



# MH2049 Advanced Course in Process Science 9.0 credits

Avancerad kurs i processvetenskap

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

## Establishment

Course syllabus for MH2049 valid from Spring 2015

## Grading scale

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

## Education cycle

Second cycle

## Main field of study

Materials Science and Engineering

## Specific prerequisites

## Language of instruction

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

## Intended learning outcomes

After completing the course the student will have:

- a sound knowledge regarding the application of thermodynamic theories for pyro metallurgical processes.
- a sound knowledge regarding the fundamental aspects and phenomena which are essential for an understanding of mechanisms in metallurgical processes.
- an in-depth knowledge regarding different metallurgical process systems as well as an ability to analyse different metallurgical processes

## Course contents

Module 1: Applied Equilibrium Theory in Metallurgical Processes

- Deoxidation and formation of non-metallic inclusions with focus on oxides
- Modification of non-metallic inclusions
- Slag-metal equilibrium calculations
- Application of slag capacity during metal refining
- Process analyses using thermodynamics

Module 2: Theory of high temperature processes, 4 hp "focus on phenomena"

- Thermodynamic models with focus on steel alloys with high alloy contents
- Thermophysical properties of metals and slags
- Heat and mass transport
- Process phenomena: bubble formation, foaming, gas-liquid reactions, reactions between liquid phases

Module 3: Reactor and process design, 4 hp "focus on processes"

- Coupling between thermodynamics and kinetics
- Production methods of stainless and high-alloy steel qualities
- Possibilities of process control in metallurgical processes such as blast furnace, BOF, EAF, AOD, ladle, tundish

## Course literature

Utdelat material, föreläsningssanteckningar

## Examination

- HEM1 - Home Assignment, 1.0 credits, grading scale: P, F
- TEN2 - Examination, 3.5 credits, grading scale: A, B, C, D, E, FX, F
- TEN1 - Examination, 3.5 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory Work, 1.0 credits, grading scale: P, 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.

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

## **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.