ENV-409

Air pollution

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Cursus	Sem.	Type
Civil & Environmental Engineering		Opt.
Energy Science and Technology	MA2, MA4	Opt.
Energy minor	E	Opt.
Environmental Sciences and Engineering	MA2, MA4	Opt.
Minor in Engineering for sustainability	E	Opt.
Minor in Integrated Design, Architecture and Sustainability	E	Opt.

Language of teaching	English
Credits	5
Session	Summer
Semester	Spring
Exam	Written
Workload	150h
Weeks	14
Hours	**3 weekly**
Lecture	2 weekly
Exercises	1 weekly
Number of positions	

Summary

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 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 assignments (quantitative and programming)

Expected student activities

Lecture attendance, assignments

Assessment methods

40% assignments, 60% final exam

Resources

Bibliography

Atkins, Peter, and Julio de Paula. *Physical Chemistry*. W. H. Freeman, 2006.
Cooper, C. David, and F. C. Alley. *Air Pollution Control: A Design Approach*. Waveland Press, Inc, 2011.
Denbigh, Kenneth George. *The Principles of Chemical Equilibrium: With Applications in Chemistry and Chemical Engineering*. Cambridge University Press, 1981.
Finlayson-Pitts, Barbara J., and James N. Pitts Jr. *Chemistry of the Upper and Lower Atmosphere: Theory, Experiments, and Applications*. Academic Press, 1999.
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Hinds, William C. *Aerosol Technology: Properties, Behavior, and Measurement of Airborne Particles*. Wiley, 1999.
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Prausnitz, John M., Rudiger N. Lichtenthaler, and Edmundo Gomes de Azevedo. *Molecular Thermodynamics of Fluid-Phase Equilibria*. Pearson Education, 1998.
Seinfeld, J. H. & Pandis, S. N. *Atmospheric Chemistry and Physics: From Air Pollution to Climate Change*. John Wiley & Sons, New York, 2006.
Wark, Kenneth, Cecil Francis Warner, and Wayne T. Davis. *Air Pollution: Its Origin and Control*. Addison-Wesley, 3rd ed., 1998.

Ressources en bibliothèque

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- Cooper. Air Pollution Control
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- Wark. Air Pollution
- 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
- Hinds. Aerosol Technology

Références suggérées par la bibliothèque

- Atkins, Chimie physique, 2021

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- https://go.epfl.ch/ENV-409