UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Functional Adaptation To Environmental Challenges

2627-1-F0602Q107

Aims

A. Knowledge and understanding. The course presents a general view of the main concepts of comparative and environmental animal physiology, from the cellular to the system level.

B. Applied knowledge and understanding. The fundamental notions are indispensable to pursue further studies in the related fields.

C. Making judgements. A comprehension of the logic and concepts of environmental physiology will enable the student to make a personal critical opinion on related matters.

D. Communication skills. The student will learn to properly communicate thefundamental concepts and notions.

E. Learning skills. The thorough personal understanding acquired during the course is necessary to proceed with personal studies.

Contents

1. Introduction to the course.
2. Comparative and environmental neurophysiology.
3. Biological rhythms and thermoregulation.
4. Cardiovascular systems.
5. Comparative physiology of respiration.

6. Osmoregulation and excretion.

Detailed program

Module I

1. Introduction to the course.
   Different types of environment. General energetic and dimensional aspects. Implications for animal locomotion.

2. Comparative and Environmental Neurophysiology.
   Evolution of the Nervous Systems.
   Comparative physiology of sensory systems and aspects of neuroethology (e.g., orientation and migration).

3. Biological rhythms and Thermoregulation.
   Biological rhythms and their dependence on environmental factors. Role of endocrine factors.
   Thermoregulation in relation with the environmental oscillations and the circadian rhythms. Thermoregulation in extreme environments.

Module II

4. Cardiovascular systems.
   Circulation in Vertebrates and Invertebrates. Cardiac function. Systemic and local regulation.

5. Comparative physiology of respiration.
   Gas exchange and respiratory pigments. Control of ventilation and blood pH regulation.
   Comparative physiology of respiration and special adaptations (e.g., prolonged immersion).

6. Osmoregulation and excretion.
   Filtrazione/absorption and secretion systems. Mechanisms of nitrogen excretion.
   Osmoregulation: general principles and osmoregulation in extreme environments.

Prerequisites

General concepts of General Physiology, Systems Physiology and Zoology.

Teaching form

The course is divided into two modules, with all lessons conducted in person.

Module I

- 11 lessons (10 of 2 hours each and 1 of 1 hour) conducted in a lecture format in person.

Module II

- 8 lessons (7 of 2 hours each and 1 of 1 hour) conducted in a lecture format in person;
- 3 lessons of 2 hours each conducted in an interactive format in person.

The lessons will be recorded and made available through E-learning, along with slides, articles, and other materials (via Forum).

Textbook and teaching resource

Pdf files and registered lessons on E-learning.

Reference textbooks:

Hill et al. Animal Physiology. Sinauer 2022
Willmer et al., Environmental Animal Physiology.
Randall et al., Animal Physiology.
Sherwood et al., Animal Physiology
Ladd-Prosser (ed.). Comparative Animal Physiology (2 voll.)
Schmidt-Nielsen. Animal Physiology.

Semester

Second semester.

Assessment method

Oral exam. There are no in itinere tests.

The exam begins with the student presenting a topic of his/her choice, among those treated during the course.

Next, the discussion is extended to other topics, to evaluate the student's comprehension of the main concept of modern Neurosciences.

On request, the exam may be carried out in english.

Office hours

Appointment by E-mail.

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Sustainable Development Goals

QUALITY EDUCATION | LIFE BELOW WATER | LIFE ON LAND