KURSPLAN
Funktionella material och ytor, 7,5 högskolepoäng

Functional Materials and Surfaces, 7.5 credits

Kurskod:	TFYS29	**Utbildningsnivå:**	Avancerad nivå
Fastställd av:	VD 2018-12-01	**Utbildningsområde:**	Tekniska området
Gäller fr.o.m.:	2019-01-01	**Ämnesgrupp:**	MA2
Version:	1	**Fördjupning:**	A1F
		Huvudområde:	Produktutveckling

Lärandemål

At the end of the course, the student should be able to:

Kunskap och förståelse
- Demonstrate comprehension of the concept of surface engineering in the context of product development
- Show familiarity with the mechanisms behind corrosion and wear of surfaces in different application environments
- Display knowledge of electroplated coatings, anodizing and electro-polishing processes, process parameters, as well as selected analysis methods for functional surface characterization and problem identification, and current relevant areas of research and development
- Show familiarity with cleaner production and environment protection measures and industrial safety aspects related to surface treatment industry.

Färdighet och förmåga
- Demonstrate independent ability to perform written calculations regarding process parameters and coating properties
- Demonstrate the ability to identify and combine appropriate analysis methods for characterization
of functional surface coatings, within the given timeframes, both in research and product development environments
- Demonstrate skills of FEA tools application for evaluating process parameters and properties of metal coatings in the design phase of a product
- Demonstrate the ability to formulate a specification of functional surface properties and show basic ability to choose test and qualification standards for functional coatings.

Värderingsförmåga och förhållningssätt
- Demonstrate the ability to motivate the choice of and evaluate surface treatment processes and process parameters, based on available knowledge, and taking into account functional, environmental, safety and cost efficiency criteria.

Innehåll

The course treats surface finishing as part of product development, and introduces industrial processes and the most important process parameters that define properties of functional surfaces. Sustainability aspects related to surface coating industry are discussed. Computer simulation in combination with experimental methods is introduced as a tool for improving quality of electrodeposits.

The course covers the following topics:
- Introduction to surface engineering of components including castings.
- Overview of surface treatment processes and factors affecting the process selection, on
- Analysis techniques for surface characterization (e.g. hardness and thickness measurements).
- Electroplating of metals, including fundamentals of electrochemistry and thermodynamics, and applications of FEA as a design tool for electroplating process.
- Sustainability aspects including cleaner production measures, environment protection directives and industrial safety aspects, test and qualification standards.

Undervisningsformer

Lectures, computer exercises and coursework assignments.

Undervisningen bedrivs på engelska.

Förkunskapskrav

Godkända kurser på grundnivå 180 hp med lägst 90 hp inom huvudområdet Maskinteknik samt 21 hp Matematik, samt genomgången kurs i Material och design, 6 hp dessutom krävs Engelska kurs 6 eller Engelska B (eller motsvarande kunskaper).

Examination och betyg

Kursen bedöms med betygen 5, 4, 3 eller Underkänd.

F

Poängregistrering av examinationen för kursen sker enligt följande system:

Examinationsmoment	Omfattning	Betyg
Tentamen[I]	4,5 hp	5/4/3/U
Laborationer och inlämningsuppgifter	3 hp	U/G

[I] Bestämmer kursens slutbetyg vilket utfärdas först när samtliga moment godkänts.

Kurslitteratur

Övrig litteratur
Title: Advanced Surface Technology vol 1 and 2
Author: Per Møller & Lars Pleth Nielsen
Publisher: M&N, Denmark, 2012
ISBN: 9788792765246 and 9788792765253
Course materials, Journal papers indicated during the course.