



## IDENTIFYING DATA

### Materials engineering

Subject	Materials engineering			
Code	V12G363V01502			
Study programme	Grado en Ingeniería en Tecnologías Industriales			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	3rd	1st
Teaching language	English			
Department				
Coordinator	Collazo Fernández, Antonio Díaz Fernández, Belén			
Lecturers	Collazo Fernández, Antonio Díaz Fernández, Belén			
E-mail	acollazo@uvigo.es belenchi@uvigo.es			
Web	<a href="http://faitic.uvigo.es">http://faitic.uvigo.es</a>			
General description	This subject combines the scientific fundamentals that prove the relation structure-properties-performance with technological aspects such as the manufacturing processes and the service conditions.			

## Skills

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.
B5	CG5 Knowledge to carry out measurements, calculations, assessments, appraisals, surveys, studies, reports, work plans and other similar works.
B6	CG6 Capacity for handling specifications, regulations and mandatory standards.
B11	CG11 Knowledge, understanding and ability to apply the legislation relating to industrial installations.
C19	CE19 Knowledge and skills for engineering materials.
D1	CT1 Analysis and synthesis.
D5	CT5 Information Management.
D7	CT7 Ability to organize and plan.
D9	CT9 Apply knowledge.
D10	CT10 Self learning and work.
D15	CT15 Objectification, identification and organization.
D17	CT17 Working as a team.

## Learning outcomes

Expected results from this subject	Training and Learning Results
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Knowledge of the main manufacturing and transformation processes used in the industry	B3	C19	D1
Probe the ability to select the most suitable forming process for each material	B4		D5
Knowledge of the joining processes used in the industry	B5		D7
Understand the complex relations between the properties of materials and the forming and joining processes in order to improve properties and to increase productivity	B6		D9
Knowledge of the characteristics of the materials used in engineering	B11		D10
Knowledge of the several types of materials and processes for their forming			D15
Knowledge of the criteria for the selection of the most suitable material for an specific application			D17
Propose operative solutions for the most common problems in the materials engineering field			
Analyse conclusions and results of tests and measurements			
Write with a suitable structure. Make a presentation with the available media			
Show the aptitude of communication and working in teams			
Identify the need of information and use the available media and services to design and perform a suitable search in the subject area			
Perform the assigned projects following the indications given by the lecturer			

## Contents

Topic	
Mechanical behavior of materials	Plastic deformation
Properties of materials obtained by casting, molding and injection	Sheet-metal forming processes Casting and casting defects
Properties of materials obtained by plastic and viscoelastic deformation	Fractography
Processing of metal powders	
Modification of properties by heat treatments, thermochemical treatments and thermomechanical treatments	
Welding processes and weldability	
structural alloys	
Composite materials	
Laboratory contents	Mechanical properties tests Non-destructive testing Metalography Hardenability tests

## Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	33	56	89
Problem solving	4	8	12
Seminars	3	3	6
Laboratory practical	13	19	32
Mentored work	0	11	11

\*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

## Methodologies

	Description
Lecturing	Presentations given by the lecturer of the main contents of the subject
Problem solving	Proposal of a set of problems/exercises that students must resolve by themselves. Guidelines, required formulas and common routines will be given in the classroom. Some problem will be resolved at the classroom, by the lecturer or by a student.
Seminars	Additional explanations to solve the main difficulties about the subject contents
Laboratory practical	Activities for application of the theoretical knowledge to particular situations and for the acquisition of basic skills and procedures related to the subject. Students will use the laboratories with the suitable equipment and devices.
Mentored work	Students, individually or in group, elaborate a document or presentation about some important topic related to the subject. Student can be asked to prepare a seminar, a short research, a summary of a document or conference...

## Personalized assistance

Methodologies	Description
Mentored work	Personalized attention, the lecturer will guide the preparation of the project. Any difficulty/doubt will be attended. This support can be provided either in person or electronically (email, videoconference, campus remoto ...) after being formally requested.

Seminars Personalized attention, time devoted to help students with any difficulty or doubt. (This support can be provided either in person or electronically (email, videoconference, campus remoto ...) after being formally requested.

