

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	Abreu Fernández, Carmen María			
Lecturers	Abreu Fernández, Carmen María Cortes Redin, María Begoña Figueroa Martínez, Raúl Iglesias Rodríguez, Fernando Pena Uris, Gloria María Pérez Vázquez, María Consuelo Riobó Coya, Cristina			
E-mail	cabreu@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
Master Session	31	55.8	86.8
Laboratory practises	18	18	36
Autonomous troubleshooting and / or exercises	0	12	12
Multiple choice tests	0.5	0.5	1
Short answer tests	1	0.95	1.95
Troubleshooting and / or exercises	1.25	3	4.25
Jobs and projects	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
Master Session	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 practises	Application to practical level of the theory in the field of the knowledge of Science and Technology of materials
Autonomous troubleshooting and / or exercises	The student has to be able to develop the capacity to resolve problems and/or exercises of autonomous form.

Personalized attention	
Methodologies	**Description**
Master Session	The professor, in his schedule of tutorials, will clear the doubts that can have the student.
Laboratory practises	The professor, in his schedule of tutorials, will clear the doubts that can have the student.
Tests	**Description**
Troubleshooting and / or exercises	The professor, in his schedule of tutorials, will clear the doubts that can have the student.

Jobs and projects	The professor, in his schedule of tutorials, will clear the doubts that can have the student.

Assessment					
	Description	Qualification	Training and Learning Results		
Laboratory practises	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
Short answer tests	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
Troubleshooting and / or exercises	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

Jobs and projects	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

Ethical commitment: it expects that the present student a suitable ethical behaviour. In case to detect a no ethical behaviour (copy, plagiarism, utilisation of unauthorised electronic devices, for example) will consider that the student does not gather the necessary requirements to surpass the matter. In this case the global qualification in the present academic course will be of suspense (0.0).

It will not allow the utilisation of any electronic device during the proofs of evaluation except permission expresses. The fact to enter an unauthorised electronic device in the classroom of examination will be considered reason of no passing of the matter in the present academic course and the global qualification will be of suspense (0.0).
Continuous evaluation: The continuous evaluation will realise during the period of teaching of the subject, according to the criteria established in the previous section. Anyway, to surpass the subject will be necessary to have reached a minimum punctuation of 40% in the proof realised in the previously fixed date by the centre (http://eei.uvigo.es) Only they will add the two notes (continuous Evaluation (3/10) and Final Examination Theorist (7/10)), if it reaches or surpasses the minimum demanded in the theoretical examination (40%, that means 2,8/7) If the student has not surpassed this condition the final note of the subject will be the one of the continuous evaluation. Those students that do not receive to the continuous evaluation will be evaluated with a final examination on the contents of the whole of the matter, that will suppose 100% of the note.
Examination of July (2ª Edition) In the examination of July will take into account the continuous evaluation. Will be able to obtain 100% of the qualification;in the examination that will realise in the previously fixed date by the centre.

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 1/V12G380V01102
Physics: Physics 2/V12G380V01202

Mathematics: Algebra and statistics/V12G380V01103
Mathematics: Calculus 1/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.