



Faculty of Science

GEOB22, Geology: Mineralogy and Petrology, 15 credits

Geologi: Mineral och bergarter, 15 högskolepoäng

First Cycle / Grundnivå

Details of approval

The syllabus is an old version, approved by Study programmes board, Faculty of Science on 2016-09-19 and was valid from 2016-12-01, spring semester 2017.

General Information

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

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.

Knowledge and understanding

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

- provide a general account of basic mineralogy with regard to crystallography, crystal chemistry and crystal physics
- provide a general account of and apply basic crystal optics
- account for mineral taxonomy, particularly the taxonomy and structures of silicate minerals
- describe and explain the fundamental concepts of petrology, such as classification and tectonic contexts

- account for the formation processes of igneous, sedimentary and metamorphic rocks

Competence and skills

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

- perform fundamental macroscopic and polarisation-microscopic identification of minerals and rocks
- perform fundamental statistical calculations to describe geological sample materials
- use images, particularly diagrams and graphs, to communicate results, in the specific field but also generally

Judgement and approach

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

- assess the component minerals in rocks and their significance for petrogenesis
- discuss, from a mineralogical perspective, the processes that lead to formation of igneous, sedimentary and metamorphic rocks

Course content

The course consists of four integrated parts:

Part 1: Mineralogy:

- The solid materials of Earth: Minerals and rocks
- Physical properties of minerals
- Crystal chemistry: How atoms and ions form minerals, and the significance of valence and ionic radius for the elemental composition of specific minerals
- The path of light and the properties of the polarisation microscope
- Important rock-forming minerals and their classification
- Basic crystallography focusing on symmetry, such as the Miller index, rotation and reflection, twin formation and polymorphism

Part 2: Igneous Petrology:

- Commonly occurring igneous minerals, their properties and classification, and identification based on macroscopy and polarisation microscopy
- Why rocks melt, focusing on latent heat, geothermal gradients and the effects of fluids
- Cryoscopic effects during melting and how these effects can be studied and calculated in phase diagrams
- Basic definitions and concepts, such as melt and magma
- Calculation of solid solution series in igneous processes, and the effect of ambient pressure on the mineral composition
- Phase diagrams and melting processes in a plate-tectonic context
- Properties of magma, such as viscosity and density, and how magma is transported in Earth's crust
- How plutonism and volcanism are linked to petrographic properties and how crystallisation processes can be calculated in phase diagrams
- Tectonic environments and classification of commonly occurring igneous rocks

Part 3: Sedimentary Petrology:

- Commonly occurring sedimentary minerals and their properties
- Classification of sedimentary minerals, and how to identify them using macroscopy and polarisation microscopy
- Sedimentary processes in different geological environments

Part 4: Metamorphic Petrology:

- Commonly occurring metamorphic minerals, their properties and classification, and how to identify them using macroscopy and polarisation microscopy
- Fundamental metamorphic concepts, variables and driving forces, such as pressure, temperature, as well as the Gibb's phase rule
- Metamorphic rocks and their links to plate-tectonic environments
- Metamorphic facies and index metamorphic minerals in basic and pelitic rocks
- Changes in metamorphic pressure and temperature over geological time
- Metamorphic provinces in Sweden

Course design

The teaching consists of lectures, field trips, seminars, group exercises and project work. Compulsory participation is required in field trips, seminars, group exercises and project work, and associated elements.

Assessment

The assessment is based on a final written exam, an oral exam requiring identification of minerals and rock samples using microscopy, project reports and participation in compulsory modules.

Students who failed the first exam opportunity will be offered an additional exam opportunity soon thereafter..

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 and oral exam, the project reports and the compulsory components. The final grade is determined by the aggregated results of the assessed components in proportion to their scope (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 a degree together with GEOB03 The Lithosphere, 15 credits, GEOB04 Sedimentology, 15 credits, GEL304 The Lithosphere, 10 credits, or GEL305 Sedimentology, 10 credits.

Subcourses in GEOB22, Geology: Mineralogy and Petrology

Applies from V17

- 1601 Mineralogy & Petrology, written examination, 12,0 hp
Grading scale: Fail, Pass, Pass with distinction
- 1602 Identification of Minerals and Rocks, practical examination, 3,0 hp
Grading scale: Fail, Pass
- 1603 Mandatory Learning Activities, 0,0 hp
Grading scale: Fail, Pass