

Specializations in the Master's Degree Programme in Biology

The Master's degree program in biology gives you the opportunity to specialize in one of three major biological disciplines:

- Ecophysiology
- Biodiversity and Evolution
- Ecology

A specialization has a scope of 30 ECTS and is composed of courses that are central to the chosen subject area (constituent courses). The remaining 30 ECTS of the Master's program can be selected from the total course offering of the Master's program in Biology, including courses included in other specializations. You also have the opportunity to follow courses offered from other disciplines if the academic context of the program is ensured.

About choosing courses for the Master's program: advice and rules

To ensure that you meet the academic prerequisite requirements for participation in the more advanced Master's courses, it is recommended that you already consider your academic interests / wishes for the Master's program when choosing bachelor's courses.

Remember that you must have approved a master's contract with your program of study by your educational manager (or educational advisor) in biology before you enroll in the courses.

If you are traveling abroad, you must take the ECTS you need to obtain a 30 ECTS specialization at a foreign university. The courses must be chosen within the chosen field of specialization.

The requirement for a 30 ECTS specialization lapses if you:

- are in the process of a secondary education
- complete a 30 ECTS option in another study program
- conduct a semester of Arctic courses in Nuuk (read more here: <https://arctic.au.dk/students-courses-and-projects/>)

Below is a list of constituent courses from which to choose 30 ECTS as well as optional recommended courses that support each of the three specializations. Prerequisite requirements are also stated.

If you are interested in information about special opportunities at the research units in the department, you can visit their websites at <https://bio.au.dk/>

Please also note the following Biology courses, which are not included in any of the three specializations:

- Biological project work (5, 10 or 15 ECTS)
- Commercial Project (15 or 20 ECTS)
- Tropical Ecosystem Management and Human Security
- Environmental Governance: Policy Processes and the Economic Dimension
- Bio-entrepreneurship

The connection between specialization and career opportunities

The three specializations of the Master's program prepare you to face the challenges that a rapidly developing labor market poses to you as a biologist. They each provide you with a solid professional foundation to analyze and act in a changing world. Through learning experimental methods and analyzing and interpreting data, they provide you with the practical and theoretical tools needed to gain new biological knowledge, disseminate it to others and apply it in practice. Whether you want to work with management, dissemination, research, innovation - or something completely different - as a trained biologist, choosing a particular specialization is not crucial to your future work. The key to your choice should always be your interests and what you are passionate about.

(MOL) = courses at Department of Molecular Biology and Genetics

(BiRC) = courses at Bioinformatics Research Centre

Ecophysiology

In this specialization, physiological processes, metabolic functions and underlying functional mechanisms of all living organisms are in focus. Central is the question of how the physiology of organisms at the organism, organ, cell and molecular level is influenced by their surrounding environment. The subjects that support this specialization thus help to give you a thorough understanding of the mechanisms underlying the functioning of organisms in the environment in which they live, along with an understanding of their evolutionary adaptation and their response to stress and changing environments. The specialization includes opportunities to qualify for a career in medical research.

Keywords: energy flow and preservation, metabolism, respiration, cold and heat tolerance, phenotypic plasticity, evolutionary adaptations, stress

Prerequisites - At least two of the following bachelor courses:

- Bioinformatics and Programming (Autumn 10 ECTS)
- Ecotoxicology (Autumn 10 ECTS)
- Microbiology: Microbial Physiology and Identification (Autumn 10 ECTS)
- Conservation Genetics and Molecular Ecology (Autumn 10 ECTS)
- Animal Ecophysiology (Spring 10 ECTS)
- Plant Ecophysiology (Spring 10 ECTS)

Constituent courses from which 30 ECTS must be selected:

- Conservation Physiology (Autumn 10 ECTS)
- Experimental Evolutionary Biology (Autumn 10 ECTS)
- Global Change Biology (10 ECTS)
- Host-Microbes Interactions (Autumn 10 ECTS) (MOL)
- Experimental Physiology (Spring 10 ECTS)
- Metabolism - Concepts and Design (Spring 10 ECTS) (MOL)
- Microbial Element Cycling and Population Ecology (Autumn 10 ECTS)
- Molecular Microbiology (Spring 10 ECTS)
- Plant Biology and Technology (Spring 10 ECTS) (MOL)

Recommended courses:

