



Faculty of Science

GEOC07, Geology: Geophysical Exploration Methods, 15 credits

Geologi: Geofysisk undersökningsmetodik, 15 högskolepoäng
First Cycle / Grundnivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2017-09-06 to be valid from 2017-09-06, spring semester 2018.

General Information

The course is an elective first cycle component of a degree of Bachelor of Science in Geology.

Language of instruction: Swedish

Main field of studies

Geology

Depth of study relative to the degree requirements

G2F, First cycle, has at least 60 credits in first-cycle course/s as entry requirements

Learning outcomes

Geophysics applies methods of physics to explore the origin, development and properties of Earth and describes the structure of Earth in physical terms. Applied geophysics comprises the most common geophysical methods, such as gravimetry, magnetometry, seismology and geoelectrics. In combination with geological investigation methods, geophysics plays an important part in the prospecting for different natural resources, such as ores, oil/gas and water. Furthermore, geophysical exploration methods are used to survey and investigate different environmental disturbances such as emissions of pollutants. The overall aim of the course is to provide students with basic knowledge of geophysics for professional activities from a societal perspective.

Knowledge and understanding

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

- account for the fundamental elements of the theory for the most common geophysical methods
- explain the methodology of data collection for the most common geophysical methods
- describe the main fields of application for the most common geophysical methods
- account for different drilling methods and their applications, and for geological drill hole logging

Competence and skills

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

- discuss and propose suitable methods for different geophysical aim formulations
- plan and perform fundamental geophysical investigations
- manage in practice some of the most common types of geophysical instruments and use them for data collection
- master the fundamentals of processing and interpretation of geophysical data
- present results and conclusions from a fundamental geophysical investigation in a written report

Judgement and approach

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

- critically review proposed methods and modes of execution of fundamental geophysical investigations
- critically review proposed interpretations of results of geophysical investigations and discuss alternative interpretations
- critically review a report based on a fundamental geological investigation

Course content

The course consists of two modules:

Module 1: Geophysical Investigation Methods, Drill Hole Logging and Drilling Methodology, 12 credits

Module 1 consists of two different blocks, which partly run in parallel:

Block 1: Basic theory, methodology and interpretation of the most common geophysical methods, and drilling methodology and geological drill hole logging

Theoretical background, fields of application, instrument management, data collection methodology, data processing and interpretation methodology for the following geophysical investigation methods: reflection seismology, refraction seismology, gravimetry, magnetometry, geoelectrical methods and electromagnetic methods. Exercises with geophysical interpretation software.

Geophysical drill hole logging: Fundamental concepts of logging technology and the functioning, implementation and fields of application of the most important exploration methods. Interpretation of lithology and physical properties (porosity, water saturation, resistivity, density). Clay volume calculations. Application of drill hole logging in hydrocarbon exploration, hydrogeology and structural geology, and with regard to geothermal energy and carbon dioxide sequestration. Practical exercise with drill hole logging.

Drilling methodology: Fundamental description of the most important drilling methods for investigation and production with regard to geothermal energy/geoenery, oil and gas, groundwater and engineering geology, and in connection with prospecting for ores and minerals.

Geological drill hole logging: Methodology for sampling, analysis and interpretation of geological materials from drilling. Core logging and documentation of drill cuttings.

Block 2: Planning, implementation and interpretation of geophysical investigations

Choice of methods for different geophysical aim formulations. Investigation software. Field investigation methodology. Integrated interpretation of results of several different geophysical methods. Description and discussion of case studies.

Applied problem-oriented field exercise using seismic equipment, magnetometer, geoelectrical instruments, VLF instruments and induced polarisation detector. The exercise includes planning of a study, data collection, and interpretation and evaluation of collected data.

Module 2: Project, 3 credits

Execution of a minor project assignment, comprising compilation, processing, interpretation and presentation of geophysical data. The project is to be presented orally and in writing. The project is to be performed and presented in groups.

Course design

The teaching consists of lectures, field exercises, group exercises and project work. Participation in field exercises, group exercises, project work and associated elements is compulsory.

Assessment

The assessment is based on written exams, project reports and oral presentations. Students who failed the first exam opportunity will be offered an additional exam opportunity soon thereafter.

In order for a permanently disabled student to be offered an examination opportunity equivalent to that of a non-disabled student, the examiner may, after consultation with the University's Disability Support Services, decide about an alternative form of examination for the student concerned.

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.

Subcourses that are part of this course can be found in an appendix at the end of this document.

Grades

Marking scale: Fail, Pass, Pass with distinction.

For a grade of Pass on the whole course, the student must have passed the exams, written assignments and project report, as well as participated actively in all compulsory components. The final grade is determined by the aggregated results of the assessed components in proportion to their extent (see appendix).

Entry requirements

To be admitted to the course, the student must meet the general entry requirements and have 75 credits in geology, earth science, physical geography or basic environmental science, or the equivalent.

Further information

The course may not be included in a degree together with GEOC04 Geophysical Exploration Methods, 15 credits.

Subcourses in GEOC07, Geology: Geophysical Exploration Methods

Applies from V18

- 1701 Theory, Geophysical Methods and Drilling, Written Exam, 4,0 hp
Grading scale: Fail, Pass, Pass with distinction
- 1702 Geophysical Investigations, Written Examination, 8,0 hp
Grading scale: Fail, Pass, Pass with distinction
- 1703 Project Report, Written and Oral Presentation, 3,0 hp
Grading scale: Fail, Pass, Pass with distinction
- 1704 Mandatory Learning Activities, 0,0 hp
Grading scale: Fail, Pass