MH2033 Advanced Materials and Process Sciences 8.0 credits

Avancerad material och processvetenskap

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 MH2033 valid from Spring 2009

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Language of instruction

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

Intended learning outcomes

The Course consists of two modules:

Module 1: Advances in Process Design

Module 2: Modelling of Materials

- Module 1 aims at providing a theoretical platform for the students for a better understanding of process metallurgy. It intended to prepare the students both for an industial as well research career.
- Module 2 aims to give the students some insight in modern materials modelling.

After the course the students should be able to:

- Use theoretical tolls for process modelling of high temperature processes
- Couple crystallography to thermodynamic models
- Use exprimetial information from literature to optimise model parameters in simple thermodynamic and kinetic models
- preform simple ab initio calculations using appropriate softeare
- read and use relevant scientific publications to obtain data to use in the above applications

Course contents

Module 1: Advances in Process Science
Thermodynamics of dilute metallic solutions and slag systems. Thermopysical properties of importance in Process Metallurgy. Surface and interfacial phenomena. Two phase reactions involving solids and gases as well as solids and liquids.

Module 2: Modelling of Materials
Thermodynamic and kinetic models. The Calphad technique. Ab initio calculataions.

Specific prerequisites

MH2030 **Applied Thermodynamics and Diffusion Kinetics** 6,0 hp or similar knowlede in simulation tools to calculate phase equilibria, phase diagrams and to solve diffusion problems.

Course literature

Module 1: Course book, Handouts.

Module 2: Lukas, Fries and Sundman, Computational Thermodynamics - The Calphad Method, Cambrige University Press, 2007, ISBN 978-0-521-86811-2
Materials handed out: Scientific papers and book chapters

Examination

- INL1 - Assignments, 4.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory Work, 1.0 credits, grading scale: P, F
- PRO1 - Project, 1.0 credits, grading scale: P, F

• TEN1 - Examination, 2.0 credits, grading scale: A, B, C, D, E, FX, F

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

Module 1:
Laboratory work and exercises (LAV1, 1hp)
Project assignment (PRO1; 1 hp)
Written exam (TEN1; 2hp)

Module 2:
Reports (INL1; 4hp)

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.