

Materials for robots

Academic Year: (2023 / 2024)

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Department assigned to the subject: Materials Science and Engineering and Chemical Engineering Department

Coordinating teacher: GONZALEZ BENITO, FRANCISCO JAVIER

Type: Compulsory ECTS Credits : 3.0

Year : 3 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

General knowledge on General chemistry.

Chemistry (1º bachillerato)

Chemistry (2º bachillerato)

General knowledge on Industrial engineering

Industrial engineering (1º de bachillerato)

Industrial engineering (2º bachillerato)

It is highly recommended to have succeeded the subjects Physics I and II, respectively

OBJECTIVES

After completing the course, students should:

- Have basic notions of the main types of materials (metals, polymers, ceramics and composites) being able to relate their structure (bond and atomic distribution) with properties (electrical, magnetic, mechanical) and behavior in service or performance.
- Be able to make decisions about when a particular material can be used in robotics, that is to say, according to their functionality.
- Know the processing techniques and methods to obtain materials with potential applications in robotics, with special emphasis on additive manufacturing.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Metallic materials for robotics
2. Polymers and composite materials for robotics
3. Mechanical properties
4. Electric and magnetic properties. Functional materials in robotics.
5. Techniques of processing materials
6. Techniques of additive manufacturing
7. Selection of materials for robotics: practical cases

LEARNING ACTIVITIES AND METHODOLOGY

THEORETICAL PRACTICAL CLASSES.

Knowledge and concepts students must acquire. Receive course notes and will have basic reference texts. Students partake in exercises to resolve practical problems.

TUTORING SESSIONS.

Individualized attendance (individual tutoring) or in-group (group tutoring) for students with a teacher. Subjects with 6 credits have 4 hours of tutoring/ 100% on-site attendance.

STUDENT INDIVIDUAL WORK OR GROUP WORK.

Subjects with 6 credits have 98 hours/0% on-site.

WORKSHOPS AND LABORATORY SESSIONS.

Subjects with 3 credits have 4 hours with 100% on-site instruction. Subjects with 6 credits have 8 hours/100% on-site instruction.

FINAL EXAM.

Global assessment of knowledge, skills and capacities acquired throughout the course.
It entails 4 hours/100% on-site.

ASSESSMENT SYSTEM

% end-of-term-examination/test:	60
% of continuous assessment (assignments, laboratory, practicals...):	40

FINAL EXAM.

Global assessment of knowledge, skills and capacities acquired throughout the course. The percentage of the evaluation varies for each subject between 60% and 0%.

CONTINUOUS EVALUATION.

Assesses papers, projects, class presentations, debates, exercises, internships and workshops throughout the course. The percentage of the evaluation varies for each subject between 40% and 100% of the final grade.

BASIC BIBLIOGRAPHY

- James F. Shackelford Introduction to materials science for engineers, Pearson Prentice Hall, 2016
- William D. Callister Materials science and engineering : an introduction, John Wiley & Sons, 2003
- William F. Smith, Javad Hashemi, Francisco Presuel-Moreno Foundations of materials science and engineering, McGraw-Hill Education, 2019