

Dynamic Meteorology (C002870)

Due to Covid 19, the education and evaluation methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

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

Credits 4.0 **Study time** 110 h **Contact hrs** 22.5 h

Course offerings and teaching methods in academic year 2020-2021

A (semester 1) English Gent lecture 22.5 h

Lecturers in academic year 2020-2021

Caluwaerts, Steven WE05 lecturer-in-charge

Offered in the following programmes in 2020-2021

[Postgraduate Studies in Weather and Climate Modeling](#) **crdts** 4 **offering** A

Teaching languages

English

Keywords

Wave solutions, perturbation theory, quasi-geostrophic analysis, baroclinic disturbances

Position of the course

The behavior of the atmosphere is treated as a problem of applied fluid dynamics which eventually gives the corresponding equations. These equations are too complex to solve, so two approximation techniques are applied to get more insight: (a) linear perturbation theory to study the wave solutions and (b) quasi-geostrophic analysis to explain the development of baroclinic disturbances in midlatitudes and on synoptic scales. Besides such approximations, modeling is a second strategy to get insight in the dynamics of the atmosphere. The currently popular numerical techniques are discussed only shortly (but more extensively in the course "Numerical Techniques"). The advantages and disadvantages of both strategies are discussed.

Contents

- 1 The dynamic equations and scale analysis
- 2 Circulation and vorticity
- 3 Quasi-geostrophic analysis
- 4 Linear perturbation theory
- 5 Baroclinic disturbances
- 6 The impact of the planetary boundary layer
- 7 General circulation

Initial competences

Elementary knowledge of classical mechanics, vector calculus, partial differential equations

Final competences

- 1 Apply fluid dynamics on the atmosphere and get insight in the dynamics of the atmosphere.
- 2 Understand the flow of fluids and gasses in the context of meteorology, including the thermodynamical aspects.
- 3 Understand the importance of analytical methods and numerical modeling in meteorology.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Lecture

Learning materials and price

Slides (with hand outs, estimated cost: €10) based on "An introduction to Dynamic Meteorology", J. R. Holton, 1992, ISBN 0-12-354355-X

References

An Introduction to Dynamic Meteorology, J.R. Holton, 1992, ISBN 0-12-354355-X, Academic Press

Course content-related study coaching

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

Evaluation methods

end-of-term evaluation

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

Oral examination

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

Oral examination

Examination methods in case of permanent evaluation

Possibilities of retake in case of permanent evaluation

not applicable

Calculation of the examination mark