

MSc in Biology

Faculty of Science, University of Neuchâtel

An integral and transversal curriculum

The Master of Science in Biology offers a programme that lets students select their area of specialization and acquire a diverse range of transferable skills. This MSc proposes an integrative approach: it begins with a common core of courses covering key topics in biology, with particular emphasis on methodological and quantitative aspects. Students then choose two of the five available specialisations: chemical ecology, biodiversity, animal behaviour, conservation biology, and microbial interactions in sustainable agriculture.

Prof. in charge of the curriculum

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Version

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General structure of the programme :

The Master in Biology is a programme given over the span of 2 years and requires 120 ECTS credits to complete. The first semester is dedicated to the core curriculum, whereas the second semester is dedicated to the acquisition of specialisations. Of the five specialisations available in 3 groups, each student must choose two from two different groups. The second year is entirely dedicated to field work and the completion of a Master thesis.

Core curriculum		Specialisations and Master thesis	
Compulsory courses	Elective courses	Group I	Group II
Generic skills	Basics of conservation biology	Microbial interactions in sustainable agriculture	Biodiversity
Computer tools	Special skills	Animal behaviour	
Seminars	Excursions	Group III	Master thesis (2 nd year)
Laboratory and field methods	Internship	Conservation biology	
	Free electives	Chemical ecology	
21 ECTS	15 ECTS	24 ECTS specialization + 60 ECTS Master thesis	

Core curriculum (compulsory courses)

Modules/courses	Duration	Semester	ECTS	Principal Lecturer	Evaluation
Generic skills module			9		
Statistics	30	A	3	Dr R. Slobodeanu	CA (graded)
Scientific writing	30	A	3	Prof. K. Zuberbühler	CA (graded)
Seminars by externals	28	A and S	3	Prof. J. Grant	CA (pass)
Computer tools (choose one)			3		
Bioinformatic tools	30	A	3	Prof. D. Croll	CA (graded)
Models and parameter estimation	30	A	3	Prof. J. Koella	CA (graded)
Seminars module (choose two)			6		
Ecology and sustainability	30	A	3	Prof. J. Vermeer	CA (graded)
Ecology and evolution	30	A	3	Prof. K. Zuberbühler	CA (graded)
Ecology and biodiversity	30	A	3	Prof. D. Croll	CA (graded)
Laboratory methods (choose one)			3		
Molecular methods	7 hd	A	3	Dr S. Venkatasalam	CA (graded)
Natural substances analyses	7 hd	A	3	Prof. S. Von Reuss and G. Roeder	CA (graded)
Total ECTS Core compulsory courses			21		

Core curriculum (elective courses)

Modules/courses	Duration	Semester	ECTS	Principal Lecturer	Evaluation
Basics of Conservation biology			3-12		
Methods in biodiversity monitoring	28	A	3	Prof. C. Praz	Written, 1 hour
Animal conservation	30	A	3	Prof. C. Praz (info fauna)	CA (graded)
Biodiversity and agriculture: a transdisciplinary perspective	28	S	3	Prof. A. Aebi	CA (graded)
Genomics of biodiversity	28	S	3	Prof. K. Lucek	CA (graded)
Special skills			3-12		
Introduction to geomatics for biodiversity conservation	28	A	3	Dr S. Boillat	CA (graded)
Microscopy	7 hd	A	3	Dr S. Zabihzadeh (CSEM)	CA (graded)
Advanced geomatics for biodiversity conservation	28	S	3	Dr S. Boillat	CA (graded)
Non-validated compulsory course of the core curriculum			max. 3		CA (graded)
Excursion (choose one max.)			max. 3		
EXC Tropical forest ethology	7 d	S	3	Prof. K. Zuberbühler	CA (pass)
EXC Marine biology	7 d	S	3	Prof. R. Bshary	CA (pass)
EXC Mediterranean ecology	7 d	S	3	Prof. E. Mitchell	CA (pass)
EXC Alpine ecology	7 d	S	3	Prof. S. Rasmann Prof. J. Grant	CA (pass)
Internship (see remarks)			6		
Approved by course controller	160	A or S	6	Prof. S. Rasmann	CA (pass)
Free electives (see remarks)			max. 12		
Approved by course controller		A or S	max. 12		
Total ECTS Core elective courses			15		

Specialisations (see remarks)

Modules/courses	Duration	Semester	ECTS	Principal Lecturer	Evaluation
Group I					
Microbial interactions in sustainable agriculture module			12		
Microbiome applications	28	S	3	Prof. D. Croll	CA (graded)
Environmental mycology	28	S	3	Prof. S. Bindschedler	CA (graded)
Microbial ecology	28	S	3	Prof. P. Junier	CA (graded)
Plant pathology	28	S	3	Dr T. Badet	CA (graded)
Animal behaviour module			12		
An integrative approach to animal behaviour	28	S	3	Prof. R. Bshary	CA (graded)
Animal behaviour research	28	S	3	Prof. K. Zuberbühler	CA (graded)
Behavioural ecology	28	S	3	Dr D. Roche	CA (graded)
Comparative cognition	28	S	3	Prof. K. Zuberbühler	CA (graded)
Group II					
Biodiversity module			12		
Soil biodiversity	28	S	3	Prof. E. Mitchell	CA (graded)
Plant systematics and evolution	28	S	3	Prof. J. Grant	CA (graded)
Natural ecosystems of Switzerland	28	S	3	Dr S. Ursenbacher (info fauna)	CA (graded)
Biodiversity data analysis	28	S	3	Dr E. Defossez	CA (graded)