- Advanced Topics in Genomics (Autumn 10 ECTS) (BiRC)
- Bioinformatics Analysis of Genomics Data (Autumn 5 ECTS) (MOL)
- Evolutionary Thinking (Autumn 10 ECTS) (BiRC)
- Cell biology in Health, Ageing and Disease (Spring 10 ECTS) (MOL)
- Experimental Aquatic Ecology (Spring 10 ECTS)
- Population Genomics (Spring 10 ECTS) (BiRC)

Biodiversity and Evolution

With a focus on populations, species and ecosystems, this specialization deals with gene-to-ecosystem-level processes that determine the distribution of biodiversity. An understanding of diversity is gained here by interconnecting our knowledge of interactions between species and their surrounding environment, evolutionary processes and adaptations. The latest technologies and methods such as GIS (geographic information systems) and eDNA (environmental DNA) are used to understand and manage biological diversity on a local as well as global scale.

Keywords: Population genetics and genomics, evolutionary ecology, phylogenetics, biogeography, ecosystem dynamics, adaptation, macroecology, species formation, management, nature conservation, behavioral biology, global change

Prerequisites - At least two of the following bachelor courses:

- Bioinformatics and Programming (Autumn 10 ECTS)
- Conservation Genetics and Molecular Ecology (Autumn 10 ECTS)
- Geographic Information Systems (GIS) (Autumn-Q2 5 ECTS)
- Behavioral Biology (Spring 10 ECTS)
- Danish Flora and Vegetation (Spring 10 ECTS)
- Arthropods' Ecology and Diversity (Summer 5 ECTS)

Constituent courses from which 30 ECTS must be selected:

- Biogeography and Macroecology (Autumn 10 ECTS)
- Evolutionary Thinking (Autumn 10 ECTS) (BiRC)
- Experimental Evolutionary Biology (Autumn 10 ECTS)
- Microbial Element Cycling and Population Ecology (Autumn 10 ECTS)
- Statistical and Geospatial Modelling (Autumn 10 ECTS)
- Global Change Biology (Spring 10 ECTS)
- Molecular Microbiology (Spring 10 ECTS)
- Wildlife Ecology and Management (Spring 10 ECTS)

Recommended courses:

- Advanced Topics in Genomics (Autumn 10 ECTS) (BiRC)
- Population Genomics (Spring 10 ECTS) (BiRC)
- Advanced Behavioural Ecology Field Course (Summer 5 ECTS)
- Flora and Fauna Identification in Freshwater (Summer 5 ECTS)

Ecology

This specialization includes subjects that deal with the composition and function of terrestrial, fresh and marine ecosystems and their management. A basic theme is the biological and physico-chemical conditions of ecosystems and their importance for the activity, distribution and interaction of organisms. Emphasis is placed on important ecosystem processes such as primary and secondary production and energy and nutrient turnover, and the factors that influence these processes in nature. Furthermore, the focus is on the management and restoration of ecosystems.

Keywords: Energy and metabolism, ecosystem structure, biotic and abiotic interactions, functional ecology, management, ecological modelling, global change, organism awareness

Prerequisites - At least two of the following bachelor courses:

- Aquatic Biology (Autumn 10 ECTS)
- Bioinformatics and Programming (Autumn 10 ECTS)
- Geographic Information Systems (Autumn Q2 5 ECTS)
- Management of Danish Nature and Environment (Autumn Q1 5 ECTS)
- Danish flora and vegetation (Spring 10 ECTS)
- Microbial Ecology (Spring 10 ECTS)

Constituent courses from which 30 ECTS must be selected:

- Biogeography and Macroecology (Autumn 10 ECTS)
- Environmental Management of Aquatic Ecosystems (Autumn 10 ECTS)
- Freshwater Ecosystems (Autumn 10 ECTS)
- Microbial Element Cycling and Population Ecology (Autumn 10 ECTS)
- Statistical and geospatial modeling (Autumn 10 ECTS)
- Experimental coastal ecology (Spring 5 ECTS)
- Global Change Biology (Spring 10 ECTS)
- Marine Ecosystems (Spring 10 ECTS)

Recommended courses:

- Conservation Physiology (Autumn 10 ECTS)
- Environmental Modelling and Management (Autumn 10 ECTS)
- Wildlife Ecology and Management (Spring 10 ECTS)
- Advanced Water Cycle Management (Summer 5 ECTS)
- Flora and Fauna Identification in Freshwater (Summer 5 ECTS)