UiT The Arctic University of Norway

Program description

Biology – Master´s Program

120 ECTS/Campus Tromsø

The program description has been approved by the board of Faculty of Biosciences, Fisheries and Economics 17.06.2025

Study program name	English: Biology – Master´s Program Bokmål: Biologi - master Nynorsk: Biologi - master
Degree obtained	Master of Science in Biology
Target group	The Biology – Master's program is aimed at students holding a bachelor's degree in biology or similar, who are interested in pursuing a career in a wide range of jobs in both public and private sectors. The program will qualify for positions within research, management, administration, consulting and teaching.
Admission requirements, required prerequisite knowledge, recommended prerequisite knowledge	Admission to the Biology - Master's program requires a bachelor's degree (180 ECTS) or equivalent qualification, including a specialization in biological topics [i.e., biodiversity (zoology/botany), ecology, cell- and molecular biology, microbiology, physiology (animal/plant), biochemistry, bioinformatics] corresponding to a minimum of 80 ECTS. Applicants must have a minimum grade average comparable to a Norwegian C (3,0) in the ECTS scale. The average grade is calculated from the entire bachelor's degree. Applicants with education from non-Nordic countries must document English language proficiency. More information of English language requirements here. Applicants with a degree in Agricultural, Fisheries and Aquaculture studies, Biomedical laboratory sciences ("Bioingeniør"), or Bachelor of Pharmacy, Medicine or Dentistry do not fulfil the admission requirements. **One of the specializations in the Biology - Master's program have additional qualification requirements** • **Molecular Environmental Biology:** Applicants must have completed courses in basic and practical molecular biology corresponding to a minimum of 10 ECTS (BIO-2018 or equivalent) or can document hands-on molecular lab experience through a bachelor thesis. Please contact the student adviser for more information about this. **Applicants from Norway or Nordic countries** Online application is via Søknadsweb, application codes: 6027 Arctic animal biology 6021 Freshwater ecology 6022 Arctic marine ecology 6023 Molecular environmental biology 6024 Northern populations and ecosystem 6025 Arctic marine ecotoxicology 6026 Ecology and sustainability **EU/EEA + Swiss applicants** Online application, application codes: 7117 Arctic animal biology 7111 Freshwater ecology 7112 Arctic marine ecology

	7113 Molecular environmental biology 7114 Northern populations and ecosystem 7115 Arctic marine ecotoxicology 7116 Ecology and sustainability **Non-EU applicants** Online application, application codes: 2087 Arctic animal biology 2077 Freshwater ecology 2078 Arctic marine ecology 2079 Molecular environmental biology 2080 Northern populations and ecosystem 2081 Arctic marine ecotoxicology 2082 Ecology and sustainability **How to apply for admission to UiT?** Read more here

The study program's Learning Outcome	**A candidate who has completed the Biology - Master´s program is expected to gain the following learning outcomes:** **Knowledge** The candidate • has advanced knowledge of biological processes and ecosystems in Arctic and sub-Arctic environments, with a specialized insight according to the individual study specialization. • can find and critically analyze scientific literature and have knowledge about current research trends in Arctic biology. • can formulate structured scholarly arguments based on academic problems, and apply this knowledge to new areas within the academic field. **Skills** The candidate • can plan and carry out an independent, limited research project in Arctic Biology, including formulating hypotheses, collecting data, and analyze their results under supervision and in accordance with applicable norms for research ethics. • can apply relevant research methodologies, tools, and technologies used in Arctic biological studies, including fieldwork techniques and laboratory analyses in an independent manner. • can evaluate own academic work and give constructive peer feedback to others' academic work. • can acquire theoretical, technical and methodological competence in his/her field of specialization. • can use AI-tools ethically and according to good scientific conduct. **General competence** The candidate • can work professionally and ethically in collaboration with others

towards a common goal.

- can apply gained knowledge and skills in new areas to carry out advanced assignments and projects.
- can communicate academic issues, analysis and conclusions effectively, both orally and in writing, to the scientific community, policy makers and general public.
- can contribute to new thinking and innovation processes within the framework of sustainable regulations and solutions.
- can conduct independent work in the field or in a laboratory in accordance with general and work-type specific safety regulations.
- can adopt the foundations of the scientific process and critical reflection of research ethics in his/her work, including ethics in animal research, integrity, and transparency.

In addition to the general learning outcomes outlined above, individual study specializations should give the following additional learning outcomes:

Arctic animal biology

Knowledge

The candidate

- has advanced knowledge of integrative biology and its importance for understanding ecological adaptation, with an emphasis on arctic contexts.
- has insight in many aspects of animal physiology and behavior including, bioenergetics, thermoregulation, photobiology, chronobiology, endocrinology, reproductive physiology, thermoregulation, nutrition/digestion and cardiovascular physiology).

Skills

The candidate

- can utilize an integrative approach to develop insights into animal biology linking eco-evolutionary demands and constraints with physiological adaptation and whole-organism, organ, cellular and molecular levels, and has intellectual appreciation and practical know-how at all these levels.
- can critically evaluate information from a variety of sources and to transpose acquired knowledge and competency to issues relevant for society e.g., environmental change and management of natural resources, food production (aquaculture), human and animal health.

