Department of Earth and Enironmental Sciences

GEON07, Quaternary Geology: Quarternary Climate and Glaciation History, 15 credits

Kvartärgeologi: Kvartär klimat- och glaciationshistoria, 15 högskolepoäng

Second Cycle / Avancerad nivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2016-09-17 and was last revised on 2016-09-17. The revised syllabus comes into effect 2016-09-17 and is valid from the spring semester 2017.

General information

The course is an elective second cycle course for a degree of Master of Science (120 credits) in Geology.

Language of instruction: English

Main field of study	*Specialisation*
Geology	A1F, Second cycle, has second-cycle course/s as entry requirements

Learning outcomes

The general aims of the course are advanced knowledge of Earth's climate and glaciation history during the Quaternary Period, with special focus on the development in northern Europe and Scandinavia during the last ice age cycle, but also with an outlook to other parts of the world. In order to reach this knowledge, students need a basic understanding of palaeoecological, palaeoclimatic and glacial geological research methodology as well as an ability to interpret complex relationships based on Quaternary proxy records and modelling results. Together with knowledge obtained in other Master courses in Quaternary geology, this knowledge will form the basis for advanced understanding and execution of environment and climate reconstructions on different time scales, with a primary focus on the most recent ice age cycles.

Knowledge and understanding

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

- account for the fundamental features of the global climatic and environmental development and the glaciation history during the Quaternary Period, as well as their major causal relations
- account thoroughly for the Late Quaternary stratigraphy,and the environmental, climatic and deglacial development of northern Europe, and account generally for the corresponding development in other parts of the world

Competence and skills

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

- independently and in a reflective way analyse and interpret different types of proxy data obtained from terrestrial and marine stratigraphies and ice cores, and based on such interpretations and comparisons reconstruct climatic and environmental changes during the Quaternary Period
- comprehend, critically assess and discuss scientific publications within the field, and based on this type of literature summarise current research questions
- 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:

- assess and evaluate ongoing global and regional climate changes as well as future climate scenarios in the perspective of Quaternary climate variations
- Assess the human influence on the climate system of the Earth in relation to natural climate variations on different time scales

Course content

The course consists of two parts:

Part 1. Literature, seminars and excursions, 10 credits
The following topics are treated based on lectures, literature studies (text book and primary scientific publications), seminars with oral presentations, discussions and excursions:

- Palaeoclimatic research history and the advent of the glacial theory
- Forcings and mechanisms behind major climate changes
- Reconstruction of climate changes based on analysis of natural climate archives (terrestrial, marine, and ice-core records)
- The initiation of Quaternary glaciations and early Glacial-Interglacial periods
- Climatic and environmental changes during the last Interglacial-Glacial cycle
- Glacial dynamics of the latest Scandinavian ice sheet as well as stadials and interstadials during the early and middle parts of the last ice age
- The deglaciation of the latest Scandinavian ice sheet and the subsequent development of the Baltic Sea Basin

- The climatic and environmental development during the last deglaciation and the current interglacial, and forcings of short-lasting climatic perturbations
- Late Quaternary glaciation history and climatic changes in the Polar regions
- The glaciation history of North America with an emphasis on the last deglaciation
- General overview of climate and glaciation dynamics in other parts of the world during the last ice age cycle
- The evolution of humans and its relations to Quaternary climate and glaciation history
- Recent and ongoing climate change, human influence on the climate system and future climate scenarios
- Quaternary stratigraphy, climate history and glacial landscapes in the peripheral areas of the latest Scandinavian ice sheet, Scania-Denmark (excursion)
- Quaternary stratigraphy and glacial history of southern and/or central Sweden (excursion)

Part 2. Written assignment and oral presentation, 5 credits

The student chooses a topic with relevance to the course content in consultation with the teachers. The research question should be treated in writing based on critical assessment of a number of primary scientific publications. The essay is also presented in the form of an oral presentation.

Course design

The teaching consists of lectures, seminars, field teaching and project work followed by written and oral presentation. Participation in seminars, field teaching, project work and presentations, as well as associated activities, is compulsory.

Assessment

Examination takes place in writing in the form of a home-based examination during the course, through assessment of submitted project report and oral presentation, as well as through compulsory activities. Students who failed the first exam opportunity will be offered an additional exam opportunity shortly thereafter.

Grades

Grading scale includes the grades: Fail, Pass, Pass with distinction
To pass the entire course, approved examination and passed project reports as well as participation in all compulsory activities are required. The final grade is decided through a joint assessment of the results of the project report and the examination in proportion to their extent (see appendix).

Entry requirements

For admission to the course, general entry requirements are required as well as 90 credits in geology including GEOB22-GEOB25 or GEOB01-GEOB04, as well as GEON05 Quaternary Geology: Glacial Sedimentology- Processes, Sediments and Landform Systems, 15 credits, and GEON06 Quaternary Geology: Palaeoecological Methods and Environmental Analysis, 15 credits, or the equivalent knowledge. Proficiency in English corresponding to English B/English 6 from Swedish upper secondary school.

Further information

The course may not be included in a degree together with GEON03 Quaternary Geology: Quaternary Climate and Glaciation History, 15 credits, KVG531 Quaternary Geology: Quaternary Climate and Glaciation History, 10 credits, or KVG528 Quaternary Geology: Regional Geology (Glaciation History, Vegetation Development, Regional Stratigraphy and Global Climate Changes), 10 credits.