<b>Assessment</b>				
	Description	Qualification	Training and Learning Results	
Lecturing	The assessment will be completed with two written exams of short questions, tests or exercises. The purpose is to assess the level of knowledge achieved along the course. One of the tests will be done during the teaching period (20%) and the other in the date established by the school	70	B3 B4 B5 B6 B11	D5 D7 D9 D10 D15
Laboratory practical	The laboratory activities will be assessed through the students attendance and participation, preparation of reports and a final test at the end of the teaching period	15		D5 D9 D10 D15 D17
Mentored work	It will be assessed by the handed reports and/or the exhibition in the classroom of the prepared project.	15	B3 B4 B11	D9 D10 D15

### **Other comments on the Evaluation**

#### FIRST ATTEMPT:

The continuous assessment will be followed during the teaching period of the subject according to the criteria established in the previous section. In the final exam, a minimum mark of 2 out of 5 is required in the own written exam to pass the subject. The mark will be the sum of the mark achieved in the final exam plus the mark achieved in the continuous assessment.

In case this minimum mark was not achieved, the whole mark will be that corresponding to the maximum achieved mark, either in the continuous assessment or in the final exam.

Students have the right to renounce to the continuous assessment system. This option must be formally asked. In this situation, the final exam will include the totality of the contents of the subject, and its qualification is 100%. The date of the exam will be fixed by the school and can be checked at <http://eei.uvigo.es>.

#### SECOND ATTEMPT (exam in July):

The qualification obtained from the continuous assessment will be kept, unless the student request to be cancelled in due course. In this situation, the totality of the contents of the subject (those given in the classroom and in the laboratory) will be included in this final exam and the student could achieved 100% of the qualification (the minimum mark to pass the exam will be 5 out of 10).

The date of the exam will be fixed by the school and can be checked at <http://eei.uvigo.es>.

EXTRAORDINARY CALL: the exam (questions, tests and/or exercises) will include the totality of the contents and the qualification will be 100%.

Ethical commitment: student is expected to show an ethical behaviour. In the case a non ethical behaviour is detected (copy, plagiarism, use of forbidden electronic devices, or others), the student will failed with a qualification of 0%.

### **Sources of information**

#### **Basic Bibliography**

Kalpakjian, S. and Schmid, S. R., **Manufacturing Engineering and Technology**, Pearson/Prentice Hall,  
Mikell P. Groover, **Fundamentals of Modern Manufacturing: Materials, Processes, and Systems**, John Wiley & Sons,

Dieter, G. E., **MECHANICAL METALURGY**, McGraw-Hill Book Company,

#### **Complementary Bibliography**

Reina Gómez, M., **Soldadura de los aceros, aplicaciones.**, Gráficas Lormo,

Sindo Kou, **Welding Metallurgy**, John Wiley & Sons,

Krauss, G., **Steels: Heat Treatment and Processing Principles**, ASM International,

Brooks, CH., **Principles of the Surface Treatment of Steels.**, Inc. Lancaster,

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## **Recommendations**

### **Subjects that continue the syllabus**

Fundamentals of manufacturing systems and technologies/V12G363V01402

Mechanics of materials/V12G363V01404

Manufacturing engineering/V12G363V01604

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

Materials science and technology/V12G363V01301

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## **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 ===

\* Methodologies

They will be adapted to the telematic tools available for the lectures. Modifications in the provided information given through Moovi, email or Campus Remoto will be eventually done as well.

\* Non-attendance mechanisms for student attention (tutoring)

The tutoring could be given in person (provided that the health measures are guaranteed) or telematic (e-mail, Campus Remoto or Moovi forums) under the modality of previous agreement. A methodological adaptation will be made to students at risk, providing them with additional specific information, if it is proven that they cannot access the contents in a conventional way.

=== ADAPTATION OF THE TESTS ===

Those tests that are already being carried out telematically will be maintained and, as far as possible, the on-site tests will be maintained, adapting them to the current health regulations. The tests will be carried out in person, unless the Rector's Resolution indicates that they should be carried out in a non-presential manner, using the several tools available to the teaching staff. Those tests that cannot be carried out by telematic means will be replaced by others (guided autonomous work, etc.)

\* Modification in the continuous assessment.

Continuous assessment [Previous Weight 50%] [Proposed Weight 60%]

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