UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: MATERIALS ENGINEERING AND TECHNOLOGY
Code: 56324
Type: CORE COURSE
ECTS credits: 6
Degree: 421 - UNDERGRADUATE DEGREE PROG. IN MECHANICAL ENGINEERING
Academic year: 2022-23
Center: 602 - E.T.S. INDUSTRIAL ENGINEERING OF C. REAL
Group(s): 20
Year: 3
Duration: C2
Main language: Spanish
Second language:
Use of additional languages:
English Friendly: Y
Web site:
Bilingual: N

Lecturer: **GEMA HERRANZ SANCHEZ-COSGALLA** - Group(s): **20**

Building/Office	Department	Phone number	Email	Office hours
POLITÉCNICO/2A-06	MECÁNICA ADA. E ING. PROYECTOS	TEAMS	gemma.herranz@uclm.es	To guarantee the correct individualized attention of the student, the tutoring schedule will be arranged with the student by email.

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	To guarantee the correct individualized attention of the student, the tutoring schedule will be arranged with the student by email.

2. Pre-Requisites

In order to take this subject with the maximum benefit, it is recommended that the student has achieved competences related to the application of the basic principles of physics and general chemistry, solving mathematical problems that may arise in engineering and has acquired knowledge of the fundamentals of science, technology and chemistry of materials and basic knowledge of manufacturing.

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

This course deals with the application of knowledge of the relationship between microstructure, processing and properties of materials in materials engineering in the field of mechanical engineering.

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
CEM07	Knowledge and capacity to apply materials engineering.
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.
CT01	Knowledge of a second language.
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

Ability to distinguish the different heat treatments of metals.

Ability to select the most suitable material for a particular application.
Knowledge of the techniques for joining parts by means of welding and adhesives.
Ability to distinguish the most common materials processing techniques and to recognise the effects of processing on material structure and processing.
Knowledge of the different techniques for inspecting parts and detecting defects by means of non-destructive testing.
Knowledge of the basic resources for improving materials through surface engineering.
The importance of knowing and predicting the behaviour of a material when in service.
Introduction to materials engineering and technology.

6. Units / Contents

Unit 1: Introduction to Materials Engineering and Technology
Unit 2: Manufacturing Processes
Unit 3: Thermal treatments
Unit 4: Surface modifications
Unit 5: Joining techniques
Unit 6: In service behaviour of materials
Unit 7: Inspection of materials
Unit 8: Materials selection in mechanical engineering

ADDITIONAL COMMENTS, REMARKS

The following laboratory practices will be carried out during the course:

Heat treatments of alloys and their microstructural and mechanical characterisation.

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.

The syllabus will address transversally the selection of materials in mechanical engineering.

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 CEM07 CG03 CG04 CG05 CG06 CT01 CT02 CT03	1.36	34	N	-	
Problem solving and/or case studies [ON-SITE]	Combination of methods	CB01 CB02 CB03 CB04 CB05 CEM07 CG03 CG04 CG05 CG06 CT01 CT02 CT03	0.2	5	Y	N	
Class Attendance (practical) [ON-SITE]	Combination of methods	CB01 CB02 CB03 CB04 CB05 CEM07 CG03 CG04 CG05 CG06 CT01 CT02 CT03	0.6	15	Y	Y	
Formative Assessment [ON-SITE]	Assessment tests	CB01 CB02 CB03 CB04 CB05 CEM07 CG03 CG04 CG05 CG06 CT02 CT03	0.24	6	Y	Y	
Study and Exam Preparation [OFF-SITE]	Self-study	CB01 CB02 CB03 CB04 CB05 CEM07 CG03 CG04 CG05 CG06 CT01 CT02 CT03	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
Mid-term tests	70.00%	0.00%	There will be a partial test of the subject in the middle of the course and it will be recoverable both in the ordinary and extraordinary exams, together with the second part. Each part will have the same weight and may include theory and problems. The minimum mark for each test is 4/10 in order to make an average with the rest of the evaluable activities. Non-continuous assessment consists of a test with two blocks and a minimum mark of 4/10 must be obtained in the overall mark in order to pass the subject.
Final test	0.00%	70.00%	This will be a single final exam to be taken in the ordinary or extraordinary exam. It will be necessary to achieve a 4/10 to average with the rest of the evaluable activities.
			Attendance at the practicals, submission of the report and

