

Course guide

220238 - 220238 - Applied Robotics

Last modified: 19/04/2023

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 707 - ESAII - Department of Automatic Control.

Degree: MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2013). (Optional subject).
MASTER'S DEGREE IN AERONAUTICAL ENGINEERING (Syllabus 2014). (Optional subject).
MASTER'S DEGREE IN SPACE AND AERONAUTICAL ENGINEERING (Syllabus 2016). (Optional subject).

Academic year: 2023 **ECTS Credits:** 3.0 **Languages:** English

LECTURER

Coordinating lecturer: Jordi Damunt

Others:

TEACHING METHODOLOGY

The course is divided into:

Practical classes, and
Self-study for doing exercises and activities.

In the practical classes (laboratory), teachers will introduce the necessary concepts and methods and guide students in applying theoretical concepts to solve practical problems, always using critical reasoning. We propose that students solve exercises in and outside the classroom, to promote contact and use the basic tools needed to solve problems. Students, independently, need to work on the materials provided by teachers and the outcomes of the sessions of exercises/problems, in order to fix and assimilate the concepts.

This course is based in the practical development of a "hands-on" project of a robotized system applied to a real case study. The project must be proposed by lecturers and can include a different set of technologies all of them integrated with robotics (that is computer vision, artificial reasoning, PLCs, OPC, SCADA systems, etc).

Projects will be mainly based on ABB industrial robots using RAPID as a program language, but some other robotic platforms as mobile robots or another kind of manipulators can be also considered.

Projects will be developed by groups and teachers will assess each student's teamwork in order to help them in the project development. Nevertheless students, organized in teamwork, need to work on the used equipment in order to develop solutions according to the project goals. Students could be asked to prepare written reports, oral presentations and public demonstration of the project functionality. Teachers provide the curriculum and monitoring of activities through ATENEA.

The teachers provide the syllabus and monitoring of activities (by ATENEA).

LEARNING OBJECTIVES OF THE SUBJECT

- . To authorize the student for the comprehension and analysis of the problems that appear during the process of automation of tasks using robots.
- . To acquire skills in the use of robots.
- . To acquire skills in order to robotize tasks and processes.
- . To introduce the student to the complexity of the integration of different technologies with the robotics world.



STUDY LOAD

Type	Hours	Percentage
Hours large group	27,0	36.00
Self study	48,0	64.00

Total learning time: 75 h

CONTENTS

Applied Robotics: real case study and implementation

Description:

This course is based in the practical development of a "hands-on" application of a robotized system applied to a real case study. The applications must be proposed by lecturers and can include a different set of technologies all of them integrated with robotics (that is computer vision, artificial reasoning, PLCs, OPC, SCADA systems, etc). Projects will be mainly based on ABB industrial robots using RAPID as a program language, but some other robotic platforms as another kind of manipulators can be also considered.

Applications will be developed by groups and teachers will asses and supervise each student?s teamwork in order to help them in the project development and to solve possible doubts. Nevertheless students, organized in teamwork need to work also in autonomous way, on the used equipment in order to develop solutions according to the project goals. Students could be asked to prepare written reports, oral presentations and public demonstration of the project functionality.

Specific objectives:

- . To authorize the student for the comprehension and analysis of the problems that appear during the process of automation of tasks using robots.
- . To acquire skills in the use of robots.
- . To acquire skills iin order to robotize tasks ans processes.
- . To introduce the student to the complexity of the integration of different technologies with the robotics world.

Full-or-part-time: 75h

Theory classes: 27h

Self study : 48h

GRADING SYSTEM

Partial laboratory test: 20%

Project results: 50%

Small project modification: 30%

EXAMINATION RULES.

Partial laboratory test will be performed individually in person and in writing.

Project results will be performed in groups and must be a final demonstration.

Small project modification will be performed individually in person using as a base the application developped during the course.

Activity 4 will take place individually in person and in writing



BIBLIOGRAPHY

Basic:

- RAPID reference manual: system data types and routines on-line [on line]. Västerås: ABB Robotics Products AB, [2013?] [Consultation : 22/06/2020]. Available on : https://library.e.abb.com/public/688894b98123f87bc1257cc50044e809/Technical%20reference%20manual_RAPID_3HAC16581-1_revJ_en.pdf.
- Fu, K. S.; González, Rafael C.; Lee, C.S.G. Robotics : control, sensing, vision, and intelligence. New York: McGraw-Hill, cop. 1987. ISBN 0070226253.

RESOURCES

Other resources:

RobotStudio Simulator (ABB)