UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Environmental Sustainability and Health

2627-2-F7503Q010

Aims

The general objectives of the course are structured as follow:
i) Knowledge and Understanding

- Acquire the theoretical and procedural knowledge required to assess health impacts or toxicological risks resulting from environmental pollutants. This includes understanding how environmental influences contribute to biological effects in humans, based on the principles of general toxicology and the primary molecular mechanisms of action and damage.
- Gain proficiency in simplified Risk Assessment and Health Impact Assessment (HIA) procedures to evaluate the health impacts of environmental pollutants (chemical, physical, and biological, including their relationship to climate change), with a specific focus on airborne pollutants.

ii) Applying Knowledge and Understanding

- Develop the ability to utilize existing literature data and databases to conduct a simplified Health Impact Assessment, and understand the methodologies required to evaluate potential risks to human health.

iii) Making Judgments – Communication Skills

- Ability to evaluate the impacts of environmental pollutants on humans and the environment, and to formulate potential mitigation strategies and environmental compatibility interventions annd to critically analyze scientific literature data.
- Development of a comprehensive, holistic overview (from environmental pollutant to human health) by integrating interdisciplinary knowledge.

Contents

The course “Health and Environmental Sustainability” aims at providing theoretical and applied knowledge on the methodologies used to define and quantify the impacts of environmental pollutants on human health. Emphasis is placed on airborne pollutants, also within the context of climate change.
Lectures are designed to clarify the complex interactions linking pollutant exposure to the onset and manifestation of diseases in humans, utilizing standard The procedures applied in the risk assessment and in the health impact assessment will be the basis also for case studies evaluation. The course will be delivered in Italian.

Detailed program

The foundational knowledge required for this course aligns with standard environmental sciences (pollutant emissions, pollutant partitioning across environmental compartments, and the biological effects of pollutants on living systems, with a particular focus on humans). Key concepts will be briefly reviewed at the beginning of the course.
Specifically, the course addresses the impacts of various environmental factors on human health, encompassing the effects of chemical, physical, and biological pollutants, also in relation to ongoing climate change

Beginning with core concepts of toxicology, environmental epidemiology, and fundamental principles of Risk Assessment, the course explores the relationship between emission sources, population exposure, physicochemical properties, and the biological, cellular, and pathogenetic mechanisms of action of pollutants. Based on these concepts, the course covers the theoretical and methodological frameworks necessary to define, quantify, and potentially mitigate the health impacts of processes and products.
In addition to outdoor environments, human exposure in indoor environments and the resulting potential health risks will be covered.

The relationship between exposure and potential adverse effects will be explored by the toxicological concepts of margin of exposure (MOE) and the hazard quotient (HQ).
Utilizing a simplified framework of the Health Impact Assessment procedure, the course will also address prevention and mitigation strategies. This includes approaches to the management and design of living environments (industrial/productive, urban, and domestic) to protect public health, also from the perspective of the Italian framework “valutazione integrata di impatto ambientale e sanitaria (VIIAS)”.

Specific focus will be devoted to the health impacts related to airborne pollutants (particulate or gases) deriving from different emission sources and in relation to the policies and practices for a sustainable approach to air pollution also in the context of the One Health concept. The potential effects of airborne pollutants on other biological receptors will be briefly discussed. The relationships between climate change, pollution and human health will be highlighted.

The analysis and discussion of (real or theoretical) case studies will serve as an in-depth learning tool for students. Through this process, students will apply the concepts presented in class, fostering a critical approach to presenting results or proposing mitigation interventions.

Prerequisites

Students are not requested to have previous specific prerequisites or knowledges. The knowledge deriving from taking the course of “Applied environmental biology” could help in easily understanding specific subjects presented in this course.

Teaching form

The course is structured in 6 CFU of class lessons equivalent to 48 hours organized as follows:

18 lessons of 2 hours in person, Delivered Didactics. Lessons will start as delivered didactics but may continue as Interactive Teaching.
6 lessons of 2 hours in presence, possibly grouped into 3 lessons of 4 hours, Interactive Teaching during which, under the supervision of the teacher, the concepts presented in class will be developed together by applying them to case studies (theoretical or real).

The lessons, both Delivered Didactics and Interactive Teaching, may use the support of online instrument such as Wooclap or Socrative.

Textbook and teaching resource

The teaching materials will be based on extracts from presentations, on scientific publication and other relevant documents shared during the classes and uploaded on the e-learning platform. Addition teaching material of relevance will be shared during the course. Textbooks for reference will be presented at the beginning of the course for possible scientific insights into specific topics.

Semester

The course is planned during the second semester.

Assessment method

The final exam will be an oral interview with grades for successful evaluations between 18 and 30/laude. The oral exam is designed to verify the understanding of theoretical concepts presented in class, as well as the ability to apply them to theoretical cases. Students must demonstrate the capacity to autonomously develop and adopt the procedures taught, alongside proficiency in using appropriate disciplinary terminology.

Office hours

Students' reception is open by prior appointment to be required by email to the professor

Sustainable Development Goals

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