



## IDENTIFYING DATA

### Materials engineering

|                     |   |           |      |            |
|---------------------|---|-----------|------|------------|
| Subject             | Materials engineering   |           |      |            |
| Code                | V12G363V01502   |           |      |            |
| Study programme     | Degree in Industrial Technologies Engineering   |           |      |            |
| Descriptors         | ECTS Credits  | Choose    | Year | Quadmester |
|                     | 6   | Mandatory | 3rd  | 1st        |
| Teaching language   | English   |           |      |            |
| Department          |   |           |      |            |
| Coordinator         | Collazo Fernández, Antonio<br>Díaz Fernández, Belén   |           |      |            |
| Lecturers           | Collazo Fernández, Antonio<br>Díaz Fernández, Belén   |           |      |            |
| E-mail              | acollazo@uvigo.es<br>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. |           |      |            |

## Competencies

|      |  |
|------|--|
| Code |  |
|------|--|

## Learning outcomes

|                                    |                               |
|------------------------------------|-------------------------------|
| Expected results from this subject | Training and Learning Results |
|------------------------------------|-------------------------------|

## Contents

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

## Planning

|                 |             |                             |             |
|-----------------|-------------|-----------------------------|-------------|
|                 | Class hours | Hours outside the classroom | Total hours |
| Lecturing       | 33          | 66                          | 99          |
| Problem solving | 7           | 7                           | 14          |
| Seminars        | 3           | 3                           | 6           |

|                      |    |    |    |
|----------------------|----|----|----|
| Laboratory practical | 10 | 10 | 20 |
| 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. Independently on the teaching modality, this support can be provided electronically (email, videoconference, FAITIC forum ...) after being formally requested. |
| Seminars      | Personalized attention, time devoted to help students with any difficulty or doubt. Independently on the teaching modality, this support can be provided electronically (email, videoconference, FAITIC forum ...) after being formally requested.                                    |

### Assessment

|                      | Description   | Qualification Training and Learning Results |
|----------------------|---|---|
| Lecturing            | The assessment will be completed with a written exam of short questions, tests or exercises. The purpose is to assess the level of knowledge achieved along the course. | 60  |
| Laboratory practical | The laboratory activities will be assessed through the students attendance and participation, preparation of reports or visits to local companies.                      | 25  |
| Mentored work        | It will be assessed by the handed reports and/or the exhibition in the classroom of the prepared project.   | 15  |

### Other comments on the Evaluation

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 4 out of 10 is required in the own written exam to pass the subject. The date of the exam will be fixed by the school and can be checked at <http://eei.uvigo.es>. In case this minimum mark was not achieved, the whole mark will be that corresponding to the continuous assessment, this means that the mark of the final exam will not be added to the whole mark.

Students have the right to renounce to the continuous assessment system. This option must be asked officially. In this situation, the final exam will include the totality of the contents of the subject, and its qualification is 100%.

In the 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 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 fo the contents and the qualification will be 100%.

Ethical commitment: student is expected to show an ethical behavior. In the case a non ethical behavior 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,

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### **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,  
Randall, M. G., **Sintering: Theory and Practice**, John Wiley & Sons,  
Beeley, P., **Foundry Tecnology**, Butterworth-Heinemann, Ltd.,

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### **Recommendations**

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

Manufacturing engineering/V12G363V01604

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

Materials science and technology/V12G363V01301  
Fundamentals of manufacturing systems and technologies/V12G363V01402  
Mechanics of materials/V12G363V01404

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### **Contingency plan**

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#### **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 FaiTIC, 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 FaiTIC 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 40%] [Proposed Weight 60%]