



Faculty of Health, Science and Technology

Programme Study Plan

Master Programme in Biology

Programme code:	NABIM
Programme title	Master Programme in Biology
Specialisation:	Ecology and Conservation Biology
Higher education credits/ECTS:	120
Programme approval:	The Programme Study Plan was approved by the Faculty Board 2016-02-25, and valid from the autumn semester 2016
Language of instruction:	Swedish and English
Degree level:	Master's
Qualifications:	General
Prerequisites	Bachelor Degree 180 ECTS cr with a Major in Biology. Upper secondary school level English 6 or B, or equivalent.

Introduction

According to the UN's Millenium Ecosystem Assessment, habitat loss is increasing and the world's biodiversity is dramatically decreasing. This means that one of the most urgent challenges today is to preserve the natural ecosystem services, including natural resources and biodiversity, for example.

The Master Programme in Biology with an emphasis on ecology and conservation biology provides advanced knowledge of how humans affect different terrestrial species and aquatic ecosystems and the measure that can be taken to conserve biodiversity and valuable habitats.

Graduates with a Master's degree in biology with an emphasis on ecology and conservation biology have the qualifications needed to perform advanced investigation and case management tasks in municipal administrations and public authorities, and for consultancy in the field. Graduates also have eligibility for doctoral studies.

Programme aims

Second-cycle courses and study programmes shall be based fundamentally on the knowledge acquired by students during first-cycle courses and study programmes, or its equivalent.

Second-cycle courses and study programmes shall involve the acquisition of specialist knowledge, competence and skills in relation to first-cycle courses and study programmes, and in addition to the requirements for first-cycle courses and study programmes shall:

- further develop the ability of students to integrate and make autonomous use of their knowledge,
- develop the students' ability to deal with complex phenomena, issues and situations, and
- develop the students' potential for professional activities that demand considerable independence, or for research and development work.

(Ch. 1, sect. 9 Higher Education Act, SFS 1992:1434)

The *Higher Education Ordinance, Qualification Ordinance*, specifies the learning outcomes required for a certain degree (SFS 1993:100). For a Master's degree with a defined specialisation, the outcomes specified in relation to the national requirements by a higher education institution shall also apply.

National outcomes for programmes at Master's level (60 ECTS cr)

Knowledge and understanding

For a Degree of Master (60 credits) the student shall

- demonstrate knowledge and understanding in the main field of study, including both an overview of the field and specialised knowledge in certain areas of the field as well as insight into current research and development work, and
- demonstrate specialised methodological knowledge in the main field of study.
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Competence and skills

For a Degree of Master (60 credits) the student shall

- demonstrate the ability to integrate knowledge and analyse, assess and deal with complex phenomena, issues and situations even with limited information
- demonstrate the ability to identify and formulate issues independently as well as to plan and, using appropriate methods, undertake advanced tasks within predetermined time frames
- demonstrate the ability in speech and writing to report clearly and discuss his or her conclusions and the knowledge and arguments on which they are based in dialogue with different audiences, and
- demonstrate the skills required for participation in research and development work or employment in some other qualified capacity.

Judgement and approach

For a Degree of Master (60 credits) the student shall

- demonstrate the ability to make assessments in the main field of study informed by relevant disciplinary, social and ethical issues and also to demonstrate awareness of ethical aspects of research and development work
- demonstrate insight into the possibilities and limitations of research, its role in society and the responsibility of the individual for how it is used, and
- demonstrate the ability to identify the personal need for further knowledge and take responsibility for his or her ongoing learning.

Local outcomes for the Master's degree (60 ECTS cr) in Biology with specialisation in ecology and conservation biology at Karlstad University

In addition to the national outcomes, the following apply:

For a Degree of Master (60 credits) the student shall:

- demonstrate specialised knowledge and understanding of different explanatory models of ecosystems, their abiotic and biotic interactions and the ability to integrate this knowledge to evaluate complex ecological problems,
- demonstrate understanding and enhanced knowledge of how human activities in various ways affect ecosystems and ecosystem services,
- demonstrate understanding of a scientific approach and critical thinking in relation to the potentials and limitations of science in investigative research on terrestrial species and aquatic ecosystems,
- demonstrate ability to communicate theories and ecological problems and research results with experts and non-experts on issues related to the field, orally and in writing.

National outcomes for the Master's degree (120 ECTS cr)

Knowledge and understanding

For a Degree of Master (120 credits) the student shall

- demonstrate knowledge and understanding in the main field of study, including both broad knowledge of the field and a considerable degree of specialised knowledge in certain areas of the field as well as insight into current research and development work, and
- demonstrate specialised methodological knowledge in the main field of study.
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Competence and skills

For a Degree of Master (120 credits) the student shall

- demonstrate the ability to critically and systematically integrate knowledge and analyse, assess and deal with complex phenomena, issues and situations even with limited information
- demonstrate the ability to identify and formulate issues critically, independently and creatively as well as to plan and, using appropriate methods, undertake advanced tasks within predetermined time frames and so contribute to the formation of knowledge as well as the ability to evaluate this work
- demonstrate the ability in speech and writing both nationally and internationally to clearly report and discuss his or her conclusions and the knowledge and

- arguments on which they are based in dialogue with different audiences, and
- demonstrate the skills required for participation in research and development work or independent employment in some other qualified capacity.
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Judgement and approach

For a Degree of Master (120 credits) the student shall

- demonstrate the ability to make assessments in the main field of study informed by relevant disciplinary, social and ethical issues and also to demonstrate awareness of ethical aspects of research and development work
- demonstrate insight into the possibilities and limitations of research, its role in society and the responsibility of the individual for how it is used, and
- demonstrate the ability to identify the personal need for further knowledge and take responsibility for his or her ongoing learning.

