29742 - Advanced Industrial Materials

Información del Plan Docente

Academic Year	2016/17
Academic center	110 - Escuela de Ingeniería y Arquitectura
Degree	434 - Bachelor's Degree in Mechanical Engineering
ECTS	6.0
Course	4
Period	Second semester
Subject Type	Optional
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

5.2.Learning activities

5.3.Program

1. ANALYSIS OF FAILURE IN SERVICE. Analysis methodology on damage and failure mechanisms. Investigation and identification techniques: non-destructive tests, metallography, electron microscopy, destructive tests. The technical report.
2. METALLIC MATERIALS. Metal alloys for low and high temperature applications: Superalloys and ODS alloys. Shape Memory Alloys. Glassy metals. Metallic foams. Metal Matrix Composites. Properties and applications.

3. MATERIALS FOR THE FUTURE. Nanostructured materials. Nanomaterials. Carbon nanotubes. Production of carbon nanotubes. New products based on nanostructured materials. Nano-scale microscopes.
4. JOINTS AND ADHESIVES. Fusion welding. Diffusion welding. Friction and Friction Stir welding. Microstructure of the welded zone in ferrous and non-ferrous alloys. Mechanic test and non-destructive test on metallurgic welding. Joint formation. Design and strength. Surfaces preparation. Joining wood, metals, plastics, composite structures and rubber-metal. Applications.
5. MODIFICATION OF SURFACES AND COATINGS. Classification. Classic surface treatments. New surface treatments. PVD (physical vapour deposition). CVD (chemical vapour deposition). Ionic implantation. Thermal projection. The laser applied to surface treatments.
6. MATERIALS RECYCLING. Waste recovery: recycling. Definition and classification of waste. RSU collection and treatment (urban solid waste). Identification procedures, classification, separation and recovery. Recycling of specific products: containers for beverages, electronic scrap, used tires, etc. Analysis of life cycle. Ecodesign.

5.4.Planning and scheduling

5.5.Bibliography and recomended resources