UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Biogeography

2526-1-F0602Q111

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 come to know the distribution patterns of organisms in space and time; She or he will be able to explain what historical, biological and ecological factors have been identified to explain these patterns.
2. Applying knowledge and understanding skills. Upon completion of the course, the student will be able to understand scientific works in the biogeographical field, including methodological details, and to apply the knowledge in an operational environment and to case studies in the biogeographical field.
3. Making judgment. The student should be able to process what has been learned and be able to recognize situations and problems in which the principles explained in the course can be used to explain the geographical distribution of current to past living through the analysis of case studies and in-depth study of the theory and examples shown in class. Individual in-depth activities (e.g., responding to surveys in light of experience or critical reflection) are carried out in class.
4. Communication skills. At the end of the teaching, the student or student will be able to express himself or herself appropriately in describing the issues addressed with propriety of language and confidence of exposition, thanks to the first-person writing and presentation of a case study from the literature, as well as having prepared for the examination appropriately in this regard by, for example, composing the terms used in class. In addition, during group discussion following individual activities, it will be possible to practice communication in the field.
5. Learn skills. By the end of the teaching, the student will be able to consult the literature on the topics covered and will be able to analyze, apply, integrate and connect the knowledge acquired with what will be learned in related teaching in biological evolution and ecology. The lecturer will provide both specially prepared lecture materials, literature and books to supplement the topics covered and actively answer

questions raised in class.

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

Outlines of historical biogeographic issues and approaches. Species concepts and biological mechanisms of speciation, diversification and radiation, extinction. Areal, sink and source, barrier, corridor, dispersal, diffusion, migration. Methodologies for estimating ranges. Discontinuity and disjunct distributions, endemism. Range dynamics, range population density and niche shifts. Biodiversity hot-spots. Global terrestrial and aquatic limiting factors (climate, water). Latitudinal and altitudinal distribution of biodiversity, biological and range characteristics, and species interactions. Terrestrial and aquatic biomes, and adaptations. Life history (Hadean-Pleistocene) and paleobiogeographic aspects, major tectonic movements and impact on biota. Islands: composition of biotic communities, colonization and adaptations, variations in phenotypic traits. Peculiarities of island biota. Insularity theory, subsequent updates, small island theory, species-energy theory. Speciation in islands. Island communities over time. Historical biogeography: evolutionary and center of origin, refuge, phylogenetic, vicariant. Phylogeography and categories of phylogeographic models. Conservation biogeography, “lack of wallace,” criteria for conservation. Systematic biogeography and biogeographic regions, chorology, major European chorologies, lower-ranking biogeographic areas with focus on italy. Hints on alien species. Educational seminars on phylogeny, pollination in islands, coral biogeography.

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.

- 19 2-hour lessons held in person.
- 2 lessons of 2 hours held in interactive mode in person.

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

Spring 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.

Evaluation Criteria: evaluation of scientific and technical knowledge regarding the subjects, critical and individual reworking skills of experimental problems assigned by teachers, communication and reasoning skills, correct use of technical language.

There are no in-itinere exams planned.

Office hours

On appointment. Please write to the lecturer directly by email: paolo.biella@unimib.it

Sustainable Development Goals

LIFE ON LAND