MJ2417 New Perspectives on Material Science and Technology 4.0 credits

Nya perspektiv på materialvetenskap och teknologi

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

Establishment

Course syllabus for MJ2417 valid from Autumn 2015

Grading scale

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

Education cycle

Second cycle

Main field of study

Mechanical Engineering

Specific prerequisites

BSc 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: Understand and apply the scientific and technical principles behind the four large parts in material science and technology: structure, properties, processing and performance.

To realise the relevance of material science and technology to design (with a broad perspective) a system, a component or a process, to meet desired needs with realistic limitations, for example economic, environmental, social, producibility and sustainability.

Identify and update current and future needs, considering different aspects of materials and equipment to challenge certain kinds of applications, towards a sustainable and improved human well-being.

Course contents

1. Introduction to material science, engineering and technology; material structures; material families; energy contents and recyclability problems

2. Challenge/Field 1: Defects as means to improve performance

3. Relevance and impact of material science and technology: Surfaces, interfaces and nano-technology; advanced ceramic materials; fuel cells; materials for clean energy; thermal and environmental barrier coatings; ...

4. Challenge/Field 2: Micro-tailoring of materials

5. Challenge/Field 3: Highly valued possibilities for materials and processing. Innovations that concern energy issues

Course literature

- Materials Science and Engineering: An Introduction, by William D. Callister and David G. Rethwisch, WILEY (2013)

- Materials for Sustainable Development, MRS Bulletin / Volume 37 / Issue 04 (2012) 297-458

- Harnessing Materials for Energy, MRS Bulletin / Volume 33 / Issue 04 (2008) 261-477

- Fundamentals of Materials for Energy and Environmental Sustainability, Eds. David S. Ginley, and David Cahen, CAMBRIDGE (2011)

-Research papers

Examination

- PRO1 - Project Work, 2.0 credits, grading scale: A, B, C, D, E, FX, F
- UPG1 - Assignment, 0.4 credits, grading scale: A, B, C, D, E, FX, F
- REP1 - Written Report, 1.0 credits, grading scale: A, B, C, D, E, FX, F
- MUN1 - Oral Presentation, 0.6 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.