Specializations and Master thesis (see remarks)

Modules/courses	Duration	Semester	ECTS	Principal Lecturer	Evaluation
Group III					
Conservation biology module			12		
Evidence-based conservation of species and habitats	28	S	3	Prof. C. Praz	CA (graded)
Evidence-based conservation of ecosystems	28	S	3	Prof. C. Zemp	CA (graded)
Plant and ecosystem conservation	28	S	3	Prof. S. Rasmann	CA (graded)
Animal population monitoring practicals	3 d	S	3	Dr B. Schmidt (info fauna)	CA (graded)
Chemical ecology module			12		
Chemical ecology	28	S	3	Dr E. Defossez	Written, 1 hour
Biosynthesis and function of secondary compounds	28	S	3	Prof. J. Vermeer and F. Kessler	CA (graded)
Plant molecular genetics (+labs)	28	S	3	Prof. J. Vermeer	CA (graded)
Natural products chemistry (+labs)	28	S	3	Prof. S. Von Reuss	CA (graded)
Total ECTS Specializations			24		
Master thesis			60		
Master thesis		A and S	60		CA (graded)
Total ECTS MSc in Biology			120		

Complementary information

Evaluations and regulations

- Course and exam registration in IS-Academia is compulsory for course validation.
- For details regarding Faculty regulations, please consult the *Règlement d'études et d'examens de la Faculté des sciences* and existing directives on the Faculty's webpage (www.unine.ch/sciences).
- Continuous assessment evaluations (pass or graded) are specified in the corresponding course description.
- Elective courses must be validated with a sufficient mark (4.0) and cannot be compensated.
- When an evaluation of a course chosen from the modules **Computer tools**, **Seminars** and **Laboratory and field methods** is failed and not compensated after a second attempt, students have the option to choose another course of the same module until all choices are exhausted.

Abbreviations and grades

labs	= laboratory work
EXE	= exercises
EXC	= excursions
CA	= continuous assessment
hd	= half-days
d	= days
N.N.	= teacher to be designated
A	= autumn semester
S	= spring semester

Remarks

- **Specializations** : Students must choose two specializations from two different groups.
- **Master thesis** : Must be supervised by a professor of the Institute of Biology.
- **Internship** : Students can validate an approx. 4 week internship for 6 ECTS credits during their Master program. For all related details, please contact Prof. S. Rasmann.
- **Free electives** : Up to 12 ECTS credits can be validated as free electives. Courses must be pre-approved by the prof. in charge of the curriculum. In addition, they must be Master level courses and in relation to the field of Biology.
- **Excursions** : Available space may be limited (not possible for external students).

Transitional provisions :

- **Sustainable agriculture specialisation**: Students that registered all the courses of the specialisation during the 2023-2024 academic year or previously, but did not acquire the corresponding ECTS credits, must validate the module in accordance with the 2023-2024 study plan.
Student that did not register all the courses of the specialisation by the end of the 2024 spring semester will be contacted individually in order to establish personal transitional provisions.
- **Chemical ecology specialisation**: Students that registered all the courses of the specialisation during the 2023-2024 academic year or previously, but did not acquire all the corresponding ECTS credits, must validate the module in accordance with the 2023-2024 study plan.
Student that did not register all the courses of the specialisation by the end of the 2024 spring semester will be contacted individually in order to establish personal transitional provisions.
- **Biodiversity specialisation**: Student following this specialisation in 2023-2024 but who didn't register the "Genomics of biodiversity" course in 2023-2024, must validate the specialisation according to the 2023-2024 study plan.
- **Ecology and Evolution specialisation**: Students that registered all the courses of the specialisation during the 2023-2024 academic year or previously, but did not acquire all the corresponding ECTS credits, must validate the module in accordance with the 2023-2024 study plan.
Students that did not register all the courses of the specialisation by the end of the 2024 spring semester will be contacted individually in order to establish personal transitional provisions.

Learning outcomes

On completion of the program, students will be able to:

Knowledge and understanding:

- Specify suitable analytical tools for data problems in the domain.
- Summarise current research in biology.
- Identify main methods in biodiversity.
- Examine major tools in biology in the laboratory.

Applying knowledge and understanding:

- Develop large datasets acquired experimentally or in the field.
- Organise large datasets using suitable computer programs.
- Design models for biological problems.
- Critically analyse scientific publications in the domain to judge their scientific quality.
- Reproduce methods in molecular biology.
- Test natural substance analysis techniques.
- Solve problems of space representation.
- Experiment with real biological problems.
- Use real biological methods.

Making judgements:

- Criticise current research in biology based on acquired knowledge about methods and through literature research.

Communication skills:

- Communicate specific scientific results to scientific and non-scientific audiences in oral and written form (oral presentation, poster presentation, written report and scientific publication).

Learning skills:

- Manage a scientific project including data collection, organisation and analysis of data and presentation of results in oral and written form.