Freshwater ecology

Knowledge

The candidate

- has advanced knowledge in ecological and evolutionary theory, management-related knowledge and key methodologies for research in freshwater habitats and fish ecology.
- has an overview of physical and chemical factors and processes in freshwater environments as an important foundation for understanding the significant seasonal changes in ecological patterns.

	Skills The candidate • can critically evaluate information from a variety of sources and to transpose acquired knowledge and competency to issues relevant for society, like e.g., freshwater and fish resource management and conservation. **Arctic marine ecology** **Knowledge** The candidate • has advanced knowledge within aspects of Arctic marine system ecology (e.g. polar night ecology, biophysical interactions, sea ice ecology and biogeochemistry, coastal ecology). • has a thorough understanding of how organisms respond to various biotic and abiotic factors, about primary and secondary production in marine, high-latitude ecosystems, how trophic interactions regulate the community and determine the functioning of marine food webs, and biogeochemical cycles such as the carbon cycle in Arctic marine system. **Skills** The candidate • has knowledge about study designs relevant in marine environments, e.g., the design of scientific experiments, prepare and conduct ship-based expeditions and the use of marine ecosystem models, and can critically reflect on the approaches benefits and limitations. • can critically evaluate information from a variety of sources and to transpose acquired knowledge and competency to issues relevant for society e.g., management of marine resources and pollution in marine systems. **Molecular environmental biology** **Knowledge** The candidate • has advanced knowledge in one of the following topics: A) Intra- and interspecies communications and molecular interactions, B) functioning dynamics and biotechnological application of microbial communities in a changing world, C) secondary metabolites in microbes and plants, their biological functions and applied aspects, and D) bioinformatics and scientific programming. **Skills** The candidate • has knowledge within molecular methods. **Northern populations and ecosystem** **Knowledge** The candidate • has advanced knowledge in Arctic terrestrial ecosystem ecology, environmental monitoring and management (e.g., plant ecology,

	animal ecology, ecosystem ecology, environmental monitoring designs and analysis, ecosystem-based management). **Skills** The candidate • can use relevant analytical methods including both theoretical and statistical approaches to issues relevant for understanding and managing Arctic terrestrial ecosystems. **Arctic marine ecotoxicology** **Knowledge** The candidate • has advanced knowledge of how arctic marine organisms, populations and communities are impacted by anthropogenic stressors. • has thorough knowledge of all classes of contaminants (persistent organic pollutants, microplastics, heavy metals, hydrocarbons, etc.) including their sources, physio-chemical properties, fate and biological effects on living organisms from molecular mechanisms of toxicity to adverse outcomes at higher levels of biological organization. **Skills** The candidate • can use a range of ecotoxicological approaches and methods for instance in toxicity testing (e.g. *in vivo*, *in vitro*, *in vivo*, *in sillico*). **Ecology and sustainability** **Knowledge** The candidate • has in-depth knowledge about specific tools used in sustainability science, such as sustainability analytics using big data analysis, carbon – or ecological footprint analysis, environmental impact analysis, spatial ecology & GIS analysis, socio-ecological systems analysis, ecosystem services assessment, climate risk assessment, or different methodologies and approaches for engaging citizens and stakeholders in sustainability science and ecosystem-based management (pending on MSc topic). **Skills** The candidate • can understand and analyze causes and possible solutions to sustainability challenges. • can critically reflect upon the different sustainability theories, principles and models that prevails in contemporary environmental policies and in global environmental assessments (e.g. IPCC, IPBES and the Arctic Council's working groups). • has translational skills and knowledge of system thinking, that allow understanding causal interactions between social- and ecological systems and identifying solutions and measures that can be implemented by management agencies and businesses.

Academic content and description of the study program	The Biology - Master´s program provides opportunities to explore an array of pressing questions within modern biology and emphasize some of society`s challenges regarding management of natural resources and biodiversity. Each of the specializations is strongly linked to ongoing research in our research groups, providing the relevant theoretical background, training in state-of-the-art laboratory and field methods, innovative and critical thinking for problem solving, thesis and publication writing as well as training of presentation and knowledge transfer proficiency. Thus, students will be given the opportunity, and is expected, to actively participate as part of the research collegiate in the research group, the department and with relevant external institutions depending on master thesis and master specialization activity. The program is a fulltime study at UiT The Arctic University of Norway´s campus in Tromsø, Norway at 69 degrees north. **The Biology Master´s program has seven specializations** Candidates will, through one of the seven specializations offered, acquire advanced knowledge of key concepts and theories at the forefront of research and development in biological sciences. • Arctic animal biology • Arctic marine ecology • Arctic marine ecotoxicology • Ecology and sustainability • Freshwater ecology • Molecular environmental biology • Northern populations and ecosystems **General Course component** The number of compulsory and elective courses varies between the master's specializations, but students must complete at least worth 60 ECTS. Elective courses should be chosen in consultation with thesis supervisors. All students must complete the safety courses (HMS-050X, see program structure tables below). An animal experimentation course is obligatory if the master's project involves experiments with research animals – course choice will depend on choice of animal model: • BIO-3503 Aquatic Animal Welfare - 5 ECTS – fish/decapods (Spring only) • Animal Experimentation for Wildlife Researchers – 5 ECTS (NMBU) – wild birds & mammals (Autumn and Spring, Online) • CAREiN - 8 ECTS (UiB) – rodents/pig/zebra fish (Autumn and Spring, Online) The course TVR-3000 on sustainability, innovation and collaborative learning with first-year students from other master´s programs at UiT are mandatory for all biology master´s students. Students may take courses at the University Centre in Svalbard (UNIS) during the second and third semesters (see speciliazation-specific course list). Students can include up to 20 ECTS of 2000 level courses, and up to 10 ECTS of 1000-level courses may be allowed upon application. For details,

