

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) (30 ECTS), the student must obtain :**

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

**Module 3** : 6.0 ECTS with Compulsory courses and

18.5 ECTS with Optional courses at least 15 ECTS with Disciplinary (marked in orange) and Interdisciplinary (marked in blue) optional courses

**Modules 2 and 4** : have to be in geosciences, ecology or environment fields, validated by the head of GEE specialisation

**Training objectives** are available in its programme regulations.

**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

### Autumn Semester (semester 1)

	Courses / Enseignements	Hours per semester			Teaching Staff	ECTS Credits	Limited nb of students
		C	E/S	PW			
MODULE 1	<b>Compulsory Courses / Enseignements obligatoires</b>						
	Data Analysis <i>Analyses de données</i>	6	-	6	Bergmann S.	2	
	Introduction into Scientific Writing <i>Introduction à la rédaction scientifique</i>	7	9	-	Waterhouse R.	2	
	Spatial Analysis and GIS in Ecology <i>Analyses spatiales et SIG en écologie</i>	7	10	-	Guisan A.	1.5	
	Master BEC Retreat <i>Retraite Master BEC</i>	-	-	-	Kawecki T.	-	
	Subtotal	20	19	6		5.5	
	<b>Optional Courses / Enseignements optionnels</b>						
	Environmental chemistry and toxicology (GSE, MSc in Environm. Sci.) <i>Chimie environnementale et toxicologie</i>			56 CPW	Chèvre N., Asta M.	5	
	Environmental time-series analysis (GSE, MSc in Environm. Sci.) <i>Traitement du signal et analyse de séries temporelles</i>			56 CPW	Irving J.	5	
	Nature Conservation (in French) (GSE, Master in Geography) <i>Conservation de la nature</i>			28 CSE + 16F	Chanteloup L., Reynard E., Badman T., Walters G.	4	
	Remote sensing of Earth Systems (GSE, MSc in Environm. Sci.) <i>Télé-détection des systèmes terrestres</i>			56 CPW	Mariethoz G., Lane S.	5	
	Advanced Data Analysis <i>Analyses de données : niveau avancé</i>	6	-	6	Ciriello G., Delaneau O.	2.5	
	Animal Communication and Parasitism <i>Communication animale et parasitisme</i>	14	-	-	Christe P., Roulin A.	1.5	
	Major Transitions in Evolution <i>Les grandes étapes de l'évolution</i>	14	-	-	Keller L.	1.5	12
	Molecular Methods in Ecology and Evolution <i>Méthodes moléculaires en écologie et évolution</i>	18	-	42	Sanders I., Fumagalli L., Salamin N.	5	
Phylogeography <i>Phylogéographie</i>	7	10	-	Fumagalli L.	1.5		
Population Genetics and Dynamics <i>Génétique et dynamique des populations</i>	7	10	-	Goudet J.	1.5		
Animal Experimentation and Wild Animals * <i>Expérimentation animale et animaux sauvages</i>	20	-	20	Rubin J.-F.	-		
Introduction to R (optional support) <i>Introduction à R (mise à niveau optionnelle)</i>				Schütz F.	-		
<b>Total</b>					<b>15</b>		
MODULE 2	<b>Practical Project / Travail pratique</b>						
	First Step Project <i>Travail d'initiation à la recherche</i>	-	-	224	Kawecki T., Guisan A.	15	

Interdisciplinary courses marked in blue

\* Only students who choose a master project with animal experimentation are allowed to select this course

#### Abbreviations

C = Course

E/S = Exercise/Seminar

PW = Practical Work

CPW or CSE or F = Course/Practical Work or Course/Seminar/Exercise or Field

Spring Semester (semester 2)

