



1. General information

Course: METALLIC MATERIALS IN MECHANICAL ENGINEERING**Code:** 56332**Type:** ELECTIVE**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:** 4**Duration:** C2**Main language:** Spanish**Second language:****Use of additional languages:****English Friendly:** Y**Web site:****Bilingual:** N**Lecturer:** JUAN CARLOS PEREZ FLORES - Group(s): 11

Building/Office	Department	Phone number	Email	Office hours
Instituto Energías Renovables / OD1	MECÁNICA ADA. E ING. PROYECTOS	926053325	JuanCarlos.PFlores@uclm.es	

2. Pre-Requisites

Not established

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

Not established

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
CEO04	Knowledge of the thermomechanical treatments of metallic materials and the ability to predict the microstructural changes produced by such treatments and their relationships with the properties.
CEO05	Ability to recognise the broad families of ferrous metal alloys (steels and castings), light alloys (aluminium, titanium) and copper and zinc alloys, and their typical microstructures, and ability to predict and/or interpret properties and applications.
CEO06	Ability to choose the most appropriate materials for a specific application, considering the effect of the design and shaping process.
CG01	Ability to draft, sign and develop projects in the field of Industrial Engineering, in accordance with the knowledge acquired under the provisions of Order CIN/351/2009, for the construction, reform, repair, conservation, demolition, manufacture, installation, assembly or operation of: structures, mechanical equipment, energy installations, electrical and electronic installations, industrial installations and plants, and manufacturing and automation processes.
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.
CG08	Ability to apply quality principles and methods.
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 design production processes according to the desirable properties of the material for the intended application.

Ability to understand specific composite and metallic material processing technologies.

Ability to select the material to be used and its treatment in order to obtain the required properties before and after processing.

Acquisition of laboratory skills and competences in materials science, mechanical testing, metrology and manufacturing.

6. Units / Contents

Unit 1:

Unit 2:

Unit 3:
Unit 4:
Unit 5:
Unit 6:
Unit 7:
Unit 8:
Unit 9:
Unit 10:
Unit 11:

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	CB01 CB02 CB03 CB04 CB05 CEO04 CEO05 CEO06 CG03 CG04 CG08 CT03	1.2	30	Y	N	
Class Attendance (practical) [ON-SITE]	Guided or supervised work	CB01 CB02 CB03 CB04 CB05 CEO04 CEO05 CEO06 CG03 CG04 CG08 CT03	0.64	16	Y	N	
Project or Topic Presentations [ON-SITE]	Group Work	CB01 CB02 CB03 CB04 CB05 CEO04 CEO05 CEO06 CG03 CG04 CG08 CT02 CT03	0.16	4	Y	N	
Laboratory practice or sessions [ON-SITE]	Practical or hands-on activities	CB01 CB02 CB03 CB04 CB05 CEO04 CEO05 CEO06 CG03 CG04 CG08 CT03	0.32	8	Y	N	
Final test [ON-SITE]	Assessment tests	CB01 CB02 CB03 CB05 CEO04 CEO05 CEO06 CG04 CT03	0.08	2	Y	N	
Writing of reports or projects [OFF-SITE]	Cooperative / Collaborative Learning	CB01 CB02 CB03 CB04 CB05 CEO04 CEO05 CEO06 CG03 CG04 CT03	0.8	20	Y	N	
Practicum and practical activities report writing or preparation [OFF-SITE]	Self-study	CB01 CB02 CB03 CB04 CB05 CEO04 CEO05 CEO06 CG03 CT03	0.64	16	Y	N	
Study and Exam Preparation [OFF-SITE]	Self-study	CB01 CB02 CB03 CB04 CB05 CEO04 CEO05 CEO06 CG03 CT03	2.16	54	Y	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
Theoretical exam	0.00%	60.00%	
Oral presentations assessment	25.00%	0.00%	
Practicum and practical activities reports assessment	15.00%	15.00%	
Progress Tests	60.00%	0.00%	
Theoretical papers assessment	0.00%	25.00%	
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).

9. Assignments, course calendar and important dates

Not related to the syllabus/contents	
Hours	hours
Final test [PRESENCIAL][Assessment tests]	2
Unit 1 (de 11):	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	2
Practicum and practical activities report writing or preparation [AUTÓNOMA][Self-study]	2

