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UNIVERSITÄT
BERN

Master of Science in ECOLOGY AND EVOLUTION (90 ECTS)

- Institute of Ecology and Evolution (IEE)
- Institute of Plant Sciences (IPS)



Ecology and Evolution



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Studying in Bern

The University of Bern has a reputation for its prime quality of teaching and research while simultaneously offering a delightful setting and a campus environment intimately linked to the social, economic and political life of the city. With over 17,000 students, it maintains a warm and friendly atmosphere. Its academic and research organisation takes pride in its interdisciplinarity and offers students all the advantages of a full university with excellent possibilities to establish their own networks.

Our university is actively involved in a wide range of European and worldwide research projects. With its central geographic location and attractive programs, it draws students from all Swiss language communities and from abroad.

Bern is listed among the cities with the best quality of life in the world. The people are welcoming and friendly, the old town - nestled in a breath-taking setting surrounded by the Swiss Alps - is listed as a UNESCO world heritage site. The Swiss capital also has an outstanding range of cultural activities. Rents remain very affordable and there is a vast choice of accommodation. Bern boasts plenty of green areas in which to relax, numerous sports facilities and a broad selection of international culinary venues. And last, but not least, there is nothing more refreshing than a summer dip in the Aare river...



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Ecology and Evolution

Organisms respond to their biotic and abiotic environment through a variety of mechanisms, including behavioural and physiological adjustments at the level of the individual, evolutionary change at population level, and changes in species composition and abundance at community level. Discovering, explaining, predicting and preserving this evolutionary potential, especially in the face of the huge constraints currently imposed by humans upon the biosphere, is the focus of our Master's program in Ecology and Evolution. Master students are central to our research and take part in its development and implementation.

The Master's program addresses students interested in a broad and attractive postgraduate curriculum in ecology and evolution of animals and plants. The program provides lectures and courses, all taught in English, on a wide range of topics and a great variety of research activities within the Biology Department. An entire year is devoted to the student's individual research project within one of our thirteen research groups.

This program is jointly organised by the Institute of Ecology and Evolution, the Institute of Plant Sciences, the Museum of Natural History and the Vetsuisse Faculty. The expertise and research of the supervisors covers a comprehensive range of topics: animal welfare, aquatic ecology and macroevolution, bee health, biotic interactions, conservation biology and restoration ecology, evolutionary ecology, behavioural ecology, computational and molecular population genetics, community ecology, fish and wildlife health, systematics, plant ecology and paleoecology.

Target audience

This Master's program is designed for students holding a Bachelor degree in biology or a related subject. Depending on their previous qualification, students with a non-biology Bachelor may be asked to complement their Master's studies with additional courses from our Bachelor program.

Curriculum

Studies in the Master's program amount to 90 credits (ECTS), one credit corresponding to 25-30 hours of student input. Full time students can complete the program in three semesters. It consists of:

- 30 credits of formal courses, including 9 ECTS of seminars and 21 other ECTS selected from the Master's program, from the University of Bern or other universities. Up to 10 ECTS may be imported from studies abroad.
- 60 credits in the form of an individual research thesis conducted in the affiliated research groups (Master's thesis).

The Master's program offers specialisations in the the fields of animal ecology and conservation, behaviour, evolution and plant ecology.

Admission

Students holding a Bachelor degree in biology with specialisation in ecology and evolution or plant sciences (plant ecology) from the University of Bern can register directly for the Master's program in Ecology and Evolution within their regular semester re-admission. All other students with a Bachelor degree in biology or related subjects must submit an application including full documentation of their previous studies to the Admissions Office of the University (www.zib.unibe.ch).

Once admitted, and prior to starting the Master's studies, each student is expected to consult with the respective Master's thesis supervisor to compose an individual study program including required and optional courses.

Students can start the program at the beginning of the autumn semester (normal procedure) or at the beginning of the spring semester.

Participating Research Groups

Aquatic Ecology and Macroevolution - Group Seehausen (IEE)

We study ecology, evolution and biodiversity of aquatic organisms, mostly fish. We wish to explain variation in diversity through improving understanding of mechanisms and rates of diversification - including population divergence, polymorphisms and speciation - and of extinction. Ultimately, we aim to understand how biodiversity dynamics are affected by the environment.

