



IDENTIFYING DATA

Materials science and technology

Subject	Materials science and technology			
Code	V12G330V01301			
Study programme	Degree in Industrial Electronics and Automation Engineering			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	2nd	1st
Teaching language	Spanish Galician			
Department				
Coordinator	Figueroa Martínez, Raúl Abreu Fernández, Carmen María			
Lecturers	Abreu Fernández, Carmen María Cortes Redín, María Begoña Figueroa Martínez, Raúl Gutián Saco, María Beatriz Iglesias Rodríguez, Fernando			
E-mail	cabreu@uvigo.es raulfm@uvigo.es			
Web	http://fatic.uvigo.es			
General description	The aim of this subject is to introduce the main concepts of materials technology as well as to study applications of the most common materials			

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 scope of industrial engineering in the field of Industrial Electronic and Automation.
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		
New	B3	C9	D10
New	B3	C9	
New	B4 B6		
New	B4	C9	D9
New	B3 B6	C9	
New			D1
New	B6	C9	D10

New		D1 D5 D9
New	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. Standards for materials analysis. Compressive and tensile deformation. Principles of fracture mechanisms. Toughness. Hardness. Main test methods. Fundamentals of thermal analysis. Fundamentals of non-destructive testing. 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: fundamentals and classification. Annealing, normalizing, quenching and tempering. Nonferrous 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	1.5	2.75
Essay	0.5	7.5	8

*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 materials science and technology.
Lecturing	Exhibition by the lecturers of the main contents of the subject, theoretical bases and/or projects guidelines. Hands on science methodology.
Laboratory practical	Practical application of the theoretical contents. Practical exercises in the materials laboratory.
Autonomous problem solving	Formulation of a practical activity related to the subject. The student must be able to resolve them by himself.

Personalized assistance

Methodologies	Description
Lecturing	
Laboratory practical	
Tests	Description
Problem and/or exercise solving	
Essay	

Assessment

	Description	Qualification	Training and Learning Results		
Laboratory practical	Attendance, participation and periodical assignments.	2	B3 B6	C9	D1 D9 D10
Problem and/or exercise solving	In the final exam, short questions will be included. The final exam will be held the day fixed by the school.	40	B3 B4 B6	C9	D1 D9 D10
Problem and/or exercise solving	Exercises will be assessed along the course (25%). The final exam will include similar exercises (20%).	50	B3 B4 B6	C9	D1 D9 D10
Essay	The main guidelines to successfully develop short projects will be given.	8	B3 B4 B6	C9	D1 D9 D10

Other comments on the Evaluation

*Evaluaci3n Continuous

The *evaluaci3n continua make during the period of *impartici3n of the subject, *seg3n los criteria established in the previous section and corresponds with 30% of the final note. To surpass the subject be necessary to have reached *unapuntuaci3n *m3nima 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 *evaluaci3n continuous (previous *autorizaci3n of the *direcci3n *dela *EEI) be3n evaluated with a final examination on the contents of *latotalidad of the matter, that *supondr3 100% of the note.

Examination of Julio (23 Edici3n)

In the examination *de julio *tendr3 in account the *evaluaci3n continuous (V3lida only in the course 2019-20). The examination *tendr3 the same *caracter3sticasque the previous and make3 in the previously fixed date by the centre. Those students *quequieran renounce to the *evaluaci3n continuous be3n evaluated with an examination *final sobre the contents of the whole of the matter (*teor3to + *pr3ctica) *quesupondr3 100% of the note.

Extraordinary examination

Examination on *los contenidos of the whole of the matter (*teor3to + *pr3ctica) that *supondr3 100% of the note.

Commitment 3tico:

It expects that the present student a behaviour 3tico suitable. In *caso de detect a behaviour no 3tico (copy, plagiarism, *utilizaci3n of *aparatos electr3nicos unauthorised, etc.), consider3 that the student no *re3ne *los requisitos necessary to surpass the matter. In this case, the *calificaci3n global in the present course *acad3mico be3 of suspense (0.0).

No allow3 the *utilizaci3n of *ning3n device *electr3nico *durante las proofs of *evaluaci3n, except *autorizaci3n expresses. The fact of *introduciran device *electr3nico unauthorised in the classroom of examination be3 *considerado motivo of no *superaci3n of the matter in the present course *acad3mico and *lcalificaci3n global be3 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 Ingeniería 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
