



# MH1027 Thermodynamics of Materials 6.0 credits

Materials Termodynamik

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

## Establishment

Course syllabus for MH1027 valid from Autumn 2015

## Grading scale

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

## Education cycle

First cycle

## Main field of study

Technology

## Specific prerequisites

- Knowledge of mathematics at a level where the solution of differential equations and integrals are included, ie the equivalent SF1626 Calculus in Several Variable, or similar
- Knowledge of basic physics and chemistry equivalent KD1260 Chemistry of Materials and SK1110 Electromagnetism and Waves, or similar
- Knowledge of Matlab programming at the level given by MH1070 Perspectives on Materials Design, etc. ( 3 credits)

## Language of instruction

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

## Intended learning outcomes

After the course the students should be able to:

- explain basic thermodynamics concepts
- perform equilibrium calculations
- perform simple thermodynamic calculations
- use and read binary phase diagrams
- formulate and solve thermodynamic problems for simple real material and processes
- use both Swedish and English as "working languages" (i.e. understand the terminology)

## Course contents

- Thermodynamic basic concepts (state variables, the first law, the enthalpy concept, heat capacity)
- The second law of thermodynamics (reversible and irreversible processes, entropy, Gibbs energy, Hemholtz energy, Gibbs-Duhems equation)
- Equilibrium conditions (chemical potential, phase equilibrium, binary phase diagrams, Gibbs' phase rule, Clapeyrons and Clausius-Clapeyrons equations, molar and partial quantities).
- Solutions thermodynamics (ideal and regular solution model, the activity definition, reference state, Raoult's law, Henry's law, Sieverts law, equilibrium between two phases.)

## Course literature

Gaskell, D. R. Introduction to the Thermodynamics of Materials, Fifth Edition. Taylor & Francis, 2008. ISBN: 978-1591690436.

## Examination

- KON1 - Short Exam, 1.5 credits, grading scale: P, F
- TEN1 - Written examination, 4.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Experimental Work, 0.5 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.