



Teuzier/Dani © A. Ebert

master of science (MSc) in environmental science

GENERAL OUTLINE

Objectives

Human activities are a regular cause of imbalances in natural systems and the societies that depend upon them, at the local, regional, and global scales. Understanding the underlying physical, chemical and biological processes is essential for resolving contemporary environmental problems. This understanding is represented in the form of models that allow informed management decisions to be made. However, such models must take into account data gathered through observation and monitoring of the phenomena concerned. Otherwise, the information they provide will be of little real value.

The Master of Science in Environmental Science provides not only an adequate scientific grounding, but also an understanding of the fundamental links between the observation, modelling and monitoring of environmental phenomena, as each of these aspects enhances the credibility and quality of the other two. This combination also provides a deeper understanding of the phenomena themselves. The teaching programme focuses

on areas of study affected by both physical and chemical processes (for example, water tables, landslides, landfills, diffuse or concentrated pollution), as well as the interactions between environmental disruptors and living organisms. Through this interdisciplinary approach, future professionals are trained to acquire the capacity to confront the increasingly complex interactions between the critical zone, ecosystems and human activities.

Career prospects

- Branches of the public administration responsible for environmental policy
- Non-governmental organisations dedicated to environmental protection
- Environmental management in companies
- Research institutes
- Consulting firms

Alumni move into a wide variety of roles, for example: PhD at ETH Zurich or director of a solar energy company. Others work at the Swiss Federal Office of Topography, for an energy, water and telecommunications supply company or in teaching.

Example of opportunities and alumni's profiles:

www.unil.ch/perspectives/unil-et-apres

can our environment do without experts?

GENERAL INFORMATION

Organisers

Faculty of Geosciences and Environment
School of Geosciences and Environment
www.unil.ch/gse

Degree awarded

Master of Science (MSc) in Environmental Science

ECTS credits

120

Duration

4 semesters

Teaching language

All compulsory courses are given in English. Students have to choose optional courses, and these may be given in English or French according to their choice. The recommended level of English is C1. All assessed work, including exams, reports and the Master's dissertation may be written in English or French.

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Additional information

www.unil.ch/masterenvi



EDUCATIONAL CONTENT

Description

The Master's programme is organised into four parts.

Part 1 : Core modules

- Foundations in Environmental Science
- Environmental Data and Systems Analysis

Part 2 : Specialisation module

- Aquatic Science **or**
- Natural Hazards and Risk **or**
- Earth Surface Processes in Mountain Environments

Part 3 : Free-choice course module

Part 4 : Master's thesis

Examinations

Evaluations may take the form of written or oral examinations, practical work, discussions, or reports.

Mobility

Subject to the prior agreement of the Mobility Committee, students may study during their third semester at a recognised institution while continuing to be registered at the University of Lausanne.

Skills development

The aim of the syllabus is to train students to describe, understand and model physical and/or chemical processes of both natural and anthropogenic origin. To this end, students will learn how to use quantitative methodologies in environmental science (field measurements, laboratory work and data analysis), as well as how to choose appropriate techniques for the evaluation and monitoring of environmental problems. Students will learn to address issues related to a theme on the theoretical or empirical foundations of environmental science, while taking into account the complexity, uncertainties, and limits of actual knowledge concerning environmental processes.

University studies develop many transverse skills such as: oral and written communication; critical, analytical and summarising faculties; abilities in research, etc. This panoply of skills, combined with specialist knowledge acquired over the course of studies, is excellent preparation for a wide range of employment opportunities such as those mentioned under "Career prospects".

SYLLABUS

Core Module 1 «Foundations in Environmental Science» 10 ECTS Credits

- Applications of Environmental Science Seminar Series
- Introduction to Scientific Programming (with Python)
- Masters Project Preparation
- Statistical Analyses in Environmental Sciences

Core Module 2 «Environmental Data and Systems Analysis» 20 ECTS Credits

Choose any courses amongst those for a total of 20 ECTS.

- Environmental Time-Series Analysis
- Machine Learning for Earth and Environmental Sciences
- Model Parameter Estimation and Uncertainty Quantification
- Mountain Ecosystems; Ecology and evolution - Course/Field
- Principle of Scientific Data Acquisition
- Remote Sensing of Earth Systems
- Scientific Computing
- Watershed and River Network Modelling
- Weather and Climate Dynamics

Specialisation modules 30 ECTS Credits

Specialisation 3A «Aquatic Science»

- Fluid Flow and Transport in the Subsurface
- Soil and Water Geochemistry
- Environmental Toxicology
- Aquatic Ecosystems: Glaciers, Rivers, and Lakes
- Tracing Biogeochemical Processes and Fluxes Using Isotope Analysis
- Field and Laboratory Methods
(I): The UNIL Campus as a Microcosm
(II): Alpine Catchments

Specialisation 3B «Natural Hazards and Risk»

- Communication on Environmental Risks
- Advanced Quantitative Risk and Vulnerability
- Risk Quantification and Insurance
- Risk Management (Monitoring, Early Warning, Post-Disaster Preparedness)
- Erosion and Slope Movements
- Monitoring Techniques for Slope Dynamics
- Hazards and Risks of Slope Mass Movements: Field Camp
- Flood Risk Modeling

Specialisation 3C «Earth Surface Processes in Mountain Environments»

- Alpine Periglacial Environments
- Monitoring Techniques for Slopes Dynamics
- Aquatic Ecosystems: Glaciers, Rivers, and Lakes
- GIS-Based Analysis for Mountain Geomorphology
- Mountain Streams; Sediments Management
- Erosion & Slope Movements
- Dates & Rates of Mountain Evolution

Free Choice Module 20 ECTS Credits

Can include a professional internship

Master's Thesis 40 ECTS Credits

PRACTICAL INFORMATION

Admission requirements

The criteria for admission into the Master's programme are either

- a Bachelor of Science in Geosciences and Environment, subject area Environmental Sciences or Geology, awarded by the University of Lausanne
- another degree or academic title judged to be sufficient to gain access to the programme, with or without further conditions

Enrolment and final date

The candidate's application must be submitted to the Admissions Department before 30th April: www.unil.ch/immat

Candidates needing a visa to study in Switzerland: 28th February.

Start of courses

Mid-September
Academic calendar: www.unil.ch/central/calendar

Part-time Master's degree

Under certain conditions, a Master's programme can be followed part-time.

www.unil.ch/formations/master-temps-partial

General information on studies, guidance

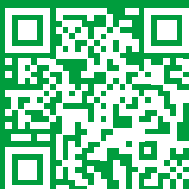
www.unil.ch/soc

Accommodation and financial assistance

www.unil.ch/sasme

International

www.unil.ch/international



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Faculté des géosciences
et de l'environnement