



Department of Earth and Environmental Sciences

## GEOM11, Bedrock Geology: Magmatic Petrology, Geochemistry and Geochronology, 15 credits

*Berggrundsgeologi: Magmatisk petrologi, geokemi och geokronologi, 15  
högskolepoäng*  
Second Cycle / Avancerad nivå

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### Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2017-03-19. The syllabus comes into effect 2017-03-19 and is valid from the autumn semester 2017.

### General information

The course is an elective second cycle course for a 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 theoretical and practical knowledge of magmatic petrology, geochemistry and geochronology in order to understand petrological processes in igneous systems. Together with other second cycle courses in bedrock geology this knowledge will form the basis for advanced understanding and analyses of crystalline bedrock on different spatial and temporal scales.

### Knowledge and understanding

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

- account for the equilibrium concept, elemental and isotopic distributions, kinetics and transport mechanisms during endogenic processes
- provide a general description of the origin of Earth based on extraterrestrial material and the change in heat content of Earth through geological time
- explain and understand nucleation processes, crystal growth and textural development during the crystallisation of magmas
- provide a thorough account of the processes that control the chemical and mineralogical development of magmas
- account for different geochemical and isotope geological methods and describe how these methods are used to acquire knowledge of petrological processes
- independently describe different tectonic environments and their effects on petrological processes in igneous systems
- account for the most important radiometric dating methods and their applications

### **Competence and skills**

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

- identify the most common minerals by means of light microscopy and minerals that can be dated
- provide a general description of how an electron microscope functions and how elemental analyses are performed
- demonstrate a good ability to interpret and use isotopic and element chemical diagrams

### **Judgement and approach**

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

- critically assess the formation processes of rocks from a geochemical perspective and make assessments of tectonic environments
- make a well supported assessment of optimal geochronological methods based on the mineral composition of a rock

- critically judge and comment on research publications and oral summaries of such works

## **Course content**

The course is an integrated unity focusing on geological processes from a geochemical and geochronological perspective, including the following components:

- Igneous rocks from melt generation to crystallisation
- Links between igneous petrology and tectonic environments
- The genesis and crystallisation of magmas related to physical and chemical conditions
- Principles and applications of geochemical diagrams and their use for the classification of rocks
- Radiometric dating methods and their applications
- An international or regional field trip including studies of igneous rocks based on petrology, chemistry, texture and formation conditions
- Basic orientation in different methods for chemical analysis of minerals and rocks
- Specialised knowledge of rocks using optical and electron-optical microscopy

## **Course design**

The teaching consists of lectures, group exercises, seminars and a field trip. Participation in group exercises, seminars and the field trip is compulsory.

## **Assessment**

The assessment is based on a written exam, written assignments and a field trip report. 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.

## **Grades**

Grading scale includes the grades: Fail, Pass, Pass with distinction  
For a Pass on the whole course, the student must have passed the written exam, the written assignments, the field trip report and 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, students must have passed 90 credits in geology including GEOB21-GEOB25 or GEOB01-GEOB04 or the equivalent. 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 GEOM05 Magmatic Petrology, Geochemistry and Geochronology, 15 credits, or GEOM03 Petrological and Ore-Forming Processes, 15 credits.