UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Biology

2627-1-F7503Q014-F7503Q01401

Aims

General objectives

General objectives are:

1. to provide the instruments for the comprehension of the basis and key concepts;
2. to provide the didactic knowledge and appropriate scientific language for teaching and critical thinking;
3. to connect the different subjects through a didactic project;
4. to stimulate through logic connections and different relations between the scientific subjects and within the same subject.

Specific objectives of Biology

The didactic module has specific aims to provide the skills to:

1. Identify key topics of Biology;
2. Logically connect the different topics;
3. Identify essential concepts, the keys to connect them, and how to argument them;
4. Provide examples of didactic tools;
5. Develop communication skills in Sciences and critical thinking;
6. Provide the tools to organize practical activities (laboratory, group activities and discussions)

Contents

- The different levels of biological organisation
- From the cells to organisms

- The biological world
- Teaching tools
- Laboratory activities (1 CFU, 10 h)

Detailed program

The main topics of Biology will be presented and discussed, centring the attention on didactic means and methods to transfer knowledge and concepts instead of basic knowledge. In particular the following topics will be presented:

- The living organisms and their classification for the knowledge of the living world;
- Different levels of organisation for the comprehension of different biological scales;
- Metabolism and metabolic processes to understand the different activities of organisms;
- Genetics and inheritance of the characters to understand the mechanisms, also related to evolution;
- Form and function in the organisms to understand the significance of biological structures related to their function and to the environment.

Laboratory activities 1 CFU (10 h) are part of the module including practical experiences and discussion groups on proposed topics. Aims of the laboratory activities are mainly related to the use of critical and logical skills, and to enhance the ability to connect different topics and subjects. They further aim at stimulating cooperation skills during group work.

Lab activities are divided in:

1. Use of biological models and samples' preparation for optical microscopy observation to understand the different dimensional scales; use of specific dyes to evidence organelles; discussion on structure and function relation; lab activities to be transferred into a secondary school class; *incipit* questions.
2. Identification of suitable scientific papers, and/or literature stories, and/or videos; single or group work aimed at identifying key concepts and connections in selected papers or videos;
3. Presentation by the students of selected papers and/or videos and general discussion on key concepts and didactic methods of presentation.

The same program is for attending and non-attending students.

Prerequisites

Basic knowledge of Biology will be considered acquired, and the references to texts and/or resources will be provided for integration or recap of the contents.

Teaching form

Teaching form comprises:

- 12 lessons of 2 hour which alternate Delivered Didactics and Interactive Teaching in person or through flipped-classroom;
- 10 hours lab activities in person of Interactive Teaching (practical activities and ctritical discussion; team work and critical discussion). Practical activities comprise examples of teaching design (case studies).

Textbook and teaching resource

Lesson slides and supplementary material discussed during the course. Links to video of biological content will be provided, along with additional books and/or papers. All additional material discussed during the lessons will be loaded on the platform.

Bibliography

- Longo C., Didattica della Biologia - Ledizioni
- Barbuto E., La didattica delle materie STEM - Insegnare le discipline scientifiche nella scuola secondaria. EdiSES
\ - Catalani, Fusi, Urani, Zanon, I saperi essenziali di Scienze per la scuola secondaria di I grado - Giunti EDU
- Padoa-Schioppa E. Metodi e strumenti per l'insegnamento e l'apprendimento della Biologia - Edises

- Morris et al., Biologia - Come funziona la vita - Zanichelli

- Sadava et al., Principi di Biologia - volume unico- Zanichelli

- Hills D et al., Fondamenti di biologia – Zanichelli

- Solomon et al., Fondamenti di biologia - EdiSES

- Solomon et al., Fondamenti di biologia - EdiSES

- Sadava D et al., Elementi di biologia e genetica – quinta edizione- Zanichelli

- Sadava et al., Biologia 3. L’evoluzione e la biodiversità- quinta edizione – Zanichelli

- Sadava et al., Biologia 4. La biologia delle piante – quinta edizione – Zanichelli

Semester

First semester

Assessment method

Oral presentation of an individual didactic project aimed at the evaluation of the basic Biological knowledge, skills to propose conceptual links and teaching tools, and to verify the appropriate language and communication skills.

Office hours

By mail appointment (chiara.urani@unimib.it)

Sustainable Development Goals