UNIL | Université de Lausanne
École de biologie

Master of Science in Behaviour, Evolution and Conservation
Specialisation Geosciences, Ecology and Environment
2024-2025

The Master program has a normal duration of 4 semesters and comprises 120 ECTS :

Module 1 : 15 ECTS : Compulsory Courses and one Interdisciplinary Course from the choice list
Module 2 : 15 ECTS : Practical Project
Module 3 : 40 ECTS : Compulsory Courses (7 ECTS) and Optional Courses (33 ECTS)
Module 4 : 50 ECTS : Personal Research Project

For specialisation Geosciences, Ecology and Environment (GEE), the student must :
- Obtain **30 ECTS** in the specialisation :
  - Module 1 : 6 ECTS with Compulsory Course (marked in pink) and one Interdisciplinary Course of the choice list (marked in green)
  - Module 3 : 7 ECTS with Compulsory Courses (marked in pink) and
    17 ECTS with Optional Courses with Disciplinary (marked in pink) and Interdisciplinary (marked in green) Optional Courses
- Carry out the First Step Research Project (Module 2) and the Master Research Project (Module 4) in the field of Geosciences, Ecology and Environment, 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

MODULE 1

Compulsory Courses / *Enseignements obligatoires*	Hours per semester C	E	S	PW	Teaching Staff	ECTS	Limited nb of students
Semester 1 (Autumn) / *Semestre 1 (automne)*							
Concepts in Ecology *Concepts en écologie*	6	-	-	-	**Bertelsmeier C.**	2	
Concepts in Evolution *Concepts en évolution*	6	-	-	-	**Schwander T.**	2	
Data Analysis (MSc MLS) *Analyses de données (MSc MLS)*	8	8	-	-	**Bergmann S.**	3	
Introduction to Scientific Writing *Introduction à la rédaction scientifique*	5	11	-	-	**Roulin A.**	2	
Spatial Analysis and GIS in Ecology *Analyses spatiales et SIG en écologie*	7	10	-	-	**Guisan A.**	2	
Master BEC Retreat *Retraite Master BEC*	-	-	-	-	**Kawecki T.**	-	
Animal Experimentation and Wild Animals * *Expérimentation animale et animaux sauvages*	20	-	-	20	**Rubin J.-F.**	-	
Introduction to R (optional support) *Introduction à R (mise à niveau optionnelle)*					**Schütz F.**	-	
Choose one of these courses :							
Soil and Water Chemistry (GSE, MSc in Environm. Sci.) *Chimie du sol et de l'eau*	40 CPW				**Keiluweit M.**, Vittoz P.	4	
Environmental time-series analysis (GSE, MSc in Environm. Sci.) *Traitement du signal et analyse de séries temporelles*	48 CPW				**Irving J.**	5	
Remote sensing of Earth systems (GSE, MSc in Environm. Sci.) *Télédétection des systèmes terrestres*	48 CPW				**Mariethoz G., Antoniazza G., Lane S.**	5	
Total **						**15**	

MODULE 2

Practical Project / *Travail pratique*							
Semester 1 (Autumn) / *Semestre 1 (automne)*							
First Step Research Project *Travail d'initiation à la recherche*	-	-	-	224	**Kawecki T.**	15	
Total						**15**	

Disciplinary courses marked in pink
Interdisciplinary courses marked in green

* Only students assigned a master project involving animal experimentation may and must take this course
** Only 15 ECTS will be validated, despite the overrun of one credit. That is indepent of the School of Biology

Abbreviations
C = Course
E= Exercise
S = Seminar
PW = Practical Work
CPW = Course/Practical Work, Field

The pandemic has shown us that circumstances beyond our control may require us to make the following adjustments / adaptations to study plans during the semester:

- 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).
- change / modification 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)

