UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Animals Biological Interactions

2223-1-F0601Q082

Aims

All living beings interact with other organisms during their life's cycle. In extreme cases such as intracellular symbioses, habitat could act as another organism. The study of these interactions is conducted by integrating different sources of biological information (zoology, genetics, physiology, ecology, microbiology, bioinformatics). Understanding characteristics and the mechanisms involved in such biological interactions is challenging in a context of base science. This kind of investigation also has many applicative outcomes ranging from biodiversity and ecosystems conservation to the characterization of microbial communities. Microbiomes influence human health and allows the principal activities of biotransformation of natural resources. 1) knowledge and understanding: A the end of the course, the student will have acquired knowledge regarding the different levels of complexity of interactions in the animal context, from those involving microbial organisms to those with the environment. Moreover, topics related to the host behavior manipulation mediated by interaction with other organisms will be discussed. 2) Applying knowledge and understanding: At the end of the course, the student will be able to apply the knowledge acquired during the course to other courses or thesis programs involving the issue of animal interactions. 3) Making judgements: The student will be able to critically adopt the acquired knowledge and choose the most reliable approach to link the functional traits of organisms to their possible complex interactions, for example in a context of ecosystem services. 4) Communication skills: At the end of the course, the student will be able to describe clearly, and with an adequate language the different types of interactions and their effects in terms of evolutionary aspects and applied contexts (e.g., bioprospecting). 5) Learning skills: At the end of the course, the student will have the necessary knowledge to deal with the next studies that will require knowledge of symbioses, molecular identification of organisms and their interactions. Finally, the student will be able to associate and integrate the acquired knowledge with the concepts belonging to the successive courses.

Contents

The course aims at discussing the study of biological interactions involving animal species under an integrative and multilevel approach. There are many possible ways to treat these topics. In this course, provided in the framework of our master program, it will be offered a wide overview concerning the principal kinds of interactions, including

their evolutionary and functional aspects. Specific attention will be devoted to the application of animals' biological interactions in terms of conservation, management of natural resources and bioprospecting.

Detailed program

- Diversity of biological interactions and importance of their study at both the theoretical and applied level.
- The concept of “symbiosis” and description of the different typologies.
- The challenge of identification. Brief description of the principal analytical techniques used for studying the diversity and dynamics of animal’s biological interactions.
-The massive DNA sequencing revolution and its applications in the field of environmental and agroecosystems interactions (eDNA, DNA metabarcoding and metagenomics).
- Interactions between microorganisms as a model to explain the origin of Eukaryotes.
- Intracellular symbioses (case studies of medical, veterinary and phytosanitary importance and the applicative outcomes deriving from their characterization).
- Eukaryotes interactions in natural and agricultural systems (e.g., pollination, seed dispersal) and the problem of biological invasions.
- Manipulation of animals’ behaviour mediated by parasites (case studies and applications of human interest).

Prerequisites

Microbiology, Zoology, basic knowledge of cell biology and molecular biology.

Teaching form

Lectures in the classroom. Some lessons could be seminars hold by experts in the sectors discussed during the course.

Textbook and teaching resource

Scientific articles provided by the teacher during lessons. Students can obtain them by accessing to the electronic library of the University. The slides of classoroom lessons and seminars will be available on the elearning Platform.

Semester

First semester

Assessment method

The verification of the knowledge aquired during the course will consist in an oral examination at the end of the course. There will be not intermediate tests. The examination will start with the critique discussion of a scientific article chosen by the student (and previously approved by the teacher), concerning the general issues treated in the lessons. The examination will continue with the discussion of the arguments included in the program of the course.

Office hours

Upon request by email (andrea.galimberti@unimib.it)

Sustainable Development Goals

LIFE ON LAND