25883 - Advanced Materials and Processes

Información del Plan Docente

Academic Year	2017/18
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	558 - Bachelor's Degree in Industrial Design and Product Development Engineering
ECTS	6.0
Year	3
Semester	Second semester
Subject Type	Compulsory
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

The proposed methodology searches for promoting the constant work of the student
The lectures for the complete group will deal with theoretical and practical objectives, complemented trough practical and laboratory sessions. These sessions are made in small groups to promote teamwork.
Another important aspect to be developed is student decision making. For this aim, several works are proposed along the semester.

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Classroom materials will be available via Moodle. These include a repository of the lecture notes used in class, the course syllabus, as well as other course-specific learning materials.
Further information regarding the course will be provided on the first day of class.

5.2.Learning tasks

The course includes 6 ECTS (150 hours) organized according to:

- Lectures : 42 hours.

- Laboratory sessions: 14 hours.

- Guided assignments : 25 hours.

- Autonomous work: 59 hours.

- Examination: 5 hours.

1 ECTS= 10 onsite hours

Lectures: the professor will explain the theoretical contents of the course and solve illustrative applied problems. These problems and exercises can be found in the problem set provided at the beginning of the semester. Lectures run for 3 weekly hours. Although it is not a mandatory activity, regular attendance is highly recommended.

Laboratory sessions: sessions will take place every 2 weeks. Students will work together in groups actively doing tasks such as practical demonstrations, measurements, calculations, and the use of graphical and analytical methods.

Guided assignments: students will complete assignments, problems and exercises related to concepts seen in laboratory sessions and lectures. They will be submitted at the beginning of every laboratory sessions to be discussed and analyzed. If assignments are submitted later, students will not be able to take the assessment test.

Autonomous work: students are expected to spend about 75 hours to study theory, solve problems, prepare lab sessions, and take exams.

5.3.Syllabus

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The course will address the following topics:

1. Metrology; dimensional measurement, form and roughness, measurement assessment.
2. Material removal processes; machining with geometrically well-defined tool edges, Electrical discharge Machining, Machining with geometrically undefined tool edges, cutting.
3. Automatization
4. Finishing machining processes; Machining with geometrically undefined tool edges, coatings, heat and chemical surface treatments.
5. 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.
6. 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.
7. 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.Course planning and calendar

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Lectures	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Problems session	x	x	x	x	x	x	x		x	x					
Laboratory sessions	A	B	A	B	A	B		B	A	B	A				
Individual work		A	B			A	B			B	A				
Examination								x							x

For further details concerning the timetable, classroom and further information regarding this course please refer to the "Escuela de Ingenieria y Arquitectura " (EINA) website: https://eina.unizar.es/

5.5.Bibliography and recommended resources

- Apuntes de clase.
- Valero Ruiz, Carlos. Introducción a los procesos de fabricación / autores Carlos Valero Ruiz, Juan Carlos De

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Francisco Moreno ; con la colaboración de Fernando Torres, Luis Berges, María José Oliveros . - 2ª ed. Zaragoza : Kronos, 2001
- Kalpakjian, Serope. Manufactura, ingeniería y tecnología. Vol. 1 y 2; 7ª ed. Naucalpan de Juárez (México) : Pearson Educación, 2014
- Michael F. Ashby "Materials Selection in Mechanical Design". Elsevier
- Michael F Ashby. David R H Jones "Engineering Materials 1: An introduction to their Properties and Applications". Butterworth-Heinemann
- J.A. Puértolas, R. Ríos, M. Castro, J. Tecnología de los materiales en ingeniería, vol 2. . Ed Sintesis
- Herbert F. Lund "Manual McGraw-Hill de reciclaje". Ed. McGraw-Hill
- Michael F Ashby. David R H Jones "Engineering Materials 2: An Introduction to Microstructures, Processing and Design". Butterworth-Heinemann