contact the study administration.

It is recommended for all students to acquire knowledge on quantitative approaches for scientific and management-related questions. The optimal approach and/or through which recommended courses may vary depending on topic and specialization. The Biology - Master´program offers the course BIO-3012 Ecological methodology: Study design and statistical analysis that is designed to cover most of the program´s specializations. Students will learn to design studies, distinguish between experimental and observational studies, select appropriate statistical analyses, apply statistical modelling approaches, interpret results in terms of quantitative effect sizes, and critically evaluate study designs and statistical results in scientific papers.

Obligatory Master Thesis component (BIO-3950)

The selection of a master project is done during the first or second semester. Students are encouraged to contact research group members within their specialization to discuss available projects and opportunities, and to find a master project and a supervisor as soon as possible during the first two semesters of the Master program. Information on available projects can also be found through internal communication channels for program students once admitted to the program. Working on a 60 ECTS thesis can be started in the first, second, or, at the latest, the third semester, depending on individual availability and the character of the project.

It is possible to conduct part or the master project in collaboration with external organizations such as Fram Centre Institutes (e.g., Norwegian Polar Institute, Institute of Marine Research, Norwegian Institute for Nature Research (NINA), Norwegian Institute of Bioeconomy Research (NIBIO), Akvaplan-niva, Nofima) and the University centre in Svalbard (UNIS), or other organizations in Norway and abroad. In this case, an internal supervisor at our department of Arctic and Marine Biology, in addition to the external supervisor at the host Institution will be affiliated with the project.

A detailed description of each specialization is found below:

Arctic Animal Biology

The specialization Arctic Animal Biology will take an ecophysiological approach. Ecophysiology is the scientific study of how organisms' physiological processes interact with, and are influenced by, their environment. It examines how environmental factors, such as climate, nutrients, and other ecological conditions, impact the physiological functions, growth, and survival of organisms. In essence, ecophysiology explores the relationships between the internal workings of an organism and the external world it inhabits.

Candidates that have completed a master of science in biology with this specialization will have advanced knowledge of integrative biology and its importance for understanding ecological adaptation, with an emphasis on arctic contexts. The programme covers many aspects of animal physiology and behaviour, including bioenergetics, thermoregulation, photobiology, chronobiology, endocrinology, reproductive physiology, thermoregulation, nutrition/digestion, cardiovascular physiology. The integrative approach will develop insights into animal biology linking eco-evolutionary demands and constraints with physiological adaptation and whole-organism, organ, cellular and molecular levels. Students will have the opportunity to gain intellectual appreciation and practical know-how at all these levels. For

	these purposes, the training environment offers globally unique access to field stations, research cruise vessels, specialized research facilities for experimental, hands-on work on arctic animal species, and advanced biosciences laboratories. Students will also be able to critically evaluate information from a variety of sources and to transpose acquired knowledge and competency to issues relevant for society e.g., environmental change and management of natural resources, food production (aquaculture), human and animal health. In addition to taught courses during the first 2 semesters, students will have the opportunity to develop their independent learning skills through the undertaking of 'Special curriculum' exercises. These can involve literature-based research, data analyzis and practical activity in a relevant topic chosen by the student and their mentor. For students planning to undertake a master´s project involving work with animals, this can include practical animal handling activities to complement and reinforce formal training courses. Master`s projects will normally form a part of ongoing projects, which encompass both curiosity-driven basic research projects and projects important for production and management of natural resources in aquatic and terrestrial environments. Students will be an integrative part of the Arctic Chronobiology and Physiology (ACP) research group and are expected to participate actively in seminars that are given within ACP, as well as at the department. For more information about the research group Arctic Chronobiology and Physiology, see our web page **Arctic Marine Ecology** The ecology of high-latitude coastal and oceanic systems is the focus of this specialization. Polar marine ecosystems, their unique characteristics, and their functioning will be explored. The structure of food webs in various Arctic marine habitats will be examined, along with the requirements for their sustainable use and the influence of the physical environment on species and their ecology. Through a master's in Arctic Marine Ecology, a wide variety of organisms, ranging from bacteria and plankton to benthos and top predators such as fish and marine mammals, will be introduced. Arctic marine food webs across the entire Arctic can be compared, and the responses of organisms and ecosystems to climate change and environmental variation can be studied. Depending on master project relevance, hands-on experience on sampling and data collection will be provided through research expeditions, as well as laboratory experiments and analyses. A suite of methods, including numerical modeling, novel observation and sampling technology, or biochemical and molecular methods, can be utilized. Experiments may be designed to study behavior or physiology in the field or in temperature-controlled laboratories. Extensive collaboration is conducted with UNIS and other research institutions in Tromsø, such as the Norwegian Polar Institute, the Institute of Marine Research, and Akvaplan-niva. Parts of the thesis may be carried out at these institutions. For more information about the research Arctic Marine System Ecology (AMSE) group see: AMSE research group

