Air pollution

A survey course describing the origins of air pollution and climate change

Content

• Atmospheric pollutants and their effects on the environment
• Emissions related to air pollution and climate change
• Measurements of air pollutants, greenhouse gases and meteorological conditions
• Air quality models
• Environmental regulations and abatement strategies related to air pollution and climate change

Keywords

Atmospheric chemistry, air quality, climate change, air pollution, meteorology, aerosols

Learning Prerequisites

Recommended courses
Physics and Chemistry of the Atmosphere (ENV-320)

Important concepts to start the course
• Differential, integral, and vector calculus
• Linear algebra
• Chemistry (reaction rates, chemical thermodynamics)
• Basic programming concepts

Learning Outcomes

By the end of the course, the student must be able to:
• Identify compounds recognized as pollutants and regulated in various countries
• Categorize emission or production sources and removal mechanisms of various pollutants.
• Compare methods and practical issues concerning measurement of gas, particles, and meteorological variables.
• Describe challenges in modeling atmospheric phenomena.
• Explain the dependence of air quality on emissions, meteorology, and atmospheric chemistry.
• Assess / Evaluate the impacts of human activity on air pollution.
• Describe potential mitigation strategies as possible solutions to air pollution problems.
• Interpret atmospheric observations

Transversal skills
• Access and evaluate appropriate sources of information.
• Plan and carry out activities in a way which makes optimal use of available time and other resources.
• Assess one's own level of skill acquisition, and plan their on-going learning goals.

Teaching methods
Lectures and exercises (quantitative and programming)

Expected student activities
Lecture attendance, exercise assignments

Assessment methods
30% exercise assignments, 70% final exam

Resources
Bibliography
http://acmg.seas.harvard.edu/people/faculty/djj/book/

Ressources en bibliothèque
• Atkins. *Physical Chemistry*
• Cooper. *Air Pollution Control*
• Denbigh. *The Principles of Chemical Equilibrium*
• Finlayson-Pitts. *Chemistry of the Upper and Lower Atmosphere*
• Flagan. Fundamentals of Air Pollution Engineering
• Wark. Air Pollution
• Hinds. Aerosol Technology
• Jacob. Introduction to Atmospheric Chemistry
• Kulkarni. Aerosol Measurement
• Prausnitz. Molecular Thermodynamics of Fluid-Phase Equilibria
• Seinfeld. Atmospheric Chemistry and Physics
• Friedlander. Smoke, Dust, and Haze
• Atkins. Physical Chemistry
• Cooper. Air Pollution Control
• Denbigh. The Principles of Chemical Equilibrium
• Finlayson-Pitts. Chemistry of the Upper and Lower Atmosphere
• Flagan. Fundamentals of Air Pollution Engineering
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Moodle Link
• https://go.epfl.ch/ENV-409