



IDENTIFYING DATA

Science and material engineering

Subject	Science and material engineering			
Code	V12G420V01302			
Study programme	Grado en Ingeniería Biomédica			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	2nd	1st
Teaching language	Spanish			
Department				
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Lecturers	Álvarez González, David Cristóbal Ortega, María Julia Gomez Barreiro, Silvia			
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General description				

Training and Learning Results

Code	
B3	CG3 Knowledge in basic and technological subjects that will enable students to learn new methods and theories, and provide them the versatility to adapt to new situations.
B4	CG2 Ability to direct activities related to the CG1 competence
B6	CG6 Capacity for handling specifications, regulations and mandatory standards.
C9	CE9 Knowledge of the fundamentals of the science, technology and chemistry of materials. Understand the relationship between microstructure, the synthesis, processing and properties of materials.
D1	CT1 Analysis and synthesis.
D5	CT5 Information Management.
D9	CT9 Apply knowledge.
D10	CT10 Self learning and work.

Expected results from this subject

Expected results from this subject	Training and Learning Results		
New	B3	C9	D10
New	B3	C9	
New	B4	C9	D9
	B6		
New	B4	C9	D9
New	B3	C9	
	B6		
New			D1 D5
New	B6	C9	D10
New		C9	D1 D9
New	B6	C9	D1 D9

Contents

Topic

1. Introduction to the science and technology of the materials.	1.1 Introduction
2.- Crystalline organisation	2.1 crystalline Solids and amorphous. Crystalline networks, characteristic and imperfections. 2.2 Transformations *alotrópicas.
3.- Superficial and massive properties	3.1 Mechanics 3.2 Chemists 3.3 Thermal 3.4 electrical and magnetic.
4.- Metallic materials	4.1 Solidification. Constitution of alloys. Size of grain. 4.2 Main binary diagrams of balance. Processed. 4.3 Alloys of basic iron: classification, applications and thermal treatments. Applications in *bioingeniería. 4.4 Alloys no-*férreas: classification, applications and thermal treatments. Main alloys in *implantología.
5.- Material Plastics	5.1 Classification: Thermoplastic, thermostable and elastomers. 5.2 Properties and methods of evaluation. 5.3 Processes of conformed. 5.4 Introduction to the biopolymers: properties and classification.
6.- Ceramic materials.	6.1 Classification and properties. 6.2 Glasses and ceramic traditional. 6.3 Ceramic technological. 6.4 Introduction to the *biocerámicos (inert and *bioactivos)

Planning

	Class hours	Hours outside the classroom	Total hours
Introductory activities	1.5	0	1.5
Lecturing	31	55.8	86.8
Problem solving	1.25	3	4.25
Laboratory practical	18	18	36
Mentored work	0.5	6	6.5
Autonomous problem solving	0	12	12
Objective questions exam	1	0	1
Essay questions exam	1	0	1
Problem and/or exercise solving	0.95	0	0.95

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Introductory activities	Presentation of the matter. Introduction to the science and technology of materials.
Lecturing	Exhibition by part of the professor of the contents on the matter object of study, theoretical bases and/or guidelines of a work, exercise that the/the student has to develop
Problem solving	Activity in which they formulate problem and/or exercises related with the subject. The student has to develop the suitable or correct solutions by means of the *ejercitación of routines, the application of formulas or algorithms, the application of procedures of transformation of the available information and the interpretation of the results. It is used to use as I complement of the lesson *magistral.
Laboratory practical	Activities of application of the knowledges to concrete situations and of acquisition of basic skills and *procedimentales related with the matter object of study. They develop in special spaces with skilled equipment (laboratories, computer classrooms, etc).
Mentored work	The/The student, of individual way or in group, elaborates a document on the thematic of the matter or prepares seminars, investigations, memories, essays, summaries of readings, conferences, etc.

Autonomous problem solving	Activity in which they formulate problems and/or exercises related with the subject (theoretical part and practical part). The student/to has to develop the analysis and resolution of the problems and/or exercises of autonomous form.
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Personalized assistance

Methodologies	Description
Lecturing	The professor, in the schedule of *tutorías, will resolve the doubts that can have the student.
Problem solving	The professor, during the lesson *magistral, as well as in the schedule of *tutorías, will resolve the doubts that can have the student.
Laboratory practical	The professor, during the development of the practices of laboratory, will resolve the doubts that can have the student.
Mentored work	The professor, in the schedule of *tutorías, will resolve the doubts that can have the student.

Assessment

	Description	Qualification	Training and Learning Results
Lecturing	It will make by means of two proofs written (problems, short questions and type test) that collect the knowledges purchased by the student along the course. The first proof will make during the period of teaching of the matter (roughly to half of the course) and will have a weight of 30%: the second proof (weight of 40%) will do in the date fixed by the centre.	70	B3 C9 D1 B4 D9
Laboratory practical	The formative activities of practical character will evaluate according to the criteria of assistance, degree of participation and reports of development of the practices (5%) and a proof of evaluation at the end of the period of teaching of the practices (15%)	20	B3 C9 D1 B6 D5 D9 D10
Mentored work	The work made in small groups will be evaluated through his public defence. Will take into account the information contributed, bibliography consulted, the structure of the contents, the clarity of the presentation and the answers contributed in the final debate with the professor and the rest of the students	10	B3 C9 D1 B4 D5 B6 D9

Other comments on the Evaluation

Global evaluation: in the two official editions the renunciation to the continuous evaluation and election of the system of global evaluation will make following the procedure and the term established by the centre. It will consist of an only examination written that will have a weight of 100% of the note and will evaluate all the theoretical and practical contents of the subject. 1ª EDITION OF THE RECORD: Modality of Continuous Evaluation. Will consist of distinct proofs made during the teaching of the subject and a final proof in the official date previously fixed by the centre. The note obtained will be the corresponding to the sum of the obtained in the diverse proofs. 2ª EDITION OF THE RECORD: Modality of continuous Evaluation. It will keep the note of the practical part of the evaluation continuous (practices of laboratory and work *tutelado) and it will make a final proof in the official date previously fixed by the centre. Extraordinary announcement: it will make in the previously fixed date by the centre. It will consider the system of global evaluation and the examination written will cover the whole of the theoretical and practical contents that will suppose 100% of the note. Ethical behaviour: it expects that the present student a suitable ethical behaviour, attending especially to the indicated in the Articles 39, 40, 41 and 42 of the Regulation on the evaluation, the qualification and the quality of the teaching and of the process of learning of the *estudiantado of the *Universidade de Vigo (approved in the *clauso of 18 April 2023). WARNING: In case of discrepancies between the distinct versions linguistic of the guide will prevail the indicated in the version in Spanish

Sources of information

Basic Bibliography

Callister, William D., **Materials Science and Engineering: an introduction.**, Wiley, 2009
 Askeland, Donald R., **The science and engineering of materials**, Cengage Learning,, 2012
 Shackelford, James F., **Introduction to materials science for engineers**, Prentice-Hall, 2010
 Smith, William F., **Fundamentals of materials science and engineering.**, McGraw-Hill, 2010

Complementary Bibliography

María Vallet Regí, **BIOMATERIALES**, Consejo Superior de Investigaciones Científicas, 2013
 Pío González Fernández, **Biomateriales: Diseño, producción y caracterización**, Rede Galega de Biomateriais, 2015

Recommendations

Subjects that continue the syllabus

Biomaterials/V12G420V01901

Subjects that it is recommended to have taken before

Chemistry: chemistry/V12G420V01205
