



# **MH2053 Applied Thermodynamics for Material Processing**

## **6.0 credits**

**Tillämpad termodynamik för materialprocesser**

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

### **Establishment**

On 06/10/2021, the Dean of the ITM school has decided to establish this official course syllabus to apply from autumn term 2022 (registration number M-2021-1758).

### **Grading scale**

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

### **Education cycle**

Second cycle

### **Main field of study**

Materials Science and Engineering

### **Specific prerequisites**

Basic knowledge of chemical thermodynamics and phase equilibria in binary systems, corresponding to the courses MH2029 Extractive Metallurgy or MH2039 Process Engineering.

### **Language of instruction**

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

## Intended learning outcomes

After successful completion of the course the student shall be able to:

- Read and interpret ternary, quaternary, and quinary phase diagrams of alloys and oxide system
- Apply ternary lever rule, liquidus projections, and iso-activity diagrams
- Apply phase diagrams in selection of refractories for liquid slags
- Perform equilibrium calculations in reduction of metal oxides and sulfides, gas solubility in metallic melts, solute distributions in slag-metal systems, and in modification of non-metallic inclusions

## Course contents

Fundamentals:

- Solution thermodynamics, multicomponent phase diagrams, kinetics for materials processes

Applications in materials engineering, e.g.:

- Ironmaking, sulfide roasting and smelting, iron and steel refining, copper and silicon refining
- Solid phase transformations and equilibria in metals and alloys

## Examination

- INL1 - Assignment, 1.0 credits, grading scale: P, F
- INL2 - Assignment, 1.0 credits, grading scale: P, F
- TEN1 - Home exam, 4.0 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.

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.