UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Ecology

2627-2-F4902N020

Learning objectives

This course is a comprehensive introduction to ecology. Students will be introduced to the types of questions asked by ecologists and the methods that are used to answer ecological questions. Particular emphasis will be paid to population, community, and ecosystem level processes. Both terrestrial and aquatic systems will be considered. The ability to understand the environment and evaluate environmental perspectives, Biomes, Biodiversity, Restoration and environmental management will be developed. Anthropocene. Ecotourism. Applying Knowledge and understanding: the course will deepen the principal concepts and theories that guide ecological inquiry. Making judgments: Collect and interpret the relevant ecological data. Communication skills: the course aims to provide the skills to communicate effectively, appropriately and with specific language, the concepts learned during the course. Learning skills: At the end of the course the student must be able to study in depth the topics covered in the course, also by consulting specific bibliography texts.

Contents

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Definitions of ecology, Autoecology-synecology, Unitary organisms, Modular organisms, populations, metapopulation, Community, ecosystems, biomes, Biosphere, Ecological factors: condition and resources, Population dynamics, Predation, Symbiosis and mutualism, coprophagous, Parasitism, Intraspecific competition, Demography, Community, Primary and secondary succession, Climax, Energy flows in ecosystems, Biogeochemical cycles, Theory of insular biogeography, The Anthropocene, Nature Conservation, Landscape ecology, Climate, biomes, Gaia hypothesis of Lovelock. Approach to techniques for society involving (Citizen Science, Citizen Engagement e Open Science).

Detailed program

Definitions of ecology (Haeckel, Krebs, Begon, Odum), Autoecology and synecology, Unitary organisms, Modular organisms, populations, metapopulation, Community, ecosystems, biomes, Biosphere, Biosphere 2, Ecological factors: abiotic and biotic, Ecological factors: condition and resource, Definition of limiting factor, Biological success in function of the ecological factor. Consumable and exhaustible resources: Essential resources, Perfectly replaceable resources, Complementary resources, Antagonistic resources, Acclimatization, lethargy, Hibernation, Strategies implemented by organisms to survive adverse events, cryptobiosis, diapause, migration, Biological forms of plants: fanerophytes, camephites, hemicriptophytes, geophytes, therophytes, Definition of ecological niche, Fundamental niche and realized niche, , Principle of exclusion of Gauss, Guild, Ecological equivalents, Ecological niche determined by both biotic and abiotic factors, Population dynamics, Method of capture and recapture of Peterson (estimation of population density), Populations Density, Births, Mortality, Predation, Symbiosis and mutualism, Saprophytes, Coprophagous, Parasitism, Succession (pioneer and late species), Primary and secondary succession, Climax (monoclimax and policlimax), Energy flows in ecosystems, Gross primary productivity and net primary productivity, Net productivity of the community, Secondary productivity, Ecological pyramids of number, biomass and energy, Reverse pyramids of number and biomass, Biogeochemical cycles, Carbon cycle, Phosphorus cycle, The phenomenon of eutrophication, Nitrogen cycle, Pollution and recovery, Biodiversity, Theory of insular biogeography, Immigration rate according to the number of resident species, Rate of extinction depending on the number of resident species, Experimental data supporting biogeographic theory, Parks like ecological islands, Conservation of nature, Management of animal and plant resources, Production Optimum (Maximum Sustainable Production), System of fixed quotas in the unit of time, Variable quote system, Withdrawal effort, Regulated escape, Climate, Climogramma, biomes, Arctic tundra, Alpine tundra, Forests of conifers (taiga, mountain forests), Temperate forests, Prairies (steppe), Savana (biomass variation in relation to fire, animal biomass in relation to water availability), Deserts, Tropical rainforests, Gaia hypothesis of Lovelock. Recovery and management of environment, Antropocene: concept, implication, transdipliscinarity; Landscape and landscape ecology: concept, innovative role of landscape ecology, landscape monitoring, Ecosystem services and ecological economy, history of Ecology in Europe. Ecotourism.

Prerequisites

no Prerequisites

Teaching methods

The course consists of 58 hours, of which approximately 50% with didactic teaching (frontal lessons with the use of slides, audio and video) and 50% with interactive teaching (exercises, subgroup work, presentation of case studies starting from which to develop individual and subgroup work, prepared and discussed during the course). In particular:
• Frontal lessons for 13 hours (4 CFU)
• Field trips for 10 hours (1 CFU)
• Pratical Laboratory for 10 hours (1 CFU)
• Exercice Laboratory for 10 hours (1 CFU)

Assessment methods

Oral examination concerning the topics treated in the Lessons, laboratory and field experiences.
There are no intermediate tests.
The purpose of the exam is to verify the acquired competencies, the ability to create connections between the

different topics studied. The explain capacity and the language style will also be evaluated. Minimum score to pass the exam: 18/30.

Textbooks and Reading Materials

Recomended text books:
-FONDAMENTI DI ECOLOGIA, CUNNIGHAM W. P., CUNNIGHAM M.A.,SAIGO B.W., MC GRAW HILL.
-ECOLOGIA APPLICATA, CUNNIGHAM W. P., CUNNIGHAM M.A.,SAIGO B.W., MC GRAW HILL.
-ELEMENTI DI ECOLOGIA, THOMAS SMITH, ROBERT SMITH, NONA EDIZIONE, PEARSON EDITORE.

Sustainable Development Goals

SUSTAINABLE CITIES AND COMMUNITIES | RESPONSIBLE CONSUMPTION AND PRODUCTION | CLIMATE ACTION | LIFE BELOW WATER | LIFE ON LAND