



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## SYLLABUS DEL CORSO

### Marine Ecology

2122-1-F7502Q004-F7502Q005M

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#### 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

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

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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
- Tutorials: 2 credits

During the COVID-19 restrictions the lessons will be recorded and available online, with some live events that will be planned and communicated on e-learning

## **Textbook and teaching resource**

Lesson slides (power point presentations)

Textbook: Marine Biology: Function, Biodiversity, Ecology (3<sup>rd</sup> edition). Jeffrey S. Levinton, Oxford University Press

Textbook: Marine Ecology: Processes, Systems, and Impacts (2<sup>nd</sup> edition). Michel J. Kaiser et al., Oxford University Press

Scientific Papers

## **Semester**

**Period:** first semester

## **Assessment method**

Online Oral examination (18-30/30)

During the Covid-19 restrictions the oral exams will be exclusively through the WebEx platform. A public link will be posted on the e-learning page for the access of virtual public

## **Office hours**

Monday 10.30-12.30

