UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Zoology

2627-1-E3202Q009-E3202Q00902

Aims

The contents of the Zoology module, of the course of Animal and Cell Biology, aim to provide the student with the knowledge related to the diversity of the animal kingdom in an evolutionary perspective. Specifically, following the Dublin Descriptors the course aims to:

- Knowledge and understanding. At the end of the course, students will have acquired knowledge of the organization of the animal kingdom, the major animal taxa, their phylogenetic relationships, and the evolutionary processes that have led to the emergence of the main morphological and functional adaptations.
- Applying knowledge and understanding. Students will be able to identify the major animal groups by recognizing their diagnostic characters, use stereomicroscopes and light microscopes to examine zoological specimens, and interpret the observed morphological and functional features within an evolutionary and adaptive framework.
- Making judgements. Students will be able to compare the different adaptive strategies adopted by the major animal groups, interpret their evolutionary significance, and critically evaluate the evidence gathered during laboratory activities.
- Communication skills. Students will be able to describe organisms, anatomical structures, phylogenetic relationships, and evolutionary adaptations using appropriate zoological terminology and scientifically accurate language.
- Learning skills. Students will be able to use the knowledge acquired to undertake more advanced studies in the biological sciences, consult zoological textbooks and scientific literature, and independently integrate new information on animal biodiversity and its evolution.
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The course includes mandatory practical activities in which some of the topics covered during the lectures will be deepened, which will allow to better appreciate the meaning of the morphological-functional adaptations. To this end, slides of zoological preparations and soil and aquatic meiofauna deriving from specimens specifically collected will be viewed using optical instruments (stereoscopes and microscopes).

The acquired knowledge will be preparatory for the continuation of the training course aimed at preparing expert figures in the different professions in the environmental field.

Contents

The course intends to address the issues of evolution and speciation, treating the distinctive features that have appeared throughout the history of life in the various animal taxa from a phylogenetic perspective.

Detailed program

The course of Zoology will deal with the issues of evolution, speciation and adaptation. Emphasis will be placed on reproduction and sexuality, on reproductive cycles and strategies, as well as parental care. Phylogeny and the main criteria for the classification of animal groups will be discussed. Organization, reproduction and sexuality in Protists will be briefly presented. The main characteristics of the Metazoans will be described: the early stages of embryonic development, the appearance of body cavities, and the origin of Protostomes and Deuterostomes. Description of animal phyla will take place with particular regard to their organization, morphological-functional adaptation and their phylogenetic relationships.

Introduction:

1. Zoology, Biodiversity and Environmental Sciences

2. Concepts of biological evolution and key characters in the evolution of biological thought

3. The mechanisms of evolution and the concept of species

4. Meaning and mechanisms of reproduction

5. Structural organizations of the living

6. Cladistic vs. evolutionary systematics

7. The origin of the first organisms

8. The cell as a basic unit of the living and its organizations

9. The domains and Kingdoms of life - Origin of eukaryotes

10. Protists and protozoa - The origin of multicellularity

Systematic:

1. The characteristics of metazoans (Parazoa, Mesozoa and Eumetazoa)

2. Porifera. Diblastic and triblastic eumetazoa

3. The Radiata (Cnidaria and Ctenophora)

4. The Bilateria, process of cephalization

5. Protostomes and Deuterostomes

6. Acoelomates, Pseudocelomates and Coelomates

7. Acelomata, Lophotrochozoa (Platyhelminthes)

8. Acelomata, Lophotrochozoa (Nemertea & Gnathostomulida)

9. Pseudocelomata, Lophotrochozoa (Rotifera, Acanthocephala, Micrognathozoa)

10. Pseudocelomata, Lophotrochozoa (Entoprocta, Gastrotricha, Cycliophora)

11. Pseudocelomata, Ecdysozoa (Nematoda, Nematomorpha)

12. Pseudocelomata, Ecdysozoa (Kinorhyncha, Priapulida, Loricifera)

13. Celomata, Lophotrochozoa (Ectoprocta, Brachiopoda, Phoronida, Sipuncula)

14. Celomata Lophotrochozoa (Annelida)

15. Celomata, Lophotrochozoa (Mollusca)

16. Celomata, Chaetognatha

17. Celomata, Ecdysozoa (Onychophora, Tardigrada, Arthropoda)

18. Celomata, Ecdysozoa (Arthropoda Exapoda)

19. Deuterostomes (Echinodermata)

20. Deuterostomes (Emichordata)

21. The deuterostomes (Chordata), Urochordata and Cephalochordata

22. The deuterostomes (Chordata), Vertebrata

Practical part (mandatory):

1. Observation of preparations under the microscope and stereoscope

2. Preparation of soil and aquatic meiofauna samples and their observation on optical instruments

3. Laboratory observation of the morphological-functional adaptations of selected taxa

Prerequisites

None

Teaching form

The teaching activity will be organized in lectures (40 hours of Delivered Didactics) and practical activities (10 hours of Interactive Teaching).

Two- or three-hour lectures, in person, Delivered Didactics

- Frontal lesson, 5 credits, 40 h

Two-hour practical classes, in person, Interactive Teaching

- Activities in wired classroom, overall 1 credits, 10 h

For this teaching, support activities (tutoring) are provided both on-going and post-course, with simulation of the examination tests.

Textbook and teaching resource

Hickman et al. 2020. Zoologia, 18/e. McGraw-Hill Italia

Ballarin 2023. Manuale di Zoologia. Piccin.

Casiraghi, de Eguileor, Cerrano, Puce. 2026. Zooolgia, 3/e. UTET.

Semester

The lectures and the practical part will be delivered in the first year of the course in the first semester.

Assessment method

Oral exam. There are 7 ordinary exam sessions during the teaching breaks.
Interview on the topics covered in class and explored in depth during the exercises.
The oral exam is aimed at ascertaining the level of knowledge set by the objectives of the course, as well as the skills, evaluated in terms of clarity and exposition correctness, and the student's ability to critically analyze the contents, synthesise and re-elaborate concepts illustrated both during the frontal lessons and in the practical ones.

Office hours

By appointment upon request at the e-mail address: luciano.bani@unimib.it

Sustainable Development Goals

LIFE BELOW WATER | LIFE ON LAND