

IDENTIFYING DATA				
Materials science and technology				
Subject	Materials science and technology			
Code	V12G380V01301			
Study programme	Degree in Mechanical Engineering			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	2nd	2nd
Teaching language	Spanish Galician			
Department				
Coordinator	Figueroa Martínez, Raúl Abreu Fernández, Carmen María			
Lecturers	Abreu Fernández, Carmen María Álvarez Dacosta, Pedro Cortes Redin, María Begoña Díaz Fernández, Belén Figueroa Martínez, Raúl Iglesias Rodríguez, Fernando Pena Uris, Gloria María Riobó Coya, Cristina			
E-mail	cabreu@uvigo.es raulfm@uvigo.es			
Web	http://faitic.uvigo.es			
General description	The aim that pursues with this subject is to initiate to the student in the Science and Technology of the Materials and his applications in the Engineering.			

Competencies	
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	CG4 Ability to solve problems with initiative, decision making, creativity, critical thinking and the ability to communicate and transmit knowledge and skills in the field of industrial engineering in Mechanical specialty.
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.

Learning outcomes			
Expected results from this subject	Training and Learning Results		
It comprises the fundamental concepts of link, structure and microestructure of the distinct types of materials	B3	C9	D10
It comprises the relation go in to microestructure of the material in his mechanical behaviour, electrical, thermal and magnetic	B3	C9	
It comprises the mechanical behaviour of the metallic materials, ceramic, plastics and compound	B4 B6		
It knows how they can modify the properties by means of mechanical processes and thermal treatments	B4	C9	D9
It knows the basic technicians of structural characterisation of the materials	B3 B6	C9	

It purchases skills in the handle of the diagrams and charts			D1 D5
It purchases skill in the realisation of essays	B6	C9	D10
It analyses the results obtained and extracts conclusions of the same			D1 D9
It is able to apply norms of essays of materials	B6		D1 D9

Contents	
Topic	
Introduction	Introduction to the Science and Technology of Material. Classification of the materials. Terminology. Orientations for the follow-up of the matter.
Crystalline arrangement.	Crystalline and amorphous solids. Crystalline lattices, characteristics and imperfections. Allotropic transformations.
Properties of materials. Laboratory practices.	Mechanical, chemical, thermal, electric and magnetic properties. Standars for materials analysis. Compressive and tensile deformation. Principles of fracture mechanisms. Toughness. Hardness. Main test methods. Fundamentals of thermal analysis. Fundamentals of non-destructive esting. Introduction to metallography. Binary isomorphous and eutectic systems. Microstructure in eutectic alloys. Analyses of practical situations.
Metallic materials.	Solidification. Constitution of alloys. Grain size. Main binary phase diagrams. Processing. Carbon steels: classification and applications. Cast iron alloys. Heat treatments: ims, fundamentals and classification. Annealing, normalizing, quenching and tempering. Nonferreous alloys.
Polymers and composites	General concepts. Classification. Properties. Types of polymers. Processing. Classification of composite materials. Polymer matrix composite materials. Processing of composite materials. Problems related to polymeric and composite materials.
Ceramic materials	Structure and bonding in ceramic materials. Silicates structure. Glasses. Properties of ceramic materials. Processing of ceramic materials. Applications.

Planning			
	Class hours	Hours outside the classroom	Total hours
Introductory activities	1.5	0	1.5
Lecturing	31	55.8	86.8
Laboratory practical	18	18	36
Autonomous problem solving	0	12	12
Objective questions exam	0.5	0.5	1
Problem and/or exercise solving	1	0.95	1.95
Problem and/or exercise solving	1.25	3	4.25
Essay	0.5	6	6.5
*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 subject. Introduction to the science and Technology of Materials
Lecturing	Exhibition by part of the professor of the contents on the matter object of study, of the bases and/or guidelines of the work /exercise/ project to develop by the student. Use of manipulative Activities or experiences of chairs
Laboratory practical	Application to practical level of the theory in the field of the knowledge of Science and Technology of materials
Autonomous problem solving	The student has to be able to develop the capacity to resolve problems and/or exercises of autonomous form.

Personalized assistance	
Methodologies	**Description**
Lecturing	The professor, in his schedule of tutorials, will clear the doubts that can have the student.
Laboratory practical	The professor, in his schedule of tutorials, will clear the doubts that can have the student.
Tests	**Description**
Problem and/or exercise solving	The professor, in his schedule of tutorials, will clear the doubts that can have the student.
Essay	The professor, in his schedule of tutorials, will clear the doubts that can have the student.

