

## Course Syllabus

### Surface Engineering and Tribology 7.5 Credits\*, Second Cycle Level 1

#### Learning Outcomes

After completing the course students shall be able to:

- illustrate the topography and microstructure of formed and machined surfaces and surface layers
- explain the mechanical contact between two surfaces
- explain the tribological contact between two surfaces in sliding contact and explain the mechanisms controlling friction and wear
- illustrate the different lubrication regimes in a lubricating contact and explain how these will influence the resulting friction and wear
- illustrate and explain the reason for the most common types of wear mechanisms of metals, ceramics and polymers exposed to tribological contact
- compare different types of surface treatments with the aim to improve the mechanical and tribological properties of metals
- motivate the different stages of tribological testing and the methodology of the post-test characterization of the tribo surfaces
- explain which microscopy and surface analysis techniques are suitable in conjunction with the characterization of tribo surfaces
- perform tribological testing and post-test characterization of the tribo surfaces and evaluate the results

#### Course Content

The course begins with an introduction to the topography and microstructure of surfaces and surface layers and how the processing / surface treatment of the surface affect these parameters. Thereafter the mechanical and tribological contact between two mating surfaces will be studied and especially the mechanisms controlling friction and wear in a tribological contact. Furthermore, the possibility to reduce friction and wear by using lubricants will be studied and the different lubrication regimes active in a sliding tribological contact will be treated. Emphasis will be placed on understanding of the wear mechanisms present in different tribological contacts and how different types of surface treatment techniques may be employed to improve the mechanical and tribological properties of metallic materials. The course concludes with a review of common tribological problems, how they can be addressed and how the tribological testing and subsequent characterization of tribo

surfaces can be used in this work.

**Assessment**

Written examination, 6 credits  
Laboratory exercises, 1.5 credits

**Forms of Study**

Lectures and laboratory exercises.

The following laboratory exercises will be included in the course;

- Surface topography measurements
- Friction testing
- Scratch testing
- Wear testing

**Grades**

The Swedish grades U, 3, 4, 5.

Laboratory exercises U,G

**Prerequisites**

Bachelor of Science in Engineering (Mechanical, Electrical, Energy, Engineering Physics, Industrial Engineering and Management), Civil Engineering of at least 180 credits.  
Knowledge in Solid Mechanics equivalent to 5 credits.

**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. A1F



D.no: HDa 2017/649  
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MP3030

**Approved:**

Approved 27 April 2017

Valid from 30 June 2017