UNIVERSITY OF GOTHENBURG

DEPARTMENT OF EARTH SCIENCES

GVK440 Quaternary Development and Paleoclimate, 7.5 credits

Kvartärutveckling och paleoklimat, 7,5 högskolepoäng

Second Cycle

Confirmation

This course syllabus was confirmed by Department of Earth Sciences on 2012-09-27 and was last revised on 2023-02-07 to be valid from 2023-08-28, autumn semester of 2023.

Field of education: Science 100%
Department: Department of Earth Sciences

Position in the educational system

The course includes 7.5 credits at the master's level. The course is offered as an elective course subject to availability.

The course can be part of the following programme: 1) Master's Programme in Earth Sciences (N2GVS)

Main field of studies	*Specialization*
Earth Sciences	A1N, Second cycle, has only first-cycle course/s as entry requirements

Entry requirements

Admission to the course requires 120 credits completed courses in the main field of Earth Sciences, of which at least 75% with the grade Pass. Students with equivalent qualifications 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

- evaluate climate and paleoclimate data from various databases, make appropriate interpretations and comparisons among various databases.
- describe and explain climate cycles in the Quaternary and earlier periods (Milankovitch cycles, Heinrich events, Dansgaard-Oeschger cycles, ENSO variations).
- describe and explain the geologic history of the Quaternary on land and sea, locally, regionally and globally.
- describe and explain leading theories of climate change and how landscape development has changed over time.

Competence and skills

- demonstrate advanced knowledge of and ability to explain different paleoproxies and their advantages, compare them and place them in a large-scale context
- assess the potential and limitation of paleoproxies and data sources.
- analyse information from primary research articles and scientific reports.

Judgement and approach

- critically evaluate and assess the quality of the science and conclusions of primary research articles and scientific reports.
- critically evaluate and assess the quality of data and conclusions received and presented in group assignments.
- justify the main results in a summary report.

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 aim of the course is to provide interdisciplinary knowledge of the development of climate during geologic history to give additional knowledge in Quaternary geology for students with other Earth Science fields. The course is divided into two modules:

Sub-courses

1. **Theory** *(Teori),* 4 credits

   Grading scale: Pass with Distinction (VG), Pass (G) and Fail (U)
   This module deepens the knowledge of past climate changes and variability on different time scales and the mechanisms behind them. The main focus will be to review different climate indicators critically that are used to interpret climate beyond observations.

   We will focus on important periods of historical climate eras such as the Bølling warm period, the Younger Dryas, 8.2 ka event, and the transition from medieval

climate to the small ice age (MCA/work-integrated learning). Social changes during Holocene (with a focus on the final 2K) come to be discussed briefly. Individual poster presentations about a proxy will be evaluated.

2. **Group assignment** *(Grupparbete),* 3.5 credits

   Grading scale: Pass (G) and Fail (U)
   The students will work in groups on paleoclimate data, collected from different sources, that will be analysed and be synthesised for different time frames with a focus on the eastern North Atlantic region.

   The results will be presented orally at a seminar and in the form of a written report.

Form of teaching

The teaching consists of lectures, compulsory seminars, exercises, computer exercises, compulsory group assignment, reports and presentations.

Language of instruction: English

Assessment

Theory, 4 credits: Fail/Pass/Pass with distinction (U/G/VG)

Exercises, 3.5 credits: Fail/Pass (U/G)

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).
A passing grade (G) for the entire course requires a passing grade for all graded sections, active participation in seminars and individual presentations. To receive the grade Pass with Distinction (VG) for the final grade, the grade Pass with Distinction for the Theory section (examination) as well as at least a a passing grade for all other sections.

Course evaluation

The students are given the opportunity to make a anonymous written evaluation of the course.

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

Additional information

Students admitted to N2GVS Master's Programme in Earth Sciences are given priority for admission to the course.