



## IDENTIFYING DATA

### (\*)Ciencia e tecnoloxía dos materiais

Subject	(*)Ciencia e tecnoloxía dos materiais			
Code	V12G380V01301			
Study programme	(*)Grao en Enxeñaría Mecánica			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	2nd	2nd
Teaching language				
Department				
Coordinator	Pérez Vázquez, María Consuelo			
Lecturers	Abreu Fernández, Carmen María Collazo Fernández, Antonio Cortes Redin, María Begoña Iglesias Rodríguez, Fernando Pena Uris, Gloria Pérez Vázquez, María Consuelo Riobó Coya, Cristina			
E-mail	mcperez@uvigo.es			
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General description	(*)El objetivo que se persigue con esta asignatura es iniciar al alumno en la Ciencia y Tecnología de los Materiales y sus aplicaciones en la Ingeniería.			

## Competencies

Code	
A3	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.
A4	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.
A6	CG6 Capacity for handling specifications, regulations and mandatory standards.
A22	RI3 Knowledge of the fundamentals of the science, technology and chemistry of materials. Understand the relationship between microstructure, the synthesis, processing and properties of materials.
B1	CT1 Analysis and synthesis
B5	CT5 Information Management.
B9	CS1 Apply knowledge.
B10	CS2 Self learning and work.

## Learning aims

Expected results from this subject	Training and Learning Results
Knowledge in basic and technological subjects, in order to qualify them for the learning of new methods and theories and provide them versatility to be adapted to the new situations.	A3
Ability to resolve problems with initiative, power to take decisions, creativity, critical reasoning and ability to communicate and transmit knowledge and skills in the field of the industrial engineering.	A4
Ability to handle especificacions, regulations and norms of required fulfilment.	A6
Knowledge of the bases of science, technology and chemistry of materials. Be able to understand the relation between the microstructure, the synthesis or processing and the properties of the materials.	A22
Analysis and synthesis.	B1
Management of the information.	B5
Be able to apply knowledge.	B9
Autonomous learning and work.	B10

<b>Contents</b>	
Topic	
Introduction	Introduction to Science and Technology of Materials. Classification of materials. Terminology. Guidance for the subject follow-up.
Crystal systems	Crystalline and noncrystalline solids. Crystal systems, characteristics and imperfections in solids. Allotropy.
Properties of materials. Laboratory practicals.	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. Alloys. Grain size. Main binary phase diagrams. Processing. Carbon steels: classification and applications. Cast iron alloys. Thermal treatments: aims, 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	2	0	2
Master Session	32	57.6	89.6
Laboratory practises	18	18	36
Autonomous troubleshooting and / or exercises	0	12	12
Autonomous practices through ICT	0	1.6	1.6
Multiple choice tests	0.25	0.25	0.5
Short answer tests	0.5	0.5	1
Troubleshooting and / or exercises	0.8	0.8	1.6
Jobs and projects	0.25	5	5.25

\*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.
Master Session	Exhibition by the lecturers of the main contents of the subject, theoretical bases and/or projects guidelines. Hands on science methodology.
Laboratory practises	Practical application of the theoretical contents. Practical exercises in the materials laboratory.
Autonomous troubleshooting and / or exercises	Formulation of a practical activity related to the subject. The student must be able to resolve them by himself.
Autonomous practices through ICT	Test questionnaire through the tem@ platform to probe the acquired knowledge.

## Personalized attention

Methodologies	Description
Master Session	Time devoted to attend and resolve doubts related to the main topics of the subject. Students will be advised, individual or in small group, in order to answer their questions. This activity can be developed directly in the classroom or in the office hours. Questions can be also answered by email. Useful information will be given at the beginning of the course.
Laboratory practises	Time devoted to attend and resolve doubts related to the main topics of the subject. Students will be advised, individual or in small group, in order to answer their questions. This activity can be developed directly in the classroom or in the office hours. Questions can be also answered by email. Useful information will be given at the beginning of the course.

Tests	Description
Troubleshooting and / or exercises	Time devoted to attend and resolve doubts related to the main topics of the subject. Students will be advised, individual or in small group, in order to answer their questions. This activity can be developed directly in the classroom or in the office hours. Questions can be also answered by email. Usefull information will be given at the beginning of the course.
Jobs and projects	Time devoted to attend and resolve doubts related to the main topics of the subject. Students will be advised, individual or in small group, in order to answer their questions. This activity can be developed directly in the classroom or in the office hours. Questions can be also answered by email. Usefull information will be given at the beginning of the course.

Assessment		
	Description	Qualification
Laboratory practises	Attendance, participation and periodical assignments.	5
Autonomous practices through ICT	Tests through the tem@ platform.	5
Multiple choice tests	Tests will be suggested in the final exam and/or during the course.	2.5
Short answer tests	In the final exam, short questions will be included. The final exam will be hold the day fixed by the school.	37.5
Troubleshooting and / or exercises	Exercises will be assessed along the course (20%). The final exam will include similar exercises (20%).	40
Jobs and projects	The main guidelines to successfully develop short projects will be given.	10

#### Other comments on the Evaluation

#### Sources of information

Callister, William, **Materials Science and Enginnering: 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,  
 Smith, William F, **Fundamentals of Materials Science and Engineering**, McGraw-Hill,  
 Mangnonon, Pat L., **The principles of materials selection for engineering design**, Prentice-Hall,  
 AENOR, **Standar tests**,

#### Recommendations

##### Subjects that are recommended to be taken simultaneously

(\*)Fundamentos de sistemas e tecnoloxías de fabricación/V12G380V01305  
 (\*)Mecánica de fluídos/V12G380V01405  
 (\*)Termodinámica e transmisión de calor/V12G380V01302

##### Subjects that it is recommended to have taken before

(\*)Informática: Informática para a enxeñaría/V12G350V01203  
 (\*)Física: Física I/V12G380V01102  
 (\*)Física: Física II/V12G380V01202  
 (\*)Matemáticas: Álgebra e estatística/V12G380V01103  
 (\*)Matemáticas: Cálculo I/V12G380V01104  
 (\*)Química: Química/V12G380V01205