Faculty of Science

NGEA25, Dynamic Meteorology 2, 7.5 credits

Dynamisk meteorologi 2, 7,5 högskolepoäng

First Cycle / Grundnivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2017-03-19 to be valid from 2017-03-19, autumn semester 2017.

General Information

The course is a compulsory course at first cycle level for Scientific Bachelor's programme with a specialisation in meteorology and bio-geophysics that is given jointly of the Department of physics and the Department of physical geography and ecosystem sciences.

Language of instruction: English

Main field of studies	*Depth of study relative to the degree requirements*
Atmospheric Sciences and Biogeochemical Cycles	G2F, First cycle, has at least 60 credits in first-cycle course/s as entry requirements
Physical Geography and Ecosystem Analysis	G2F, First cycle, has at least 60 credits in first-cycle course/s as entry requirements
Physics	G2F, First cycle, has at least 60 credits in first-cycle course/s as entry requirements

Learning outcomes

The course builds further on NGEA24, Dynamic Meteorology 1, and give together with this a comprehensive background of physical processes in the atmosphere that control the weather at the global, regional and local level. The course brings up waves and jet streams, quasi-geostrophic analysis and barocline instability. It also contains a section about models and methods that are applied in modern weather forecasting.

The course is given during the third year on Scientific Bachelor's programme with a specialisation in meteorology and bio-geophysics. It is compulsory to become certified as forecast meteorologist according to international standard.

Knowledge and understanding

On completion of the course, the students shall be able to:

- account for how the earth surface influences dynamic processes in the atmosphere
- explain oscillations and waves in the atmosphere
- account for the quasi-geostrophic equation system
- account for barocline instability
- describe and explain basic principles and methods that are used in numerical weather forecast models

Competence and skills

On completion of the course, the students shall be able to:

- discuss and to some extent analyse simple models for barocline instability
- discuss connections between observations and measurements and barocline instability
- discuss methods for production of numerical weather forecast models
- present differences between various types of numerical models
- Discuss connections between the theoretical contents of the course and the practical skills that are applied in modern weather forecast with examples linked to practical components (normally at Denmark's Meteorological Institute)
- create and present a scientific report orally and in writing

Judgement and approach

On completion of the course, the students shall be able to:

- evaluate the importance of different processes in the atmosphere and be able to distinguish these
- assess how different atmospheric processes influence weather system in different scales
- discuss and demonstrate an understanding of the basic physical background for numerical weather forecast models.

Course content

The course consists of four main components but is not divided into separate modules:

1. Waves and vågrörelser in the atmosphere. The component contains oscillations and the pertubation method, simple wave forms and Rossby waves. This component is carried out as project work the students present where as seminars.
2. Quasi-geostrophic analysis. This part of the course treats the structure in the extra-tropiska circulatory systems, quasi-geostrophic approximation, prognosis and diagnosis of vertical movements in the atmosphere and ideal the model for baroklina disturbances.
3. Barocline instability. Barocline and barotrophic atmospheres. Two-layer model for barocline instability as well as connections between observations and barocline instability is main components in this course module.
4. Physical basis of weather forecast models and numerical methods for weather forecast. In this final course module, the theoretical sections from earlier course components are tied together to applications in modern weather forecast methodology and modelling. Also the specific weather phenomena as turbulence and connections between the atmosphere and land surfaces be brought up. This component is given in cooperation with SMHI.

Apart from these thematic parts contains the course components that intend to increase the student's ability to read and understand physical and mathematical relationships, derive and differentiate equations that are relevant for the contents of the course. Also a certain measure of oral and written presentation is trained in the course.

Course design

The teaching consists of lectures, calculation exercises and seminars. Participation in seminars and calculation exercises are compulsory. Parts of the teaching that connects to numerical weather forecast modelling is carried out in collaboration with SMHI. The course participants are also to some extent expected to connect their theoretical knowledge to the placement that is carried out in parallel to the course.

Assessment

Examination takes place via written assignments and presentations in seminars during the course and through a written examination. For students who have failed the regular examination, additional occasion in close connection to this is offered.

In consultation with Disability Support Services, the exam may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equal to that of a student without a disability.

Subcourses that are part of this course can be found in an appendix at the end of this document.

Grades

Marking scale: Fail, Pass, Pass with distinction.
To pass in the whole course approved examination as well as passed written assignments is required. The same grading scale is used on all components. Final grade is decided by joining the results of examination and written assignments. How this joining is designed be described at latest at the course introduction.

Entry requirements

The course requires NGEA24 Dynamic meteorology 1 or the equivalent. If equivalent knowledge have been acquired at other higher education institution, the entry requirements in mathematics and physics relevant for NGEA24 should also be satisfied.

Further information

The course is read normally in parallel with the course METD01 Project in analysis of weather maps and weather forecasting, 15 credits that is given in collaboration with Denmark's Meteorological Institute.

Subcourses in NGEA25, Dynamic Meteorology 2

Applies from H17

1701 Exam, 7,5 hp
Grading scale: Fail, Pass, Pass with distinction