



DEPARTMENT OF EARTH SCIENCES

GVN465 Climate modelling, 15 credits

Klimatmodellering, 15 högskolepoäng

Second Cycle

Confirmation

This course syllabus was confirmed by Department of Earth Sciences on 2018-04-17 and was last revised on 2022-10-27 to be valid from 2023-01-16, spring semester of 2023.

Field of education: Science 100%

Department: Department of Earth Sciences

Position in the educational system

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

Main field of studies

Earth Sciences

Specialization

A1N, Second cycle, has only first-cycle course/s as entry requirements

Entry requirements

Admission to the course requires basic knowledge of the climate system equivalent to GV1410 Geosciences, Basic Level Course 30 credits, GV0340 Earth System Sciences 7.5 credits, and GV2500 Data Analysis for Earth Sciences 7.5 credits and at least 180 credits in the main field of Earth Sciences, Environmental Science, Marine Sciences, Physics or Computer Science and Engineering. Students with equivalent education may, 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

- summarise the physical and dynamical processes that control the climate system
- describe basic numerical methods used to simulate the climate system
- define current climate change scenarios and the Climate Model Intercomparison Project (CMIP) process

Competence and skills

- demonstrate basic knowledge of data analysis tools and Unix/Linux
- compile and run a simple climate model
- conduct CMIP-like multi-model analyses to test a hypothesis
- analyse and visualise data from climate models

Judgement and approach

- critically appreciate the uncertainty in the climate model simulation
- evaluate biases from multi-model runs and their consequences on climate change projections

The course is sustainability-related, 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.

Course content

The course deals with the ocean-ice-atmosphere dynamics of the climate system and their implementation in current generation climate models. The students will learn about the physics of the climate system, their mathematical formulation, and how this formulation is either directly translated into a numerical scheme or a parameterization.

The students will also learn and practice computing methods that are necessary for climate modelling and climate model analysis. They will conduct their own multi-model analysis for model evaluation, climate change projections, or climate change event attribution studies.

Form of teaching

The course consists of lectures, computer-based exercises, and a compulsory individual project work. One oral presentation, a poster session, manuscript writing and students' peer-review evaluate the student's understanding of the lectures and course literature, but also provide the student with the full experience of life as a climate modeller.

Language of instruction: English

Assessment

The course contains five assignments, each worth 3 credits or 20%. The student will obtain Pass (G) on an individual assignment if their grade on that assignment is 12% or more. The five assignments are:

1. Climate modelling, presentation, 3 credits or 20%. Grading: U/G
2. Climate modelling, manuscript first draft, 3 credits or 20%. Grading: U/G
3. Climate modelling, peer-review, 3 credits or 20%. Grading: U/G
4. Climate modelling, poster presentation, 3 credits or 20%. Grading: U/G
5. Climate modelling, manuscript final version and response to reviewer, 3 credits or 20%. Grading: U/G

The overall grade on the course will be Pass with Distinction (VG) if the student obtains a total of 80% or more and Pass (G) on all assignments upon first submission. The overall grade of the course will be Pass (G) if the student eventually obtains Pass (G) on all assignments.

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). Grades are also provided as percentage, with each module worth 20%.

In order to get the full 15 credits, all five modules must be passed. In order to achieve the grade Pass with Distinction (VG) on the full course, all five modules must be passed upon first try and the total score must be 80% or more.

Course evaluation

The course evaluation is performed both as a scheduled dialogue between teacher and students, as well as a written anonymous online survey.

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.