

## 30261 - Robotics

### Syllabus Information

**Academic Year:** 2020/21

**Subject:** 30261 - Robotics

**Faculty / School:** 110 - Escuela de Ingeniería y Arquitectura

**Degree:** 439 - Bachelor's Degree in Informatics Engineering

**ECTS:** 6.0

**Year:** 4

**Semester:** Second semester

**Subject Type:** ---

**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 teaching process will involve three main activities: theoretical classes, problems and practices, with increasing level of student participation.

- In the theoretical classes the teachers will present the theoretical bases autonomous robots, illustrated with examples.
- In the classes of problems the students will develop problems and exercises previously stated.
- Tests for monitoring the student learning at the end of each block of topics will be held.
- Practices will be developed in small groups where students will develop their robot and the software for controlling the robot.

### 4.2.Learning tasks

The program offered to help you achieve the expected results includes the following activities:

Class work: 2.4 ECTS (60 hours)

- 1) Presential class (type T1) (30 hours).

Lectures of theoretical and practical content. The concepts and fundamentals of autonomous robots are presented, illustrated v

2) Classes of problems and resolution of cases (type T2) (12 hours).

Exercises and case studies involving students, coordinated at all times with the theoretical contents will be developed. Students

3) Lab (type T3) (18 hours).

Non-contact work: 3.6 ECTS (90 hours)

4) Practical works (T6 type) (50 hours).

Activities that the student will perform in groups and that the teacher will propose throughout the teaching period. In this course

5) Study (type T7) (35 hours).

Personal work of the student theoretical part, conducting exercises, preparation of oral presentations, and development of prac

6) Evaluation tests (T8) (5 hours).

In addition to the qualifying function, evaluation by me

### 4.3.Syllabus

The course will address the following topics:

Program

- 1. Introduction
- 2. Mobile robots
- 3. Spatial localization
- 4. Kinematic modeling
- 5. Odometry
- 6. Concurrent programming robots and processes
- 7. Motion control
- 8. Computer Vision Robotics
- 9. Sensing systems
- 10. Navigation planning
- 11. Localization and maps
- 12. Robotic Projects

Laboratory practices:

- 1. Robot design, implementation of sensors and actuators, introduction to the robot programming environment
- 2. Calibration and programming of basic functions. Toolpath generation and movements
- 3. Vision tracking of objects
- 4. Planning and obstacle avoidance
- 5. Integration of software modules and hardware tuning

### 4.4.Course planning and calendar

Scheduling of sessions and presentation of works.

- Lectures and problem classes and practice sessions are held according to scheduling established by the center (schedules a

Each teacher will inform its hours of tutoring.

- The other activities will be planned depending on the number of students and will be announced in time. It will be available on

### 4.5.Bibliography and recommended resources

<http://psfunizar7.unizar.es/br13/egAsignaturas.php?codigo=30261&Identificador=15425>

[BB: Basic Bibliography / BC: Complementary Bibliography]

- [BB] Siegwart, Roland. Introduction to autonomous mobile robots / Roland Siegwart, Illah R. Nourbakhsh and Davide Scaramuzza . - 2nd ed. Cambridge (Massachusetts) ; London : The MIT Press, cop. 2011
- [BC] Dudek, Gregory. Computational principles of mobile robotics / Gregory Dudek, Michael Jenkin . - 2nd ed. New

York : Cambridge University Press, 2010

URL (moodle2):

- Slides of the course. Programming and robot construction manuals. Exercices and practice guides.  
[<http://moodle2.unizar.es>]