Behavioural Ecology - Group Taborsky (IEE)

The research aim in this division is to understand how genetic, developmental and environmental factors shape animal behaviour, particularly in a social context. Field and lab observations and experiments are combined with modelling to derive general principles responsible for the evolution of behaviour, with a focus on cooperation and alternative behavioural tactics.

Community Ecology - Group Nentwig (IEE)

We analyse interactions between species in ecological networks (predator – prey, plant – herbivore and plant – pollinator) in natural, agricultural and urban landscapes. This relates to changes of biodiversity through land use change, functional aspects of ecological compensation areas and set asides, insect migration, and the ecological impact of alien species.

Computational and Molecular Population Genetics - Group Excoffier (IEE)

We use genomic data to reconstruct the demographic history of populations and species, to understand host-parasite co-evolution, and to discover genes or biological processes that have responded to natural selection. We are also interested in describing how spatial range expansions have affected the functional genomic diversity of various species, with a special focus on humans.

Conservation Biology - Group Arlettaz (IEE)

We work on societally-relevant biodiversity conservation and restoration issues, adopting a problem-solving approach. Our main research focus is on population biology of rare and endangered animal species (from insects to top predators) of temperate, Mediterranean and Alpine biomes, and on community ecology (plants and animals) of farmland and Alpine ecosystems.



Genetic Basis of Evolutionary Processes - Group Peichel (IEE)

This group uses the threespine stickleback fish as a model system to identify the genetic and genomic mechanisms that underlie phenotypic variation and the evolutionary processes leading to adaptation and speciation. Our studies utilize a combination of molecular, genomic, developmental and cytogenetic methods, morphological and behavioral analyses, and fieldwork.

Terrestrial and Aquatic Paleoecology - Group Tinner (IPS)

Biotic evidence (e.g. pollen, leaves, invertebrate remains, charcoal) preserved in natural archives such as sediments or ice cores is used to reconstruct ecosystem dynamics and species responses to environmental change. A key aim is to use these results to validate conceptual and dynamic models that predict future biotic response to climate and global change impacts.

Plant Ecology - Group Fischer (IPS)

This team addresses questions in ecology, evolution and conservation. Current foci are rare and invasive plants (why are some species successful, while others are not? which environmental and genetic factors drive the success of populations?), alpine plants, and communities in grasslands and forests (what are the causes and consequences of changes in plant diversity?).

Biodiversity and Ecosystem Services - Group Allan (IPS)

We are interested in what maintains biodiversity: especially coexistence and effects of environmental change on plant communities. We also look at how biodiversity change affects ecosystem functioning and services in natural and experimental systems. We use field and greenhouse experiments and analysis of large datasets and work in grasslands, forests and drylands.

Biotic Interactions - Group Erb (IPS)

How plants interact with their environment determines their survival in nature and yield in agriculture. We elucidate the strategies that plants use to resist pest insects. By combining different techniques and plant models in an interdisciplinary approach, we aim at generating a flow of knowledge from single genes to ecological interactions across a gradient from wild systems to agriculture.

Bee health - Group Neumann (Vetsuisse)

We are conducting research in behavioral, evolutionary and molecular ecology of social and solitary bees with a focus on honey bee pathology and toxicology. We accept students interested in pursuing their MSc with us; students leave the program with advanced skills in experimental design and scientific writing, field and lab techniques, as well as basic beekeeping.

Animal Welfare - Group Würbel (Vetsuisse)

We study environmental effects on the behaviour and welfare of laboratory, farm and companion animals. Our aim is to establish an objective scientific basis for the assessment of animal welfare, for the development of welfare-friendly housing systems, for the diagnosis, prevention and therapy of behavioural problems, and for the refinement of animal experiments.

Fish and Wildlife Health - Group Segner (Vetsuisse)

This group performs research in the fields of disease ecology and ecotoxicology. Focus is given on the adaptive responses of organisms to environmental stressors, in particular pathogens and toxicants. The aim is to understand the molecular and physiological mechanisms of the stressor responses in the ecological and evolutionary context of fish and wildlife species.