The Master program has a normal duration of 3 semesters and comprises 90 ECTS:

**Module 1**: 15 ECTS - Compulsory courses (5.5 ECTS) and Optional courses (9.5 ECTS)

**Module 2**: 15 ECTS - First Step Project

**Module 3**: 30 ECTS - Compulsory courses (6 ECTS) and Optional courses (24 ECTS)

**Module 4**: 30 ECTS - Personal Research Project (Master Thesis)

For specialisation Geosciences, Ecology and Environment (GEE), the student must obtain:

**Module 1**: 5.5 ECTS with Compulsory courses and at least one Interdisciplinary optional course (marked in blue)

**Autumn Semester (semester 1)**

### Courses / Enseignements

#### Compulsory Courses / Enseignements obligatoires

**Data Analysis**
- Analyses de données: 6 ECTS
- Bergmann S.: 2 ECTS

**Introduction to Scientific Writing**
- Introduction à la rédaction scientifique: 7 ECTS
- Waterhouse R.: 2 ECTS

**Spatial Analysis and GIS in Ecology**
- Analyses spatiales et SIG en écologie: 7 ECTS
- Guisan A.: 1.5 ECTS

**Master BEC Retreat**
- Retraite Master BEC: - ECTS

**Total**: 20 CSE + 16F

#### Optional Courses / Enseignements optionnels

**Environmental Chemistry and Toxicology (GSE, MSc in Environm. Sci.)**
- Chimie environnementale et toxicologie: 6 CPW
- Chèvre N., Asta M.: 5 ECTS

**Environmental Time-series Analysis (GSE, MSc in Environm. Sci.)**
- Traitement du signal et analyse de séries temporelles: 7 CPW
- Irving J.: 5 ECTS

**Nature Conservation (GSE, Master in Geography)**
- Conservation de la nature: 7 CPW
- Guisan A.: 1.5 ECTS

**Remote Sensing of Earth Systems (GSE, MSc in Environm. Sci.)**
- Télédétection des systèmes terrestres: 7 CPW
- Mariethoz G., Lane S.: 5 ECTS

**Advanced Data Analysis**
- Analyses de données: niveau avancé: 6 ECTS
- Ciriello G., Delaneau O.: 2.5 ECTS

**Animal Communication and Parasitism**
- Communication animale et parasitisme: 6 CPW
- Christe P., Roulin A.: 1.5 ECTS

**Major Transitions in Evolution**
- Les grandes étapes de l'évolution: 14 CPW
- Keller L.: 1.5 ECTS

**Molecular Methods in Ecology and Evolution**
- Méthodes moléculaires en écologie et évolution: 18 ECTS
- Sanders I., Fumagalli L.: 5 ECTS

**Phylogeography**
- Phylogeographie: 7 CPA
- Fumagalli L.: 1.5 ECTS

**Population Genetics and Dynamics**
- Génétique et dynamique des populations: 7 CPA
- Goudel J.: 1.5 ECTS

**Animal Experimentation and Wild Animals**
- Expérimentation animale et animaux sauvages: 20 CPA
- Rubin J.-F.: 1 ECTS

**Introduction to R (optional support)**
- Introduction à R: 6 CPA
- Schütz F.: 1 ECTS

**Total**: 15 ECTS

#### Practical Project / Travail pratique

**First Step Project**
- Travail d'initiation à la recherche: 224 CPA
- Guisan A.: 15 ECTS

### Training Objectives

Specific training objectives:
- At the end of the course the students will be able to:
  - Solve complex ecological problems through quantitative and modelling approaches, using complementary knowledge acquired in geosciences and environmental sciences.
  - Have an integrated view of natural systems and conduct interdisciplinary research projects in ecology/environment.
  - Transfer scientific knowledge and skills acquired to applied problems in the field of ecology, environment and conservation.

### Abbreviations

- **C** = Course
- **E/S** = Exercise/Seminar
- **PW** = Practical Work
- **CPW** or **CSE** or **F** = Course/Practical Work or Course/Seminar/Exercise or Field
• alternative or time-shifted modalities for teachings, internships, practical work, fieldworks and camps that could not take place or teachings that could no longer

practical work <-> theoretical work, face-to-face evaluation <-> online evaluation, etc.

• adaptation of evaluation modalities, without inducing derogations from the Study Regulations (oral <-> written, exam <-> validation, individual work <-> group work, practical work <-> theoretical work, face-to-face evaluation <-> online evaluation, etc.)