Assessment					
	Description	Qualification	Training and Learning Results		
Laboratory practical	Assistance, participation and reports that delivered periodically. Results of learning: it Comprises the mechanical behaviour of the metallic materials, ceramic, plastics and compounds Knows the basic technicians of structural characterisation of the materials Purchases skills in the handle of the diagrams and charts. It is able to apply norms of essays of materials Purchases skill in the realisation of essays. It analyses the results obtained and extracts conclusions of the same	2	B3 B6	C9	D1 D5 D9 D10
Problem and/or exercise solving	In the final examination will include questions of short answer and/or type test. The examination will realise in the date fixed by the centre. Results of learning: it Comprises the fundamental concepts of link, structure and microestructure of the distinct types of materials. It comprises the relation go in to microestructure of the material in his mechanical behaviour, electrical, thermal and magnetic. It comprises the mechanical behaviour of the metallic materials, ceramic, plastics and composed Know how can modify the properties by means of mechanical processes and thermal treatments Knows the basic technicians of structural characterisation of the materials Purchases skills in the handle of the diagrams and charts Is able to apply norms of essays of materials Purchases skill in the realisation of essays Analyses the results obtained and extracts conclusions of the same	43	B3 B4 B6	C9	D1 D5 D9 D10
Problem and/or exercise solving	It will value the exercises posed along the course (25%). In the final examination will include similar exercises (20%). Results of learning: it Comprises the fundamental concepts of link, structure and microestructure of the distinct types of materials. It comprises the relation go in to microestructure of the material in his mechanical behaviour, electrical, thermal and magnetic. It comprises the mechanical behaviour of the metallic materials, ceramic, plastics and composed Know how can modify the properties by means of mechanical processes and thermal treatments Knows the basic technicians of structural characterisation of the materials Purchases skills in the handle of the diagrams and charts Is able to apply norms of essays of materials Purchases skill in the realisation of essays Analyses the results obtained and extracts conclusions of the same	50	B3 B4 B6	C9	D1 D5 D9 D10
Essay	They posed works along the course and will indicate the guidelines for his preparation. Results of learning: it Comprises the fundamental concepts of link, structure and microestructure of the distinct types of materials. It comprises the relation go in to microestructure of the material in his mechanical behaviour, electrical, thermal and magnetic. It comprises the mechanical behaviour of the metallic materials, ceramic, plastics and composed Know how can modify the properties by means of mechanical processes and thermal treatments Knows the basic technicians of structural characterisation of the materials Purchases skills in the handle of the diagrams and charts Is able to apply norms of essays of materials Purchases skill in the realisation of essays Analyses the results obtained and extracts conclusions of the same	5	B3 B4 B6	C9	D1 D5 D9 D10

Other comments on the Evaluation

*EvaluaciÃ*n Continuous

The *evaluaciÃ*ncontinua makeÃ during the period of *imparticiÃ*n of the subject, *segÃ*nlos criteria established in the previous section and corresponds with 30%of the final note. To surpass the subject beÃ necessary to have reached *unapuntuaciÃ*n *mÃ*nima of 40% in the proof made in the date previously *fijadapor the centre, that corresponds with 70% of the final note. Those students *queno receive to the *evaluaciÃ*n continuous (previous *autorizaciÃ*n of the *direcciÃ*n *dela *EEI) beÃ*n evaluated with a final examination on the contents of *latotalidad of the matter, that *supondrÃ 100% of the note.

Examination of Julio (2*Â* *EdiciÃ*n)

In the examination *deJulio *tendrÃ in account the *evaluaciÃ*n continuous (VÃ*lida only in the course 2019-20). The examination *tendrÃ the same *caracterÃ*sticasque the previous and makeÃ in the previously fixed date by the centre. Those students *quequieran renounce to the *evaluaciÃ*n continuous beÃ*n evaluated with an examination *finalsobre the contents of the whole of the material (*teorÃ*to + *prÃ*ctica) *quesupondrÃ 100% of the note.

Extraordinary examination

Examination on *loscontenidos of the whole of the material (*teorÃ*to + *prÃ*ctica) that *supondrÃ 100%of the note.

Commitment Ã*tico:

It expects that the present student a behaviour Ã*tico suitable. In *casode detect a behaviour no Ã*tico (copy, plagiarism, *utilizaciÃ*n of *aparatoselectrÃ*nicos unauthorised, etc.), considerÃ that the student no *reÃ*ne *losrequisitos necessary to surpass the matter. In this case, the *calificaciÃ*nglobal in the present course *acadÃ*mico beÃ of suspense (0.0).

No allowÃ the *utilizaciÃ*n of *ningÃ*n device *electrÃ*nico *durantelas proofs of *evaluaciÃ*n, except *autorizaciÃ*n expresses. The fact of *introducirun device *electrÃ*nico unauthorised in the classroom of examination beÃ *consideradomotivo of no *superaciÃ*n of the matter in the present course *acadÃ*mico and *lacalificaciÃ*n global beÃ of suspense (0.0).

Sources of information

Basic Bibliography

Callister, William, **Materials Science and Engineering: an introduction**, Wiley,

Askeland, Donald R, **The science and engineering of materials**, Cengage Learning,

Shackelford, James F, **Introduction to materials science for engineers**, Prentice-Hall,

Complementary Bibliography

Smith, William F, **Fundamentals of materials science and engineering**, McGraw-Hill,

AENOR, **Standard tests**,

Montes J.M., Cuevas F.G., Cintas J., **Ciencia e Ingeneiría de Materiales**, Paraninfo,

Recommendations

Subjects that continue the syllabus

Materials engineering/V12G380V01504

Subjects that are recommended to be taken simultaneously

Fundamentals of manufacturing systems and technologies/V12G380V01305
Fluid mechanics/V12G380V01405
Thermodynamics and heat transfer/V12G380V01302

Subjects that it is recommended to have taken before

Computer science: Computing for engineering/V12G350V01203
Physics: Physics I/V12G380V01102
Physics: Physics II/V12G380V01202
Mathematics: Algebra and statistics/V12G380V01103
Mathematics: Calculus I/V12G380V01104
Chemistry: Chemistry/V12G380V01205

Other comments

To enrol in this matter is necessary to have surpassed or enrol of all the subjects of the inferior courses to the course in that

it is situated this matter.

In case of discrepancy in the information contained in this guide will understand that it prevails the version edited in Spanish.