

## **KEMM06, Chemistry: Analytical Chemistry - Advanced Course, 15 credits**

*Kemi: Analytisk kemi - fördjupningskurs, 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 2007-03-01 and was last revised on 2012-01-24. The revised syllabus applies from 2012-01-01, spring semester 2012.

### **General Information**

The course is an optional second-cycle course for a degree of Master of Science, main field of subject Chemistry.

*Language of instruction:* English and Swedish  
When necessary, the course in full is given in English.

*Main field of studies*

Chemistry

*Depth of study relative to the degree requirements*

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

### **Learning outcomes**

The course aims to provide advanced theoretical insight into commonly occurring modern separation techniques, such as chromatographic, mass spectrometric and capillary electrophoretic techniques. The course also aims to develop the students' ability to independently select and optimise appropriate separation techniques/methods and to provide a coherent overview of the subject.

The aim of the course is that on its completion students will have acquired the following skills and knowledge:

#### **Knowledge and understanding**

On completion of the course the student will be able to:

- provide advanced explanations for the gas and liquid chromatographic principles and techniques that the course includes
- explain the basics of mass spectrometry and capillary electrophoresis
- describe the construction and function of different analytical instruments for the techniques treated on the course
- explain the principles of various extraction techniques and highlight the importance of proper sample preparation before instrumental analysis

### Competence and skills

On completion of the course the student will be able to:

- modify and apply methods and techniques for chromatographic separation, for both quantitative and qualitative purposes
- evaluate the choice of chromatographic technology for the separation of low molecular weight substances, based on the characteristics of the substances and the sample
- compile results and present them orally and in writing
- search, evaluate the relevance of, summarize and present scientific information in an assigned area

### Course content

*Lectures:* Advanced theoretical treatment of chromatographic separation and the underlying distribution and adsorption equilibria. Instrumentation and experimental technology for high performance liquid chromatography and gas chromatography, especially with capillary columns and selective detectors. Coupling gas chromatography to mass spectrometry. Basic orientation on capillary electrophoresis.

*Laboratory work:* Experimental technology for high performance fluid chromatography. Optimisation of HPLC systems with different combinations of mobile and stationary phases. Gas chromatography with capillary columns, injection techniques and the use of mass spectrometric detection. Sample preparation with conventional and pressurized liquid extraction technique.

*Literature project:* Isomer separation with oral and written presentation.

### Course design

Teaching comprises lectures and exercises that treat theoretical aspects. The block of lectures is followed by a compulsory block of laboratory work and a literature project. The laboratory work and literature project are presented orally and in writing.

### Assessment

The course is assessed with a written examination.

A re-sit examination is offered soon after the examination to students who do not pass.

*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.

To be awarded Pass on the whole course, students must pass the examination, pass the laboratory work and pass the project.

The examination grades are: Pass with Distinction, Pass or Fail. Grades for the compulsory components are: Pass or Fail.

The final grade for the course is determined by the grade on the final examination.

## Entry requirements

To be eligible for this course students must have basic eligibility, English B and 90 higher education credits in completed Science courses, including passes in courses equivalent to:

- KEMA00 General and Analytical Chemistry 7.5 credits, KEMA01 Organic Chemistry – Basic Course 7.5 credits, KEMA02 Inorganic Chemistry – Basic Course 7.5 credits and KEMA03 Biochemistry – Basic Course 7.5 credits and
  - KEMB06 Analytical Chemistry, 15 credits
- Equivalent knowledge that has been gained in another way also provides eligibility for the course.

## Further information

The course cannot be credited as part of a degree programme that also includes KEM052 Analytical Chemistry – Advanced Course, 15 credits.

## Subcourses in KEMM06, Chemistry: Analytical Chemistry - Advanced Course

Applies from H13

- 0711 Analytical Chemistry - Advanced Course, 7,5 hp  
Grading scale: Fail, Pass, Pass with distinction
- 0712 Analytical Chemistry - Adv. Course, Compulsory Elements, 7,5 hp  
Grading scale: Fail, Pass

Applies from H07

- 0701 Analytical Chemistry - Advanced Course, 15,0 hp  
Grading scale: Fail, Pass, Pass with distinction
- 0702 Analytical Chemistry - Advanced Course, Compulsory Elements, 0,0 hp  
Grading scale: Fail, Pass