Autumn semester, 2019-2020

Cooordinator	
Credits	3 ESTC credits (108 hours)
Lecturers	**Irina Bezkorovaynaya** (Siberian Federal University, Russia)
Level	BSc students
Host institution	**SiberianFederalUniversity**, School of Ecology and Geography
Course duration	September – December 2019

Summary
The influence of soil processes and soil biota on global changes, especially in relation to global greenhouse gases and carbon cycle, necessitates knowledge of biological diversity and functions of soil biota. The course covers the main approaches to the study of primary and secondary production in soils.
Special attention will be paid to the functioning of soil biota in permafrost soils.

Target student audiences
BSc students in ecology and environmental management

Prerequisites
Required courses (or equivalents):
Biology
Ecology
Soil Science

Aims and objectives
Aims:
The goals of this course is to review the theoretical foundations of soil ecology and identify the features of soil biological processes in cryogenic ecosystems.
Course objectives:
1. To give theoretical foundations of soil ecology.
2. To analyze role of soil biota in the functioning of cryogenic ecosystems.
3. To give a comprehensive overview of modern approaches to study biological processes in soils.

General learning outcomes:
By the end of the course, successful students will:
- know the fundamentals of soil ecology;
- know the place and role of soil biota in the functioning of cryogenic ecosystems;
- be able to analyze data on primary and secondary production processes in soils.

Overview of sessions and teaching methods
The course will include classroom and distance training using e-learning technologies.
The lessons in the audience will include lecture, interactive technologies, such as group work, discussions and the mini-conference.
During the self-studying according to practical lessons students should read, make notes of the publications proposed by the teacher, and be ready to discuss given topics.

Course workload
The table below summarizes course workload distribution:

Activities	Learning outcomes	Assessment	Estimated workload (hours)
In-class activities			
Lectures	Knowledge of theory, concepts, methodology of soil ecology	Class participation	16
Moderated in-class discussions	Understanding the place and role of soil biota in the functioning of cryogenic ecosystems; - be able to analyze data on primary and secondary production processes in soils.	Class participation and preparedness for discussions	8
In-class assignments for group work	The ability of successful communication to address issues related to the assessment of the role of soil biota in the functioning of cryogenic ecosystems	Class participation and preparedness for assignments	8
Independent work			
Preparation of a presentation for discussion at the mini-conference	The ability to competently and effectively present the material to the audience and enter into a discussion	Presentation quality	16
Performance of control tasks on the on the e-learning course	Knowledge the fundamentals of soil ecology and be able to analyze data on primary and secondary production processes in soils	Completed task on the e-learning course	28
Reading and discussion of assigned papers for seminars and preparation for lectures	Familiarity with and ability to critically and creatively discuss key concepts, tools and methods as presented in the literature	Class participation, creative and active contribution to discussion	32
Total			***108***

Grading

The students' performance will be based on the following:
Each student performs home assignment on the e-learning course - 20% of points.
At each seminar, students perform personal or group assignments - 60% of points.
The final presentation on mini-conference will be presented at the end of the course - 20% of the total points.

Course schedule

Day	Time	Topic	Lecturer
		Lecture: Introduction to soil ecology	
		Seminar: The fitness of the soil environment	
		Lecture: Soil biota diversity	
		Seminar: Soil microbes and soil fauna: diversity and function	

		Lecture: Primery production processes in soils. Methods of sampling	
		Seminar: Primery production processes in permafrost soils. Methods of sampling	
		Lecture: Secondary production in soils: activities of heterotrophic organisms	
		Seminar: Secondary production in permafrost soils: activities of heterotrophic organisms	
		Lecture: Techniques for measuring microbial production and turnover	
		Seminar: Techniques for measuring microbial production and turnover	
		Lecture: Role of soil biota in organic matter dynamics in cryogenic ecosystems	
		Seminar: Effects of soil biota on plant residues breakdown	
		Lecture: Soil biota and nutrient cycling in cryogenic ecosystems	
		Seminar: Decomposition and nutrient cycling in Siberian cryogenic ecosystems	
		Lecture: Applied soil biology in cryogenic ecosystems	
		Seminar: Applied soil biology in cryogenic ecosystems	

Literature

Coleman, D. C., Callaham, M. A., & Crossley Jr, D. A. (2017).Fundamentals of soil ecology. Academic press. ISBN: 978-0-12-805251-8

Lavelle, P., & Spain, A. V. (2001). Soil ecology. Springer Science & Business Media. ISBN: 0-306-48162-6

Soil Atlas of the Northern Circumpolar Region https://esdac.jrc.ec.europa.eu/content/soil-atlas-northern-circumpolar-region

Global soil biodiversity atlas https://www.globalsoilbiodiversity.org/atlas-introduction