UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: MATERIALS SCIENCE
Code: 56313
Type: CORE COURSE
ECTS credits: 6
Degree: 420 - UNDERGRADUATE DEGREE PROGRAMME IN MECHANICAL ENGINEERING
Academic year: 2023-24
Center: 605 - SCHOOL OF INDUSTRIAL ENGINEERS. AB
Group(s): 11
Year: 2
Duration: First semester
Main language: Spanish
Second language: English
Use of additional languages:
English Friendly: Y
Web site:
Bilingual: N

Lecturer: **JESUS CANALES VAZQUEZ** - Group(s): **11**

Building/Office	Department	Phone number	Email	Office hours
Instituto Energías Renovables/0D1	MECÁNICA ADA. E ING. PROYECTOS	926053197	jesus.canales@uclm.es	

Lecturer: **JUAN CARLOS PEREZ FLORES** - Group(s): **11**

Building/Office	Department	Phone number	Email	Office hours
Instituto Energías Renovables / 0D1	MECÁNICA ADA. E ING. PROYECTOS	926053325	JuanCarlos.PFlores@uclm.es	

2. Pre-Requisites

Students are expected to demonstrate learning skills acquired during the previous academic course related to Mathematics, Physics and Chemistry

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

Students will develop skills to determine the properties of materials and choose the most adeqaute material for a given industrial application.

Such skills will be the used in further subjects such as Materials Engineering and Technology, Fabrication Technologies, Technology of Composite Materials, Fabrication systems, etc, in the different industrial engineering degrees.

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 and being able to select the most appropriate hardening mechanism.

Ability to distinguish the different mechanical properties of materials and ability to implement mechanical tests.

Introduction to materials science and engineering.

Recognition of the metal alloys, polymers, ceramics and composites most commonly used in industry and their applicability

Understanding of the structure of materials and causes of their behaviour in relation to their microstructure and equilibrium diagrams
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
Unit 2: Structure of Materials
Unit 3: Crystal Nucleation & Growth
Unit 4: Mechanical Properties
Unit 5: Work-Hardening
Unit 6: Metal Alloys
Unit 7: Ceramic Materials

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	-	
Problem solving and/or case studies [ON-SITE]	Combination of methods	CB01 CB02 CB03 CB04 CB05	0.2	5	Y	Y	
Laboratory practice or sessions [ON-SITE]	Combination of methods	CB03	0.6	15	Y	Y	
Study and Exam Preparation [OFF-SITE]	Self-study	CB01 CB02 CB03 CEC03 CG03 CG04 CG05 CT02 CT03	3.6	90	N	-	
Formative Assessment [ON-SITE]	Assessment tests	CB01 CB02 CB03 CB04 CB05 CEC03 CG03 CG04 CT03	0.24	6	Y	Y	
		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	70.00%	70.00%	
Laboratory sessions	15.00%	15.00%	
Assessment of problem solving and/or case studies	5.00%	5.00%	
Theoretical papers assessment	10.00%	10.00%	
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:

Marks in the exam must be equal or above 4.0 to calculate the average. Marks below 4.0 shall imply final qualifications below 4.0. Students failing in either the contiunuous evaluation activities or lab work must add the corresponding fraction of the final qualification to the final exam/test

Non-continuous evaluation:

Marks in the exam must be equal or above 4.0 to calculate the average. Marks below 4.0 shall imply final qualifications below 4.0. The marks of students failing lab work (exam) will depend exclusively on the final exam/test

Specifications for the resit/retake exam:

Marks corresponding to continuous evaluation mode and/or lab work will be kept for the entire academic year.

Specifications for the second resit / retake exam:

Same conditions for resit/retake exam apply

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
Laboratory practice or sessions [PRESENCIAL][Combination of methods]	15
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Formative Assessment [PRESENCIAL][Assessment tests]	6

Global activity

Activities	hours

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

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Otero Huerta, E	Corrosión y degradación de materiales	Síntesis	Madrid	84-7738-518-1	1997	
Smith. Willian F; Javad Hashemi	Fundamentos de la Ciencia e Ingeniería de materiales	McGraw Hill		9789701056387	2014	
Apraiz Barreiro, J.	Tratamientos térmicos de los aceros	Cie Dossat 2000. Décima edición		84-95312-56-5	2002	
Pat L. Mangonon	Ciencia de Materiales selección y diseño	Prentice Hall		970-26-0027-8	2001	
Juan Manuel Montes Martos, Francisco Gómez Cuevas, Jesús Cintas	Ciencia e ingeniería de los materiales	Paraninfo		9788428330176	2014	
Shackelford James F, Alfredo Güemes	Introducción a la Ciencia de Materiales para Ingenieros	Prentice Hall Iberia		84-8322-047-4	1998	
Smallman, R.E. and Bishop, R.	Metals and materials. Science, processes, applications	Butterworth Heinemann		0-7506-1093-X	1995	
Smith, William F.	Fundamentos de la ciencia e ingeniería de materiales	McGraw-Hill		0-07-296304-2 (CD-RO	2006	
W.D. Callister Jr and David G. Rethwish	Introducción a la Ciencia e ingeniería de los materiales Tomo I y II	Reverté		978-84-291-7251-5	2016	
Ian P. Jones	Materials Science for Electrical and Electronic Engineers	Oxford University Press		0-19856294-2	2001	