• possibility to switch from one mode of teaching to another (face-to-face <-> distance, synchronous <-> asynchronous, switch to co-modal teaching where it was

Spring Semester (semester 2)

Course / Enseignement | Hours per semester | Teaching Staff | ECTS Credits | Limited nb of students
--- | --- | --- | --- | ---
Integrated course Mountain Ecosystems - Ecology & Evolution | 14 | Guisan A. | 1.5
Integrated course Mountain Ecosystems - Geo-Environmental Sciences | 14 | Guisan A. | 1.5
Integrated Practical Work Mountain Ecosystems in the Alps | - | Guisan A. | 3

Subtotal | 28 | 0 | 6 |

Optional Courses / Enseignements optionnels

Aquatic Ecosystems - Glaciers, Rivers and Lakes (GSE) | 56 CPW | Perga M.-E., Lane S. | 5
Ecotopes aquatiques - glaciers, rivières et lacs | 56 CPW | Perga M.-E., Lane S. | 5

Méthodes de terrain et de laboratoire - le campus UNIL comme microcosme | 49 PW | Guisan A. | 3

Méthodes de terrain et de laboratoire (GSE - out of semester) | 40 PW | Guisan A. | 3

Mountain Learning for Environmental Science and Engineering (GSE) | 56 CPW | Meurier T. | 5

Aperçu pédagogique pour les sciences et ingénierie de l'environnement | 24 CPW | Lane S. | 3

Watershed and main network modelling (GSE) | 56 CPW | Pielig N., Ruiz-Villanueva V. | 5

Modélisation des bassins versants et des réseaux fluviaux | 40 PW | Lane S. | 3

Mountain stream basin sediment (management field days (GSE - autumn) | 40 PW | Lane S. | 3

Applied Ecology

Ecologie appliquée | 14 | Pelled J. | 3

Biological Invasions

Invasions biologiques | 14 | Bertelsmeier C. | 1.5

Co-evolution, Mutualism, Parasitism

Co-evolution, mutualisme, parasitisme | 14 | Sanders I. | 1.5

Current Problems in Conservation Biology

Problèmes actuels en biologie de la conservation | 14 | Wedekind C. | 3 | 10

Ecology of the Alps of Switzerland

Ecologie des alpes de Suisse | 7 | 10 | Rubin J.-F. | 1.5

Mountain Ecology, Evolution and Conservation

Ecologie des alpes, évolution et conservation | 14 | Dietemann V. | 1.5

Physiology and comparative Methods

Physiologie et méthodes comparatives | 14 | Salamin N. | 3

Plant Population Genetics and Conservation

Génétique des populations végétales et biologie de la conservation | 7 | 10 | Fellner F. | 1.5

Spatial Modelling of Species and Biodiversity

Modélisation spatiale des espèces et de la biodiversité | 14 | Guisan A. | 3

Comparative Genomes - from Thousands of Genomes to Single Cells

Génomique comparative - des milliers de génomes aux cellules individuelles | 7 | 9 | Mullen C. | 1.5

Sex, Ageing and Foraging Theory

Introduction à l'âge et la santé | 10 | Van de Waal E. | 1.5

Introduction au comportement, à la cognition et à la culture des primates | 9 | Mullen C. | 1.5

Scientific Communication - Scientific Hands-on Workshop Module (in French only)

Scientific Communication - module atelier scientifique | 14 | Kaufmann A., Reymond P., Mullon C. | 3 | 8

Scientific Mediation and Communication - Museum Module

Communication et médiation scientifique - module musée | 6 | 2 | Gosselin O. | 3 | 6

The Environment, addressed in an interdisciplinary way (oral in French) (GSE)

Séminaire interfacultaire en environnement | - | Guisan A. | 2

The Evolution of Cooperation - from Genes to Learning and Culture - Evolution de la coopération - des gènes à l'apprentissage et la culture | 28 | Lehnmann L. | 3

Social Genetics

Génétique sociale | 2 | 12 | Keller L., Key T. | 1.5

Optional Field Courses (financial participation required by the student)

Etudes de terrain optionnelles | 7 | 49 | Schaefer T. | 3 | 20

Factors determining the biodiversity of the long of gradients

Evolution and Biogeography of Semiarid and Island Flora

Diversification et biogéographie des floraux insulaires en zone semi-aride | - | - | Paswell J. | 2 | 14

Total | 30

* Before choosing an optional course, please check the "programme requirement" (prérequis for the course) in the course description
- To complete the acquisition of the credits, it is possible to take optional courses from the module 1 during the third semester depending on their availability and only with the approval of the head of the Master.

Spring semester (semester 2) and Autumn Semester (semester 3)

Course / Enseignement | ECTS Credits
--- | ---
Master Thesis GEE | 30
Thesis Director | Directeur du travail de Master | 30

Due to the sanitary evolution related to COVID-19, the study plans may be adapted during the semester as follows:

- possibility to switch from one mode of teaching to another (face-to-face <-> distance, synchronous <-> asynchronous, switch to co-modal teaching where it was not initially planned)
- adaptation of evaluation modalities, without inducing derogations from the Study Regulations (oral <-> written, exam <-> validation, individual work <-> group work, practical work <-> theoretical work, face-to-face evaluation <-> online evaluation, etc.)
- alternative or time-shifted modalities for teachings, internships, practical work, fieldworks and camps that could not take place or teachings that could no longer take place in the form initially planned

Students are invited to consult this document regularly (Study Plan & Evaluation Procedure)