

KEMM36, Chemistry: Electroanalytical Chemistry, 15 credits

Kemi: Elektroanalytisk kemi, 15 högskolepoäng

Second Cycle / Avancerad nivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2007-09-12 and was last revised on 2007-09-12. The revised syllabus applies from 2007-09-13, spring semester 2008.

General Information

The course is an optional second-cycle course for a degree of Master of Science in Chemistry.

Language of instruction: Swedish and English
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 in-depth theoretical and practical insights into commonly occurring modern electroanalytic techniques, both potentiometric and amperometric. The course also aims to develop the students' ability to independently select and optimise appropriate electroanalytical 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:

- the ability to explain, at an advanced level, the theories and causes behind concepts such as the electrical double layer, polarisation, convection, migration, diffusion, capacitance/impedance, electrocatalysis and their significance when applying different stationary and dynamic electroanalytical techniques
- the ability to describe the structure and function of different instrument components, e.g. reference electrodes, ion-selective electrodes, different electrode materials that are used in ammeters, electrochemical flow cells etc

- the ability to produce, characterise and apply chemically modified electrodes in electrocatalysis
- the ability to produce, characterise and apply biochemically modified electrodes in bioelectrocatalysis (enzyme based amperometric biosensors)
- the ability to search for and evaluate scientifically relevant information
- the ability to provide oral and written accounts and discussions of conclusions that are based on experimental results and the knowledge/theory that is the basis of the study
- the ability to present scientific results and theories, both orally and in writing

Course content

Lectures: In-depth theoretical treatment of the kinetic and thermodynamic factors that control electrode reactions. Instrumentation and experimental techniques for the most common potentiometric and amperometric electroanalytical techniques. Basic orientation in bioelectrochemistry and impedance spectroscopy.

Laboratory work: This aims to illustrate and combine the most common modern electroanalytical techniques (redox potentiometry, linear and cyclical sweep voltammetry, hydrodynamic voltammetry, rotating disc electrode methodology, etc) and applications in bioelectrochemistry.

Literature project: Individual choice of a specialised subject in modern (bio)electrochemistry with an oral presentation.

Course design

Teaching comprises lectures in which theoretical aspects are treated. The block of lectures is followed by a compulsory block of laboratory work and an individual literature project. The laboratory work is presented in writing and the literature project is presented orally.

Assessment

The course is examined orally. 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 literature 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 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, or KEM101 General Chemistry 1 15 credits and KEM102 General Chemistry 2 15 credits, or KEM111 Chemistry for Environmental and Biological Sciences – General Course 1 15 credits and KEM122 Chemistry for Environmental and Biological Sciences – General Course 2 15 credits

and

- KEMB06 Analytical Chemistry 15 credits or KEM005 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 KEM514 Electroanalytical Chemistry 15 credits.

Subcourses in KEMM36, Chemistry: Electroanalytical Chemistry

Applies from H13

- 0711 Electroanalytical Chemistry, 7,5 hp
Grading scale: Fail, Pass, Pass with distinction
- 0712 Electroanalytical Chemistry, Compulsory Elements, 7,5 hp
Grading scale: Fail, Pass

Applies from H07

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