



FMH3101 Phase Transformations 7.5 credits

Fasomvandlingar

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

Establishment

On 22/06/2020, the Dean of the ITM School has decided to establish this official course syllabus to apply from autumn term 2020 (registration number M-2020-0217).

Grading scale

P, F

Education cycle

Third cycle

Specific prerequisites

Admitted to doctoral studies with knowledge in the thermodynamics and materials science.

Language of instruction

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

Intended learning outcomes

On completion of the course, the student will be able to:

- Explain the theories behind nucleation, growth and roughening.
- Explain the background of effect of surfaces on growth of a new phase.
- Explain the background of and theories of phase transformations that are controlled by the mobility of the interface.
- Explain the theories behind partitionless and diffusionless transformations.

Course contents

Overview of phase transformations in solid materials, transformations of different order, homogeneous and heterogeneous reactions, nucleation and growth, classification of transformations, activated processes, coherence at nucleation, faceted growth, effect of structure of interfaces, mathematical background of diffusion, exact and approximate solutions, effect of pressure, surface tension and stress and strain, morphological stability, spinodal decomposition, critical size, the theory of fluctuations, the theory of Lifshitz-Slyozov-Wagner, effect of stress and strain, inverse roughening, phase boundary motion, solute drag, solute trapping, transition to partitionless transformations, massive transformations, martensitic transformations, higher order phase transformations.

Examination

- INL1 - Assignments, 7.5 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.