Universidad Zaragoza

Year : 2020/21

29918 - Materials Engineering

Syllabus Information

Academic Year: 2020/21
Subject: 29918 - Materials Engineering
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 435 - Bachelor's Degree in Chemical Engineering
ECTS: 6.0
Year: 2
Semester: Second semester
Subject Type: Compulsory
Module: ---

1.General information

1.1.Aims of the course

1.2.Context and importance of this course in the degree

1.3.Recommendations to take this course

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. It is based on the participation and the active role of the student. A wide range of teaching and learning tasks are implemented.

Students are expected to participate actively in the class throughout the semester.

Classroom materials will be available via Moodle. These include a repository of the lecture slides used in class, the course syllabus, as well as other course-specific learning materials.

Further information regarding the course will be provided on the first day of class.

4.2.Learning tasks

The course includes 6 ECTS organized according to:

- Theory and problem solving sessions (1.8 ECTS): 45 hours.
- Laboratory sessions (0.5 ECTS): 12 hours.
- Seminars and guided assignments (0.1 ECTS): 3 hours.
- Oral presentations and global written exam (0.2 ECTS): 4 hours.
- Autonomous work and tutorials (3.4 ECTS): 86 hours.

Theory sessions: The professor will explain the theoretical contents of the course in whole group participative lectures. Lectures run for 2 weekly hours in average. Although it is not a mandatory activity, regular attendance is highly

recommended. To favour the continuous learning, some volunteer assessments activities may be proposed throughout the course. As an alternative to lectures, the professor can propose: i) deepening and broadening the learning material through commented ppts, readings, links to videos and other especific documents; ii) programming on-line activities to promote adequate understanding of contents.

Problem solving sessions: These sessions run for 1 weekly hour in average. Illustrative applied problems will be solved by the professor and/or students. These problems and exercises of the course can be found in the problem set provided at the beginning of the semester to allow the student to work the exercises proposed by the professor before the session. Some volunteer assessments activities may be proposed to favour the continuous autonomous work of the student.

Laboratory sessions: Sessions will be proposed every 2 weeks (12 hours in total), where students are expected to work together in groups actively doing tasks such as material processing and tests, measurements, calculations, and the use of graphical and analytical methods. Students will have laboratory guides for each session including theoretical and practical contents of the session and the instructions of the practice session. Pre and post-laboratory assessment activities will be carried out.

Seminars and guided assignments: addressed to guide the students in several activities proposed during the semester, among them, lab reports, oral presentations, selection of materials or multidisciplinary assignments together with other semester subjects.

Autonomous work: supported by material prepared by the professor, this activity is essential for the student learning and to pass the assessment activities.

Tutorials: the professor's office hours will be posted on Moodle and the degree website to assist students with questions and doubts. It is beneficial for the student to come with clear and specific questions.

4.3.Syllabus

Contents are structured in four sections:

Section A. Learning and understanding of basic concepts related to the microstructure of materials. Crystalline and amorphous structures, crystal defects and diffusion processes. Nature of alloys and phase equilibrium diagrams. Iron-carbon phase diagram. Phase transformations.

Section B. Materials testing and correlation of materials properties with microstructure. Mechanical properties and mechanisms of deformation and fracture. Tensile, hardness and impact tests, microscopic metallography. Physical properties of materials.

Section C. Metallic materials. Steels: obtaining, shaping, types, properties and applications. Cast irons: types, properties and applications. Non-ferrous alloys: types, properties and applications. Thermal and thermochemical treatments. Corrosion and corrosion protection methods.

Section D. Ceramic, polymeric and composite materials. Types, properties and applications.

4.4.Course planning and calendar

For general details concerning the timetable, classroom, starting and finishing dates, global exam dates, etc., of this course please, refer to the "Escuela de Ingeniería y Arquitectura" website (https://eina.unizar.es/).

At the beginning of the corresponding semester, students will be registered in the subject's Moodle site at University of Zaragoza. In this site, all the information and documents necessary to tackle the subject will be released in due time.

4.5.Bibliography and recommended resources

http://biblos.unizar.es/br/br_citas.php?codigo=29918&year=2019