



1. General information

Course: ADVANCED MATERIALS

Type: ELECTIVE

Degree: 421 - UNDERGRADUATE DEGREE PROG. IN MECHANICAL ENGINEERING

Center: 602 - E.T.S. INDUSTRIAL ENGINEERING OF C. REAL

Year: 4

Main language: Spanish

Use of additional languages:

Web site:

Code: 56376

ECTS credits: 6

Academic year: 2023-24

Group(s): 20

Duration: First semester

Second language:

English Friendly: Y

Bilingual: N

Lecturer: GLORIA PATRICIA RODRIGUEZ DONOSO - Group(s): 20

Building/Office	Department	Phone number	Email	Office hours
POLITÉCNICO/2B-10	MECÁNICA ADA. E ING. PROYECTOS	TEAMS	gloria.rodriguez@uclm.es	In order to guarantee the correct individualised attention to students, the tutoring timetable will be arranged by e-mail.

2. Pre-Requisites

In order to take this subject to the maximum advantage, it is recommended that the student has acquired knowledge of the fundamentals of science, technology and materials chemistry; the understanding of the relationship between the microstructure, the synthesis

3. Justification in the curriculum, relation to other subjects and to the profession

This subject tries to apply the knowledge of science, technology and engineering of materials in the selection of materials in industrial applications

4. Degree competences achieved in this course

Course competences	
Code	Description
CB01	Prove that they have acquired and understood knowledge in a subject area that derives from general secondary education and is appropriate to a level based on advanced course books, and includes updated and cutting-edge aspects of their field of knowledge.
CB02	Apply their knowledge to their job or vocation in a professional manner and show that they have the competences to construct and justify arguments and solve problems within their subject area.
CB03	Be able to gather and process relevant information (usually within their subject area) to give opinions, including reflections on relevant social, scientific or ethical issues.
CB04	Transmit information, ideas, problems and solutions for both specialist and non-specialist audiences.
CB05	Have developed the necessary learning abilities to carry on studying autonomously
CEO43	Knowledge of the structure, properties and selection of advanced materials, of manufacturing methods and their physical principles, and computer assisted manufacturing techniques.
CG03	Knowledge of basic and technological subjects to facilitate learning of new methods and theories, and provide versatility to adapt to new situations.
CG04	Ability to solve problems with initiative, decision-making, creativity, critical reasoning and to communicate and transmit knowledge, skills and abilities in the field of industrial engineering.
CG05	Knowledge required to carry out measurements, calculations, valuations, appraisals, valuations, surveys, studies, reports, work plans and other similar work.
CG06	Ability to handle specifications, regulations and mandatory standards.
CG07	Ability to analyse and assess the social and environmental impact of technical solutions.
CT02	Knowledge and application of information and communication technology.
CT03	Ability to communicate correctly in both spoken and written form.

5. Objectives or Learning Outcomes

Course learning outcomes	
Description	
Knowledge of the techniques of coatings and surface treatments of materials.	
Capacity to select the most suitable materials for different industrial applications. Selection of advanced materials (metallic alloys, ceramics, polymers and composites) for use in mechanical engineering.	

6. Units / Contents

Unit 1: INTRODUCTION

Unit 2: SELECTION OF MATERIALS

Unit 3: COATINGS AND SURFACE TREATMENTS

Unit 4: MATERIALS IN INDUSTRY

7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Combination of methods	CB01 CB02 CB03 CB05 CEO43 CG03	1.12	28	N	-	Theoretical/practical classes in the classroom.
Problem solving and/or case studies [ON-SITE]	Group Work	CB01 CB02 CB03 CB04 CB05 CEO43 CG03 CG04 CT03	0.48	12	Y	Y	Oral presentation of a group project to the rest of the students
Class Attendance (practical) [ON-SITE]	Practical or hands-on activities	CB01 CB02 CB03 CB05 CEO43 CG03 CG04 CG06 CT03	0.6	15	Y	Y	Performance of laboratory practicals and preparation of a practical report discussing the results obtained.
Formative Assessment [ON-SITE]	Assessment tests	CB01 CB02 CB03 CB05 CEO43 CG03 CG04 CT03	0.2	5	Y	Y	Written test performance.
Study and Exam Preparation [OFF-SITE]	Self-study	CB01 CB02 CB03 CB05 CEO43 CG03 CG04	3.6	90	N	-	Autonomous work by the student to prepare the subject.
Total:			6	150			
Total credits of in-class work: 2.4			Total class time hours: 60				
Total credits of out of class work: 3.6			Total hours of out of class work: 90				

