

Course guide

240AR063 - 240AR063 - Medical Robotics

Last modified: 16/05/2023

Unit in charge: Barcelona School of Industrial Engineering
Teaching unit: 707 - ESAII - Department of Automatic Control.

Degree: MASTER'S DEGREE IN AUTOMATIC CONTROL AND ROBOTICS (Syllabus 2012). (Optional subject).
MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2014). (Optional subject).

Academic year: 2023 **ECTS Credits:** 4.5 **Languages:** English

LECTURER

Coordinating lecturer: ALICIA CASALS GELPI

Others:

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

3. The student will be able to know how to apply the methods of parameter estimation and control / optimal states and the search techniques and constraint satisfaction applications of robotics area.
4. The student will be able to model, formulate and solve problems of control, taking into account its uncertainty, by Fuzzy logic based controllers.
5. The student will be able to recognize and represent problems in the area by automatic and robotic techniques optimization, and then apply analytical methods / numerical resolution.
6. The student will be able to select, plan, and evaluate different techniques to detect, extract and analyze data an image or sequence of images.

Generical:

1. Ability to conduct research, development and innovation in the field of systems engineering, control and robotics, and as to direct the development of engineering solutions in new or unfamiliar environments, linking creativity, innovation and transfer of technology

TEACHING METHODOLOGY

After an analysis of the medical requirements of robotics in each different area, the main theoretical concepts of applicability in each case will be reviewed, followed by a study on how they are applied to the specific medical robotics environments.

LEARNING OBJECTIVES OF THE SUBJECT

By the end of the course, the student should have skills and knowledge to:

- Consider the human factors as part of the inputs to the project to develop
- Analyze a problem and identify the project requirements
- Select the adequate control strategy for each robot project
- Conceive a project as a whole

STUDY LOAD

Type	Hours	Percentage
Hours small group	20,3	18.03
Hours large group	20,3	18.03
Self study	72,0	63.94

Total learning time: 112.6 h

CONTENTS

Introduction to Medical Robotics

Full-or-part-time: 3h

Theory classes: 1h

Theory classes: 1h

Theory classes: 1h

Human Robot Cooperation Modes in Medical Robotics

Full-or-part-time: 3h

Theory classes: 1h

Theory classes: 1h

Practical classes: 1h

Assistive Robotics

Full-or-part-time: 6h

Theory classes: 1h

Theory classes: 1h

Theory classes: 1h

Practical classes: 1h

Practical classes: 1h

Practical classes: 1h

Principles of neurorobotics

Full-or-part-time: 3h

Theory classes: 1h

Theory classes: 1h

Practical classes: 1h



Rehabilitation Robotics-

Full-or-part-time: 6h

Theory classes: 1h

Theory classes: 1h

Theory classes: 1h

Theory classes: 1h

Practical classes: 1h

Practical classes: 1h

Prosthesis

Full-or-part-time: 3h

Theory classes: 1h

Theory classes: 1h

Practical classes: 1h

Medical Diagnostic and Image Guided Surgery

Full-or-part-time: 3h

Theory classes: 1h

Theory classes: 1h

Practical classes: 1h

Surgical Robotics

Full-or-part-time: 8h

Theory classes: 1h

Theory classes: 1h

Theory classes: 1h

Theory classes: 1h

Theory classes: 1h

Laboratory classes: 1h

Laboratory classes: 1h

Laboratory classes: 1h

Haptics in Medical Robotics

Full-or-part-time: 3h

Theory classes: 1h

Theory classes: 1h

Practical classes: 1h

GRADING SYSTEM

Partial Exam: 20%

Final Exam: 40%

Personal work Report: 20%

Personal work: participation and oral presentation 20%