UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

One Health Laboratory: From Environment To Health

2526-1-F0602Q110

Aims

Knowledge and understanding: The laboratory course aims to provide an integrated view of the effects of the environment on human well-being and health. Both the aspect of disease prevention and the maintenance of the person's state of well-being will be addressed. The topic of strengthening the body's immune defenses and, in general, the balance between human, ecosystem and environment will be investigated, also following the paradigms of the one health concept. The course will also present concrete tools to strengthen ecosystem functions with a positive impact on the quality of life and natural resources.
Applied knowledge and understanding: the course will make the student able to have a broader and more global vision of human well-being and personal care, through experimental activities in an operational environment. Contrasting contexts will be evaluated, such as areas with high biodiversity and polluted or compromised ones. In this context, it will be possible to analyze the relationship between human and nature by going beyond the individual physiological functions that characterize the individual's well-being. From the applicative point of view, the key issues will be the understanding of how the environmental characteristics and biodiversity affect the quality of life, reduce stress phenomena and offer resources active towards the prevention of disease, such as bioactive molecules to be used as drugs, foods or cosmetics.
Autonomy of judgment: Learning and interpreting the 'one health' vision in order to be able to propose new intervention strategies to ensure health, human well-being, and the respect and protection of biodiversity.
Communication skills: the course aims to provide the student with the skills to communicate effectively, appropriately and with specific language, concepts related to the biological complexity and its interactions with the environment, according to the one health paradigm, also considering the topics of prevention and monitoring.
Ability to learn: at the end of the course the student should be able to autonomously explore the topics covered during the lessons with a multidisciplinary and integrated vision. The student will also develop the ability to interact with experts in the sector, to interpret complex data and to consult dedicated scientific literature.

Contents

The teaching program includes 3 modules; the first is dedicated to field activities, aimed at analyzing different

environments with different degrees of wilderness and anthropic impact (e.g. protected areas, coasts and seaside cities) in order to identify stress factors that can disturb the ecosystem balance and the human well-being. The second module involves the study of bioactive substances belonging to biodiversity and the assessment of potential pollutants with negative effects on human health. The last phase of the laboratory involves the study of the effects of biodiversity and natural substances such as anti-inflammatory, antioxidant and anti-neurodegenerative in a context of prevention, well-being and care.

Detailed program

The laboratory consists of three closely related elements.
The first will address the practical analysis of different ecosystem typologies with varying degrees of complexity and criticality and the effects on human health and the environment. This phase will therefore take place in an operational environment such as parks / reserves and polluted and man-made urban areas. Among the analyzed elements there will be climatic stress factors (temperature alterations, water crisis, etc.) and biological ones (alteration of biodiversity, spread of exotic weed, allergic and pathogenic species). This module will provide the basis for interpreting the human-ecosystem and environment relationship.
The second element will lead the student to understand how to exploit biological resources to obtain bioactive metabolites capable of promoting well-being and preventing diseases. Risk factors, such as chemical and biological pollutants that can affect the ecosystem and human health will be also discussed. Analytical techniques of eco-sustainable extraction of bioactive compounds will be acquired starting from biological samples and matrices collected in the field (leaves, fruits, seeds, etc.).
The last part of the laboratory will be dedicated to studying the mechanisms underlying the defenses and disease prevention through laboratory tests. The effects of the extracted molecules on biological systems will be studied with particular reference to inflammation, aging and toxicity phenomena due to protein aggregation and involved in neurodegenerative processes.

Prerequisites

Basic knowledge of biology (botany, ecological) and biochemistry

Teaching form

Lessons in the field and in the laboratory.

Textbook and teaching resource

The lesson slides and the material provided in the field will be made available on the e-learning platform.

Semester

Second semester

Assessment method

The oral exam aims to verify the student's acquisition of the technical and scientific concepts treated during the course and will consist of oral questions aimed at ascertaining the understanding of the theoretical arguments and of the experiments carried out in the field and laboratory.
During the exam, the ability to contextualize the topics, the critical ability and the ability to propose appropriate solutions to different contexts and problems will also be assessed.
Evaluation Criteria: scientific and technical knowledge on the issues of biodiversity, ecosystems, one health, critical and individual re-elaboration skills, communication skills and correct use of technical language.

Office hours

By appointment by writing to the reference teachers.

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING | SUSTAINABLE CITIES AND COMMUNITIES | CLIMATE ACTION | LIFE ON LAND