



MH1027 Thermodynamics of Materials 6.0 credits

Materials Termodynamik

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

Establishment

The official course syllabus is valid from the autumn semester 2026 as decided by the Faculty Board: PA-2026-011. Decision date: 2026-08-26.

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)

Intended learning outcomes

After the course the students should be able to:

- Explain basic thermodynamics concepts
- 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

- Basic thermodynamic concepts (state and path variables, first law, heat capacity, enthalpy)
- The second law of thermodynamics (irreversible processes, entropy)
- Equilibrium (Gibbs energy, Helmholtz energy, chemical potential, Gibbs-Helmholtz equation)
- Solutions thermodynamics (ideal solutions, non-ideal solutions, activities, reference states, Henry's law, Sieverts law, multicomponent solutions, solution models)
- Phase equilibria (Clapeyron and Clausius-Clapeyron equations, Gibbs phase rule, phase diagrams)

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.

Transitional regulations

MH1027 TEN1 – Can be completed with TEN1 in MH1035; for other modules, please contact the course coordinator.

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.