	Arctic Marine Ecotoxicology Ecotoxicology is the study of how man-made pollution affects organisms at all levels of biological organization, from cells to ecosystems. The subject is multidisciplinary and primarily integrates ecology and toxicology with advanced knowledge of one or several of the following fields of sciences: cell and molecular biology, physiology, environmental chemistry and ecology. A fundamental introduction to ecotoxicological principles and approaches, as well as contemporary research topics, will be provided by this specialization. A broad choice of elective courses, including those at UNIS, will allow knowledge on Arctic ecosystems to be deepened from molecular, physiological, or ecological perspectives. Master projects will be carried out as part of ongoing research projects, which encompass both fundamental research and more applied topics related to contemporary environmental issues. For instance, a master project can cover fields of science related to the release, transport and toxicity of legacy and emerging persistent organic pollutants, petroleum related pollution, littering in the marine environment (e.g. microplastics), and more. The research approaches may span from molecular and cellular mechanisms to integrative whole animal or population studies and through experimental or field-based research. Many projects are offered in collaboration with external institutions, especially within the Fram Centre in Tromsø, e.g. Akvaplan-niva, Norwegian Polar Institute (NPI), Norwegian Institute for air research (NILU), Institute of Marine Research (IMR) and Norwegian Institute for Nature Research (NINA). Students from this discipline may be relevant candidates to research institutions in both the public and private sectors, management at the regional, national and international levels as well as consultancy firms. **Ecology and Sustainability** Students will learn theories and practices underpinning sustainability science and ecosystem-based management. To solve complex sustainability challenges, students will learn how to understand and analyze the interactions between natural and social systems to find solutions and support decisions that can meet the needs of present and future generations while conserving the planet's life supporting systems. Students will get insights in sustainability theories, principles, models and indicators, including those of relevance for the UN's Sustainable Development Goals, the Paris Agreement, the post-2020 global biodiversity framework, the European Green Deal, IPCC, IPBES and the climate- and environmental assessments produced by the Arctic Council. Ecosystem-based approaches to research, management and adaptations are generally regarded as the key for addressing complex sustainability challenges, and this program will train students in system thinking by working with ecosystem ecology, spatial ecology, resilience, socio-ecological systems, regime shifts, tipping points, biodiversity and ecosystem services assessment, and adaptive management and governance. Students will also be trained in equitable engagement of citizens, stakeholders and indigenous – and local communities science and management. Skills and tools that students learn in our group depend on the topic chosen for the MSc thesis. Students are also encouraged to do their MSc project together with external partners at the FRAM center or to link their tasks closely to needs of business or management agencies. **Freshwater Ecology** Master's projects are usually related to topical activities within freshwater ecology, which include research in lakes, rivers and coastal areas related to

	landlocked and anadromous populations of fish (in particular salmonids), invertebrates, and parasites. Research activities comprise basic aspects of ecology and more applied topics related to nature and resource management. Important keywords are population and community ecology, predation, competition, parasitism, trophic ecology, invasion biology, anadromy, life history and migration, catchment to coast, climate change. For more information about the research group see: Freshwater ecology research group **Molecular Environmental Biology** MSc in Molecular Environmental Biology focuses on the physiological and molecular analysis of plants and microorganisms. Research areas cover a broad range of contemporary research topics ranging from functional plant and microbial molecular biology and physiology and plant/microbe interactions to bioinformatic analysis and modelling. The common theme of our discipline is understanding interactions within, and between cells and between organisms and their environment at a cellular and molecular level. The Master students will be offered an opportunity for a molecular study within one selected field of research and the participation in an ongoing research project among the following focal areas: • Analysis of molecular signaling and transport processes within and between individual plant and bacterial • Communication and interaction of plants and microorganisms with each other and with the environment. • Biochemistry and cell biology of parasitic plants and the interaction with their hosts. • Environmental and developmental regulation of secondary metabolism in plants. • Plant cell wall metabolism and enzymatic degradation of plant biomass for bioenergy. • Diversity and function of microbial communities involved in biodegradation of environmental pollutants. • Microorganisms and microbial communities with key roles in the global carbon cycle and their responses to environmental change. • Microbial growth on atmospheric methane and other trace gases. • Biotechnological application of methane oxidizing bacteria for reducing methane emissions. • Implementation of bioinformatic approaches for the topics above and beyond. During the master´s study the students will be given the opportunity to choose from a variety of different courses applying modern methods of experimental molecular biology and bioinformatics for the study of plant and microbe systems. All courses are designed specifically to prepare the candidates for their master's thesis. Also, the active participation in common seminars and courses are expected as an important part of scientific training. **Northern Populations and Ecosystems** A MSc in the research group Northern populations and ecosystems provides insight into general ecological theories, analytical approaches and tools for understanding, analysing and managing populations, food webs and ecosystems. Students in our group work with empirical data collected in the field and typically use novel technologies and/or advanced data analyses to understand ecological patterns and processes. MSc projects are offered in a broad range of topics, including animal behavior, health and

