

## **GEOM06, Metamorphic Petrology and Structural Geology, 15 credits**

*Berggrundsgeologi: Metamorf petrologi och strukturgeologi, 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 2011-02-03 to be valid from 2011-02-03, autumn semester 2011.

### **General Information**

The course is an elective course for second-cycle studies for a Degree of Master of Science (120 credits) in geology.

*Language of instruction:* English and Swedish  
The course is given in English.

*Main field of studies*

Geology

*Depth of study relative to the degree requirements*

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

### **Learning outcomes**

The aim of the course is that students should have acquired the following knowledge and skills on completion of the course; they should

- be able to describe how tectonic processes govern metamorphism and how this is represented in the bedrock evolution through geologic time as a result of changing pressure and temperature,
- in detail be able to account for how different metamorphic parageneses, textures and deformation structures can be connected to large-scale tectonics,
- in detail be able to account for different metamorphic facies and characteristic metamorphic parageneses in different host rocks, and how facies and reactions are represented in petrogenic diagrams,

- be able to describe various types of metamorphic reactions, and explain at a general level the effect of fluids on metamorphic equilibria and reactions,
- in detail be able to account for the equilibrium concept, be able to describe how equilibria and non-equilibria are expressed in mineral chemistry and textures, and explain at a general level how diffusion, nucleation and crystal growth occur during metamorphism,
- be able to account for how common petrographic tools such as polarisation microscopy, electron microscopy and mineral chemical microanalysis are used in metamorphic petrology, and be able to account for principles and methods for pressure and temperature determination,
- at a general level be able to account for the most important radiometric dating methods within metamorphic petrology and their applications,
- at a general level be able to describe the effects of metamorphism and deformation on the material properties of the bedrock and its practical fields of use,
- independently be able to identify, describe and interpret metamorphic parageneses, metamorphic textures and deformation structures at the meso and micro scale by means of polarisation microscopy,
- be familiar with the use of metamorphic phase diagrams and simple methods for pressure and temperature calculations based on mineral chemical data.

## Course content

The course focuses on metamorphic petrology and relationships between metamorphism and deformation in different tectonic environments. Emphasis is placed on recognition and analysis of different metamorphic parageneses, textures and deformation structures, and how to relate these parameters to processes. Emphasis is also placed on the connection between metamorphic and structural geological phenomena at different scales from large-scale dynamic systems to the micro scale. Processes that include interaction between metamorphism, deformation and fluids are discussed, such as effects of metamorphism and deformation on the material properties of the bedrock and its practical fields of use. The course also gives an orientation on methods for semi-quantitative and quantitative pressure and temperature determination and radiometric dating of metamorphism and deformation.

The course contains several practical study elements based on polarisation microscopy, presentations of scientifically published case studies and reviews as well as exercises in handling of mineral chemical analyses, phase diagrams and quantitative pressure and temperature determinations.

## Course design

The teaching consists of lectures, exercises, seminars, excursions and/or study visits. Participation in exercises, seminars and excursions/study visits and thereby integrated other teaching is compulsory.

## **Assessment**

The examination takes place in writing in the form of examination and through assessment of individual project reports. For students who have not passed the regular examination, additional examination in close connection to this is offered.

*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.

The grades in the course are passed with distinction, passed and failed. To pass the entire course, approved examination, approved project reports and participation in all compulsory parts are required.

The final grade is determined by summarising the results of all parts that are included in the examination.

## **Entry requirements**

For admission to the course, general entry requirements are required and 75 credits in geology including GEOB01-GEOB04 or the equivalent knowledge, and English B or the equivalent.

## **Further information**

## Subcourses in GEOM06, Metamorphic Petrology and Structural Geology

Applies from V11

1101 Metamorphic Petrology and Structural Geology, 15,0 hp  
Grading scale: Fail, Pass, Pass with distinction