Universitat de Lleida

DEGREE CURRICULUM

MATERIALS SCIENCE

Coordination: ESTEBAN DALMAU, BERNAT

Academic year 2018-19

MATERIALS SCIENCE 2018-19

Subject's general information

Subject name	MATERIALS SCIENCE
Code	102333
Semester	2nd Q(SEMESTER) CONTINUED EVALUATION
Typology	

Degree	Course	Character	Modality
Not informed	1	COMPULSORY	Attendance-based
Bachelor's degree in Industrial Organisation and Logistics Engineering	1	COMPULSORY	Attendance-based
Not informed	1	COMPULSORY	Attendance-based
Bachelor's degree in Industrial Organisation and Logistics Engineering	1	COMPULSORY	Attendance-based

Course number of credits (ECTS)	6
Type of activity, credits, and groups	

Activity type	PRALAB	PRAULA	TEORIA
Number of credits	0.4	2.6	3
Number of groups	3	2	2

Coordination	ESTEBAN DALMAU, BERNAT
Department	COMPUTER SCIENCE AND INDUSTRIAL ENGINEERING
Teaching load distribution between lectures and independent student work	Classroom lessons: 60 hours Self study: 90 hours
Important information on data processing	Consult this link for more information.
Language	Catalan and Spanish
Distribution of credits	Theoretical credits: 3 ECTS Room practices credits: 2,6 ECTS Lab practices credits: 0,4 ECTS

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
ESTEBAN DALMAU, BERNAT	bernat.esteban@udl.cat	12,4	

Subject's extra information

It is **COMPULSORY** that the students bring the following elements of individual protection (EPI) to the practices at the laboratory.

- Laboratory gown from UdL
- Protection glasses
- Mechanical protection gloves

They can be purchased through the shop Údels of the UdL:

C/ Jaume II, 67 baixos
Centre the Cultures i Cooperació Transfronterera

http://www.publicacions.udl.cat/

There will be a specific service for the *Campus Universitari d'Igualada*.

The use of other elements of protection (for example caps, masks, gloves of chemical or electrical risk, etc.) will depend on the type of practice to be done. In that case, the teacher will inform of the necessity of specific EPI.

Not bringing the EPI's described or not fulfilling the norms of general security that are detailed below imply that the student can not access to the laboratories or have to go out of them. The no realisation of the practices for this reason imply the **consequences in the evaluation** of the subject that are described in this course guide.

GENERAL NORMS OF SECURITY IN LABORATORY PRACTICES

- Keep the place of realisation of the practices clean and tidy. The table of work has to be free from backpacks, folders, coats...
- No short trousers or short skirts are allowed in the laboratory.
- Closed and covered footwear is compulsory in the laboratory.
- Long hair needs to be tied.
- Keep the laboratoy gown laced in order to be protected from spills of chemicals.
- Bangles, pendants or wide sleeves are not allowed as they can be trapped.
- Avoid the use of contact lenses, since the effect of the chemical products is much bigger if they enter between the contact lense and the cornea. Protection over-glasses can be purchased.
- No food or drink is allowed in the laboratory.
- It is forbidden to smoke in the laboratories.
- Wash your hands whenever you have contact with a chemical product and before going out of the laboratory.
- Follow the instructions of the teacher and of the laboratory technicians and ask for any doubt on security.

For further information, you can check the following document of the *Servei de Prevenció de Riscos Laborals de la UdL*: http://www.sprl.udl.cat/alumnes/index.html

Learning objectives

- It includes the relationship between the microstructure, the synthesis and processing and the properties of the materials.
- Get to know the main characteristics of metals (and metallic alloys), ceramics, polymers, semiconductors and composite materials. It is deepening in the knowledge of its crystalline or non-crystalline structures, structural defects and atomic diffusion phenomena.
- Know the physical and chemical properties (mechanical, electrical, magnetic, thermal, optical, corrosion properties) of the different types of materials available to an engineer and know how to evaluate some of the magnitudes that characterize them.
- Understands the relationship between the internal structure and the properties of the materials
- It knows and uses the mechanical behavior, in particular the mechanical resistance, of metals, ceramics and polymers.
- Know how to interpret phase equilibrium diagrams.
- Prepare, resolve and correctly explain the resolution of a Science of Materials problem.
- Know how to search and choose, in a limited time, the information necessary to solve a Science of Materials problem.