	Courses / Enseignements	Hours per semester			Teaching Staff	ECTS Credits	Limited nb of students
		C	E/S	PW			
MODULE 3	<b>Compulsory Courses / Enseignements obligatoires</b>						
	Integrated course Mountain Ecosystems - Ecology & Evolution <i>Cours intégré écosystèmes de montagne - écologie et évolution</i>	14	-	-	Guisan A.	1.5	
	Integrated course Mountain Ecosystems - Geo-Environmental Sciences <i>Cours intégré écosystèmes de montagne - sciences géo-environnementales</i>	14	-	-	Guisan A.	1.5	
	Integrated Practical Work Mountain Ecosystems in the Alps <i>Travaux pratiques intégrés écosystèmes de montagne dans les Alpes</i>	-	-	52	Guisan A.	3	
	Subtotal	28	0	52		6	
	<b>Optional Courses / Enseignements optionnels *</b>						
	Aquatic Ecosystems : Glaciers, Rivers and Lakes (GSE) <i>Ecosystèmes aquatiques : glaciers, rivières et lacs</i>	56	CPW		Perga M.-E., Lane S.	5	
	Field and laboratory methods (I) : The UNIL campus as a microcosm (GSE) <i>Méthodes de terrain et de laboratoire : le campus UNIL comme microcosme</i>	56	PW		Chèvre N., Vennemann T., Berg J.	5	
	Field and laboratory methods (II) : Alpine catchments (GSE- out of semester) <i>Méthodes de terrain et de laboratoire (II) : bassin versant alpin (GSE - hors semestre)</i>	40	PW		Perga M.-E.	5	
	Machine Learning for Environmental Science and Engineering (GSE) <i>Apprentissage automatique pour les sciences et l'ingénierie de l'environnement</i>	56	CPW		Beucler T.	5	
Mountain streams: ecological processes and management (GSE) <i>Rivières de montagne : écosystèmes aquatiques de la haute montagne</i>	24	CPW		Lane S.	3		
Watershed and river network modelling (GSE) <i>Modélisation des bassins versants et des réseaux fluviaux</i>	56	CPW		Peleg N., Ruiz-Villanueva V.	5		
Mountain streams: sediment management (field class) (GSE - autumn) <i>Rivières de montagne : gestion des sédiments (cours de terrain en automne)</i>	40	PW		Lane S.	3		
Applied Ecology <i>Ecologie appliquée</i>	14	-	28	Pellet J.	3		
Biological Invasions <i>Invasions biologiques</i>	14	-	-	Bertelsmeier C.	1.5		
Co-evolution, Mutualism, Parasitism <i>Co-évolution, mutualisme, parasitisme</i>	14	-	-	Sanders I.	1.5		
Current Problems in Conservation Biology <i>Problèmes actuels en biologie de la conservation</i>	14	14	-	Wedekind C.	3	10	
Ecology of the Fishes of Switzerland <i>Ecologie des poissons de Suisse</i>	7	-	10	Rubin J.-F.	1.5		
Honeybee Ecology, Evolution and Conservation <i>Ecologie des abeilles, évolution et conservation</i>	14	-	-	Dietemann V.	1.5		
Phylogeny and Comparative Methods <i>Phylogénie et méthodes comparatives</i>	14	14	-	Salamin N.	3		
Plant Population Genetics and Conservation <i>Génétique des populations végétales et biologie de la conservation</i>	7	-	10	Felber F.	1.5		
Spatial Modelling of Species and Biodiversity <i>Modélisation spatiale des espèces et de la biodiversité</i>	14	14	-	Guisan A.	3		
Comparative Genomics : from Thousands of Genomes to Single Cells <i>Génomique comparative : des milliers de génomes aux cellules individuelles</i>	7	7	-	Arguello R.	1.5		
Introduction to Primate Behaviour, Cognition and Culture <i>Introduction au comportement, à la cognition et à la culture des primates</i>	10	8	-	Van de Waal E.	1.5		
Sex, Ageing and Foraging Theory <i>Théories et modèles de l'évolution de la reproduction sexuée, la sénescence et la consommation de ressources</i>	9	-	9	Mullon C.	1.5		
Scientific Communication - Scientific Hands-on Workshop Module (in French only) <i>Médiation scientifique - module atelier scientifique</i>	14	14	-	Kaufmann A., Reymond P., Ducoulombier D., Trouilloud S., Ythier M.	3	8	
Scientific Mediation and Communication - Museum Module <i>Communication et médiation scientifique - module musée</i>	6	-	22	Sartori M., Glaizot O.	3	6	
The Environment, addressed in an interdisciplinary way (most in French) (GSE) <i>Séminaire interfacultaire en environnement</i>	-	10	-	Guisan A.	2		
The Evolution of Cooperation : from Genes to Learning and Culture <i>L'évolution de la coopération : des gènes à l'apprentissage et la culture</i>	28	-	-	Lehmann L.	3		
Social Genetics <i>Génétique sociale</i>	2	12	-	Keller L., Kay T.	1.5		
<b>Optional Field Courses (Financial participation required by the student)</b> <i>Etudes de terrain optionnelles</i>							
Drivers of Invertebrate Biodiversity along Ecological Gradients <i>Facteurs déterminant la biodiversité des invertébrés le long de gradients écologiques</i>	7	-	49	Schwander T.	3	20	
Evolution and Biogeography of Semi-arid and Island Floras <i>Evolution et biogéographie des flores insulaires en zone semi-aride</i>	-	-	40	Pannell J.	2	14	
<b>Total</b>					<b>30</b>		

Interdisciplinary courses marked in blue

Disciplinary courses marked in orange

\* - Before choosing an optional course, please check the "programme requirement" (prerequisites 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)

MODULE 4	Course / Enseignement	Teaching Staff	ECTS
			Credits
	Master Thesis GEE <i>Travail de Master GEE</i>	Thesis Director <i>Directeur du travail de Master</i>	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)