Independent project (degree project)

A requirement for the award of a Degree of Master (120 credits) is completion by the student of an independent project (degree project) for at least 30 credits in the main field of study. The degree project may comprise less than 30 credits, however no less than 15 credits, if the student has already completed an independent project in the second cycle for at least 15 credits in the main field of study or the equivalent from a programme of study outside Sweden.

Local outcomes for the Master's degree (120 ECTS cr) in Biology with specialisation in ecology and conservation biology.

In addition to the national outcomes, the following apply:

For a Degree of Master (120 credits) the student shall

- demonstrate considerably specialised knowledge and understanding of different explanatory models of ecosystems, their abiotic and biotic interactions and the ability to integrate this knowledge to evaluate complex ecological problems,
- demonstrate understanding and enhanced knowledge of how human activities in various ways affect ecosystems and ecosystem services, at the local, regional and global level,
- demonstrate ability to independently plan, use and evaluate the results of common quantitative and qualitative sampling and analysis methods and to compile and present them orally and in writing,
- demonstrate deepened insight into research and development work in the field of ecology and conservation biology,
- demonstrate deepened understanding of a scientific approach and critical thinking in relation to the potentials and limitations of science in investigative research on terrestrial species and aquatic ecosystems,
- demonstrate ability to communicate theories and ecological problems and research results with experts and non-experts on issues related to the field, orally and in writing.

Programme Structure

The Master programme, 120 ECTS cr is a two-year full-time course of study. Students have the opportunity to conclude their studies with a Master's degree, 60 ECTS cr after one year.

With the exception of a methods course 15 ECTS cr specifically designed for fresh water ecology, methodological issues are integrated with other programme courses, which also include laboratory examination components and field studies.

Programme students have opportunities to gain practical work experience in connection with the independent projects, which are often carried out in cooperation with county administrative boards, private power plants and other external actors.

A Master degree (120 cr) project 30 ECTS cr in biology is required in semester 4. Student can also choose to do a degree project 15 ECTS for the one-year Master (60 cr) in semester 2. The Master degree project 30 ECTS cr is a coherent study, which means that previous 15-credit projects at Master level in biology cannot be included in the degree project for the Master 120-credit degree.

In the second and third semesters students can take optional courses and profile their degree by choosing courses in statistics, GIS or in the social science, economic or juridical fields.

Programme curriculum

Courses totalling 75 ECTS cr in the major biology with specialisation in ecology and conservation biology are included in this Master-level programme, which is closely connected to the strong research environment in biology at Karlstad University, especially in fresh water ecology with a focus on streaming water and conservation. In addition, there are optional courses (45 credits), which can be studied at Karlstad University or at another university.

Semester 1

In semester 1, students enhance and broaden their knowledge of ecology and of how human activities affect the ecosystem generally and specifically in Sweden.

The course Ecosystems in a Changing World is an advanced course on human impact on ecosystems, the resilience of ecosystems and ecosystem services and their relation to the development of human societies. Students develop their ability to investigate the effects of human lifestyles on eco systems and services from a science perspective. One aspect is how a warmer climate will affect ecosystems through the adjustment, proliferation and extinction of species.

The course Ecological Conservation provides specialised knowledge of how human activities affect ecological processes in terrestrial and aquatic ecosystems. Different

measures to ensure biological diversity are discussed, along with how ecological knowledge is transformed into practical ecological conservation efforts and how these are included in the decision-making process. Students practise evaluating and critically reviewing previous research and the knowledge of the legislation on nature conservation and decision-making. There are several excursions to illustrate nature conservation in different environments.

Required courses:

- Ecosystems in a changing world (15 ECTS cr)
- Ecological Resource Management (15 ECTS cr)

Semester 2

The second semester includes a specialisation course in the research field of fresh water ecology, plus an optional course.

The course Research Methods in Fresh Water Ecology deals with the techniques used in fresh water biology, such as test fishing, fish labelling and bottom fauna sampling. Major parts of the course take place in direct contact with the ongoing research projects in biology.

Required courses:

- Scientific Methods in Freshwater Ecology (15 ECTS cr)
- Optional course (15 ECTS cr)

The Master's degree (60 ECTS cr) includes the course:
Degree Project in Biology, 15 ECTS cr)

Semester 3 – Optional semester

Students take optional courses totalling 30 ECTS cr.

Semester 4

Students carry out a degree project with a focus on ecology and conservation biology, preferably undertaken in conjunction with one of the ongoing research projects in biology or with an external actor.

Required course:

- Degree project in Biology, 30 ECTS cr (Master's degree 120)

Degree title

Master of Science (120 credits). Major: Biology.

It is also possible to earn a Master's degree 60 ECTS credits upon completion of required courses (60 cr), including at least 30 ECTS cr at master's level and a degree project 15 ECTS cr in Biology.

Master of Science (60 credits). Major: Biology.

Credit Transfer

Students may transfer credits from previously completed university courses in Sweden or abroad, or replace a course, subject to approval in accordance with current regulations.

Additional Information

The local regulations for studies at Bachelor and Master levels at Karlstad University stipulate the obligations and rights of students and staff.