UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Marine Ecology

2627-1-F7504Q002-F7504Q00202

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; aspects of physiology related to marine species distributions, abundances and roles; characteristics of some of the main marine ecosystems.

The students should become able to understand the ecological principles and processes that regulate the distribution of marine organisms in different ecosystems and the biological relationships between organisms and habitats, as well as to know the main marine ecosystems (DdD1). The course module will also allow students to contextualize, understand and evaluate, from an ecological point of view, a marine environment (DdD3). The final oral exam will also aim to strengthen their communication skills (DdD4) and their ability to present scientific data (DdD5).

Contents

Processes of Marine Organisms and Systems, Primary Production in Marine Environments, Structure and Dynamics of Marine Communities, Functioning of Marine Ecosystems

Detailed program

**Processes in Marine Ecosystem

Ecological and Evolutionary Principles of Marine Biology

Ecological interactions; Interactions on the scale of individuals; The population level; The community level: structure and interspecies interactions; The ecosystem level

The Chemical and Physical Environment

Measures of physiological performance; Temperature; Salinity; Oxygen; Light

Reproduction, Dispersal, and Migration

Ecological and evolutionary factors in sex; Reproduction, demography, and life cycles; Migration; Larval dispersal at different scales

Primary Production Process and Critical Factors in Plankton Abundance

Photosynthetic marine organisms; Light and photosynthesis; Patchiness of the plankton; The seasonal pattern of plankton abundance; Water column parameters and the spring diatom increase; Nutrients required by phytoplankton; Rate of nutrient uptake; Harmful algal blooms; Phytoplankton succession and the paradox of phytoplankton coexistence; Global trend of primary production; Measuring primary productivity; Zooplankton grazing in the sea

**Systems in Marine Ecosystem

Seagrass Meadows

Morphology; Adaptations to marine life; Distribution, taxonomy and evolution; Factors affecting growth; Succession; Seagrass Ecology and Functions; Seagrass grazing; Decline of seagrasses and restoration

Mangrove Forests

Classification; Zonation; Adaptations and reproduction; Associated organisms; Functions and services; Impacts on mangrove forests

Coral Reefs

Coral polyp; Symbiosis with zooxanthellae and calcification; Coral growth and reproduction; Factors limiting the growth; Distribution of coral reefs; Coral reef development and types; Zonation; Biological interactions in coral reef ecosystem; Bioerosion and corallivory

The Water Column: Marine Vertebrates and Other Nekton

Cephalopods; Fish; Mammals; Marine birds and reptiles

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. The aim is to assess the capacity to analyse the dataset and the ability to interpret, synthetise and communicate in a power point presentation the results of the case study

- questions related to the course. 3 or more questions related to the scientific themes addressed in class. During the exam, the teacher will evaluate the knowledge of the relevant information provided in the course, the ability to correlate the information obtained from different archives and the capacity to explain clearly and with an appropriate terminology the themes of the course.

The final grade will be in /30.

Office hours

monday 8:30-10:30

Sustainable Development Goals

LIFE BELOW WATER