UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: MATERIALS IN CHEMICAL ENGINEERING
Type: CORE COURSE
Degree: 344 - CHEMICAL ENGINEERING
Center: 1 - FACULTY OF SCIENCE AND CHEMICAL TECHNOLOGY
Year: 3
Main language: Spanish
Use of additional languages:
Web site:

Code: 57721
ECTS credits: 6
Academic year: 2021-22
Group(s): 21
Duration: First semester
Second language: English
English Friendly: Y
Bilingual: N

Lecturer: **ANA SANCHEZ-MIGALLON BERMEJO** - Group(s): **21**

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Lecturer: **ELENA VILLASEÑOR CAMACHO** - Group(s): **21**

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2. Pre-Requisites

It is recommended that the student has done courses fundamentals of chemistry, organic chemistry, and inorganic chemistry allowing to know the nomenclature of inorganic and organic compounds , according to IUPAC rules, as well as quantities and units physico-chemical

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

Chemical engineering degree student must acquire the conceptual and technical tools that enable you to exercise in the field of science and engineering of materials. It's a subject common to the industrial branch, so it is taught in the third year of the degree, in the first half, and on the other hand is a compulsory subject since since the beginning of civilization, along with the energy materials are used to improve the niv of life of mankind. All of the products that surround us are made based on materials, each time with better properties. This course will study the types of materials used in chemical engineering, expressing the current competition between materials and the future trends in their use.

4. Degree competences achieved in this course

Course competences

Code	Description
E09	Knowledge of the fundamentals of science, technology and materials chemistry. To understand the relationship between the microstructure, the synthesis or processing and the properties of the materials.
E14	Knowledge and use of the principles of the resistance of materials.
G03	Ability to solve problems with initiative, decision making, creativity, critical reasoning and to communicate and transmit knowledge, skills and abilities in the field of Chemical Engineering.
G14	ethical commitment and professional ethics
G18	Capacity for teamwork
G20	Ability to learn and work autonomously
G21	Ability to apply theoretical knowledge to practice
G22	Creativity and initiative

5. Objectives or Learning Outcomes

Course learning outcomes

Description

To know fundamental aspects of crystalline matter for the understanding of the properties and behavior of metals and alloys and any material that may have a crystalline structure.

To know the processing, properties and applications of ceramic materials.

To know the processing, properties and applications of polymeric and composite materials.

To know the structure, preparation, properties and applications of zeolites.

To have skills for the autonomous search of information, analysis, interpretation and use for practical purposes.

To know the different types of metal alloys, especially steel, its processing, properties and applications.

To know the main industrial tests used to evaluate the mechanical properties of metals and alloys as well as for quality control.

To know the electrical properties of metals and alloys. Study of superconductors

Additional outcomes

6. Units / Contents

Unit 1: Materials and engineering
Unit 2: Inorganic solids
Unit 3: Crystal defects and non-stoichiometry
Unit 4: Mechanical properties of metals
Unit 5: Alloys
Unit 6: Electric properties of metals
Unit 7: Polymeric materials
Unit 8: Ceramic materials
Unit 9: Composites
Unit 10: Zeolites
Unit 11: Introduction to nanomaterials

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	E09 E14 G03 G14	1.5	37.5	N	-	
Problem solving and/or case studies [ON-SITE]	Project/Problem Based Learning (PBL)	G03 G20	0.5	12.5	Y	N	
Group tutoring sessions [ON-SITE]	Group tutoring sessions	G14 G18 G20	0.2	5	Y	N	
Other off-site activity [OFF-SITE]	Self-study	G21 G22	3.6	90	N	-	
Progress test [ON-SITE]	Assessment tests	E14 G18 G20 G22	0.2	5	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
Assessment of active participation	10.00%	0.00%	
Assessment of problem solving and/or case studies	20.00%	0.00%	
Progress Tests	70.00%	100.00%	
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**
Unit 1 (de 11): Materials and engineering	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Unit 2 (de 11): Inorganic solids	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Problem solving and/or case studies [PRESENCIAL][Project/Problem Based Learning (PBL)]	3
Group tutoring sessions [PRESENCIAL][Group tutoring sessions]	1
Unit 3 (de 11): Crystal defects and non-stoichiometry	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Unit 4 (de 11): Mechanical properties of metals	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Problem solving and/or case studies [PRESENCIAL][Project/Problem Based Learning (PBL)]	2
Group tutoring sessions [PRESENCIAL][Group tutoring sessions]	1
Unit 5 (de 11): Alloys	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Problem solving and/or case studies [PRESENCIAL][Project/Problem Based Learning (PBL)]	3
Group tutoring sessions [PRESENCIAL][Group tutoring sessions]	1
Unit 6 (de 11): Electric properties of metals	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	1

Unit 7 (de 11): Polymeric materials	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	12
Problem solving and/or case studies [PRESENCIAL][Project/Problem Based Learning (PBL)]	3
Group tutoring sessions [PRESENCIAL][Group tutoring sessions]	1
Unit 8 (de 11): Ceramic materials	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Unit 9 (de 11): Composites	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Unit 10 (de 11): Zeolites	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Problem solving and/or case studies [PRESENCIAL][Project/Problem Based Learning (PBL)]	1
Group tutoring sessions [PRESENCIAL][Group tutoring sessions]	1
Unit 11 (de 11): Introduction to nanomaterials	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Problem solving and/or case studies [PRESENCIAL][Project/Problem Based Learning (PBL)]	1
Progress test [PRESENCIAL][Assessment tests]	5
Global activity	
Activities	**hours**
Progress test [PRESENCIAL][Assessment tests]	5
Class Attendance (theory) [PRESENCIAL][Lectures]	36
Problem solving and/or case studies [PRESENCIAL][Project/Problem Based Learning (PBL)]	13
Group tutoring sessions [PRESENCIAL][Group tutoring sessions]	5
Total horas:	59

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
V. Muller	Inorganic Structural Chemistry	Wiley			1992	
W.F.Smith y Javad Hashemi	Fundamentos de la Ciencia e Ingeniería de Materiales	McGraw-Hill		978-607-15-1152-2	2014	
A. Dyer	An introduction to zeolite molecular sieves	John Wiley			1988	
A.K.Cheetham, P. Day	Solid state chemistry compounds	Clarendon Press Oxford			1992	
A.K.Cheetham, P. Day	Solid state chemistry techniques	Oxford Science Publications			1991	
C.E,Arraher, Jr	Introduction to polymer chemistry	CRC Press		978-1-4398-0953-2	2010	
D. Hull	An introduction to composite materials	Cambridge University Press			1993	
D. R. Askeland	La Ciencia e Ingeniería de Materiales	Paraninfo		84-9732-016-6	2001	
J. F. Shackelford	Introducción a la Ciencia de Materiales para Ingenieros	Prentice Hall		978-84-8322-659-9	2010	
J.M. Montes, F.G. Cuevas y J. Cintas	Ciencia e Ingeniería de los materiales	Paraninfo		978-84-283-3017-6	2014	
W.D.Calister, Jr.	Introducción a la Ciencia e Ingeniería de los Materiales	Reverté		84-291-7254-8	2003	