PERSONA CIÈNCIA EMPRESA
Universitat Ramon Llull

TITLE OF COURSE: MATERIALS TECHNOLOGY

MATTER: Materials and Esctructures
MODULE: Specific Technology
STUDIES: Degree on Industrial Technologies Engineering

GENERAL CHARACTERISTICS *

Type: ☐ Basic training, ☑ Compulsory ☐ Elective

☐ End-of-grade ☐ External Internship

Duration: Semiannual **Semester / s**: 5
Number of ECTS credits6
Language / s: Catalan (Castilian)

DESCRIPTION

BRIEF DESCRIPTION AND JUSTIFICATION (The sense of the subject in relation to the studies. Between 100 and 200 words.)

This subject that has to be attended compulsorily after the course Fundamentals of Materials Science, aims at analyzing the technological aspects of materials, with special emphasis on the transformation of the same. At this point, it assumes the student already knows the relationship between structure and properties of materials. After completing the course Materials Technology is intended that the student has knowledge of how to modify a material, and how this change affects their structure and therefore their properties.
The focus of the course will be highly practical, where examples will be crucial. In this sense, the agenda will be supplemented by company visits. So you think that school attendance is essential to get the most out of the course. The syllabus has been structured based on the three most common groups of materials: Metal, Ceramic, and Polymeric Organic, and develops the technology associated with each group. In the case of common technologies, emphasizes the points of contact and raises the parallel explanation for the three types of materials. Thus, for example extrusion is discussed in Chapter polymeric materials but commenting on the technical application of metallic and ceramic materials, establishing commonalities and differences. The program also includes an introduction to rheology that is necessary in order to understand many of the processes which are explained later and two chapters that want to explain its specific common trunk separately, such as welding and recycling of materials.

COMPETENCES (Put the subject in relation to preassigned competencies in the field.)

- Ability to understand and apply the basic skills and include: computer graphic expression, mechanics and materials, necessary for the practice of industrial engineering (E2).
- Knowledge of materials science and technology to enable them to learn new methods and theories and equip them with versatility to adapt to new situations (E3).
- Ability to solve problems with initiative, decision making, creativity, and critical thinking (E4).

* These features may not be changed without the approval of the bodies responsible for the top-level academic structures (matter, module and / or the curriculum).

- Ability to develop, plan and implement analytical and numerical methods for mathematical modeling in the field of industrial engineering (E7).
- Ability to communicate effectively, both orally and in writing, to transmit knowledge, skills and abilities in the field of industrial engineering. (T1)
- Knowledge of the fundamentals of science, technology and materials chemistry. Understand the relationship between the microstructure synthesis or processing and materials properties (CRI3)

PREREQUISITES * (Modules, materials, disciplines or knowledge necessary to follow the subject. Subjects can be entered must have been completed.)
The competences of the earlier educational stages.

CONTENTS (As a ratio of the sections that constitute the agenda of the same, to a second-level detail.)

1. - Why the Materials Technology

Two. - Fundamentals of rheology

2.1. Viscosity concept

2.2. Viscoelasticity

2.3. Materials application

Three. - Advanced Metallurgy:

3.1. Heat treatments

3.2. Formed

3.3. Surface treatments

April. - Polymer Processing

4.1. Calendering

4.2. Extrusion and Pultrusion

4.3. Thermoforming

4.4. Injection

4.5. Foam Technology

May. - Ceramics Transformation

5.1. Molding

5.2. Sintered

5.3. Glass Technology

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5.4. Cement technology

5.5. Advanced Ceramics

June. - Joining technologies

6.1. Adhesives

6.2. Welding Fundamentals

6.3. Welding Design

6.4. Welding

July. - Fabricaciónn additive Technologies

August. - Nondestructive Testing

9. - Recycling of materials

METHODOLOGY

TRAINING ACTIVITIES * (Complete the table relating activities, workload, ECTS credits, and skills.)

Training activities	ECTS credits	Competencies
Exposure Sessions concepts	1.8	E2, E3, CRI3
Sessions for solving exercises, problems and cases	0	
Seminars	0	
Compulsory activities office teacher	0.45	E4, E7
Practical work / laboratory	0.6	E4, E7
Presentations	0.3	T1
Personal study activities by students	2.4	E2, E3, CRI3
Evaluation activities (exams, seguimento controls ...)	0.45	E4
TOTAL	**6**	

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EXPLANATION OF THE TEACHING METHODOLOGY (Justifying the teaching methods used in relation to the skills and contents of the subject. Between 100 and 200 words.)
The methodology combines lectures with work in the laboratory and interactive work using the Internet. So, there are 4 hours of lectures per week during the second half ..

Students must perform eight practices over a period of two weeks These practices combine work in the Laboratory (6 practices), and 2 specific practices of welding on welding training center

At the end of each chapter, the student makes through the course website on Blackboard, a test exam self-assessment. To monitor progress, the results are automatically sent the teacher. The same applies to the work of the practice. No specific work is assigned to the student, although in each chapter raises a number of questions that students can answer the teacher through email or virtual forum for the course (Blackboard ®).

Practices should be presented in public, individually and perform all written reports.

Throughout the course are organized 4 exercises in wiki format. Students must write, via a web application, the answer to a topic related to the subject. After correction and evaluation by teachers of the subject, these chapters are available to prepare students for the examinations of the course.