diseases, wildlife ecology, plant ecology, theoretical ecology and evolution, ecosystem science and management, and the impacts of climate change on northern ecosystems. A primary focus is placed on arctic-alpine tundra and boreal forests. Projects are often conducted as part of larger research initiatives and in teamwork. Many of the projects are connected to the Climate-ecological Observatory for Arctic Tundra (COAT; www.coat.no), and extensive collaboration is carried out with partners within the Fram Centre such as the Norwegian Institute for Nature Research (NINA), the Norwegian Polar Institute, Norwegian Institute of Bioeconomy Research (NIBIO) and the Marine Research Institute as well as management agencies and other stakeholders.

Students will work with their supervisors to conceptualize and design their own project work. Students need to contact their supervisor at an early stage to plan their thesis work and to acquire the necessary scientific literature and training to implement the project. Students in our group will learn:

- The theoretical and conceptual frameworks relevant to their topic
- To develop study designs or models reflecting their hypotheses or questions
- To use state-of-the-art methods for acquiring and analyzing data
- To write a research paper
- To communicate and present their work.

For more information about the research group see: Northern populations and ecosystems research group

Table: Programme structure of the 7 Master specializations

Program Structure: Arctic Animal Biology

The Table below summarizes the compulsory courses for all students (red color), elective courses (grey). The sum of all courses taken must be at least 60 ECTS.

	10 ECTS	10 ECTS	10 ECTS
First semester (autumn)	Compulsory safety courses at semester start (no ECTS) [a]		
	TVR-3000 on sustainability, innovation and collaborative learning	BIO-3035 Arctic Animal Biology: Physiological and Behavioural Adaptations to the Environment	Elective courses
Second semester (spring)[b]	BIO-3014 Biological timekeeping	BIO-3036 Arctic Animal Biology: Exploring Physiological Control Mechanisms	Elective courses
Third semester (autumn)[b]	BIO-3950 Master's Thesis Biology		
Fourth semester (spring)	BIO-3950 Master's Thesis Biology		

[a] HMS-0501 Safety in the laboratory, workshop and on sea and land expeditions, HMS-0502 First aid in the laboratory, workshop and on sea and land expeditions, HMS-0503 UiT's regulations for field work and sea-

going expeditions, HMS-0504 Biological material.
[b] Possibilities to take single (intensive) courses at UNIS.

In addition to the compulsory courses mentioned above, the following elective courses are recommended based on the research interest or project topic. Discussions with supervisors are encouraged to determine the optimal set of courses. In addition to the compulsory courses above, it is recommended students choose from the following elective courses, depending on their research interest/project topic.

Recommended elective courses in the autumn
BIO-3805 or BIO-3810 Special curriculum (5 or 10 ECTS)
BIO-3038 Molecular methods in environmental microbiology (10 ECTS)
BIO-3009 Arctic Marine Pollution (10 ECTS)

Recommended elective courses in the spring
BIO-3805 or BIO-3810 Special curriculum (5 or 10 ECTS)
BIO-3118 Biological Imaging Techniques (10 ECTS)
BIO-3020 Fundamentals of Ecotoxicology (10 ECT)

Program Structure: Arctic Marine Ecology

The Table below summarizes the compulsory courses for all students (red color), elective courses (grey). The sum of all courses taken must be at least 60 ECTS.

	10 ECTS	10 ECTS	10 ECTS
First semester (autumn)	Compulsory safety courses at semester start (no ECTS)[a]		
	TVR-3000 on sustainability, innovation and collaborative learning	BIO-3015 Arctic Marine System Biology and Climate Change	Elective courses
Second semester (spring)[b]	BIO-3012 Ecological methodology: Study design and statistical analysis	Elective courses	Elective courses
Third semester (autumn)[b]	BIO-3950 Master's Thesis Biology		
Fourth semester (spring)	BIO-3950 Master's Thesis Biology		

[a] HMS-0501 Safety in the laboratory, workshop and on sea and land expeditions, HMS-0502 First aid in the laboratory, workshop and on sea and land expeditions, HMS-0503 UiT's regulations for field work and sea-going expeditions, HMS-0504 Biological material.
[b] Possibilities to take single (intensive) courses at UNIS.

