Department of Earth and Enironmental Sciences

GEON05, Quaternary Geology: Glacial Sedimentology - Processes, Sediments and Landform Systems, 15 credits

Kvartärgeologi: Glacial sedimentologi - processer, sediment och landformssystem, 15 högskolepoäng

Second Cycle / Avancerad nivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2016-04-04. The syllabus comes into effect 2016-07-01 and is valid from the autumn semester 2016.

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

Learning outcomes

The general aim of the course is to provide students with specialised knowledge of the formation of the glacial landscape, both with regard to sediments and landforms. In order to attain this knowledge, students must have a basic understanding of active glacial processes and processes active in glaciofluvial and glaciolacustrine/marine environments associated with ice sheets. Together with knowledge obtained in other second cycle courses in Quaternary geology, this knowledge is to be used for specialised understanding and execution of environment and climate reconstructions on different time scales, mainly of the latest ice age cycles.

Knowledge and understanding

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

- account for the interaction of different processes in glacial sedimentation environments, and describe facies models of subglacial, supraglacial, ice marginal, proglacial, glaciolacustrine and glaciomarine environments with regard to the formation of sediments and landforms
- describe scientifically established criteria for identification of different glaciogenic sediments
- summarise publications of primary research in the area of glacial geology

Competence and skills

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

- independently plan and execute a sedimentological field study of a major section with complex, glaciogenic sediments
- independently select and use appropriate documentation and analysis methods for field and laboratory studies aiming to identify and describe glaciogenic sediments, and apply different facies coding systems in this context
- present a completed field study as a scientific project report including a formulated issue, critically evaluate and interpret field and laboratory data, and justify the conclusions
- reconstruct glacial dynamics, glacial sedimentation environments and deglaciation patterns based on map and terrain model studies of landforms and landform systems

Judgement and approach

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

- assess and critically discuss positions taken and conclusions expressed in publications of primary research in glacial geology
- apply a scientific approach to environment and climate reconstructions based on glacial geological methodology

Course content

The course consists of two components:

Component 1. Glaciology, glacial sedimentology: processes and sediment products, **7.5 credits**

Glaciology: climatic factors, glacial rheology, energy and mass relations, movement patterns of ice sheets and topographically controlled glaciers, process dynamics of temperate and polar glaciers, glacier hydrology.
Glacial geology: interaction between glaciers and their physical environment, processes of glacial erosion, transport and deposition, textural and structural properties of tills, glaciotectonics, glaciofluvial, glaciolacustrine and glaciomarine processes and sediment products.
Field course 1: Field studies in the forefield of a contemporary glacier, including glacier dynamics, active glacial and glaciofluvial processes of erosion, deformation and deposition. The process studies shall be used for interpretation of sediments and landforms close to the present glacier.
Field course 2: Field investigations of a major section showing different types of tills, glaciotectonic structures, coarse glaciofluvial sediments and glaciolacustrine

sequences. Documentation methods, sampling techniques, processing, compilation, and evaluation and interpretation of data. Presentation.

Component 2. Glaciogenic landforms and landform systems, 7.5 credits

Glacial landforms resulting from glacial erosion, deformation and deposition. Landforms associated with glaciofluvial, glaciolacustrine and glaciomarine sediments. Reconstruction of glacial dynamics and glacial sedimentation environments based on landform systems. Geomorphological and soil geology mapping from air photos, LiDAR-based terrain models and analysis of the distribution and formation of sediments and landforms.
Field trip: The glacial history of a region as demonstrated through studies of the distribution pattern of glaciogenic sediments and landforms.

Course design

The teaching consists of lectures, seminars, group exercises, project work in connection with field exercises and field trips. Participation in field exercises, field trips, seminars, group work and project work and any integrated teaching is compulsory.

Assessment

The assessment is based on a submitted project report and a written exam at the end of the course. 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
For a grade of Pass on the whole course, students must have passed the project report and participated in all compulsory components. The final grade is based equally on the results of the project report and the exam.

Entry requirements

To be admitted to the course, students must have 90 credits in geology including knowledge equivalent to courses GEOB21-GEOB25 or GEOB01-GEOB04. 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 GEON01 Quaternary Geology: Glacial Sedimentology, Sediment and Land Form Systems, 15 credits, KVG529 Quaternary Geology, Glacial Sedimentology Processes, Sediment Products and Land Form Systems, 10 credits, or KVG525 Quaternary Geology, Glacial Sedimentology Processes, Sediment Products and Land Form Systems, 10 credits.