UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: MATERIALS SCIENCE
Code: 56313
Type: CORE COURSE
ECTS credits: 6
Degree: 417 - UNDERGRAD. IN INDUSTRIAL ELECTRONICS AND AUTOMAT. ENGINEERING
Academic year: 2023-24
Center: 602 - E.T.S. INDUSTRIAL ENGINEERING OF C. REAL
Group(s): 20 21
Year: 2
Duration: First semester
Main language: Spanish
Second language:
Use of additional languages:
English Friendly: Y
Web site:
Bilingual: N

Lecturer: **CRISTINA BERGES SERRANO** - Group(s): **20 21**

Building/Office	Department	Phone number	Email	Office hours
	MECÁNICA ADA. E ING. PROYECTOS		Cristina.Berges@uclm.es	

Lecturer: **GEMA HERRANZ SANCHEZ-COSGALLA** - Group(s): **21**

Building/Office	Department	Phone number	Email	Office hours
POLITÉCNICO/2A-06	MECÁNICA ADA. E ING. PROYECTOS	TEAMS	gemma.herranz@uclm.es	In order to guarantee the correct individualised attention to students, the tutoring timetable will be arranged by e-mail.

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 achieved competences related to the application of the basic principles of general chemistry, mastery of the basic concepts of the general laws of physics and the resolution of mathematical problems that may arise in engineering.

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

This course enables students to acquire knowledge of the fundamentals of materials science, technology and chemistry by understanding the relationship between their microstructure, synthesis or processing and their properties.

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
CEC03	Knowledge of the fundamentals of the science, technology and chemistry of materials. Understanding of the relationship between microstructure, synthesis/processing and properties of materials.
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.
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
Understanding of the structure of materials and causes of their behaviour in relation to their microstructure and equilibrium diagrams
Ability to distinguish the different mechanical properties of materials and ability to implement mechanical tests.
Understanding and being able to select the most appropriate hardening mechanism.
Introduction to materials science and engineering.
Recognition of the metal alloys, polymers, ceramics and composites most commonly used in industry and their applicability
Understanding the relationship between the microstructure of matter and its macroscopic properties (mechanical, optical, electrical, magnetic and chemical).

6. Units / Contents

Unit 1: Introduction to Materials Science and Engineering
Unit 2: Structures and Imperfections
Unit 3: Microstructure and Phase Transformations
Unit 4: Mechanical properties
Unit 5: Hardening methods
Unit 6: Electrical, magnetic, chemical, thermal and optical properties
Unit 7: Engineering materials: metallic, polymers, ceramics and composites

ADDITIONAL COMMENTS, REMARKS

During the course, laboratory practices will be carried out and will be structured in two blocks:

1. Metallographic preparation and observation of microstructures.

2. Mechanical properties: traction, hardness, impact.

The practicals may be carried out outside class hours. The timetable and groups will be published at the beginning of the course in the Academic Guide of the Centre.

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 CB04 CB05 CEC03 CG03 CG04 CG05 CG06 CT02 CT03	1.36	34	N	-	Theoretical/practical classes in the classroom.
Problem solving and/or case studies [ON-SITE]	Combination of methods	CB01 CB02 CB03 CB04 CB05 CEC03 CG03 CG04 CG05 CG06 CT02 CT03	0.2	5	Y	N	Completion of tasks or cases related to the applied content of the subject, combining proposals on the Moodle platform and expository methods in class of the tasks carried out.
Class Attendance (practical) [ON-SITE]	Combination of methods	CB01 CB02 CB03 CB04 CB05 CEC03 CG03 CG04 CG05 CG06 CT02 CT03	0.6	15	Y	Y	Performance of laboratory practicals and preparation of a practical report discussing the results obtained.
Study and Exam Preparation [OFF-SITE]	Self-study	CB01 CB02 CB03 CB04 CB05 CEC03 CG03 CG04 CG05 CG06 CT02 CT03	3.6	90	N	-	Autonomous work by the student to prepare the subject.
Formative Assessment [ON-SITE]	Assessment tests	CB01 CB02 CB03 CB04 CB05 CEC03 CG03 CG04 CG05 CG06 CT02 CT03	0.24	6	Y	Y	Written test performance.
		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
Laboratory sessions	15.00%	15.00%	In continuous assessment, this activity will be carried out throughout the course and will consist of attendance at the practicals, submission of the report and resolution of practical questions. In non-continuous assessment or if the student has not passed the laboratory practicals during the course, he/she must take a test to assess similar competences both in the ordinary and extraordinary exams, and must obtain a minimum of 4 points out of 10 to average with the rest of the assessable activities.
Mid-term tests	67.00%	0.00%	There will be a partial test of the subject in the middle of the course and another one in the ordinary exam with the rest of the syllabus of the subject. Each part will have the same weight and may include theory and problems. The minimum mark in each test will be 4 points out of 10 in order to average with the rest of the evaluable activities.
			It will be a single final test. A minimum of 4 points out of 10 will