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System

Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Final test	50.00%	50.00%	In the subject of Advanced Materials there will be only one final test that will be carried out in the ordinary and extraordinary call. It will be mandatory to achieve a minimum of 4 points out of 10 to make an average with the rest of the evaluable activities.
Assessment of problem solving and/or case studies	35.00%	35.00%	During the course the student must carry out a group work and an oral presentation about it in class. If the student has not done this activity during the course, they must take a test of this part that evaluates the same skills that are acquired in carrying out these practical cases. This is valid both in the ordinary and in the extraordinary call.
Laboratory sessions	15.00%	15.00%	Attendance at practices and delivery of memory is mandatory to be evaluated with 15% of the final grade. If the student does not pass this activity during the course, they must take a test that allows evaluating similar competences both in the ordinary and extraordinary calls, and must obtain a minimum of 4 points out of 10 to make an average with the rest of the evaluable activities.
Total:	100.00%	100.00%	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

Students who have passed the practicals and group work will take an exam with questions related to the syllabus of the subject that will have a weight of 50%. It is necessary to obtain a minimum of 4 points out of 10 in each of the tests to make an average with the rest of the evaluable activities.

If the student has not passed the laboratory practices during the course, this part must be examined in the final test, obtaining a minimum of 4 points out of 10 to make an average with the rest of the evaluable activities. The weight of this block in the final grade is 15% of the overall grade for the subject.

If the student has not done the group work during the course, they must take an exam for this part that evaluates the same skills that are acquired in carrying out this activity and that will have a weight of 35% in the overall grade of the subject.

The subject will only be considered passed if the student has obtained at least 5 out of 10 in all the evaluation tests.

The group work that must be exhibited in class is compulsory and not recoverable to pass the subject.

Once approved the group work and laboratory practices, these notes will be saved for successive calls.

Non-continuous evaluation:

The student will be evaluated in a final test that will have a weight of 50% in the overall grade of the subject.

If the student has not done the laboratory practices, they must take a theoretical-practical exam that allows evaluating the competences that are acquired after completing the practices and that will have a weight of 15% in the overall grade of the subject.

If the student has not done the group work during the course, they must take an exam of this part that evaluates the same skills that are acquired in carrying out this activity and that will have a weight of 35% in the overall grade of the subject.

The subject will only be considered passed if the student has obtained at least 5 out of 10 in all the evaluation tests.

Specifications for the resit/retake exam:

Students who have passed the practices and group work during the course will take an exam with questions related to the subject's syllabus, whose weight will be 50% of the final grade. In this modality it is necessary to obtain a minimum of 4 points out of 10 to

make an average with the rest of the evaluable activities.
If, on the other hand, the student has not passed or carried out the laboratory practices during the course, they must also be examined in this part in the final test, the weight of this block in the final grade is 15%.
Group work can be recovered by making an individual oral presentation on a Material Selection topic. The weight of this block in the final grade is 35%.
The subject will not be considered passed if the student has obtained at least 5 out of 10 in all the evaluation tests.
Specifications for the second test/retake exam:

The evaluation criteria are the same as in the the resit/retake exam:

9. Assignments, course calendar and important dates	
Not related to the syllabus/contents	
Hours	hours
Class Attendance (theory) [PRESENCIAL][Combination of methods]	28
Problem solving and/or case studies [PRESENCIAL][Group Work]	12
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	15
Formative Assessment [PRESENCIAL][Assessment tests]	5
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Global activity	
Activities	hours
Class Attendance (theory) [PRESENCIAL][Combination of methods]	28
Problem solving and/or case studies [PRESENCIAL][Group Work]	12
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	15
Formative Assessment [PRESENCIAL][Assessment tests]	5
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Total horas: 150	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Mangonon, Pat L.	The principles of materials selection for engineering design	Prentice Hall		0-13-242595-5	1999	
Vázquez Vaamonde, A.J., Damborenea, J. J. d	Ciencia e ingeniería de la superficie de los materiales metá	Consejo Superior de Investigaciones Científicas		84-00-07920-5	2000	
Ashby, Michael F.	Materials selection in mechanical design	Butterworth-Heinemann		0-7506-4357-9	1999	
J. R. DAVIS	SURFACE ENGINEERING FOR CORROSION AND WEAR RESISTANCE	ASM INTERNATIONAL		978-0871707000	2001	
Ashby, Michael F.	Materiales para ingeniería. 2	Reverté		978-84-291-7256-0 (v	2009	
G. P. Rodríguez, A. Romero	Apuntes de la asignatura	Moodle			2020	
Mangonon, Pat L.	Ciencia de materiales : selección y diseño	Pearson Educación		970-26-0027-8	2001	