Laboratory sessions	22.00%	22.00%	resolution of practical questions are compulsory in order to be assessed with 22% of the final mark. If the student does not pass these activities during the course, it will be recoverable by means of an assessment that allows the evaluation of similar competences both in the ordinary and extraordinary call that will have a weight of 22% and that must be passed (4 points out of 10) to average with the rest of the evaluable activities of the subject.
Assessment of problem solving and/or case studies	8.00%	8.00%	Resolution of cases of practical and expository content related to the subject, which will have a weight of 8% of the total grade. This activity will be carried out during the course and will be recoverable by means of an assessment that allows similar competences to be evaluated in both the ordinary and extraordinary exams.
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 internship and the partial exam will take a second partial exam in the ordinary exam with questions related to the remaining subject syllabus. If the student has not passed the first partial exam, he/she will have to take two tests, one of the first part of the subject and another 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 both in the ordinary and extraordinary exams, and must obtain a minimum of 4 points out of 10 to obtain an average with the rest of the evaluable activities. The weight of this block in the final grade is 22% of the overall grade for the course.

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 and that will have a weight of 8% 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 assessment 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 70% 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 22% 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 course.

The student must take a specific test to evaluate the same competences acquired in the practical cases, which will have a weight of 8% in the overall grade of the course.

The course 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:

Evaluation criteria are the same as for the final exam.

Specifications for the second resit / retake exam:

Evaluation criteria are the same as for the final exam.

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
Formative Assessment [PRESENCIAL][Assessment tests]	6
Study and Exam Preparation [AUTÓNOMA][Self-study]	90

Global activity

Activities	**hours**
Class Attendance (theory) [PRESENCIAL][Combination of methods]	34
Problem solving and/or case studies [PRESENCIAL][Combination of methods]	5
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Formative Assessment [PRESENCIAL][Assessment tests]	6
Class Attendance (practical) [PRESENCIAL][Combination of methods]	15
Total horas:	150

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Black, J. T.	DeGarmo's materials and processes in manufacturing	Wiley			2008	
Otero, E.	Corrosión y degradación de materiales	Síntesis			1997	
Degarmo, E.P.	Materiales y procesos de fabricación	Reverté			1994	
Rodríguez G., Herranz, G.	Apuntes de la asignatura https://campusvirtual.uclm.es/				2022	Plataforma moodle
Hutchings, I.M.	Tribology, Friction and Wear of	Edward Arnold			1992	

Montes Martos, J. M., Gómez Cuevas, F. y Cintas Físico, J.	Engineering Materials Ciencia e Ingeniería de Materiales	Paraninfo	978-88428330176	2014
Davis, J. R.	Surface engineering for corrosion and wear resistance	ASM International	978-0871707000	2001
Puértolas, J.A., Ríos R., Castro, M.	Tecnología de los Materiales en Ingeniería	Síntesis	978-84-9077-387-1	2016
Groover, M.K.	Fundamentos de Manufactura Moderna	Prentice-Hall		1997
German, R.M.	Powder Metallurgy Science	Princeton NJ		1994
German, R.M. & Bose, A.	Injection molding of metals and ceramics	Metal Powder Industries Federation	978-1878954619	1997
Kalpakjian, S., Schmid, S.	Manufactura, Ingeniería y Tecnología	Pearson Hall.		2001
Groover, Mikell P. (1939-)	Fundamentals of modern manufacturing : materials, processes,	John Wiley and Sons,	978-0-471-74485-6	2007
Callister, William D Jr (1940-)	Ciencia e ingeniería de los materiales /	Reverte,	978-84-291-7251-5	2016