UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: ADVANCED MATERIALS
Code: 56376
Type: ELECTIVE
ECTS credits: 6
Degree: 353 - UNDERGRADUATE DEGREE PROG. IN MECHANICAL ENGINEERING (CR)
Academic year: 2023-24
Center: 602 - E.T.S. INDUSTRIAL ENGINEERING OF C. REAL
Group(s): 20
Year: 4
Duration: First semester
Main language: Spanish
Second language: English
Use of additional languages:
English Friendly: Y
Web site:
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	

2. Pre-Requisites

It is advisable that the student have knowledge of mathematics, physics, chemistry, and Materials Science as well as basic knowledge of manufacturing acquired in previous courses.

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

“Advanced materials” is an elective subject included in the mention of Machines of the Mechanical Engineering Degree.
The concepts developed in this subject are related with Material Science, Engineering and Technology of Materials and Manufacturing Systems and Industrial Organization.

4. Degree competences achieved in this course

Course competences

Code	Description
A02	To know how to apply knowledge to work or vocation in a professional manner and possess the competences that are usually demonstrated by the formulation and defence of arguments and the resolution of problems in the field of study.
A03	To have the capability to gather and interpret relevant data (normally within the area of study) to make judgements that include a reflection on themes of a social, scientific or ethical nature.
A04	To be able to transmit information, ideas, problems and solutions to a specialized audience.
A05	To have developed the learning skills necessary to undertake subsequent studies with a greater degree of autonomy.
A12	Knowledge of basic materials and technologies that assist the learning of new methods and theories and enable versatility to adapt to new situations.
A13	Ability to take the initiative to solve problems, take decisions, creativity, critical reasoning and ability to communicate and transmit knowledge, skills and abilities in Mechanical Engineering.
A14	Knowledge to undertake measurements, calculations, evaluations, appraisals, studies, give expert opinions, reports, work plans and similar tasks.
A15	Ability to work to specifications and comply with obligatory rules and regulations.
A16	Ability to analyse and evaluate the social and environmental impact of technical solutions.
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
E04	Knowledge of the structure, properties and selection of state-of-the-art materials, of the methods of manufacture and their basic physical properties, as well as computer assisted manufacturing techniques.

5. Objectives or Learning Outcomes

Course learning outcomes

Not established.

Additional outcomes

Selection of materials in different industrial applications.
Selection of advanced materials, metal alloys, ceramics, polymers and compounds for use in mechanical engineering.
Know the techniques of coatings and surface treatments of materials.

6. Units / Contents

Unit 1: INTRODUCTION

Unit 2: SELECTION OF MATERIALS

Unit 3: COATINGS AND SURFACE TREATMENTS

Unit 4: MATERIALS IN INDUSTRY

- **Unit 4.1** CORROSION RESISTANT MATERIALS: CHEMICAL INDUSTRY
- **Unit 4.2** HIGH TEMPERATURE MATERIALS
- **Unit 4.3** BIOMATERIALS
- **Unit 4.4** MATERIALS FOR TOOLS
- **Unit 4.5** MATERIALS FOR TRANSPORT
- **Unit 4.6** AEROSPACE MATERIALS
- **Unit 4.7** MATERIALS IN ENERGY 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]	Lectures	E04	1.12	28	N	-	
Project or Topic Presentations [ON-SITE]	Group Work	A02 A12 A14 A15 CB01 CB02 CB03 CB04 CB05 E04	0.48	12	Y	Y	
Laboratory practice or sessions [ON-SITE]	Combination of methods	A04 A05 A12 CB01 CB02 CB03 CB04 CB05 E04	0.6	15	Y	Y	
Final test [ON-SITE]	Assessment tests	A05 A12 E04	0.2	5	Y	Y	
Study and Exam Preparation [OFF-SITE]	Self-study	A13 A15 E04	3.6	90	N	-	
		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%	Minimum grade in this part to pass the subject: 5 points out of 10.
Theoretical papers assessment	35.00%	35.00%	During the course, the student must carry out a group work and an oral presentation about it in class. This activity is mandatory and must be done during the course. To pass the student must obtain a grade equal to or greater than 5 points out of 10.
Laboratory sessions	15.00%	15.00%	The attendance and the delivery of the documentation of the practical classes are mandatory requirements to pass the subject. Minimum grade in this part to pass the subject: 5 points out of 10.
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:

To pass the course it is necessary to pass the final exam and all the practical activities, with a minimum punctuation of 5 points out 10 in each part.
If during the course, the student has not passed the laboratory practices must be examined of this part in the final test.
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:

Evaluation criteria not defined

Specifications for the resit/retake exam:

To pass the course it is necessary to pass the resit exam and all the practical activities, with a minimum punctuation of 5 points out 10 in each part.
If during the course, the student has not passed the laboratory practices must be examined of this part in the final test.
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.

Specifications for the second resit / retake exam:

To pass the course, it is necessary to pass the retake exam and all the practical activities, with a minimum punctuation of 5 points out 10 in each part.
If during the course, the student has not passed the laboratory practices must make the retake exam of this part.
The group work can be recovered by making an individual oral presentation on a subject of Material Selection.

9. Assignments, course calendar and important dates

Not related to the syllabus/contents	
Hours	**hours**
Project or Topic Presentations [PRESENCIAL][Group Work]	12
Laboratory practice or sessions [PRESENCIAL][Combination of methods]	15
Final test [PRESENCIAL][Assessment tests]	5
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Unit 1 (de 4): INTRODUCTION	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Unit 2 (de 4): SELECTION OF MATERIALS	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Unit 3 (de 4): COATINGS AND SURFACE TREATMENTS	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	5
Unit 4 (de 4): MATERIALS IN INDUSTRY	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	17
Global activity	
Activities	**hours**
Project or Topic Presentations [PRESENCIAL][Group Work]	12
Class Attendance (theory) [PRESENCIAL][Lectures]	28
Laboratory practice or sessions [PRESENCIAL][Combination of methods]	15
Final test [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
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	
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	