GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2024-2025

Air Pollution and Chemical Transport Models (CTM) (C002866)

Course size *(nominal values; actual values may depend on programme)*

Credits 3.0 **Study time 90 h**

Course offerings and teaching methods in academic year 2024-2025

A (semester 2)	English	Gent	seminar
			lecture

Lecturers in academic year 2024-2025

Mensink, Clemens	WE05	lecturer-in-charge

Offered in the following programmes in 2024-2025	**crdts**	**offering**
Postgraduate Studies in Weather and Climate Modeling	3	A

Teaching languages

English

Keywords

Air pollution, physical transport models, atmospheric chemistry, urban air quality

Position of the course

This course first introduces the physical and chemical processes in the atmosphere which are important for the development, transport and removal of air pollution. These processes are then physically and mathematically transformed in a model. Applying numerical techniques allows us to simulate the concentration of pollution in time and space. This mathematical framework will be of use to analyze the current questions about air pollution.

Contents

1 Introduction in air pollution, sources and impacts
2 Micro-meteorology and the planetary boundary layer
3 Gaussian dispersion models
4 Eulerian transport models
5 Atmospheric chemistry in air quality models
6 Numerical techniques in air quality models
7 Modeling urban and regional air quality
8 Climate change and air pollution

Initial competences

Elementary knowledge of classical mechanics, vector calculus and partial differential equations. One should also have acquired the intended competences of the subject "Numerical Techniques".

Final competences

1 Understand the relation between atmospheric/meteorological processes and air pollution.
2 Understand the physical and chemical processes that cause, disperse and remove air pollution.
3 Being able to translate these processes in a mathematical set of equations and using some numerical techniques transform this into a numerical model. Being able to interpret the results of such an air quality model.

Conditions for credit contract

This course unit cannot be taken via a credit contract

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Seminar, Lecture

Study material

Type: Slides

Name: Air pollution and chemical transport models
Indicative price: Free or paid by faculty
Optional: no
Language : English
Number of Slides : 500
Oldest Usable Edition : 2024
Available on Ufora : Yes
Online Available : No
Available in the Library : No
Available through Student Association : No

References

Atmospheric Pollution, Mark Z. Jacobsen, 2002, Cambridge University Press (ISBN 0-521-81171-6);
Air Pollution meteorology and dispersion, S. Pal Arya, 2000, Oxford University Press (ISBN 0-19-507398-3);
Introduction to atmospheric chemistry, P.V. Hobbs, 2000, Cambridge University Press (ISBN 0-521-77143-9);
Atmospheric Composition Change, S. Fuzzi and M. Maione (eds.), 2009, Atmospheric Environment 43 (33) 5135-5442;
Workbook of atmospheric dispersion estimates, B. Turner, 1994, US Environmental Protection Agency;
Introduction to atmospheric modeling, D. Steyn, 2015, Cambridge University Press (ISBN 9781316182482);

Course content-related study coaching

Support via Ufora (forum), e-mail and private discussions upon appointment.

Assessment moments

end-of-term and continuous assessment

Examination methods in case of periodic assessment during the first examination period

Oral assessment

Examination methods in case of periodic assessment during the second examination period

Oral assessment

Examination methods in case of permanent assessment

Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible

Extra information on the examination methods

four exam exercises during the course and an oral examination in the exam period

Calculation of the examination mark

Theory: Periodical evaluation (50%).
Exercise: Non-periodical evaluation (50%).