



DEPARTMENT OF EARTH SCIENCES

GVN370 Advanced Climate Data Analysis, 7.5 credits

Avancerad klimatdataanalys, 7,5 högskolepoäng

First Cycle

Confirmation

This course syllabus was confirmed by Department of Earth Sciences on 2020-04-09 and was last revised on 2023-05-15 to be valid from 2024-01-15, spring semester of 2024.

Field of education: Science 100%

Department: Department of Earth Sciences

Position in the educational system

The course includes 7,5 credits at the undergraduate level. The course is offered as an elective course subject to availability.

The course can be part of the following programmes: 1) Atmosphere, Climate and Ecosystems, Master's Programme (N2ACE), 2) Bachelor's Programme in Earth Sciences (N1GVS), 3) Bachelor of Science in Environmental Science (N1MVN), 4) Environmental Sciences (N2MVN) and 5) Master's Programme in Earth Sciences (N2GVS)

Main field of studies

Earth Sciences

Specialization

G2F, First cycle, has at least 60 credits in first-cycle course/s as entry requirements

Entry requirements

For admission to the course, the student must have taken GV2500 Data Analysis for Earth Sciences and at least 60 credits in the main field of Earth Sciences. Students with equivalent education may be admitted to the course after review and approval.

Learning outcomes

On successful completion of the course the student will be able to:

Knowledge and understanding

- know how to download, load, visualize and save different types of climate data
- describe key signal processing methods (e.g. Fourier transforms, filtering, EOF analysis)

Competence and skills

- structure and write algorithms adapted to multidimensional climate data
- analyse big climate data with a common scientific programming software
- find information on functions or for debugging, be it in the classroom or online

Judgement and approach

- choose the most adapted method for big climate data analysis depending on the objectives of the study and the data type
- reflect on the reliability of sources of information for debugging

The course is sustainability-focused, which means that at least one of the learning outcomes clearly shows that the course content meets at least one of the University of Gothenburg's confirmed sustainability criteria. The content also constitutes the course's main focus.

Course content

The course introduces students to advanced data analysis methods for so-called "Big Data" in climate science, i.e. data with more than three dimensions, stored in many large files, which are typical for remote sensing or climate modelling. These methods are crucial for project work at the bachelor's and master's levels, but also for applications needed in the job market.

The topics covered are:

- writing a clear algorithm
- using a program (such as Matlab or Python)
- downloading and loading files regardless of their type and format
- creating IF- and FOR-loops to analyse multidimensional climate data
- apply signal processing methods to climate data in order to examine their spatio-temporal variability
- effective debugging

Form of teaching

The teaching consists of a combination of computer-based data analysis exercises and lectures. The course also features a group project for which a written report must be submitted (one per group).

Language of instruction: English

Assessment

1. Short individual submission 1, 1.5 credits: U/G.
2. Short individual submission 2, 1.5 credits: U/G
3. A written group project report, 3 credits: U/G/VG
4. An oral presentation, 1.5 credits: U/G/VG

For international students who require a grade in percent, each passed (G) assessment will be converted with 1 credits = 13%.

If a student who has twice received a failing grade for the same examination component wishes to change examiner ahead of the next examination session, such a request should be made to the department in writing and should be approved by the department unless there are special reasons to the contrary (Chapter 6 Section 22 of the Higher Education Ordinance).

If a student has received a recommendation from the University of Gothenburg for study support for students with disabilities, the examiner may, where it is compatible with the learning outcomes of the course and provided that no unreasonable resources are required, decide to allow the student to sit an adjusted exam or alternative form of assessment.

In the event that a course has ceased or undergone major changes, students are to be guaranteed at least three examination sessions (including the ordinary examination session) over a period of at least one year, but no more than two years after the course has ceased/been changed. The same applies to internships and professional placements (VFU), although this is restricted to just one additional examination session.

Grades

The grading scale comprises: Pass with Distinction (VG), Pass (G) and Fail (U).

The student must have passed all assessments in order to pass the course (G). To obtain Pass with Distinction (VG) the student must have obtained Pass (G) for components 1 and 2 as well as Pass with Distinction (VG) for components 3 and 4 upon their first submission.

Course evaluation

The course evaluation is performed in two steps - partly in dialogue with students and course coordinator, and partly in an anonymous web-based questionnaire.

The results of and possible changes to the course will be shared with students who participated in the evaluation and students who are starting the course.

Additional information

Students admitted to N1GVS Bachelor's Programme in Earth Sciences have priority for admission to the course.