

## 30044 - Flexible Automation and Robotics

### Syllabus Information

**Academic Year:** 2020/21

**Subject:** 30044 - Flexible Automation and Robotics

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

**Degree:** 436 - Bachelor's Degree in Industrial Engineering Technology

**ECTS:** 6.0

**Year:** 4

**Semester:** First semester

**Subject Type:** Optional

**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

Robotics and Flexible Automation is an optional subject that delves into the knowledge of the fundamentals of automation acquired in previous courses, and contributes to the fundamentals of the industrial robot, which is the most flexible and versatile of the elements involved in automated production.

The teaching process will be developed in five main levels:

- Theory classes: In the theory classes the theoretical bases of the subject will be exposed, illustrated with examples.
- Resolution of cases: Problems and cases related to the contents of the subject will be developed in problem classes.
- Works: Learning activities (jobs), supervised by the teachers, will be carried out throughout the semester. In the works the knowledge and aptitudes will be applied gradually, serving as training, deepening and self-evaluation.
- Laboratory: Lab practices will be developed in small groups, supervised by teachers. In them they will apply gradually, in a simulated or real environment, their theoretical knowledge, facing the limitations and constraints that are inherent to the real systems.
- Continuous personal study by the students.

#### 4.2.Learning tasks

The program offered to the student to help him achieve the expected results includes the following activities ...  
Class attendance.

Master classes of theoretical and practical contents. The contents that are developed can be found in the following section,

Program.

Classes of problems and resolution of cases

Problems and cases will be developed with the participation of the students, coordinated at all times with the theoretical contents. Part of this activity will be dedicated to the contents related to the presentation of the cases to be dealt with in the proposed subject works.

Laboratory practices

The student will perform a set of practices in the automation and robotics laboratory of the Systems and Automation Engineering Area (Laboratory L0.06 of the Ada Byron building) in which he will work with programmable robots and robots.

The practices to be carried out will address the following aspects:

Spatial and kinematic location with Matlab's Robotic Toolbox

Graphic simulation of industrial robots.

Programming of ABB Irb120 industrial robots.

Dynamic modeling and servo control with the Matlab Robotic Toolbox

Advanced programming of automata. Industrial communications. Supervision and data acquisition systems

Integration of the robot in an automated cell.

Course assignments

Activities that the student will carry out in reference to the assignments assigned.

Personal study

Personal study of the student, related to the theory, the realization of problems and the previous preparation of the laboratory practices.

### 4.3.Syllabus

Robot control and programming

- Morphology of the industrial robot and technologies.
- Spatial description
- Manipulator kinematics
- Robot programming
- Robot control system: trajectory generation and dynamic control.

Flexible automation and PLC advanced programming

Selection and implantation of industrial robots

Industrial robotics research

### 4.4.Course planning and calendar

The lectures and problems and the practical sessions in the laboratory are taught according to the schedule established by the center (schedules available on their website).

The tutoring schedules of the professors of the Department can be found at: <http://diis.unizar.es/ConsultaTutorias.php>

The rest of the activities will be planned according to the number of students and will be announced well in advance. It will be available at <http://add.unizar.es>

The detailed calendar of the various activities to be developed will be established once the University and the Center have approved the academic calendar, which can be consulted on the center's website (<http://eina.unizar.es/>). The relationship and date of the various activities, together with all the documentation on the subject, will be published in the Anillo Digital Docente (ADD, <http://add.unizar.es/>). As a guide, every week there are 3 hours of classes scheduled in the classroom and approximately every two weeks the student will perform a laboratory practice.

### 4.5.Bibliography and recommended resources

Link:

[http://biblos.unizar.es/br/br\\_citas.php?codigo=30044&year=2019](http://biblos.unizar.es/br/br_citas.php?codigo=30044&year=2019)