UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Marine Ecology

2425-1-F7502Q004-F7502Q005M

Aims

This course examines biological aspects of ocean ecosystems and the physical processes that regulate them. Topics include the distributions, abundances, and interactions of marine organisms; interactions between organisms and the transformation and flux of energy and matter in marine ecosystems; and aspects of physiology related to marine species distributions, abundances and roles. Lectures facilitate understanding 1) the complex nature of the process that affect and control marine biodiversity; 2) become familiar with multiple definitions and measures of marine biodiversity; 3) identify threats to marine biodiversity and what mechanisms are developing to identify and manage biodiversity loss; 4) of the impact and rapid spread of non-indigenous marine species, methods of introduction and spread, and current control measures; 5) gain knowledge of how major fisheries management programs relate to biodiversity loss and conservation. 6) measure the success/failure of current action strategies, such as Marine Protected Areas, by applying lessons learned and incorporation of emerging methods and data sources

Contents

Introduction to Marine Biodiversity; Biodiversity of Plankton, Benthos and Nekton; Spatial and Temporal Patterns of Marine Biodiversity; Global threats and for global Biodiversity and Anthropogenic Impacts; Coral Reef's biodiversity; Marine fisheries and Biodiversity.

Detailed program

1- Introduction to Marine Biodiversity

Definition of Biodiversity , Who “owns” Biodiversity? How is it measured and why is it important: Genetic diversity;

how is it defined/measured? genes, populations; Species diversity; how is it defined/measured?; Ecosystem diversity; Functional diversity; The magnitude of the known marine biodiversity

2- Marine Biodiversity – Plankton, benthos, nekton

Planktonic diversity classification by size, distribution, lifestyle, general description of the realm, major taxa, magnitude of diversity and biodiversity functioning; Benthos diversity classification by size, distribution, habitat, lifestyle, feeding behaviour. General description of the realm, major taxa, magnitude of diversity and biodiversity functioning; Nekton diversity classification by, size, distribution, habitat, lifestyle, feeding behaviour. General description of the realm, major taxa, magnitude of diversity and biodiversity functioning

3- Spatial and Temporal pattern of Marine Biodiversity and Conservation of the Ocean

Spatial and temporal patterns

Factor in Biodiversity (speciation-extinction); Biogeographic factors; Major gradient of species diversity (latitudinal, longitudinal, bathymetric); Explanation of regional diversity differences; Expansion and Extinction in the Past; How extinctions change biodiversity: (a) Two kinds of extinctions; natural, induced – extinction rate-(b) The implications of extinction-(c) Earth's past mass extinction events - (d) The current mass extinction event - (e) Generalizations we can draw from past extinction events

Conservation of marine biodiversity

Value of Marine Biodiversity; Why is important? Ecosystem function and services; The shifting baseline concept; What is an endangered species; The IUCN red list; CITES; Conservation strategies (MPAs)

4- Global Threats for Global Biodiversity and Anthropogenic Impacts

Threats to Marine Biodiversity

Human effects on Marine Environment; Pollution (toxic metals, pesticides, herbicides); the problem of the Plastic; Biological Invasion; Nutrients and Eutrophication; Global Environmental Change and the Ocean

The Hidden Diversity of the Coral Reef

The Holobiont (members and habitats); The coral probiotic Hypothesis; The Hologenome theory of evolution; The coral Symbiome; Impact of Environmental stress on the coral Symbiome

The coral diseases

Terminology and definitions; History and actual distribution; Koch’s postulates; Skeleton Eroding Band, Brown Band Disease, White Syndrome, Ulcerative White Spot, Black Band Disease, Tumors; Divers of coral disease outbreaks; Vectors and Reservoirs; Management issue and Actions

5- Marine Fisheries and Biodiversity

Fisheries and food from the Sea

What is a fishery; Stock - a key concept; Fishing techniques and their effects (Longline fishery, Purse seine, Trawls, Gill nets); Magnitude and Impacts

Marine Fisheries and Biodiversity – Overfishing

Definitions; Vulnerable resource species; The case: Terranova Grand banks; The impact of the overfishing; The case of Tuna fisheries; The waste; The food fraud; Illegality: shark finning, flag of convenience, IUU definitions

Marine Fisheries and Biodiversity – Fishing Management

Aged-based population; Closures and quotas- quotas and Individual transferable quotas; Mariculture; MPAs;

The roles of consumers

Prerequisites

no

Teaching form

- Lessons: 4 credits, 28 h (14 lessons of 2h each), Delivered Didactics, DE
- Tutorials: 2 credits, 24 h (12 lessons of 2h each), Interactive Teaching, DI

Textbook and teaching resource

- Power point presentations

- Marine Biology: Function, Biodiversity, Ecology (3°edition). Jeffrey S. Levinton, Oxford University Press

- Marine Ecology: Processes, Systems, and Impacts (2° edition). Michel J. Kaiser et al., Oxford University Press

- Scientific Papers

Semester

first semester

Assessment method

oral examination based on:

- power point presentation of a scientific article

- questions related to the presentation

- questions related to the course

Office hours

monday 8:30-10:30

Sustainable Development Goals

LIFE BELOW WATER