In addition to the compulsory courses above, it is recommended that students choose from the following elective courses, and they are encouraged to discuss what will be the optimal set of courses with their supervisors.

Recommended elective courses in the autumn
BIO-3516 Food web and fisheries (10 ECTS)

BIO-3505 Ecological interactions (10 ECTS)
BIO-3009 Arctic Marine Pollution (10 ECTS)

Recommended elective courses in the spring
BIO-3029 Sea ice habitats and biology (5 ECTS)
BIO-3004 Ecosystem-based management (10 ECTS)
BIO-3506 Top predators in marine ecosystems 10 ECTS (every other year)
BIO-3020 Fundamentals of Ecotoxicology 10 ECTS

Recommended UNIS courses
AB330 Ecosystems in Ice-covered waters (10 ECTS every other year)
AB323 Light Climate and Primary Productivity in the Arctic (10 ECTS, every other year).

Program Structure: Arctic Marine Ecotoxicology

The Table below summarizes the compulsory courses for all students (red color), elective courses (grey). The sum of all courses taken must be at least 60 ECTS.

	10 ECTS	10 ECTS	10 ECTS
First semester (autumn)	Compulsory safety courses at semester start (no ECTS) [a]		
	TVR-3000 on sustainability, innovation and collaborative learning	BIO-3009 Arctic Marine Pollution	Elective courses
Second semester (spring) [b]	BIO-3012 Ecological methodology: Study design and statistical analysis	BIO-3020 Fundamentals of Ecotoxicology	Elective courses[b]
Third semester (autumn)[c]	BIO-3950 Master's Thesis Biology		
Fourth semester (spring)	BIO-3950 Master's Thesis Biology		

[a] HMS-0501 Safety in the laboratory, workshop and on sea and land expeditions, HMS-0502 First aid in the laboratory, workshop and on sea and land expeditions, HMS-0503 UiT's regulations for field work and sea-going expeditions, HMS-0504 Biological material.

[b] Possibility to apply for an entire semester at UNIS (see recommended courses). Dispensation for BIO-3012 and BIO-3020.

[c] Possibilities to take single (intensive) courses at UNIS (see recommended courses).

In addition to the compulsory courses above, it is recommended that students choose from the following elective courses, and they are encouraged to discuss what will be the optimal set of courses with their supervisors.

Recommended elective courses in the autumn
BIO-3015 Arctic Marine System Ecology and Climate Change (10 ECTS)
BIO-3035 Arctic Animal Biology: Physiological and Behavioural Adaptations to the Environment (10 ECTS)

BIO-3037 Molecular Methods in Plant Biology
BIO-3505 Ecological Interactions (10 ECTS)

Other relevant elective courses in the autumn
BIO-3013 Northern food web ecology (10 ECTS)

Recommended elective courses in the spring
BIO-3004 Ecosystem-based management (10 ECTS)
BIO-3518 Northern inland waters and global change (10 ECTS)
BIO-3506 Top predators in polar marine ecosystems: Biology, Role and Management implications (10 ECTS) (every other year)
BIO-3027 Scientific Programming with Python in the life sciences (10 ECTS)

Other relevant elective courses in the autumn
MBI-3015 Human pharmacology and toxicology (10 ECTS)

Relevant courses offered at UNIS (to be taken in its entirety with dispensation for BIO-3012 and BIO-3020)
AT331 Arctic Environmental Pollution: Distribution and Processes (10 ECTS, January-February)
AT330 Arctic Environmental Toxicology (10 ECTS, March-April)
AT324 Techniques for the Detection of Organo-Chemical Pollutants in the Arctic Environment (10 ECTS, April/May)

Relevant Autumn (3rd semester) courses offered at UNIS

AB-340 Climate Change Biology (10 ECTS)

Program Structure: Ecology and Sustainability

The Table below summarizes the compulsory courses for all students (red color), elective courses (grey). The sum of all courses taken must be at least 60 ECTS.

	10 ECTS	10 ECTS	10 ECTS
First semester (autumn)	Compulsory safety courses at semester start (no ECTS) [a]		
	TVR-3000 on sustainability, innovation and collaborative learning	BIO-3021 Sustainability Science	Elective courses
Second semester (spring)[b]	BIO-3012 Ecological methodology: Study design and statistical analysis	Elective course within the topic of ecology	Elective courses
Third semester (autumn)[b]	BIO-3950 Master's Thesis Biology		
Fourth semester (spring)	BIO-3950 Master's Thesis Biology		

[a] HMS-0501 Safety in the laboratory, workshop and on sea and land expeditions, HMS-0502 First aid in the laboratory, workshop and on sea and land expeditions, HMS-0503 UiT's regulations for field work and sea-going expeditions, HMS-0504 Biological material.
[b] Possibilities to take single (intensive) courses at UNIS.

In addition to the compulsory courses above, it is recommended that students choose from the following elective courses, and they are encouraged to discuss what will be the optimal set of courses with their supervisors.