Final test	0.00%	67.00%	be necessary to obtain an average with the rest of the evaluable activities.
Assessment of problem solving and/or case studies	18.00%	18.00%	In continuous assessment, this activity will be carried out throughout the course and will consist of solving cases of practical and expository content related to the subject. In non-continuous assessment, the student must take a specific test that evaluates the same competences acquired in the completion of these case studies.
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 practical exercises, case studies and the first partial exam will take a second partial exam with questions related to the remaining subjects of the course. If the student has not passed the first partial exam, he/she will have to take two exams, one of the first part of the subject and the other of the second part of the subject. It is necessary to obtain a minimum of 4 points out of 10 in each of the tests in order to obtain an average with the rest of the evaluable activities.
If the student has not passed the laboratory practicals during the course, he/she must take a test to evaluate similar competences, and must obtain a minimum of 4 points out of 10 in order to obtain an average with the rest of the evaluable activities.
If the student has not carried out the practical cases during the course, he/she must take an assessment of this part that evaluates the same competences acquired in the practical cases.
The course will only be considered passed if the student has obtained at least 5 out of 10 in all the assessment tests.
If the student has not passed the laboratory practicals during the course, he/she must take a test to evaluate similar competences both in the ordinary and extraordinary exams, and must pass it in order to pass the subject (4 points out of 10). The weight of this block in the final grade is 15% of the overall grade for the course.
If the student has not completed the problems proposed during the course, he/she must take an assessment of this part that evaluates the same competences acquired in the completion of these practical cases and that will have a weight of 18% in the overall grade of the course.
The course will only be considered passed if the student has obtained at least a 5 out of 10 in all the evaluation tests.

Non-continuous evaluation:

The student must take a final test that will include content from the entire syllabus of the course, which will have a weight of 67% in the overall grade of the course. Students must obtain at least a 4 out of 10 in order to obtain an average with the rest of the evaluable activities of the subject.
The student must take a specific theoretical-practical test to evaluate the competences acquired after the internship, which will have a weight of 15% in the overall grade of the subject. Students must obtain a minimum of 4 out of 10 in order to obtain an average with the rest of the evaluable activities of the subject.
The student must take a specific test to evaluate the same competences acquired in the practical cases, which will have a weight of 18% in the overall grade of the course.
The subject will only be considered passed if the student has obtained at least 5 out of 10 in all the evaluation tests.
If the student has not carried out the problems proposed during the course, he/she must take an assessment of this part that evaluates the same competences acquired in the practical cases and that will have a weight of 18% in the overall grade of the course.
The subject will only be considered passed if the student has obtained at least 5 out of 10 in all the evaluation tests.
If the student has not carried out the problems proposed during the course, he/she must take an assessment of this part that evaluates the same competences acquired in the practical cases and that will have a weight of 18% in the overall grade of the course.
The course will only be considered passed if the student has obtained at least a 5 out of 10 in all the evaluation tests.

Specifications for the resit/retake exam:

Students who have pending any of the partial exams will take a single test in the extraordinary call with questions related to the entire syllabus of the subject that will have a weight of 67% of the overall subject. It is necessary to obtain a minimum of 4 points out of 10 in this test in order to obtain an average with the rest of the evaluable activities.
If the student has not passed the laboratory practicals in the ordinary exam, he/she must also take a test to evaluate similar competences, and must obtain a minimum of 4 points out of 10 in order to obtain 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 course.
If the student has not completed the practical cases in the ordinary exam, he/she must also take an assessment of this part that evaluates the same competences acquired in the practical cases and that will have a weight of 18% in the overall grade of the course.
The subject will only be considered passed if the student has obtained a minimum of 5 out of 10 in all the assessment tests.

Specifications for the second resit / retake exam:

The evaluation criteria are the same as in the extraordinary call.

9. Assignments, course calendar and important dates

Not related to the syllabus/contents

Hours	**hours**
Class Attendance (theory) [PRESENCIAL][Combination of methods]	34
Problem solving and/or case studies [PRESENCIAL][Combination of methods]	5
Class Attendance (practical) [PRESENCIAL][Combination of methods]	15
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Formative Assessment [PRESENCIAL][Assessment tests]	6

Global activity

Activities	**hours**
Formative Assessment [PRESENCIAL][Assessment tests]	6
Class Attendance (theory) [PRESENCIAL][Combination of methods]	34
Class Attendance (practical) [PRESENCIAL][Combination of methods]	15
Problem solving and/or case studies [PRESENCIAL][Combination of methods]	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
Callister, William D Jr	Ciencia e ingeniería de los materiales	Reverté		978-84-291-7251-5	2016	
Rodríguez, Gloria, Herranz, Gemma	Ciencia de los materiales				2022	Material de apoyo de las asignatura y apuntes de clase/ Subject support material and lecture notes.
Askeland, Donald R.	The science and engineering of materials	Thomson		0-495-24442-2	2006	
Askeland, Donald R.	Ciencia e ingeniería de los materiales	Paraninfo		84-9732-016-6	2001	
Callister, William D Jr	Fundamentals of materials science and engineering: an integrated approach	John Wiley & Sons		978-0-470-23463-1	2008	
Montes Martos, Juan Manuel, Gómez Cuevas, Francisco y Cintas Físico, Jesús	Ciencia e ingeniería de los materiales	Paraninfo		979-84-283-3017-6	2014	
Shackelford, James F.	Introducción a la ciencia de materiales para ingenieros	Pearson Prentice Hall		978-84-8322-659-9	2010	
Smith, William F. Hashemi, Javad	Foundations of materials science and engineering	McGraw-Hill		0-07-296304-2	2006	
Smith, William F. Hashemi, Javad	Fundamentos de la ciencia e ingeniería de materiales	McGraw-Hill Interamericana		978-607-15-1152-2	2014	