

Course Syllabus

Materials Selection and Functional Surfaces 7.5 Credits*, Second Cycle Level 1

Learning Outcomes

After completion of this course, students shall be able to:

- Understand the importance of selection of appropriate materials for design and construction.
- Develop the skills to select appropriate materials in engineering design on the basis of various functional properties, objectives, and constraints.
- Apply this knowledge in materials selection to improve durability, decrease energy consumption, and be economical and eco-friendly when designing.
- Analyse and evaluate the role of the design aspects such as engineering dimension, product use, environment, aesthetics and emotion in the selection of materials.
- Evaluate the structure, properties, processing and performance of various materials in order to choose optimum materials within realistic constraints for various cases.
- Understand the basics of different surface treatment techniques and coatings, and describe the potential and areas of usage of these.
- Apply surface engineering knowledge in material selection to improve the efficiency and lifetime of components.

Course Content

The course addresses various factors that influence material selection in production, distribution, consumption and recycling. Various engineering materials such as metals, polymers, ceramics, and composites are described. A description of materials properties with respect to engineering design is included and material property charts such as strength vs density are introduced. The materials and process selection with case studies are explained. Furthermore, tools are described for environmental audit for materials manufacturing, usage and recycling with an assessment of the environmental impact of products through the application of life cycle analysis.

Fundamentals of surface treatments and coatings of conventional and new techniques are described. Conventional and new technologies for surface coatings such as electron beam

technology, laser technology, ion implantation, CVD and PVD techniques are explained.

Assessment

Written exam (6 credits) and Project work (1.5 credits)

Forms of Study

Lectures and project work.

Grades

The Swedish grades U, 3, 4, 5.

Project work U G

To receive a passing grade in the course, students must pass all components. The written examination determines the final grade of the course.

Prerequisites

Bachelor of Science degree in engineering (mechanical, electrical, energy, engineering physics) of at least 180 credits and English 6

Subject:

Materials Technology

Group of Subjects:

Materials Technology

Disciplinary Domain:

Technology, 100%

This course can be included in the following main field(s) of study:

1. Materials Technology

Progression Indicator within (each) main field of study:

1. A1N

Approved:

Approved 15 February 2018

Valid from 15 February 2018