Recommended elective courses in the autumn
BIO-3013 Northern food web ecology (10 ECTS)
BIO-3015 Arctic Marine System Ecology and Climate Change (10 ECTS)
BIO-3505 Ecological interaction (10 ECTS)

Recommended elective courses in the spring
BIO-3518 Northern inland waters and climate change (10 ECTS)
BIO-3004 Ecosystem-based management (10 ECTS)
FSK-3012 Geographical Information Systems for Coastal and Marine Resource Management (10 ECTS)

Program Structure: Freshwater Ecology

The Table below summarizes the compulsory courses for all students (red color), elective courses (grey). The sum of all courses taken must be at least 60 ECTS.

	10 ECTS	10 ECTS	10 ECTS
First semester (autumn)	Compulsory safety courses at semester start (no ECTS) [a]		
	TVR-3000 on sustainability, innovation and collaborative learning	BIO-3505 Ecological Interactions	Elective courses / BIO-3519 Parasites and Epidemiology recommended
Second semester (spring)[b]	BIO-3012 Ecological methodology: Study design and statistical analysis	BIO-3518 Northern Inland Waters and Climate Change	Elective courses
Third semester (autumn)[b]	BIO-3950 Master's Thesis Biology		
Fourth semester (spring)	BIO-3950 Master's Thesis Biology		

[a] HMS-0501 Safety in the laboratory, workshop and on sea and land expeditions, HMS-0502 First aid in the laboratory, workshop and on sea and land expeditions, HMS-0503 UiT's regulations for field work and sea-going expeditions, HMS-0504 Biological material.

[b] Possibilities to take single (intensive) courses at UNIS.

In addition to the compulsory courses above, it is recommended that students choose from the following elective courses, and they are encouraged to discuss what will be the optimal set of courses with their supervisors

Recommended elective courses in the autumn
BIO-3519 Parasites and epidemiology (10 ECTS)
BIO-3516 Food-webs and Fisheries (10 ECTS)
BIO-3013 Northern food web ecology (10 ECTS)

Recommended elective courses in the spring
BIO-3004 Ecosystem-based management (10 ECTS)

Program Structure: Molecular Environmental Biology

The Table below summarizes the compulsory courses for all students (red color), elective courses (grey). The sum of all courses taken must be at least 60 ECTS.

	10 ECTS	10 ECTS	10 ECTS
First semester (autumn)	Compulsory safety courses at semester start (no ECTS) [a]		
	TVR-3000 on sustainability, innovation and collaborative learning	BIO-3037 Molecular Methods in Plant Biology	BIO-3038 Molecular Methods in Environmental Microbiology
Second semester (spring)[b]	BIO-3027 Scientific Programming with Python in the life sciences	Elective courses	Elective courses
Third semester (autumn)[b]	BIO-3950 Master's Thesis Biology		
Fourth semester (spring)	BIO-3950 Master's Thesis Biology		

[a] HMS-0501 Safety in the laboratory, workshop and on sea and land expeditions, HMS-0502 First aid in the laboratory, workshop and on sea and land expeditions, HMS-0503 UiT's regulations for field work and sea-going expeditions, HMS-0504 Biological material.
[b] Possibilities to take single (intensive) courses at UNIS.

In addition to the compulsory courses above, it is recommended that students choose from the following elective courses, and they are encouraged to discuss what will be the optimal set of courses with their supervisors.

Other relevant elective courses in the autumn
BIO-3530 Arctic and Alpine Plant Ecology: online course (5 ECTS)
BIO-3540 Field Course in Arctic and Alpine Plant Ecology (5 ECTS)
BIO-3805 or BIO-3810 Special curriculum (5 or 10 ECTS)

Recommended elective courses in the spring

BIO-3118 Biological Imaging Techniques (10 ECTS)
BIO-3012 Ecological methodology: Study design and statistical analysis (10 ECTS)
BIO-3010-1 Modelling in Systems Biology I – Metabolic pathways (5 ECTS)
BIO-3805 or BIO-3810 Special curriculum (5 or 10 ECTS)

Relevant courses offered at UNIS
AB327 – Arctic Microbiology (10 ECTS)

Program Structure: Northern Populations and Ecosystems

The Table below summarizes the compulsory courses for all students (red color), elective courses (grey). The sum of all courses taken must be at least 60 ECTS.

	10 ECTS	10 ECTS	10 ECTS
First semester (autumn)	Compulsory safety courses at semester start (no ECTS) [a]		
	TVR-3000 on sustainability, innovation and collaborative learning	BIO-3013 Northern Food Web Ecology	Elective courses
Second semester (spring)[b]	BIO-3012 Ecological methodology: Study design and statistical analysis	Elective courses	Elective courses
Third semester (autumn)[b]	BIO-3950 Master's Thesis Biology		
Fourth semester (spring)	BIO-3950 Master's Thesis Biology		

[a] HMS-0501 Safety in the laboratory, workshop and on sea and land expeditions, HMS-0502 First aid in the laboratory, workshop and on sea and land expeditions, HMS-0503 UiT's regulations for field work and sea-going expeditions, HMS-0504 Biological material.
[b] Possibilities to take single (intensive) courses at UNIS.

