UNIVERSITÉ SAVOIE MONT BLANC

UNITA universitas montium

Bachelor (BSc) in

Earth Sciences

Detailed Programme of the Spring semester taught in English (January-May)

This semester is designed to provide **in-depth and practical knowledge about geological environments**, with a focus on alpine terrains. The programme has a strong emphasis on field work (two one-week field camps).
It also proposes an initiation to research through supervised projects in **ISTerre** and **EDYTEM** laboratories.

Course code[2]	ECTS[3]	Course name	Keywords
GEOL 402	4	Field geology: sedimentary terrains	Mapping; palaeoenvironments; sedimentology; structural geology; tectonics
GEOL 403	2	Geographic information system (GIS)	Remote sensing; QGIS; raster processing; classification; time lapse
GEOL 601	6	Geological risks	Seismic hazard; volcanic eruptions; landslides and gravitationnal processes; rupture theory
GEOL 604	6	Field geology: metamorphic terrains	Mapping; petrography; structural geology; tectonics
GEOL 603	2	Tectonics	Orogenesis; modelling; geodynamics; active tectonics
GEOL 606	2	Gravimetry	Gravity field; anomalies calculation; modeling of geological structures at different scales
GEOL 607	6	Introduction to research	Initiation to research; lab work; geosciences
GEOL 608	2	Environmental risks of mining and quarrying	Environmental contamination and impacts, metals speciation and dynamics
FLE-A1/A2 FLE-B1/B2	4	French - level A1/A2 French - level B1/B2	French course - beginner French course - intermediate

[1] Host laboratory thematics can be found at: https://www.isterre.fr/ and https://edytem.cnrs.fr/
[2] Course code https://formations-scem.univ-smb.fr/fr/toute-l-offre-de-formation/licence-XA/licence-sciences-de-la-terre-KGXZ5F2W.html
[3] ECTS (European Credits Transfer System)

SCIENCES ET MONTAGNE
UNIVERSITÉ SAVOIE MONT BLANC

laboratoire edytem
environnements dynamiques territoires montagnes

ISTerre
Institut des Sciences de la Terre

DETAILLED PROGRAMME

GEOL402 Field geology : sedimentary terrains (4 ECTS)

1 week of geological mapping of sedimentary rocks in an Alpine context (Provence). Students work partly accompanied by teachers and partly independently in groups of 3-4.
Involves observations of sedimentology, stratigraphy, tectonic structures and geomorphology within a 10 km^2 area. Measurements of bedding, fault planes, schistosity, fold axes. One map and one report will be submitted per group, covering terrain descriptions and emphasizing paleo-environmental + tectonic reconstructions (geological sections).

GEOL601 Geological risks (6 ECTS)

In this course, geological risks (from seismic to volcanic) are reviewed. Examples and exercises are proposed, in accordance with field observations and lab results.

GEOL603 Tectonics (2 ECTS)

Observation, description and characterization of tectonic processes and structure geometries in major orogenic systems: extensional zones, convergence zones and strike-slip zones. Focus is from the million-year scale to the active deformation scale.
Analysis of maps, geological sections from lithospheric to sub-surface scale, stratigraphic cores, seismic lines, geomorphic markers, geodesy data, and numerical and analogue models. Study of the Himalayan orogen, from deep to shallow structures. Link between ductile and brittle deformation.

GEOL604 Field geology : metamorphic terrains (6 ECTS)

1 week of geological mapping of metamorphic and magmatic rocks (Ardèche). Students work partly accompanied by teachers and partly independently in groups of 3-4.
Observations of metamorphic and magmatic rocks, minerals, foliations, folds and faults within a 10 km^2 area. Measurements of fault planes, foliation, schistosity, fold axes. One map and one report will be submitted per group, covering terrain descriptions and with an emphasis on the metamorphic history of the region. A complementary microscopy analysis will allow students to better describe lithologies and microstructures.

GEOL606 Gravimetry (2 ECTS)

This course covers the concepts of gravity field, isostasy and gravity anomalies. It describes the techniques used to measure, correct, analyze and model gravimetric anomalies, and how gravimetry can be used to identify the Earth's structure at different scales. There are two sessions to measure gravity in the field, one to understand how g varies with altitude, and the other to measure and model the gravimetric anomaly created by a tunnel. Students will also work in small groups to present a scientific paper on applied gravimetry.

>> This programme can be completed with a **French course** for foreigners (4 ECTS).

GEOL403 Geographic information system (GIS) (2 ECTS)

The course describes the use of satellite images and their processing for thematic purposes. The various sections cover the history of remote sensing, radiation physics, satellites and radiometric sensors, colour representation, image enhancement, filtering and classification, and radar images.
The student will also carry out a personal project using QGIS on the time-lapse processing of satellite images in an area of environmental change (drying lakes, deforestation, mines extension, etc.).

GEOL607 Introduction to research (6 ECTS)

Initiation to research, supervised by a lecturer or researcher of EDYTEM or ISTerre laboratories.
The student is involved in an ongoing research project, on a topic in agreement with his interests, and will participate to each step: literature review, field or lab work, analyses, data treatment, data presentation and discussion. This work will take place all along the semester, from January to May, at least one day a week, and will give rise to a report and an oral presentation.

GEOL608 Environmental risks of mining and quarrying (2 ECTS)

An introduction will present the mining system and the main types of impacts. The focus will be environmental contamination: (i) trace metals and organic contaminant transfer from the subsurface to groundwaters and soils, (ii) the effects of contamination on lacustrine biota, and (iii) the effects of contamination on plant growth.
Theoretical concepts will be provided on contaminant transfer within the critical zone. Examples will be provided from on-going research work.

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More info