

## 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.

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

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).

### ***Curriculum 2019-2021***

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

<b>CODE</b>	<b>COURSE</b>	<b>Cp, ECTS</b>
<b>3121002</b>	<b>Personal Study Plan to MSc degree</b>	1
	<b>Advanced studies in Biology</b> (incl. MSc thesis and maturity test)	80
	<b>Alternative studies</b> (including a minor subject or other studies)	39

*Compulsory advanced studies in biology (at least 80 Cp)*

<b>Advanced studies (biology of environmental change), 80 cp (3123810)</b>		
<b>CODE</b>	<b>COURSE</b>	<b>Cp</b>
<b>3123101</b>	Philosophy and History of Biology	3
<b>3710418</b>	Design of Ecological and Environmental Experiments	4
<b>3123104</b>	MSc thesis	40
<b>3123105</b>	Maturity test in MSc degree	
<b>3123241</b>	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)

<b>CODE</b>	<b>COURSE</b>	<b>CP</b>	<b>SCHEDULE</b>
<b>3122239</b>	Introduction to biology of environmental change	3	Every autumn
<b>3122242</b>	Structure and Function of Plants	3	Every spring

*General courses* recommended for international students (Alternative studies)

<b>CODE</b>	<b>COURSE</b>	<b>CP</b>	<b>SCHEDULE</b>
<b>1131003</b>	Orientation for international students	1	Every autumn
<b>8031003</b>	University study skills	1	Every autumn
<b>8031006</b>	University computing skills	2	Every autumn
<b>8020270</b>	Information skills and Sources in Science for Int. Students	1	Every autumn
<b>8014301</b>	Finnish 1	4	Every autumn
<b>3622111</b>	Basic statistics in English	5	Every autumn

Compulsory and voluntary courses in Biology, that can be included in the advanced studies in Biology and that are organized during study years 2019-21, are listed here. 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*

<b>Code</b>	<b>Name of the course</b>	<b>cp</b>	<b>Schedule</b>
<b>3123101</b>	Philosophy and History of Biology	3	every autumn
<b>3710418</b>	Design of Ecological and Environmental Experiments	4	every spring
<b>Courses in Environmental Ecology</b>			
<b>3123172</b>	Advanced Taxonomic Collection	2-6	continuously
<b>3710486</b>	Chemical Ecology	5	autumn, odd years
<b>3123190</b>	Community Ecology	4	autumn, even years
<b>3123244</b>	Contemporary Evolution and Behavioural Ecology	3	autumn, odd years
<b>3123175</b>	Current Issues in Aquatic Ecotoxicology	2	autumn, odd years
<b>3710462</b>	Ecological Risk Assessment	5	every spring
<b>3123158</b>	Ecology of Tropical Africa	3	spring, odd years
<b>3710485</b>	Entomology	4	autumn, even years
<b>3123243</b>	Exercises in Fish and Fisheries Biology	4	spring, odd years
<b>3123242</b>	Fish and Fisheries Biology	4	autumn, even years
<b>3123194</b>	Global Peatland Ecology	3	autumn, odd years
<b>3123169</b>	Literature Report in Hydrobiology	3	continuously
<b>3127111</b>	Summer School Climate change effects on Northern Ecosystems	5	every summer
<b>Courses in genetics and physiology</b>			
<b>3123198</b>	Function of plants in changing environment	8	spring, odd years
<b>3123247</b>	Environmental adaptation of animals	6	spring, odd years
<b>3123248</b>	Neurophysiology	6	autumn, odd years

<b>3123196</b>	Genetic Modification of Organisms	5	spring, even years
<b>3123186</b>	Optical Methods in Plant Biology and Environmental Research	5	autumn, even years
<b>3710484</b>	Systems Biology and Environmental Bioinformatics	5	spring, odd years
<b>Courses in Biogeochemistry</b>			
<b>3710419</b>	Biogeochemistry	6	spring, odd years
<b>3710451</b>	Bioprocesses in Removal of Environmental Pollutants	3	autumn, odd years
<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>Other advanced-level courses</b>			
<b>3710475</b>	Chemicals, Environment and Health	5	every spring,
<b>3123195</b>	Sustainable Water Management		spring, even years
<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>Name of the 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