# FKE3010 Electrochemical Engineering 7.5 credits

## Teknisk elektrokemi

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

## Establishment

Course syllabus for FKE3010 valid from Spring 2014

## Grading scale

undefined

## Education cycle

Third cycle

## Specific prerequisites

The course Applied Electrochemistry KE2110, or equivalent. Basic knowledge in numerical methods.

## Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

## Intended learning outcomes

After completion of the course you should be able to:

· Explain and implement the equations for mass transport in dilute and concentrated electrolytes, and to assess their applicability in specific cases.

· Explain and implement equations for production and transport of heat in electrochemical systems, and explain the temperature dependence of electrode potentials, electrode kinetics and mass transport properties.

· Explain and implement models for current distribution in porous electrodes.

· Set up models for an electrochemical system, based on continuity equations and transport equations for relevant variables, and with necessary boundary conditions.

· Solve problems of moderate mathematical/ numerical level of difficulty, and to discuss and make conclusions from the results.

Explain and discuss important aspects and problems in modelling, design and use of some realistic systems (e.g. PEM fuel cells and Li ion batteries), and to evaluate results from simulations.

## Course contents

The course is run as seven seminars (≈ 3 hrs.). At each of the six first seminars a new theme is introduced, with an assignment that is to be solved and discussed at the following seminar.

**Themes**:

Mass transport in dilute electrolytes

Thermal modelling

Current distribution in porous electrodes

Mass transport in concentrated electrolytes

Literature study in fuel cell modelling

Literature study in battery modelling

## Course literature

J. Newman, ”Electrochemical Systems”, 3rd edition, Wiley 2004. + annat material

## Examination

Based on recommendation from KTH’s coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

## Other requirements for final grade

All home assignments passed.

## Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.