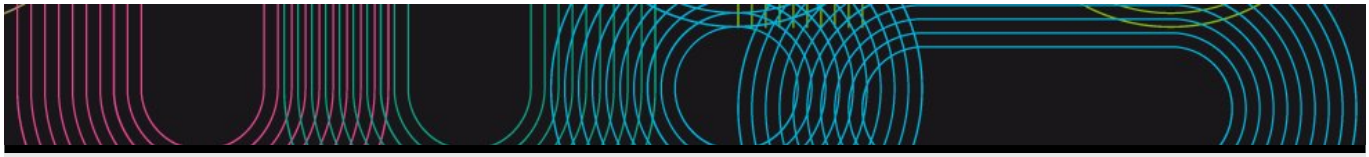

IDENTIFYING DATA				
Materials science and technology				
Subject	Materials science and technology			
Code	V12G360V01301			
Study programme	Degree in Industrial Technologies Engineering			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	2nd	1st
Teaching language	Spanish Galician			
Department				
Coordinator	Figueroa Martínez, Raúl Abreu Fernández, Carmen María			
Lecturers	Abreu Fernández, Carmen María Cortes Redin, María Begoña Díaz Fernández, Belén Feijoó Vázquez, Iria Figueroa Martínez, Raúl			
E-mail	cabreu@uvigo.es raulfm@uvigo.es			
Web	http://faitic.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 them to learn new methods and theories, and equip them with versatility to adapt to new situations.
B4	CG4 Ability to solve problems with initiative, decision making, creativity, critical thinking and to communicate and transmit knowledge, skills and abilities in the field of Industrial Engineering.
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 microstructure of the distinct types of materials	B3	C9	D10
It comprises the influence of the microstructure of the material on its mechanical , electrical, thermal and magnetic behaviour	B3	C9	
It comprises the mechanical behaviour of the metallic, ceramic, plastics and composite materials.	B4 B6		
It knows how to modify the material properties by means of mechanical processes and thermal treatments	B4	C9	D9
It knows the basic structural characterisation techniques for materials.	B3 B6	C9	
To acquire skills in the handle of the diagrams and charts			D1
To acquire skills in the realisation of tests	B6	C9	D10

It analyses the results obtained and extracts conclusions from them		D1 D5 D9
It is able to apply norms of materials testing	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	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 laboatory.
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 hold 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

Continuous assessment: The continuous assessment activities will be carried out during the teaching period and correspond to 30% of the grade.
Final Exam: Will consist of a written test weighed 70% of the course grade,that will be taken on the official dat set by the EEI direction.

Requirements to pass the course:

1- To get a minimum mark of 40% in the final exam, that is: 2.8 / 7 points and

2- The sum of the continuous assessment mark and the written tests has to be get a minimum or 50%, that is, 5/10 points.

If these requirements are not met, the student will have been deemed to have failed the course, and final grade for the course will be that obtained in the written exam.

Students that do not follow the continuous assessment activities, after receiving authorization from the EEI direction, will be evaluated with a single final exam on the contents of all the course that will weight the 100% of the grade.

July exam (2nd Edition): In the July edition, the continuous assessment marks will be also considered (Valid only in course 2020-21). The characteristics of the exam will be the same as the first edition, and will be taken on the official date set by the EEI direction.

Extraordinary Call: The extraordinary call exam contents will cover the entire course, both lecture and labo items, weighing 100%, 10 points. A minimum mark of 5 (50%) will be required to pass the course.

Ethical commitment: Students are expected to carry out their work in accordance with an appropriate ethical behaviour. If the professor detects a behaviour that constitutes academic dishonesty (cheating, plagiarism, use of unauthorized electronic devices, for example) the student will be deemed not met the requirements to pass the subject, and student will be informed that the final grade of this course will be FAIL (0.0). The use of any electronic device will not be allowed during the evaluation tests, unless expressly authorized. Introducing an unauthorized electronic device into the exam room will be considered reason for not passing the course in the present academic year and the final grade will be: FAIL (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

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

Contingency plan

Description

=== EXCEPTIONAL PLANNING ===
Given the uncertain and unpredictable evolution of the health alert caused by COVID-19, the University of Vigo establishes an extraordinary planning that will be activated when the administrations and the institution itself determine it, considering safety, health and responsibility criteria both in distance and blended learning. These already planned measures guarantee, at the required time, the development of teaching in a more agile and effective way, as it is known in advance (or well in advance) by the students and teachers through the standardized tool.

=== ADAPTATION OF THE METHODOLOGIES ===
* Teaching methodologies maintained
All the lecture-based sessions will be maintained, moving them totally or partially to an online version, through the Online Campus (Campus Remoto) of the UVigo.
* Teaching methodologies modified
Laboratory sessions will be modified to adapt the group size to that set by the University or the EEI as safe. Sessions will be organized to ensure the safety distance. All the activities that can be performed in non face-to-face mode will be deployed on online platforms.
* Non-face-to-face student attention (tutoring)
Non-face-to-face tutorial services will be held through the virtual offices on the Online Campus, although the attention of the students may be carried out also by other ways (email, videoconference, FAITIC forums, ...), always after previous agreement with the teacher.
* Modifications (if applicable) of the contents of the course
According to the moment when the University decision of starting non-face-to face or mix teaching is made, some reduction of the lab contents will need to be done, following the defined organization. Students will be informed of the changes through FAITIC platform.
* Additional bibliography to facilitate self-learning
If student access to academic libraries is limited, additional documentation will be provided.

* Other modifications

=== ADAPTATION OF THE COURSE ASSESSMENT ===

* Tests already carried out
The marks obtained in the continuous assessment tests already performed will maintain their weight in the final grade without changes, as defined in the teaching guide.

* Pending tests that are maintained
- Those continuous assessment tests or exams that have not yet been done will also maintain their contribution in the final grade, as defined in the teaching guide. Exams will be held face-to-face if possible and will be adapted to take place fully online, if the applied contingency measures make it necessary.
* Tests that are modified
- Final exam: The final exam weight (70% of the course grade) can be modified depending on the date when the non face-to-face teaching is stablished. It can be reduced to a minimum contribution of 40% of the course grade.
- Students will be informed through Faitic of the change in the reweighting of the final exam, as well as the new tests that will be proposed to increase the weight of the continuous assessment.
- The final exam will be held face-to-face if possible but, if not, it will be adapted to be performed online.
* New tests
- In case of reducing the weight of the final exam mark in the course grade, new online tests and/or exercises will be proposed covering different items of the course syllabus and performed online using FAITIC platform. The sum of the marks for the new tests and the final exam will contribute 70% to the course grade.
- Students will receive sufficient information in advance of the new tests and the grading procedure through FAITIC platform.