UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Biogeography

2324-1-F0601Q111

Aims

Biogeography is a fascinating science of synthesis that combines knowledge from various other scientific fields, even genetics or paleontology, in addition to the physiological and ecological aspects of organisms. Biogeography means studying the distribution of living beings in time and space, also investigating their causes. It is a very intriguing science that allows one to face modern issues and reach various parts of the world both far and near. The student may also be interested in this teaching because it allows one to develop an overview of various disciplines, to further understand the temporal and spatial projections of the various biological mechanisms.

1. Knowledge and understanding. The student will gain knowledge of the distribution patterns of organisms in space and time, and will be able to explain the historical and ecological factors identified as driver of such patterns.
2. Applying knowledge and understanding. The student will be able to apply the knowledge reported under 1. to biogeographical case studies.
3. Making judgements. The student will be able to process the acquired knowledge towards the explanation of the distribution patterns of extinct and extant biota.
4. Communication skills. Use of an appropriate scientific/chemical vocabulary and ability in oral reports.
5. Learning skills. Skills in literature reading and understanding, skills in the elaboration of interconnections among the course-related knowledge and other subjects related to biological evolution and ecology.

Contents

The course will deal with the study of organism distribution in an integrated and multi-level way. The teaching is based on the three main strands of Biogeography, namely ecological biogeography, historical biogeography, systematic biogeography, and also deals with aspects related to evolution, speciation, conservation, the life history, islands and the distribution of organisms.

Detailed program

Notes on historical biogeographic topics and approaches. Concepts of species and biological mechanisms of speciation, diversification and radiation, extinction. Area, sink and source, barrier, corridor, dispersion, diffusion, migration. Discontinuity and disjointed distributions, endemism. Distribution range dynamics, range and population density, niche movements. Biodiversity hot-spots. Genetic mechanisms of populations (Genetic drift, selection, geographic mosaic, founder effect, bottleneck, genetic migration, introgression, hybrid zone). Small populations (inbreeding, selection). Global terrestrial and aquatic limiting factors (climate, water bodies). Latitudinal and altitudinal distribution of biodiversity, biological characteristics (traits) and distribution range, interactions between species. Terrestrial and aquatic biomes, and adaptations. History of life (Hadean-Pleistocene), palaeontological and palaeoclimatic aspects. Tectonic movements and "recent" climate changes and impact on biota. Islands: composition of biotic communities, colonizations and adaptations, variations of phenotypic traits. Peculiarities of island biota. Theory of island biogeography, subsequent updates, small-island effects, species-energy theory. Speciation in the islands. Island communities through time: Rakata, Hawaii. Historical biogeography: evolutionary and center of origin, refuge, phylogenetic, vicariantist approaches. Case studies. Phylogeography and categories of phylogeographic models. Biogeography of conservation, "lack of wallace", criteria for conservation. Systematic biogeography and biogeographic regions, chorology, main European chorologies, lower rank biogeographic areas with focus on Italy. Hints on alien species. Educational seminars on phylogeny, phylogeography of characteristic Italian species, pollination in the islands, biogeography of corals.

Prerequisites

The main concepts of Ecology are of fundamental importance, and the basic concepts of Zoology, Botany and Biological Evolution are also necessary. Propaedeutic teachings: None

Teaching form

Lectures in classroom supported by multimedia presentations, scientific articles for recent case studies, didactic seminars by experts.

Textbook and teaching resource

The entire teaching material used in the lectures will be made available to students in pdf and via the e-learning platform (presentations and articles).

Textbooks (suggested)
Zunino M., Zullini A. 2004. Biogeografia. La dimensione spaziale dell'evoluzione. Casa Editrice Ambrosiana, 374 pp.
Lomolino, M.V., Riddle, B.R. and Whittaker, R.J. 2017. Biogeography, 5th Edition. Oxford University Press, 754 pp.

Semester

Fall semester

Assessment method

Oral test that will begin with the critical discussion of a scientific article, previously agreed between student and lecturer, concerning the topics covered in the teaching. The assessment of the topics included in the teaching program will therefore take place. During the test, the student must demonstrate the ability to connect the various topics covered in the course to each other. During the oral test, the student must demonstrate the ability to clearly expose the knowledge acquired, demonstrating the complete understanding and showing properties of language.
The presentation of the article can be anticipated and take place during the lessons so that it is useful as a presentation of case studies.

Office hours

On appointment. Please write to the lecturer directly by email.

Sustainable Development Goals

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