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MODULE 3

Courses / *Enseignements*	Hours per semester C	E	S	PW	Teaching Staff	ECTS	Limited nb of students
Compulsory Courses / *Enseignements obligatoires*							
Semester 2 (Spring) / *Semestre 2 (printemps)*							
Integrated course Mountain Ecosystems *Cours intégré écosystèmes de montagne*	28	-	-	-	**Guisan A.**	3	
Integrated Practical Work Mountain Ecosystems in the Alps *Travaux pratiques intégrés écosystèmes de montagne dans les Alpes*	-	-	-	52	**Guisan A.**	4	
Subtotal / *Sous-total*	28	0	0	52		7	
Optional Courses / *Enseignements optionnels* *							
Semester 2 or 4 (Spring) / *Semestre 2 ou 4 (printemps)*							
Aquatic ecosystems : glaciers, rivers and lakes (GSE) (1) *Ecosystèmes aquatiques : glaciers, rivières et lacs*	48 CPW				**Perga M.-E., Lane S., Antoniazza G.**	5	
Field and laboratory methods (I) : The UNIL campus as a microcosm (GSE) *Méthodes de terrain et de laboratoire : le campus UNIL comme microcosme*	60 CPW				**Chèvre N., Vennemann T., Berg J.**	6	
Field and laboratory methods (II) : Alpine catchments (GSE, outside semester) *Méthodes de terrain et de laboratoire (II) : bassin versant alpin (GSE, hors semestre)*	50 CPW				**Perga M.-E., Lane S.**	5	
Mountain streams: ecological processes and management (GSE) (1) *Rivières de montagne : écosystèmes aquatiques de la haute montagne*	24 CPW				**Lane S.**	3	
Watershed and river network modelling (GSE) *Modélisation des bassins versants et des réseaux fluviaux*	48 CPW				**Peleg N.**	5	
Aquatic ecosystems: consultancy proposals, analyses and reports (GSE, outside semester, summer) *Ecosystèmes aquatiques : propositions de consultation, analyses et rapports (GSE, hors semestre, été)*	40 PW				**Lane S.**	4	
Applied Ecology *Ecologie appliquée*	14	-	-	36	**Pellet J.**	4	
Co-evolution, Mutualism, Parasitism *Co-évolution, mutualisme, parasitisme*	14	-	-	-	**Sanders I.**	2	
Current Problems in Conservation Biology *Problèmes actuels en biologie de la conservation*	14	14	-	-	**Wedekind C.**	4	10
Ecology of the Fishes of Switzerland *Ecologie des poissons de Suisse*	7		-	10	**Rubin J.-F.**	2	
Honeybee Ecology, Evolution and Conservation *Ecologie des abeilles, évolution et conservation*	14	-	-	-	**Dietemann V.**	2	
Phylogeny and Comparative Methods *Phylogénie et méthodes comparatives*	14	14	-	-	**Salamin N.**	4	
Spatial Modelling of Species and Biodiversity *Modélisation spatiale des espèces et de la biodiversité*	14	14	-	-	**Guisan A.**	4	
Behaviour, Economics and Evolution Lecture Series (HEC) *Séminaires BEE*	10	-	10	50	**Lehmann L.**, Santos-Pinto L.	6	
Interfaculty Seminar on the Environment (most in French, GSE) *Séminaire interfacultaire en environnement*	-	-	14	-	**Guisan A.**	2	
Scientific Communication - Scientific Hands-on Workshop Module (in French only) *Médiation scientifique - module atelier scientifique*	14	14	-	-	**Genovese J., Ciuffi A.**, Ducoulombier D.,Trouilloud S., Ythier M.	4	8
Seminars of the Department of Ecology and Evolution *Séminaires du Département Ecologie et Evolution*	-	-	10	-	**Kawecki T.**	2	
The Evolution of Cooperation and Decision-Making *L'évolution de la coopération et de la prise de décision*	22	-	-	-	**Lehmann L.**	3	
Introduction to High Performance Computing Cluster ** *Introduction au calcul de haute performance*	8	-	-	-	**E. Jeanvoine**	-	
Semester 3 (Autumn) / *Semestre 3 (automne)*							
Environmental toxicology (GSE, MSc in Environm. Sci.) *Toxicologie environnementale*	30 CPW				**Chèvre N.**	3	
Soil and Water Chemistry (GSE, MSc in Environm. Sci.) (3) *Chimie du sol et de l'eau*	40 CPW				**Keiluweit M.**	4	
Environmental time-series analysis (GSE, MSc in Environm. Sci.) (3) *Traitement du signal et analyse de séries temporelles*	48 CPW				**Irving J.**	5	
Machine Learning for Earth and Environmental Sciences (GSE) *Apprentissage automatique pour les sciences de la terre et de l'environnement (GSE)*	48 CPW				**Beucler T.**	5	
Nature Conservation (in French, GSE, Master in Geography) *Conservation de la nature*	44 CPW				**Chanteloup L., Reynard E., Badman T., Walters G.**	4	
Remote sensing of Earth systems (GSE, MSc in Environm. Sci.) (3) *Télédétection des systèmes terrestres*	48 CPW				**Mariethoz G., Antoniazza G., Lane S.**	5	
Biological Invasions *Invasions biologiques*	14	-	-	-	**Bertelsmeier C.**	2	
Advanced Data Analysis (MSc MLS) *Analyses de données : niveau avancé (MSc MLS)*	8	8	-	-	**Ciriello G.**	3	
Animal Communication and Parasitism *Communication animale et parasitisme*	14	-	-	-	**Christe P.**, Roulin A.	2	
Anthropogenic Effects on Wild Animals : Mechanisms and Fitness Consequences *Effets anthropogènes sur les animaux sauvages : Mécanismes et conséquences sur la fitness*	14	-	-	-	**Bize P.**	2	
Molecular Methods in Ecology and Evolution *Méthodes moléculaires en écologie et évolution*	18	-	-	42	**Sanders I.**, Fumagalli L., Salamin N.	6	
Phylogeography *Phylogéographie*	7	10	-	-	**Fumagalli L.**	2	
Population Genetics and Dynamics *Génétique et dynamique des populations*	9	20	-	-	**Goudet J.**	4	

