



Faculty of Science

GEOB25, Geology in Society, 15 credits

Geologi i samhället, 15 högskolepoäng

First Cycle / Grundnivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2017-03-19 to be valid from 2017-03-19, autumn semester 2017.

General Information

The course is a compulsory first cycle component of a Bachelor of Science in Geology.

Language of instruction: Swedish

Main field of studies

Geology

Depth of study relative to the degree requirements

G1F, First cycle, has less than 60 credits in first-cycle course/s as entry requirements

Learning outcomes

The course forms part of a series of six compulsory courses, which aims at providing basic knowledge within a broad range of geological disciplines. The properties of the bedrock and the superficial deposits are highly important to our exploitation of natural resources, as well as to human health and natural ecosystems. To be able to plan a sustainable society for the future, we need to understand how human activities affect the environment below Earth's surface and how different types of geology can provide different conditions for resource exploitation and affect the spread of pollutants. The course covers three important aspects of the importance of geology in society, namely within hydrogeology, environmental geochemistry and geological resource exploitation.

Knowledge and understanding

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

- account for the formation, properties and appearance of groundwater in loose deposits and bedrock
- account for and demonstrate understanding of different types of hydraulic properties of groundwater reservoirs
- account for at a fundamental level of pressure gradients and flow directions of groundwater
- demonstrate an understanding of sediment stability problems associated with human activities influencing groundwater and surface water conditions
- account for the environmental quality target "Unpolluted environment", different types of underground pollution, handling of pollution problems and relevant legislation
- demonstrate an understanding of different geochemical processes in the underground that affect human health and the environment
- account for the formation, occurrence, localisation and extraction of ores, important industrial minerals and rocks, ballast material and fossil fuels
- account for different methods for energy storage and extraction of geothermal energy in bedrock and superficial deposits
- provide a general description of the methodology for storing carbon dioxide and spent nuclear fuel in the bedrock

Competence and skills

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

- analyse groundwater flows by means of construction of flow nets
- execute basic mathematical calculations of hydrogeological parameters such as hydraulic field capacity and hydraulic conductivity based on different case studies and practical laboratory experiments
- perform geological and hydrogeological assessments with regard to anthropogenic contaminants, e.g. in the context of the localisation and design of landfills
- discuss in detail questions that relate to geological resources in society
- communicate in speech and writing relevant aspects of the importance of geology in society

Judgement and approach

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

- critically assess and discuss the importance of groundwater in a resource geological and societal perspective
- critically assess and discuss underground pollution problems in a societal perspective
- demonstrate an understanding of geological materials as finite resources and the implications of this for society, the environment and research

- demonstrate an understanding of the financial value and societal significance of geological resources
- critically assess their own and others' written presentations
- assess risks in connection with geological work tasks

Course content

The course consists of three modules:

Module 1: Hydrogeology, 7 credits

Module 1 contains the following components of fundamental hydrogeology and engineering geology:

- The hydrological cycle: the formation, occurrence and renewal of groundwater
- Basic hydrogeology: the occurrence of groundwater in saturated and unsaturated zones, material properties in soil profiles
- Open and closed aquifers and their properties
- Pore water pressure and its significance for the stability properties of soil profiles
- Theoretical and practical analysis of the hydraulic properties of groundwater reservoirs, including fundamental calculation methods and calculation exercises for determination of these properties
- Calculations of groundwater flows by means of construction of flow nets
- Groundwater as a natural resource
- Groundwater protection
- Methods of hydrogeological mapping and documentation

Module 2: Environment Geochemical Processes, 4 credits

Module 2 contains the following components of soil geochemistry, underground pollution, and links to human health and the environment:

- The significance of naturally occurring and anthropogenically introduced pollutants in a societal perspective
- Chemical and biological processes in the underground of relevance to the assessment of environmental impact
- Overview of the significance of geology to human health (medical geology)
- Overview of environmental legislation concerning underground pollutants, landfills and activities influencing groundwater and surface water conditions
- Different aspects of remediation of underground pollutants and control programs
- Study visit to an active landfill

Module 3: Geological Resources, 4 credits

Module 3 contains the following components of geological resources:

- The formation, occurrence and methods of prospecting financially important raw materials, such as coal, petroleum, ores, industrial minerals and ballast material
- Geological conditions for geothermal energy extraction in bedrock and superficial deposits
- Geological conditions and challenges related to carbon dioxide storage and the planned deep storage of spent nuclear fuel
- Study visit to an active quarry

Course design

The teaching consists of lectures, laboratory sessions, exercises and study visits. Compulsory participation is required in laboratory sessions, exercises, study visits and associated elements.

Assessment

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

In consultation with Disability Support Services, the exam may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equal 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 Pass on the whole course, the student must have passed the written exams, the project reports and assignments, and the 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, students must meet the general entry requirements and have passed GEOA01 Planet Earth ? An Introduction, 15 credits, GEOA81 Geology: Earth, Water and the Environment, 15 credits, or the equivalent.

Further information

The course may not be included in degree together with GEOP05 Hydrogeology 15 credits, GEOP01 Hydrogeology, 15 credits, GEOC06 Soil and Landfills, 7.5 credits or GEOP03 Geological Resources and Society, 15 credits.

Subcourses in GEOB25, Geology in Society

Applies from H17

- 1701 Laboratory Report, Hydrogeology, 1,5 hp
Grading scale: Fail, Pass
- 1702 Hydrogeology and Technical Geology, Written Examination, 5,5 hp
Grading scale: Fail, Pass, Pass with distinction
- 1703 Contaminated Soil, Oral Examination, 4,0 hp
Grading scale: Fail, Pass, Pass with distinction
- 1704 Geological Resources, Written Examination, 4,0 hp
Grading scale: Fail, Pass, Pass with distinction
- 1705 Mandatory Learning Activities, 0,0 hp
Grading scale: Fail, Pass