

Academic Year: ( 2023 / 2024 )

Review date: 24-05-2023

Department assigned to the subject: Systems Engineering and Automation Department

Coordinating teacher: CASTILLO MONTOYA, JOSE CARLOS

Type: Electives ECTS Credits : 6.0

Year : 2 Semester : 1

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

C++ programming skills. C++ will be used in the lab sessions.

## DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction to robotics
2. Perception in robotic
3. Actuation in robotics
4. Navigation
5. Processing elements
6. Decision-making in robotics
7. Human-Robot Interaction
8. Novel applications

## LEARNING ACTIVITIES AND METHODOLOGY

### TRAINING ACTIVITIES

- AF1 Theoretical class [23.33 hours with 100% attendance, 0.78 ECTS]  
AF2 Practical classes [10 hours with 100% attendance, 0.33 ECTS].  
AF3 Theoretical and practical classes [10 hours with 100% attendance, 0,33 ECTS].  
AF4 Laboratory practice [3 hours with 100% attendance, 0,1 ECTS]  
AF5 Tutorials [4 hours with 100% attendance, 0,13 ECTS]  
AF6 Group work [40 hours with 0% attendance, 1,33 ECTS]  
AF7 Individual work of the student [88 hours with 0% attendance, 2,93 ECTS]  
AF8 Partial and final exams [1,67 hours with 100% attendance, 0,06 ECTS].

### TEACHING METHODOLOGIES

MD1 In-class lectures by the lecturer with the support of computer and audiovisual media, in which the main concepts of the subject are developed, and the bibliography is provided to complement the students' learning.

MD3 Resolution of practical cases, problems, etc. posed by the lecturer individually or in groups.

MD4 Presentation and discussion in class, under the moderation of the lecturer, of topics related to the content of the subject, as well as of practical cases.

MD5 Preparation of individual or group work and reports.

## ASSESSMENT SYSTEM

SE1 Class participation. 10%

SE2 Individual or group work carried out during the course. 90%.

- Continuous assessment: 100%.

- o Partial 1 (30%, if passed the content will be removed for the final exam).
- o Midterm 2 (30%, if passed the content is removed for the final exam)
- o Final practical project: 30%.
- o Class participation: 10%.

- Final exam
  - o 0%: if the student follows the continuous assessment, this exam will be taken only with the part(s) not passed in the midterm(s).
  - o 100%: if the student has not followed the continuous assessment, he/she will sit the final exam with all the content and the final mark will be worth 60% of the mark obtained.
- Extraordinary exam: 100% with all the content.

<b>% end-of-term-examination:</b>	0
<b>% of continuous assessment (assignments, laboratory, practicals...):</b>	100

#### BASIC BIBLIOGRAPHY

- Barrientos, A. ., & Balaguer Bernaldo de Quirós, C. Fundamentos de robótica (2ª ed.), McGraw-Hill Interamericana, 2007
- Craig, J. J. Robótica (3ª ed.), Pearson Educación, 2006
- Mataric, M. J. The robotics primer., The MIT Press., 2007
- Mordechai Ben-Ari, Francesco Mondada Elements of Robotics, Springer Nature, 2017
- Roland Siegwart, Illah Reza Nourbakhsh and Davide Scaramuzza. Introduction to autonomous mobile robots., MIT Press., 2011
- Siciliano, B., & Khatib, O. Springer Handbook of Robotics (2nd ed. 2016.), Springer, 2016

#### ADDITIONAL BIBLIOGRAPHY

- Kajita, Shuuji, Hirukawa, Hirohisa, Harada, Kensuke, & Yokoi, Kazuhito. Introduction to Humanoid Robotics (2014th ed., Vol. 101), Springer Berlin Heidelberg, 2014
- Mihelj, et al. Robotics (2nd ed. 2019.), Springer, 2019
- Roland Siegwart, Illah Reza Nourbakhsh and Davide Scaramuzza Introduction to autonomous mobile robots, MIT Press., 2011

#### BASIC ELECTRONIC RESOURCES

- . Web de ROS: <https://www.ros.org>
- . Documentación de Webots: <https://cyberbotics.com/doc/guide/index>
- . A gentle introduction to ROS: <http://> <https://cse.sc.edu/~jokane/agitr/agitr-letter.pdf>