COURSE DESCRIPTION

Course code	Volume in ECTS credits	Institution	Faculty	Department
MIŠ8010	7	ŽŪA VDU	MEF	AEI

Course title in Lithuanian

Ekosistemų evoliucija ir ekologija

Course title in English

Ecosystems evolution and ecology

Study methods	Volume in ECTS credits
Lectures	1
Consultations	4
Seminars	1
Individual work	1

Short course annotation in Lithuanian (up to 500 characters)

Ekosistemų evoliucija ir ekologija dalyko studijos skirtos Aplinkos ir ekologijos mokslo krypties doktorantams. Studijuodami šį dalyką doktorantai pagilins žinias apie ekosistemas, jų evoliuciją bei bioįvairovę, regionine lokalizacija, ekologinių sąlygų specifika bei keliamomis aplinkosauginėmis problemomis globaliu ir lokaliu mastu; ekosistemų gamtosaugos prasmę ir perspektyvas kintant klimatui; geokosminių ir antropogeninių veiksnių įtaką ekosistemų homeostazei bei išlikimui; pritaikyti ekosistemų ekologijos žinias natūralių ir žmogaus sukurtų ekosistemų valdymui; tausoti gamtinius resursus bei bioįvairovę kaip vieningą sistemą.

Short course annotation in English (up to 500 characters)

Course Ecosystems evolution and ecology assigned for PhD studies of Environment and ecology scientific direction. The studies of this subject will provide PhD students with deeper knowledge of ecosystems, their evolution and biodiversity, regional localization, specifics of ecological conditions and environmental problems on a global and local scale; the meaning and prospects of ecosystem conservation in climate change; influence of geocosmic and anthropogenic factors on homeostasis and survival of ecosystems; to adapt ecosystem knowledge for the management of natural and man-made ecosystems; to conserve natural resources and biodiversity as a unified system.

Relevance of the course

Evolution and ecology of ecosystems is relevant for PhD students in the field of Environment and Ecology to achieve their deeper competitions and knowledge about ecosystems and their formation.

Course aims

To assess of the state of ecosystems in a globally changing biosphere; to evaluate the conditions of origin and basic structures of the different ecosystems; to evaluate the impact of various environmental reasons on the stability of the environment - vegetation system; to define the value of ecosystem homeostasis and its changes; to evaluate energy metabolism and influence of anthropogenic factors on ecosystem survival; to adapt ecosystem knowledge for the management of natural and man-made ecosystems; to conserve natural resources (soil, water, air) and their biodiversity as a integrated system.

Content (topics) and methods

Introduction to Ecosystem Evolution and Ecology. Geological time scale. Methods of Reconstruction. Dating methods. Genetic identification of the development of organisms and ecosystems. DNA potential in evolution research. DNA capture, storage and extraction. Other fossil biomolecules and chemical constituents; stable carbon isotope (13C) method for fossil analysis.

Geological evidence of the evolution and evolution of ecosystems and organisms. Environmental and climate change in geological stages of ecosystem development. Evolution of ecosystems and biogeographical distribution. Five historical mass extinctions, the reasons and the survival of

populations. The sixth mass extinction, its reasons.
First forms of life in the primary environment. Early Environment on the Earth. Accumulation of organic matter and the emergence of a cell. First prokaryotes, their geological evidence. Eukaryotes evolution.
Colonisation of land. Changes in the environment during Cambrian and Ordovic (543-443 MY). Fossil evidence of the first terrestrial plants. Organizational adaptations. Evolution directions: from green algae to terrestrial plants; biogeographic distribution of first terrestrial plants in late Silurian-Early Devon (approx. 430-390 MY)
First forests. The major changes in the environment lasted from the middle Devon to the late Carbon (~ 395-290 million). Land conditions for plant adaptation between Middle Devon and Late Carbon (~ 395-290 MY). The oldest tree fossils. Biogeographic distribution of vegetation in Carbone (354-290 MY).
The emergence of seed plants. Changes in environment in Perm (290-248 MY). Biogeographic distribution of vegetation in Perm (267-264 MY). Coniferous expansion. Biogeographic distribution of vegetation in the Jura (206-180 MY).
Origin of flowering plants. First colonies of the Angiosperm. The environment and spread of the first colonies. Why so late? Direction of Evolution: From Gymnosperm to Angiosperm? Biogeographic distribution of vegetation in late Crete (~ 84-65 MY).
Cainozoic (65 MY). environmental changes in the last 65 MY (Tertiary and Quarter). Biogeographic distribution of vegetation 60 - 50 MY (late Palaeocene-Early Eocene). Evolution of herbaceous species. Deforestation and spread of arid vegetation. Biogeographic distribution of vegetation between 34-25 MY(Oligocene). Type C4 and CAM photosynthesis and plant evolution. Biogeographic spread of vegetation before 11.2-5.3 MY (late Miocene).
- reading lectures;
- consultations (lectures can be read in case of sufficient number of PhD students)

Structure of cumulative score and value of its constituent parts

A ten-point scale and cumulative scoring scheme are applied. Self-study assignments (report on selected topic) are graded, final assessment is determined by examinations, multiplication of intermediate evaluations by weighting and product summing.

Compulsory reference materials

No.	Authors of publication, title, publishing house, year of publication.
1.	Begon M., Townsend C. R., Harper J. L. 2005. Ecology – From Individuals to Ecosystems, 4th ed., Blackwell Publishing, Oxford, 738.
2.	Behrensmeyer AK., Damuth J, DiMichele W, Potts R, Sues H, Wing S. 1993. Terrestrial Ecosystems Through Time:Evolutionary Paleoecology of Terrestrial Plants and Animals. University of Chicago Press. 568.
3.	Brandon R. N. 1996. Concepts and Methods in Evolutionary Biology. Cambridge: Cambridge University Press, 458.
4.	Grime JPh., Pierce FRS S. 2012. The Evolutionary Strategies that Shape Ecosystems. Wiley-Blackwell, 263.
5.	Ingrouille M., Eddie W. 2006. Plants: Evolution and Diversity. Cambridge University Press. 458.
6.	Rauchfuss H. 2008. Chemical Evolution and the Origin of Life. Springer-Verlag Berlin Heidelberg. 354.
7.	Willis KJ, McElwain. 2002.The evolution of plants. Oxford university press, 195.

Supplementary reference materials

No.	Authors of publication, title, publishing house, year of publication.
1.	Allison S. K. 2012. Ecological Restoration and Environmental Change: Renewing Damaged Ecosystems., Routledge, 252.
2.	Archibold, O.W. 1995. Ecology of World Vegetation. Springer Netherlands, 510.
3.	Bissonette J.A., Storch I. 2003. Landscape ecology and resource management: linking theory

	with practice. 463.
4.	Goldammer, Johann G. Fire in Ecosystems of Boreal Eurasia Forestry sciences. Dordrecht a.o. : Kluwer Academic Publishers, 1996. 528.
5.	Sinclair, Anthony Ronald Entrican. 2006. Wildlife ecology, conservation, and management. Oxford. 469.
6.	Kabailienė M., Radzevičius S. 2011. Paleontologija. Vilniaus Un. 530.

Course programme designed by

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