UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

The Polluted Brain: The Air We Breathe, The Brain We Have

2627-122R-03

Title

The Polluted Brain: The Air We Breathe, The Brain We Have

Teacher(s)

Sancini Giulio

Language

Italian/English

Short description

Human health and the health of our planet are inextricably linked. Our civilization depends on human health, thriving natural systems, and the wise management of natural resources. With natural systems degrading at a rate unprecedented in human history, both our health and that of our planet are at risk. Starting from these questions, a discussion will be opened regarding the role of researchers in studying the relationship between the environment and health. Certain health risks associated with inhaling fine and ultrafine particles—such as asthma, lung cancer, and, more recently, heart disease—are already well-established. However, a growing body of evidence suggests that such exposure may also damage the brain, accelerating cognitive aging and potentially even increasing the risk of Alzheimer's disease and other forms of dementia. The link between air pollution and dementia remains a

subject of debate. Further research is needed to confirm a causal connection and to understand exactly how particles can penetrate the brain and cause damage. Nevertheless, concern is being raised by a growing number of epidemiological studies conducted worldwide, new findings from animal models and human neuroimaging studies, and increasingly sophisticated techniques for modeling PM2.5 exposure.

Indicators:
A. Understanding the context of higher education and its value in a knowledge-based society (35%)
B. Self-assessing, verifying, and consolidating one's own knowledge (35%)
C. Consolidating reflective and transversal skills (15%)
D. Understanding employment sectors, potential career paths, and future sustainable and inclusive jobs (15%)

Content and activities:
Air quality: pollutants impacting our health; outdoor and indoor pollution
Nanoparticles and their interaction with biological barriers
"We are what we breathe": The forefront of environmental, health, and biological sciences in training the next generation of scientists to drive innovation and deliver significant economic and social benefits
Engaging young students in understanding the effects of major environmental pollutants on Central Nervous System physiology and identifying direct and indirect links to key neuroinflammatory and neurodegenerative disorders

Objectives:
Guiding students to actively reflect on the effects of environmental pollutants on brain health, supporting their professional growth, and strengthening/acquiring soft and "smart" skills relevant to precision medicine
Teaching methodology:
The module includes lectures and small-group work. The methodology alternates between moments of individual reflection and group activities.

Assessment and self-assessment:
Methods for self-reflection on the process
Post-session self-assessment scales
Questions posed by the instructor to evaluate learning both during and at the conclusion of the lessons; collection of student feedback

CFU / Hours

1 CFU/8 h

Teaching period

2, 9, 16, 23 March 2026, from 2 pm to 4 pm

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING | QUALITY EDUCATION | SUSTAINABLE CITIES AND COMMUNITIES