



IDENTIFYING DATA

Materials for the aerospace industry

Subject	Materials for the aerospace industry			
Code	O07G410V01903			
Study programme	Grado en Ingeniería Aeroespacial			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	2nd
Teaching language	#EnglishFriendly Spanish Galician			
Department				
Coordinator	Álvarez González, David			
Lecturers	Álvarez González, David			
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General description	The aim of this subject is to offer to the students knowledges and tools for the selection of materials in the aerospace field. English Friendly subject: International students may request from the teachers: a) materials and bibliographic references in English, b) tutoring sessions in English, c) exams and assessments in English.			

Training and Learning Results

Code	
A2	That the students know how to apply their knowledge to their work or vocation in a professional way and that they possess the competences that are usually demonstrated through the elaboration and defense of arguments and the resolution of problems within their area of study
A3	That the students have the capability to gather and interpret relevant data (usually within their area of study) to issue judgments that include a reflection on relevant social, scientific or ethical issues
A5	That the students develop those learning capabilities necessary to undertake further studies with a high degree of autonomy.
B1	Capability for design, development and management in the field of aeronautical engineering (in according with what is established in section 5 of order CIN / 308/2009), aerospace vehicles, aerospace propulsion systems, aerospace materials , airport infrastructures, air navigation infrastructures and space management, air traffic and transport management systems.
C20	Appropriate knowledge applied to engineering: mechanics of fracture of the continuous media and their dynamic behavior, fatigue of structural instability and aeroelasticity.
D3	Capability of oral and written communication in native language
D4	Capability of autonomous learning and information management
D5	Capability to solve problems and draw decisions
D6	Capability for interpersonal communication
D8	Capability for critical and self-critical reasoning
D11	Show motivation for quality with sensitivity towards subjects within the scope of the studies
D13	Sustainability and environmental commitment. Equitable, responsible and efficient use of resources

Expected results from this subject

Expected results from this subject	Training and Learning Results			
New	A2	B1	C20	D3
	A3			D4
	A5			D5
				D6
				D8
				D11
				D13

New	A2 A3 A5	B1	C20	D3 D4 D5 D6 D8 D11 D13
New	A2 A3 A5	B1	C20	D3 D4 D5 D6 D8 D11 D13

Contents

Topic	
Subject 1. Selection of Materials	Criteria employed for the selection of materials in function of his application. Employment of Indexes of Material and Indexes of Performance. Ashby diagrams. Management of databases of material properties.
Subject 2. Aerospace Alloys.	Steels. Light alloys. Titanium and Superalloys Manufacture and optimisation of material properties. Termo-mechanical Treatments. Mechanical and thermal properties of alloys.
Subject 3. Composite materials.	Classification: polymeric , metallic or ceramic matrix. Mechanical and thermal properties of the materials. Estimation of properties of compound materials.
Subject 4. Behaviour and Failure of aerospace materials	Friction and wear. Enbrittlement. Fracture. Corrosion and degradation. Fatigue. Creep.
Subject 5. Mechanical and adhesive joints.	Analysis of failures. Diagnostic and inspection of failures. Mechanical joints. Welding. Adhesive joints.
Subject 6. Quality control and Testing.	Classification and properties. Quality control of raw materials. Techniques of thermal analysis. Mechanical testing. Non destructive testing (NDT).

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	24	52.5	76.5
Laboratory practical	4	7	11
Autonomous problem solving	4	7.5	11.5
Studies excursion	6	2	8
Practices through ICT	10	17	27
Mentored work	2	10	12
Objective questions exam	2	0	2
Presentation	0.5	1.5	2

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

Methodologies

	Description
Lecturing	Oral presentation of the contents of the course.
Laboratory practical	Activities for the practical application of the knowledges purchased.
Autonomous problem solving	Resolution of problems and exercises related with the matter.
Studies excursion	Visits in groups to companies of the aeronautical sector.
Practices through ICT	Practical exercises of selection of materials with software CES-EduPack.
Mentored work	Oral presentation of mentored related with the employment of materials in the aerospace industry.

Personalized assistance

Methodologies	Description
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Laboratory practical	Time in which the professor helps to the student to resolve and make the activities proposed in the lab.
Autonomous problem solving	Orientation that the teacher loans to the students for the correct resolution of the problems .
Lecturing	Attention that the professor loans of individual way to the students to resolve the doubts and difficulties that they find on the understanding of the contents of the matter.
Practices through ICT	Time devoted to the resolution of doubts, and to the practical application of the available computer tools for the selection of materials.
Mentored work	It will facilitate to the student orientation and documentation for the preparation of the mentored works.

Assessment

	Description	Qualification	Training and Learning Results			
Laboratory practical	Reports of the lab work that the student will have to deliver (individual or in groups).	15	A2 A3 A5	B1	C20	D4 D5 D6 D8 D11 D13
Practices through ICT	Reports of the lab work that the student will have to deliver (individual or in groups).	15				
Objective questions exam	Individual written proof in which the student/to will have to answer to relative questions to the matter presented in the classroom.	40	A2 A3 A5	B1	C20	D3 D4 D5 D8 D11 D13
Presentation	Oral presentation by groups of a subject proposed during the development of the matter.	30	A2 A3 A5	B1	C20	D3 D4 D5 D6 D8 D11

Other comments on the Evaluation

The data corresponding to schedules, classrooms and exam dates can be consulted in an updated way on the centre's website:<http://aero.uvigo.es/gl/docencia/exames>

To pass the course in the first call, it will be necessary to achieve at least 40% of the maximum mark in each of the evaluated tests. If said 40% is not reached in any test, the final grade will be limited by 4.9. The qualification of the practical part will be maintained for the second call.

The student has the right to opt for the global evaluation according to the procedure and the term established by the center for each call. In the case of opting for the global evaluation, the subject will be evaluated with an exam that will include contents developed in the theoretical classes and the contents and problems developed during the practices. The same methodology will be applied for the evaluation in the end of program call.

The use of any type of electronic device during the evaluation tests is prohibited, unless expressly authorized. The fact of introducing any unauthorized device in the classroom during the evaluation test will be considered a reason for not passing the subject. In this case, the student will obtain a grade of 0 (failed).

Evaluation for non-assistants: the qualification course will be that of a final exam to evaluate all the competences assigned to the subject.

Sources of information

Basic Bibliography

Donald R. Askeland, **Ciencia e ingeniería de los materiales**, 6ª, Cengage Learning, 2012

William F. Smith, **Fundamentos de la Ciencia e Ingeniería de los Materiales**, 4ª, McGraw-Hill, 2014

Complementary Bibliography

A. Brent, **Plastics. Materials and processing**, 3ª, Pearson Prentice Hall, 2006

J. Antonio Pero-Sanz, **Ciencia e ingeniería de materiales. Estructura, transformaciones, propiedades y selección**, 5ª, CIE-Dossat 200, 2000

Michael F. Ashby, **Materiales para ingeniería 1. Introducción a las propiedades, las aplicaciones y el diseño**, 1ª, Reverté, 2008

Michael F. Ashby, **Materiales para ingeniería 2. Introducción a la microestructura, el procesamiento y el diseño**, 1ª, Reverté, 2009

Prasad, N.E., **Aerospace materials and Materials technologies**, 1, Springer, 2017

Recommendations

Subjects that it is recommended to have taken before

Materials science and technology/O07G410V01304

Resistance of materials and resilience/O07G410V01405

Aerospace manufacturing/O07G410V01501