Study and Exam Preparation [AUTÓNOMA][Self-study]	2
Group 11:	
Initial date: 03-02-2020	End date: 10-02-2020
Unit 2 (de 11):	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Class Attendance (practical) [PRESENCIAL][Guided or supervised work]	1
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	2
Writing of reports or projects [AUTÓNOMA][Cooperative / Collaborative Learning]	2
Practicum and practical activities report writing or preparation [AUTÓNOMA][Self-study]	2
Study and Exam Preparation [AUTÓNOMA][Self-study]	4
Group 11:	
Initial date: 11-02-2020	End date: 17-02-2020
Unit 3 (de 11):	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Class Attendance (practical) [PRESENCIAL][Guided or supervised work]	2
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	2
Writing of reports or projects [AUTÓNOMA][Cooperative / Collaborative Learning]	2
Practicum and practical activities report writing or preparation [AUTÓNOMA][Self-study]	4
Study and Exam Preparation [AUTÓNOMA][Self-study]	8
Group 11:	
Initial date: 18-02-2020	End date: 25-02-2020
Unit 4 (de 11):	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Class Attendance (practical) [PRESENCIAL][Guided or supervised work]	1
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	2
Writing of reports or projects [AUTÓNOMA][Cooperative / Collaborative Learning]	2
Practicum and practical activities report writing or preparation [AUTÓNOMA][Self-study]	2
Study and Exam Preparation [AUTÓNOMA][Self-study]	6
Group 11:	
Initial date: 02-03-2020	End date: 09-03-2020
Unit 5 (de 11):	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Class Attendance (practical) [PRESENCIAL][Guided or supervised work]	2
Writing of reports or projects [AUTÓNOMA][Cooperative / Collaborative Learning]	2
Study and Exam Preparation [AUTÓNOMA][Self-study]	8
Group 11:	
Initial date: 10-03-2020	End date: 17-03-2020
Unit 6 (de 11):	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Class Attendance (practical) [PRESENCIAL][Guided or supervised work]	1
Writing of reports or projects [AUTÓNOMA][Cooperative / Collaborative Learning]	2
Study and Exam Preparation [AUTÓNOMA][Self-study]	2
Group 11:	
Initial date: 23-03-2020	End date: 24-03-2020
Unit 7 (de 11):	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Class Attendance (practical) [PRESENCIAL][Guided or supervised work]	1
Project or Topic Presentations [PRESENCIAL][Group Work]	1
Writing of reports or projects [AUTÓNOMA][Cooperative / Collaborative Learning]	4
Study and Exam Preparation [AUTÓNOMA][Self-study]	2
Group 11:	
Initial date: 30-03-2020	End date: 31-03-2020
Unit 8 (de 11):	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Class Attendance (practical) [PRESENCIAL][Guided or supervised work]	1
Project or Topic Presentations [PRESENCIAL][Group Work]	1
Writing of reports or projects [AUTÓNOMA][Cooperative / Collaborative Learning]	2
Study and Exam Preparation [AUTÓNOMA][Self-study]	4
Group 11:	
Initial date: 14-04-2020	End date: 20-04-2020
Unit 9 (de 11):	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Class Attendance (practical) [PRESENCIAL][Guided or supervised work]	2

Project or Topic Presentations [PRESENCIAL][Group Work]	1
Writing of reports or projects [AUTÓNOMA][Cooperative / Collaborative Learning]	2
Study and Exam Preparation [AUTÓNOMA][Self-study]	4
Group 11:	
Initial date: 21-04-2020	End date: 27-04-2020
Unit 10 (de 11):	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Class Attendance (practical) [PRESENCIAL][Guided or supervised work]	2
Project or Topic Presentations [PRESENCIAL][Group Work]	1
Writing of reports or projects [AUTÓNOMA][Cooperative / Collaborative Learning]	2
Study and Exam Preparation [AUTÓNOMA][Self-study]	6
Group 11:	
Initial date: 28-04-2020	End date: 04-05-2020
Unit 11 (de 11):	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Class Attendance (practical) [PRESENCIAL][Guided or supervised work]	2
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	2
Practicum and practical activities report writing or preparation [AUTÓNOMA][Self-study]	6
Study and Exam Preparation [AUTÓNOMA][Self-study]	8
Group 11:	
Initial date: 11-05-2020	End date: 18-05-2020
Global activity	
Activities	hours
Writing of reports or projects [AUTÓNOMA][Cooperative / Collaborative Learning]	20
Practicum and practical activities report writing or preparation [AUTÓNOMA][Self-study]	16
Study and Exam Preparation [AUTÓNOMA][Self-study]	54
Class Attendance (theory) [PRESENCIAL][Lectures]	29
Class Attendance (practical) [PRESENCIAL][Guided or supervised work]	15
Project or Topic Presentations [PRESENCIAL][Group Work]	4
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	10
Final test [PRESENCIAL][Assessment tests]	2
Total horas: 150	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Bhadeshia, H.K.D.H., Honeycombe, R.W.K.	Steels. Microstructure and properties	Butterworth-Heinemann			2007	
J. Apraiz Barreiro	Tratamientos térmicos de los aceros	Dossat			2002	
J.A. Pero-Sanz Elorza	Aceros: Metalurgia física, selección y diseño	Dossat 2000			2004	
J.R. Davis	Properties and selection: nonferrous alloys and special-purpose materials	ASM International			1990	
Smallman, R.E., Bishop, R.J.	Metals and Materials. Science, processes, applications	Butterworth-Heinemann			1995	
W.F. Smith and J. Hashemi	Fundamentos de la Ciencia e Ingeniería de Materiales	McGraw Hill			2014	
F. J. Belzunce	Aceros y Fundiciones: Estructura, Transformaciones, Tratamiento Térmicos y Aplicaciones	Universidad de Oviedo			2001	