

Academic Year: ( 2022 / 2023 )

Review date: 11-04-2022

Department assigned to the subject: Systems Engineering and Automation Department

Coordinating teacher: BALAGUER BERNALDO DE QUIROS, CARLOS

Type: Compulsory ECTS Credits : 3.0

Year : 1 Semester : 1

**REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)**

Subject of the 1 course without requirements.

**OBJECTIVES**

The objective of the course is to serve as an introduction to Robotics Engineering. The main approaches, definitions, classifications, statistics, and robotics tools will be presented. Special emphasis will be placed on the technologies that will be used as well as on the main applications of both industrial and service robotics. Likewise, the automation of processes in production and service environments will be introduced.

**DESCRIPTION OF CONTENTS: PROGRAMME**

1. Introduction
2. Why study Robotics Engineering
  - a. Priorities and needs of the European Union
  - b. where to work
  - c. where to research
  - d. How to continue my studies
3. Structure of the Degree in Robotics Engineering
  - a. Objectives and motivations
  - b. Teaching structure
  - c. extracurricular activities
4. What is a robot
  - a. Origins
  - b. Definitions
  - c. Robotics Classification
    - i. Classification according to structure
    - ii. Classification according to functionalities
  - d. Most important parts of a robot
  - and. statistics
5. What is Robotic Engineering
  - a. Multidisciplinarity of robotics
  - b. robotics technologies
    - i. robot hardware
    - ii. robot software
    - iii. AI in robotics
6. Smart robotics
  - a. Robot design (kinematics and dynamics)
  - b. Control
    - i. Introduction
    - ii. Locomotion
    - iii. Navigation
  - IV. Handling
  - v. Reasoning
  - c. Perception in robotics
  - d. robot programming
  - and. Communications in robotics
  - F. human robot interaction
    - i. physical interaction
    - ii. non-physical interaction
  - g. smart decision making

- h. ethics in robotics
- 7. Robotics applications
  - a. industrial applications
  - b. service applications
  - c. field applications

## 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.

## ASSESSMENT SYSTEM

### 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.

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

## BASIC BIBLIOGRAPHY

- John J. Craig Robótica, Pearson, 2006