



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## SYLLABUS DEL CORSO

### Biodiversity

2526-1-F7504Q002-F7504Q00201

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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

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**

14 two-hour lectures, in person, Delivered Didactics - DE

12 two-hour lectures, in person, Interactive teaching - DI

## **Textbook and teaching resource**

### **- Power point presentations**

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

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

- Scientific Papers

## **Semester**

first semester

## **Assessment method**

The exam will be composed of a 10 min (max) power point presentation of a scientific article and an oral examination of the topics covered during the course.

During the oral exam, the understanding of the topics covered in class will be assessed through both general and specific questions, as well as the ability to make connections between concepts, think critically, and use appropriate scientific language

In particular there will be questions related to:

- questions related to the presentation (INTERVIEW)
- questions related to the course (INTERVIEW)

Mark range: 18-30/30

### **Office hours**

monday 8:30-10:30

### **Sustainable Development Goals**

LIFE BELOW WATER

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