



## DEPARTMENT OF EARTH SCIENCES

### **GVN370 Advanced Climate Data Analysis, 7.5 credits**

Avancerad klimatdataanalys, 7,5 högskolepoäng

*First Cycle*

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#### **Confirmation**

This course syllabus was confirmed by Department of Earth Sciences on 2020-04-09 to be valid from 2021-01-18, spring semester of 2021.

*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, students must have read GVN330 Climate Data Analyses, 7,5 credits and at least 60 credits in the main field of Earth Sciences. Students with equivalent course and education can, after review and approval, be admitted to the course.

## 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, typical of 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)
- download and load files regardless of their type and format
- creating IF- and FOR-loops to analyse multidimensional climate data
- applying signal processing methods to the 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: Attendance to at least 50% of the computer-based exercise sessions, 1.5 credits: U/G.
- 2: Two online quizzes, 2 credits: U/G
- 3: A written group project report, 4 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 failed the same examined element on two occasions, wishes to change examiner before the next examination session, such a request is to be submitted to the department in writing and granted unless there are special reasons to the contrary (Chapter 6, Section 22 of Higher Education Ordinance).

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, though at most two years after the course has ceased/been changed. The same applies to work experience and 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 three assessments in order to pass the course (G). To obtain Pass with Distinction (VG) the student must have obtained Pass (G) for moments 1 and 2 as well as Pass with Distinction (VG) for moment 3 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 precedence for admittance to the course.