

## MDP in Biology of Environmental Change (BEC), Joensuu

BEC is a research-oriented programme that aims to increase student's knowledge of biological and biogeochemical aspects of the state of the environment. It is designed to give the higher university degree (MSc) to students who already have accomplished the lower university degree (BSc) in an appropriate field of science (environmental or biological science).

There are two main subjects in the BEC programme: Environmental science in Kuopio campus and Biology in Joensuu campus. The joint MDP programme enables a wide selection of advanced courses of both disciplines. Most of the courses are available at both campuses via video-connection. Alternative studies in environmental science, biology, biogeochemistry, hydrobiology, ecotoxicology, environmental policy and law, and environmentally oriented forestry are available, as well as generic core competencies for scientific research, and skills to apply field-specific methods in the laboratory.

Studies in biology of environmental change will provide the student with advanced knowledge on the effects of environmental change on ecosystems and their bioprocesses, especially the interactions between atmosphere and ecosystems. The studies are divided into study modules of which the *Environmental ecology study module* focuses on understanding the interactions in ecosystems and the importance of environmental changes in ecosystem interaction situations. *Genetics and physiology* study module concentrates on the ecophysiological, cellular and molecular biological effects associated with environmental change as well as understanding of the interaction mechanisms at cellular level. Advanced studies provide a good understanding for the research activities on biological impacts of environmental change at universities and research institutes and to act as a leading expert in environmental monitoring.

The curriculum of the BEC programme (main subject biology) consists of 120 credit points (Cp, ECTS), including general skills studies, advanced level courses in biology (including master's thesis), as well as alternative studies of biology or in other disciplines, e.g., environmental science, environmental law and policy, statistics, or sustainable development.

The curriculum consists of lectures, exercises, book exams and hands-on training in research groups. Students will achieve comprehensive knowledge in at least one specialised subject (e.g., environmental ecology, aquatic research or genetics and physiology), generic core competencies for scientific research, and skills to apply field-specific methods in the laboratory.

The Master's thesis (40 Cp) includes an experimental element. The aim is to improve the student's skills in data collection, data analysis and to evaluate the student's ability to report and discuss the observed results scientifically in relation to existing data and knowledge.

The courses are usually organised during one term (autumn or spring). The student must register for courses in WebOodi at least two weeks before the course starts. Three examinations are arranged after the course. The last exam is usually organised in the general examination day of the department. Registration for all examinations have to be done at least 10 days before the exam date using WebOodi. The schedules for courses and examination days are given in WebOodi. Voluntary/alternative courses will be arranged only if at least five (5) students majoring in biology or environmental sciences have registered for the course. All teaching is given in English.

If a minimum of 20 Cp is completed in one discipline, it will be marked as a minor subject in the degree certificate.

Most of the courses in the MDP in BEC are not compulsory but the students may select the topics according to their own interest. At the beginning of the studies, a personal study plan (PSP) will be prepared for each student with the assistance of the teacher tutors. In order to facilitate the preparation of the PSP, the courses are organised in modules based on their subject and level (basic/advanced).

#### Structure of the studies (120 Cp)

Code	Title of the course	Cp
3121002	Personal Study Plan for the M.Sc. degree	1
8015017	Advanced English Academic and Professional Communication for the International Master's Degree Programmes of Science and Forestry	2
	Advanced studies in Biology	80
	(incl. MSc thesis and maturity test)	
	Alternative studies	37
	(including a minor subject or other studies)	

#### Advanced studies (biology of environmental change), 80 cp (3123810)

Compulsory courses\* are mentioned with codes.

Code	Course	Cp
3123101	Philosophy and History of Biology*	3
3710418	Design of Ecological and Environmental Experiments*	4
3123104	MSc thesis*	40
3123105	Maturity examination (MSc Biology)*	
3123241	MSc thesis Seminar in Environmental Science and Biology*	3
	Advanced book exams	6-10
	Advanced courses in Biology	24-28

#### General courses in Biology, recommended for international students (Alternative studies)

Code	Course	Cp	Schedule
3122239	Introduction to biology of environmental change	3	Every autumn

#### General courses, recommended for international students (Alternative studies)

Code	Course	Cp	Schedule
1131003	Orientation for international students	1	Every autumn
8031003	University study skills	1	Every autumn
8031006	University computing skills	2	Every autumn
8020270	Information skills and Sources in Science for Int. Students	1	Every autumn
8014301	Finnish 1	4	Every autumn
3622111	Basic statistics in English	5	Every autumn

Compulsory and voluntary courses in Biology, that can be included in the advanced studies in Biology and are organized during study years 2020-22. Most of the advanced courses are arranged every other year. The schedule is given as semester (autumn/spring) and the odd/even year.

#### Advanced courses in Biology

Code	Course	Cp	Schedule
3123101	Philosophy and History of Biology	3	every autumn
3710418	Design of Ecological and Environmental Experiments	4	every spring
<b>Courses in Environmental Ecology</b>			
3123172	Advanced Taxonomic Collection	2-6	continuously
3710486	Chemical Ecology	5	autumn, odd years
3123190	Community Ecology	4	autumn, even years
3123244	Contemporary Evolution and Behavioural Ecology	3	autumn, odd years
3123175	Current Issues in Aquatic Ecotoxicology	2	autumn, odd years
3710462	Ecological Risk Assessment	5	every spring
3123158	Ecology of Tropical Africa	3	spring, odd years
3710485	Entomology	4	autumn, even years
3123243	Exercises in Fish and Fisheries Biology	4	spring, odd years
3123242	Fish and Fisheries Biology	4	autumn, even years
3123194	Global Peatland Ecology	3	autumn, odd years
3123169	Literature Report in Hydrobiology, Advanced studies	3	continuously
3123250	Ecosystem Restoration in the Tropics and climate change	5	every spring
3127111	Summer School Climate change effects on Northern Ecosystems	5	every summer, except 2021
<b>Courses in genetics and physiology</b>			
3123198	Function of plants in changing environment	8	spring, odd years
3123247	Environmental adaptation of animals	6	spring, odd years
3123196	Genetic Modification of Organisms	5	spring, even years
3123186	Optical Methods in Plant Biology and Environmental Research	5	every autumn
<b>Courses in Biogeochemistry</b>			
3710419	Biogeochemistry	6	spring, odd years

<b>3710451</b>	Bioprocesses in Removal of Environmental Pollutants	3	autumn 2021 for the last time
<b>3710469</b>	Journal Club in Biosphere-Atmosphere Interactions	2-4	continuously
<b>3710455</b>	Stable Isotopes in Environmental Research	5	autumn, odd years
<b>3710474</b>	Soil Ecology	6	spring, even years
<b>Other advanced-level courses</b>			
<b>3710475</b>	Chemicals, Environment and Health	5	every spring
<b>3123195</b>	Sustainable Water Management	5	spring, even years
<b>3710458</b>	Environmental Data Mining	5	every autumn
<b>3710459</b>	Advanced Course on Environmental Data (ADM)	5	every spring
<b>3123112</b>	Research seminar in biology	2	continuously
<b>3123143</b>	Working in Research Group	3-6	continuously
<b>3123138</b>	Practical Training, advanced studies	7-10	continuously

Courses in Forest Sciences accepted as advanced studies in Biology

<b>Code</b>	<b>Course</b>	<b>Cp</b>	
<b>3513175A</b>	Carbon Dynamics of Forest Soils, field course	3	Forest Sciences
<b>3513175B</b>	Carbon Dynamics of Forest Soils, book exam	4	Forest Sciences