MH2048 Advanced Course in Materials Design 9.0 credits

Avancerad kurs i materialdesign

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

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

Establishment

On 15/10/2019, the Dean of the ITM School has decided to establish this official course syllabus to apply from spring term 2020 (registration number M-2019-1319)

Grading scale

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

Education cycle

Second cycle

Main field of study

Materials Science and Engineering

Specific prerequisites

MH2017 Micro and Nanostructures/MH2038 Micro and Nano Structures in Materials, or the equivalent

MH2040 Applied Thermodynamics and Kinetics, Part 1, or the equivalent

Language of instruction

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

Intended learning outcomes

After passing the course, the student should be able to:

· Design a material design map (system design chart) and critically discuss design strategies for a material that should satisfy certain performance requirements including essential link tools and relevant input and output.

· Classify and compare link tools from a general multi-shell perspective and explain their integration in the ICME (Integrated Computational Material Engineering) framework and relate them to Design of Materials.

· Use the software tools Thermo-Calc, DICTRA and TC-PRISMA to solve material design problems and describe critical parameters at a general level for ab initio and phase field simulations (PFM).

· Present result of a project work in a written report and orally at a seminar.

Course contents

· The concept of computational material design (Computational the Design of Material)

· Principles and tools for material design, material's genome and ICME.

· Continued studies with DICTRA for simulation of the diffusion-controlled phase transformation.

· Introduction to TC-PRISMA for simulation of precipitation reactions.

· Introduction to Ab initio calculations using density function theories (DFT).

· Introduction to the phase field method (PFM).

Course literature

Anges i kurs-PM vid kursstart.

Examination

- NÄR1 - Attendance, 1.0 credits, grading scale: P, F
- PRO1 - Project, 6.0 credits, grading scale: A, B, C, D, E, FX, F
- TEN1 - Written examination, 2.0 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.

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.