EVALUATION

EVALUATION METHODS * (Complete the table relating assessment methods, skills and weight in the grade for the course.)

Evaluation Methods	Weight	Competencies
Final Exam (A)	50%	E2, E3, E4, CRI3
Review / is partial / en / Controls programmed (B)		
Classroom activities (C)	5%	CRI3
Reports work done (D)		
Presentations and / or oral examinations (F)	5%	T1, CRI3
Development of wikis. (G)	20	E2, E4, E7, CRI3
Laboratory reports (H)	15%	T1, CRI3
Practical work / laboratory (I)	5%	E4, CRI3

LEARNING OUTCOMES (Explanation of the achievements of student skills assessment permit, relating them to the skills and methods of evaluation.)

• The student will be able to answer theoretical questions on the final exam. [A].

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• The student will demonstrate a basic understanding of the relationship between structure and properties .. [A]
• The student will demonstrate ability to deliver answers and share ideas electronically. [G, H].
• The student will be able to solve "cases" on the final exam. [A].
• The student will be able to present their ideas in public. [I]
• The student will be able to test materials in the laboratory. [H, I].
• The student will be able to present their ideas in public. [F]

QUALIFICATION (Explanation of the computer system of the grade for the course.)

A. After completing the course final exam is performed it is mandatory to pass the course (50% of the final grade). The minimum to average with the rest of the notes is a 4 (40% of total)
B. Tests: After each test Capitol is placed on Blackboard ® page of the asignatura.Los results are automatically sent to the teacher. Each practice also assigned test. Students should be performed before starting work in the laboratory.
C. Homework: Throughout the course are organized 4 exercises in Wiki format. Students have to write, via a web application, the answer to a topic related to the subject. Furthermore, the teacher presents in class after each chapter specific questions. The student's can comment with peers and the teacher, using the on-line forum on the website on the Blackboard ® course. The result of these years corresponds to 10% of the final grade
D. Oral Presentations: Students must present for your laboratory work. The note of the oral presentation is 10% of the final grade.
E. Are encouraged to participate in class, but has no influence on the final grade.
F. Internship Reports: Students must submit the reports for their work in the laboratory, in different formats. The mean score of the 4 best reports is 10% of the total mark.
G. Presence in the Laboratory: The Laboratory is mandatory attendance.
H. Be reviewed in the teacher's office work done by the students every three weeks. The outcome of this review will be 10% of the final grade
I. For evaluation exercises can continuuada averaged with the final exam, the average grade must be greater than 7 (70%).
J. The approval of the subject is achieved when the average of the final examination and continuous assessment exercises above 6 (60%)

EVALUATION OF COMPETENCES (Define calculation expressions for each competency in terms of the evaluation activities.)

For the assessment of the competence of the subject (E2, E3, E4, E7, T1, CRI3) in each of the assessment activities a part of the note reflected the skills acquired. The ability to understand and apply basic computer skills, graphic expression, mechanics and materials (E2) will be evaluated in the development of wikis and on the final exam. E3 Competition

assess specific aspects of the final exam questions. E4 competition will be evaluated in the resolution of problems of the final examination of the scheduled and practical work and laboratory project considering solving methodology, treatment of results, the application of modeling and simulation. The E7 will face competition in the development of LAM models for the design and manufacture of a physical model. The competition will be measured T1 delimiting the ability to present and defend the work reports. Competition CRI3 be measured in specific sections of the final examination of the scheduled, the project, practices and presentations measuring knowledge of materials science. Each evaluation activity will have a maximum score of 100 points will be divided into amounts to quantify the degree of acquisition of skills by students.

TEXTBOOKS (Recommended and accessible to the student.)

- Ashby, M. F., Jones, D. R., P. L. Engineering Materials 1, Introduction to properties, applications and design., Ed Reverte, Barcelona, 1st Edició 2010.
- Ashby, M. F., Jones, D. R., P. L. Engineering Materials 2, Introduction to the microstructure, processing and design., Ed Reverte, Barcelona, 1st Edició 2010
- del Río, J. Plastic Forming metal materials (cold and hot), CIE 2000 Investment Dossat publishers, Madrid, 2005
- Moore, H.D., D. Kibbey R. Manufacturing Materials and Processes, Ed Limusa, 1st edition, Mexico City, 2002
- Kurs, W., et al. Introduction à la Science des Materiaux, Ed Presses Universitaires et Polytechniques Romandes, Lausanne, 1993.
- Grossberg, Alexander Yu., Khokhlov, AR, Giant Molecules, Here, There and Everywhere, 1st Edition, Ed Academic Press, Nova York, 1997.

REQUIRED MATERIAL:
CD ROM

- University of Wisconsin, JCE Software Solid State Resources
- Russ, JV, Materials Science: A multimedia approach PWS Publishing Company, 1995
- Mathias, L. J., et al. Macrogallery, MRG Polymer Press, University of Southern Mississippi, Hattiesburg (MS), 1998

INTERNET:

- Visualizing Materials Science: vims.ncsu.edu / index.acgi

HISTORICAL DOCUMENT

EARLIER CHANGES (Indicate date and author / s, most recent first)

LAST REVISION (Indicate date and author / s.) March 2012, Dr. Salvador Borrós Gómez, Dr. Núria Agulló