

## 69161 - Assistive Robotics

### Syllabus Information

**Academic year:** 2024/25

**Subject:** 69161 - Assistive Robotics

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

**Degree:** 615 - Máster Universitario en Robótica, Gráficos y Visión por Computador / Robotics, Graphics and Computer Vision

**ECTS:** 3.0

**Year:** 1

**Semester:** Second semester

**Subject type:** Optional

**Module:**

### 1. General information

In recent years, there has been significant progress in the field of assistive and collaborative robotics. The course covers the modelling and control of robotic arms with vision-based perception, which is an essential aspect of this growing area. This multidisciplinary course covers topics such as robot modelling, movement generation, controlling poly-articulated mechanisms, and processing visual information for autonomous control. The applications hold great social importance, as they are primarily designed to aid individuals with motor disabilities. Furthermore, these technologies have significant professional relevance, providing valuable tools in medical settings or automation within various industries.

### 2. Learning results

The course offers several key capabilities, including modeling poly-articulated systems such as manipulator robots and exoskeletons. Participants will gain insight into designing control systems for these complex mechanisms. Additionally, they will explore vision-based perception within a robotics context and implement visual servoing methods to accomplish various tasks. Lastly, the course covers the numerous applications of robotics in both assistive and industrial settings.

### 3. Syllabus

- Introduction to Robotics. Manipulation robotics. Mobile robotics. Assistive robotics. Applications.
- Modelling of a robot manipulator mechanism, generation of trajectories, kinematic and dynamic control of the movement.
- Position-Based Visual Servoing. Image-Based Visual Servoing. Hybrid Visual Servoing. Stability analysis. Lyapunov.

### 4. Academic activities

Lectures: sessions with the teacher in which the contents of the course will be explained (15 hour)

Problems and cases: sessions to solve exercises and practical cases proposed by the teacher (6 hours)

Laboratory practices: practical sessions in the laboratory (9 hour)

Study of the subject, works: 42 hours

Assessment tests: 3 hours

### 5. Assessment system

Global evaluation:

- Exam (30% of the mark, minimum 5 out of 10).
- Work assignment (50% of the grade). The evaluation of the works will be carried out through the submitted report and defense.
- Laboratory practices and oral presentations (20% of the mark, minimum 5 out of 10). The evaluation of the practices will be carried out through the work carried out in the laboratory and the report. Oral presentation includes defense of results of exercises and practices.

To pass the course, all the evaluation activities must be carried out.

### 6. Sustainable Development Goals

3 - Good Health & Well-Being

9 - Industry, Innovation and Infrastructure

11 - Sustainable Cities and Communities