Competences

Basic competences:

B01 That students have demonstrated to possess and understand knowledge in an area of study that starts from the base of general secondary education, and is usually found at a level that, although supported by advanced textbooks, also includes some aspects that imply knowledge coming from the vanguard of his/her field of study.

B02 That students know how to apply their knowledge to their work or vocation in a professional manner and possess the skills that are usually demonstrated through the elaboration and defense of arguments and the resolution of problems within their area of study.

B04 That students can transmit information, ideas, problems and solutions to a specialized and non-specialized public.

General competences

CG3. To synthesize basic and technological subjects, which enable them to learn new methods and theories, and provide them with versatility to adapt to new situations.

CG4. To solve problems with initiative, make decisions, creativity, critical reasoning and to communicate and transmit knowledge, skills and abilities in the field of Industrial Chemical Engineering.

CG6. To implement specifications, regulations and mandatory rules.

CG10. To work in a multilingual and multidisciplinary environment.

Specific competences

CE9. Apply the basics of science, technology and materials chemistry. To recognize the relationship between the microstructure, the synthesis or processing and the properties of the materials.

CE14. To conceptualize the principles of strength of materials.

Transversal competences

CT1. To develop a proper understanding and oral and written expression of Catalan and Spanish.

CT3. To iImplement new technologies and technologies of information and communication.

CT5. To apply essential notions of scientific thinking.

Subject contents

Topic 1: Introduction and classification of materials

Topic 2: Crystal and non-crystalline structure of solids

Topic 3: Diffusion and solidification

Topic 4: Phase diagrams

Topic 5: Thermal and mechanical treatments

Topic 6: Mechanical properties and tests

Topic 7: Electrical, magnetic, thermal and optical properties

Topic 8: Polymers

Topic 9: Corrosion

The project taught in the first year 2nd semester integrates the following courses: Materials science and Business organization. The project coordinator will supervise the accomplishment of the assignments detailed in the course plan, which will be available to students at the beginning of the semester.

Methodology

The methodological axes of the subject will be divided into:

1. Theoretical lecture sessions where the professor will present theoretical contents necessary for the acquisition of knowledge and for the correct development of the practical sessions.
2. Problem sessions where the teacher will do some examples, but where students will take an active part of their learning process by working in small groups or individually.
3. Practical sessions in the laboratory where the students will work in groups in practices related to the thematic developed in the theoretical sessions. Each group will have to submit a report.

In addition, students have the responsibility to reinforce their knowledge independently, based on the didactic material provided or recommended by the teacher.

Development plan

Week	Methodology	Content	classroom hours	Self study hours
1-8	Classroom lessons/problems	Topics 1-6	32	40
8	Laboratory practices		2	5
9	Exam 1	Topics 1-6	2	
10-15	Classroom lessons/problems	Topics 7-9	20	40
15	Laboratory practices		2	5
16	Exam 2	Topics 7-9	2	

The project activities will be carried out within the problem sessions.

Evaluation

Exam 1 (Ex1). Topics1-6. Weigh **40%** of the final mark of the subject.

Exam 2 (Ex2). Topics 7-10. Weigh **30%** of the final mark of the subject.

Laboratory practices (work in the laboratory + report) and xercises presented and evaluated during the course. Weigh 1**5%** of the final mark of the subject.

Project taught. Weigh **15%** of the final mark of the subject.

Retake exam: Allows you to recover exams 1 and 2 . (Ex1 +Ex2). 70%

Bibliography

- Smith, William Fortune. Fundamentos de la ciencia e ingeniería de materiales. Madrid: Mc Graw Hill, 1992. ISBN 8476159404.
- Calister, William D.. Introducción a la ciencia e ingeniería de los materiales. Barcelona: Reverté, 1995. ISBN 842917253.
- Cruells, M et al. Ciència dels materials. Barcelona: Publicacions i edicions de la UB, 2007. ISBN 9788447531783.
- Askeland, Ronald R. Ciencia e ingenieria de los materiales. Madrid: International Thomson Editores, 2001. ISBN 8497320166.
- Shackelford, James F. Introducción a la ciencia de materiales para ingenieros. 4. Madrid: Prentice Hall, 1998. ISBN013807125.
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