Interdisciplinary courses marked in green
Disciplinary courses marked in pink

* - Before choosing a interdisciplinary optional course (marked in green), please check the "programme requirement" (prerequisites for the course) in the course description
- Students can choose optional courses not included in this study plan for a max. of 4 ECTS. They can also obtain a maximum of 6 ECTS for a professional internship outside of Unil. Both are subject to prior approval of the head of the Master and will require a sufficient proof of completion

(1) For the courses "Aquatic Ecosystems : Glaciers, Rivers and Lakes (GSE)" and "Mountain streams: ecological processes and management (GSE)", you can choose only one of the two

(2) Students assigned a master project involving High Performance Computing Cluster must take this course

(3) Only if the course was not already taken as part of Module 1 in Semester 1

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Optional Courses / *Enseignements optionnels* *							
Optional Field Courses / *Etudes de terrain optionnelles* *(Financial contribution by the student required)*							
Drivers of Invertebrate Biodiversity along Altitudinal Gradients (Field course in the Alps) *Facteurs déterminant la biodiversité des invertébrés le long de gradients altitudinaux (stage de terrain dans les Alpes)*	6	-	-	42	**Schwander T.**	4	20
Ecology and Evolution of the Mediterranean Flora *Ecologie et évolution de la flore méditerranéenne*	-	-	-	48	**Pannell J.**	4	14
Total						**40**	

Disciplinary courses marked in pink

* Students can choose optional courses not included in this study plan for a max. of 4 ECTS. They can also obtain a maximum of 6 ECTS for a professional internship outside of Unil. Both are subject to prior approval of the head of the Master and will require a sufficient proof of completion

MODULE 4

Personal Research Project / *Projet de recherche personnel*	Hours per semester C	E	S	PW		ECTS
Semesters 2 to 4 (Spring / Autumn) / *Semestres 2 à 4 (Printemps / Automne)*						
Write a Review *Rédaction d'une revue*	4	2	-	-	Kawecki T., Director of the Master Research Project	5
Master Research Project GEE *Travail de Master GEE*					Director of the Master Research Project	45