Department of Earth and Enironmental Sciences

GEON09, Quaternary Geology: Global Environmental Change from a Geological Perspective, 15 credits

Kvartärgeologi: Globala miljöförändringar i ett geologiskt perspektiv, 15 högskolepoäng

Second Cycle / Avancerad nivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2021-04-28. The syllabus comes into effect 2021-04-28 and is valid from the spring semester 2022.

General information

The course is an elective second cycle component of a Master of Science degree in Geology.

Language of instruction: English

Main field of study	*Specialisation*
Geology	A1N, Second cycle, has only first-cycle course/s as entry requirements

Learning outcomes

The general aim of the course is to give the students advanced knowledge of how today's human-induced environmental and climatic changes relate to natural variations during Earth's history, especially during the Quaternary, but also in a longer geological perspective. Together with knowledge obtained in other second cycle courses, this knowledge will form the basis for advanced understanding of how geological knowledge can be used to promote sustainable development and responsible use of geological resources in a wide sense (geosystem services). The course covers natural variations in climate and glaciation and related environmental responses, but it also provides a long-term perspective on human environmental impact, as well as current environmental and natural resource problems.

Knowledge and understanding

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

- account for the fundamental features of and causes behind Earth's long-term climate and glaciation development, with an emphasis on changes during the Cenozoic (the last 66 million years)
- account for the glaciation dynamics during the Quaternary (the last 2.6 million years) and its consequences in the form of environmental changes, with an emphasis on Scandinavia during the last glacial cycle
- describe the most important geological resources (geosystem services) for humanity, with an emphasis on previously glaciated regions, explain their formation and development in a geological perspective, and account for how they are influenced by human activity and today's global environmental changes

Competence and skills

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

- prepare a basic field study of subject-relevant environmental changes in a selected region based on literature and existing monitoring series, and select and adapt field and laboratory methods to the assignment
- independently and in a reflecting way acquire, analyse and interpret field-based data related to the ongoing climate change in the perspective of past glacial dynamics and environmental changes since the last deglaciation
- draw conclusions about local and regional glaciation dynamics based on Quaternary stratigraphies, sediments and landforms
- apply fundamental quantitative methods to achieve advanced understanding of the most important processes that lead to changes in climate and related environmental responses
- critically assess and discuss scientific primary publications within the subject area, and based on such material summarise a given current research issue
- communicate scientifically in writing and speaking in English and in a balanced way utilize scientific terminology associated with the topic

Judgement and approach

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

- evaluate ongoing global and regional environmental and climatic changes as well as future scenarios in the perspective of natural variations during geological time
- identify geosystem services in glacially influenced landscapes and critically discuss societal adaptations in relation to past, ongoing and future changes in climate and glaciation patterns
- evaluate the dependency and use of geosystem services in modern society in relation to the limitations of the planet

Course content

The course consists of two modules:

Part 1. Theory and scientific communication, 7.5 credits

The following components are treated based on lectures, literature studies, field teaching and seminar assignments with oral presentations and discussions:

- Climate-governing processes on different time scales
- Reconstruction of climate changes based on analysis of natural environmental archives
- The climate and glaciation history of Earth with an emphasis on past episodes of glaciation and strong warming
- The evolution of humans in relation to the climatic and environmental development before and during the Quaternary
- Geological environments in glaciated regions, especially as results of glaciation and deglaciation, as well as climatic and environmental changes during and after the last ice age
- The ongoing climatic development, human influence on the climate system and future climate scenarios
- Effects on landscapes and ecosystems as well as feedback mechanisms as results of the ongoing climatic change
- Geological resources in a wide sense (geosystem services) in relation to ongoing global and regional environmental changes and the development of modern society.

Module 2: Project Work with field study, 7.5 credits

At the onset of the course, and in consultation with the course coordinator, the student chooses a well-constrained individual assignment with connection to ongoing climatic and environmental changes. The assignment is prepared based on literature and if possible relevant data from the site or region that is visited later during the course as part of a field course of about one week. A written report is compiled based on observations and data collected in the study area during the field course. The report, the results and conclusions of which should be considered in the perspective of current research, is also presented orally followed by student opposition.

Course design

The teaching consists of lectures, seminars, field teaching and project work with field study, as well as written and oral presentation. Participation in seminars, field teaching, project work with field study and presentations as well as associated components is compulsory.

Assessment

Examination takes place through active participation in seminars and field teaching, and through written examination at the end of the course (module 1), and through active participation in the field study and the submitted project report, including oral presentationy, during the course (module 2), as well as through compulsory components. Students who do not pass an assessment will be offered another opportunity for assessment soon thereafter.

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

Grades

Grading scale includes the grades: Fail, Pass, Pass with distinction
For a grade of Pass on the whole course, approved examination and passed project report including oral presentation and participation in all compulsory components are required. The grading scale for written examination and project report is Failed, Passed, Passed with distinction. The grading scale for compulsory components is Failed, Passed. The final grade is decided through a joint assessment of the results of the examination and the project report in proportion to their extent.

Entry requirements

To be admitted to the course, students must have obtained general entry requirements as well as 90 credits in natural sciences, and English B or the equivalent.

Further information

The course may not be included in a degree together with GEON07, Quaternary Geology: Quaternary Climate and Glaciation History, 15 credits.