



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## COURSE SYLLABUS

### Analysis and Management of Animal Biodiversity

2324-1-F0601Q112

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#### Aims

This course examines the definitions, patterns, estimates and conservation of animal biodiversity. Topics include planning a biodiversity research, techniques and analyses to be used to study animal biodiversity, conservation biology and genetics, threats to biodiversity, instruments to manage, preserve and restore animal biodiversity.

#### Contents

Definitions and estimates of biodiversity, instruments and techniques to study and preserve animal biodiversity, conservation biology and genetics.

#### Detailed program

##### **What is the biological diversity.**

Introduction and structure of the course. Definitions of biodiversity from genes to ecosystems and functional biodiversity. Measuring biodiversity.

##### **Patterns of biodiversity.**

The magnitude of the known animal biodiversity. Temporal and spatial patterns of animal biodiversity. Biodiversity hotspots.

##### **Threats to animal biodiversity.**

Human impacts and their effect on animal biodiversity. Habitat degradation, loss, and fragmentation. Pollution. Overexploitation. Invasive species and diseases. Global climate change.

**Biodiversity, ecosystem functioning and services.**

Contribution of animal biodiversity to ecosystem functioning and ecosystem services. The value of biodiversity and ecosystem services.

**Planning a biodiversity research and sampling.**

Planning a biodiversity research. Sampling strategies. Monitoring and sampling techniques.

**Phenotypic and genetic variation.**

Phenotypic diversity. Genetic diversity from chromosomes to single nucleotide polymorphisms.

**Nucleic acid sequencing.**

Nucleic acid extraction. Sequencing technologies from first to third generation sequencing. Sequencing methodologies including whole genome sequencing, reduced representation sequencing, transcriptomics and other 'omics'.

**Phylogenetic inference.**

Theory and definitions. Methods for reconstructing phylogenies. Application of phylogenetics in animal biodiversity studies.

**Population-level variation.**

Introduction to population genetics. The Hardy-Weinberg principle and deviations from its assumptions. Genetic drift. Effective population size. Natural selection. Population subdivision. Gametic disequilibrium.

**Evolutionary responses to impacts.**

Hybridization, invasive species, exploited populations, and climate change.

**Conservation genetics.**

Inbreeding depression. Demography and extinction. Population connectivity. Conservation breeding and restoration. Genetic identification and monitoring. Conservation units.

**Conservation planning and prioritization.**

Species level conservation and the IUCN Red List. Site level conservation and protected areas. Ecosystem management. Animal conservation in urban landscapes. Restoration.

**Legal framework of conservation biology.**

Environmental laws and policies at the International and national level.

**Seminars and case studies.****Prerequisites**

None

**Teaching form**

Frontal lessons

## **Textbook and teaching resource**

PowerPoint Slides

Scientific Papers

Conservation Biology: Foundations, Concepts, Applications (3rd Edition). Fred Van Dyke, Rachel L. Lamb. Springer

Conservation and the Genomics of Populations (3rd Edition). Fred W. Allendorf et al. Oxford University Press

## **Semester**

First semester

## **Assessment method**

Oral examination on the topics treated during lessons + presentation of a case study (scientific paper) about the topics of the course (to be agreed with the lecturer).

Mark range: 18-30/30

## **Office hours**

By appointment by sending an email to the lecturer ([davide.maggioni@unimib.it](mailto:davide.maggioni@unimib.it))

## **Sustainable Development Goals**

CLIMATE ACTION | LIFE BELOW WATER | LIFE ON LAND

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