In addition to the compulsory courses above, it is recommended that students choose from the following elective courses, and they are encouraged to discuss what will be the optimal set of courses with their supervisors

Recommended elective courses in the autumn
BIO-3505 Ecological interactions (10 ECTS)
BIO-3519 Parasites and epidemiology (10 ECTS)
BIO-3015 Arctic Marine System Ecology and Climate Change (10 ECTS)
BIO-3035 Arctic Animal Biology: Physiological and Behavioural Adaptations to the Environment (10 ECTS)

Recommended elective courses in the spring
BIO-3004 Ecosystem-based management (10 ECTS)

	BIO-3518 Northern inland waters and global change (10 ECTS) BIO-3027 Scientific Programming with Python in the life science (10 ECTS) Relevant courses offered at UNIS AB326 Arctic Plant Ecology (10 ECTS, June/July) AB329 Arctic Winter Ecology (10 ECTS, January/February) AB340 Climate Change Biology (10 ECTS, January/February)
Learning activities, examination and assessment	Different teaching methods are employed, including lectures, seminars, laboratory work, computer lab and field courses. Course examinations may be oral or written, assessments of project work/lab reports/field reports, often in combination. Supervision of the project work that leads to the writing of the master's thesis will be given by faculty staff, sometimes in collaboration with an external supervisor.

The study programme's relevance	A Master of Science degree in Biology is recognized as a qualification for advanced studies at the PhD level. Additionally, a diverse range of career opportunities in both the public and private sectors, including roles in research, resource and environmental management, administration, consulting, and education, is made accessible. The completion of the master's thesis allows an area of expertise to be established and acquired technical and soft skills to be showcased. Furthermore, it is considered an important step in building a scientific and professional network, which can support future job prospects.
Work scope	The program consists of 120 ECTS. Full-time students are expected to work 40 hours per week, corresponding to 1500 - 1800 hours per year.
For master's theses/independent work in master's degrees	The master thesis is an independent, individual scientific work (60 ECTS) under the guidance by one or several supervisors. The thesis is written within one of the following specializations: • Arctic animal biology • Arctic marine ecology • Arctic marine ecotoxicology • Ecology and sustainability • Freshwater ecology • Molecular environmental biology • Northern populations and ecosystems The number of pages required for a master`s thesis may vary depending on the type of project and must be discussed with the supervisor. The general work effort in a master`s project is 1500-1800 hours (including field and lab work). Students who are admitted to the biology - master's degree program normally select a project during the first or second semester, and no later than one month before the end of the second semester. A contract of supervision and a project description approved by the Department are required from each student. It is possible to conduct part or the entire

	master project work in collaboration with external institutions in Norway or abroad. In this case, the student will need to have both an external supervisor at the host Institution, as well as an internal supervisor at our department of Arctic and Marine Biology. The student should contact the study administration for stays abroad. Deadline for handing in the contract is 1st of September during the third semester. Deadline for submission of thesis is May 15th in the final semester. After the master's thesis is submitted, there is an oral master's examination. This examination consists of a public presentation (minimum 30 minutes) where the student provides an overview of the project. Then follows an oral examination with the examination commission. The final oral exam is normally within 2-3 weeks after the submission, and not later than six weeks.
Language of instruction and examination	Language of instruction is English, and all of the syllabus material is in English. Examination questions are given in English but may be answered either in English or a Scandinavian language. The Master`s thesis must be written in English.

Internationalization	Students may have the opportunity to attend and present at national and international conferences during or after completing their thesis. These events serve as platforms for networking and offer a valuable opportunity for the student´s research to be evaluated by peers. The study program emphasizes internationalization by engaging with the international academic field and incorporating international research literature as a foundation for learning and research. Students benefit from exposure to guest researchers from around the world, bringing diverse perspectives and expertise. Additionally, the program is enriched by the international diverse academic environment at the department, fostering cross-cultural collaboration and providing students with a broader understanding of their field in the Arctic context.
Student exchange	Students can undertake periods of studying at The University Centre at Svalbard (UNIS), especially during their third and fourth semester. Each specialization highlights relevant courses at UNIS. International exchange during an entire semester is not possible in the first year of studies due to obligatory courses in all specializations. Stays abroad can take place as part of a master project in the third and fourth semester. Please consult the program study adviser for more information.
Administrative responsibility and academic responsibility	**Administrative responsibility:** Department of Arctic and Marine Biology at Faculty of Biosciences, Fisheries and Economics **Academic responsibility:** Study program leader
Quality assurance	The study program undergoes continuous evaluation in line with the university`s quality assurance system. This process is lead by the study program leader with support from the study program council, the Department´s leadership team, the study administration and collegial work with teachers and supervisors involved in the program at the department. An internal evaluation is conducted each semester, while an external and international committee reviews the program every sixth year. Additionally, new courses are assessed annually for the first three years, and established courses are evaluated every two years.