem.candidature.etudiant@univ-grenoble-alpes.fr)

#### Continuing education manager

Laura DI RUZZA

✉ [fc-phitem@univ-grenoble-alpes.fr](mailto:fc-phitem@univ-grenoble-alpes.fr)

### Partner schools

Cette formation peut être suivie dans le cadre d'un double-diplôme en partenariat avec Université Libanaise (Liban). Le M1 doit obligatoirement être fait à l'Université Libanaise.  
Professeur en charge du Double Diplôme : Mme Cécile CORNOU

### Partner laboratories

Institute of Earth Sciences - ISTerre

🔗 <https://www.isterre.fr>

### Course location(s) - City

📍 Grenoble

### Campus

🏠 Grenoble - University campus

# Program

## Specifics of the program

See the updated program in the [French](#) webpages:

### Master 1st year

#### Semester 7

	Nature	CM	TD	TP	Crédits
UE Signal processing	Teaching Unit (UE)		6h	15h	6 credits
UE Introductory Field Course - Professional project	Teaching Unit (UE)				3 credits
UE Programmation et environnements informatiques	Teaching Unit (UE)			18h	3 credits
UE Geophysical observation of the Earth	Teaching Unit (UE)		21h		6 credits
UE Tectonics and surface processes (2023-2024)	Teaching Unit (UE)		21h		6 credits
UE Geomechanics	Teaching Unit (UE)				3 credits
UE Geophysical Prospecting	Teaching Unit (UE)				3 credits
UE Professional and Scientific Communication 1	Teaching Unit (UE)			24h	3 credits
UE Gestion des risques : approches réglementaires et alternatives	Teaching Unit (UE)			18h	6 credits
UE Waves Physics	Teaching Unit (UE)		6h	9h	3 credits
UE Physics and Chemistry of the Earth	Teaching Unit (UE)		6h		6 credits

#### Semester 8

	Nature	CM	TD	TP	Crédits
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UE Introduction to Seismic Risk	Teaching Unit (UE)			6 credits
UE Volcanic dynamics and hazards	Teaching Unit (UE)			3 credits
UE Advanced volcanic dynamics and hazards	Teaching Unit (UE)			3 credits
UE Mouvements de terrain, avalanches, ouvrages de protection	Teaching Unit (UE)	4h	5h	6 credits
UE Exploration geophysics	Teaching Unit (UE)	3h	30h	6 credits
UE Remote sensing and GIS project	Teaching Unit (UE)	36h	24h	6 credits
UE Data sciences & Inverse problems	Teaching Unit (UE)	18h		3 credits
UE Instrumentation for geophysics	Teaching Unit (UE)	6h		3 credits
UE Introduction to Machine learning in Earth Sciences	Teaching Unit (UE)		12h	3 credits
UE Scientific computing	Teaching Unit (UE)	12h	9h	3 credits
UE Induced seismicity	Teaching Unit (UE)			3 credits

## Master 2nd year

### Semester 9

	Nature	CM	TD	TP	Crédits
UE Advanced gravitational risk	Teaching Unit (UE)		3h	15h	3 credits
UE Engineering seismology	Teaching Unit (UE)				6 credits
UE Project in engineering seismology [seismic vulnerability, site characterization, ground motion simulation]	Teaching Unit (UE)				3 credits
UE Project in gravitational risk [multi-method approach]	Teaching Unit (UE)		3h	15h	3 credits
UE Active Faults	Teaching Unit (UE)		9h	9h	6 credits

UE Risk management: regulatory and alternative approaches	Teaching Unit (UE)	18h	6 credits
UE Near surface geophysics	Teaching Unit (UE)	6h 21h	6 credits
UE Quantitative seismology	Teaching Unit (UE)		6 credits
UE Signal processing	Teaching Unit (UE)	6h 15h	6 credits
UE Tectonics and surface processes (2023-2024)	Teaching Unit (UE)	21h	6 credits
UE Advanced Machine Learning in Earth Sciences	Teaching Unit (UE)	15h	3 credits
UE Computing and data analysis Project	Teaching Unit (UE)		3 credits
UE Numerical Modelling	Teaching Unit (UE)	15h	3 credits

## Semester 10

	Nature	CM	TD	TP	Crédits
UE short Internship	Teaching Unit (UE)				6 credits
UE long Internship	Teaching Unit (UE)				24 credits