

## 220238 - Applied Robotics

Coordinating unit:	205 - ESEIAAT - Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit:	707 - ESAII - Department of Automatic Control
Academic year:	2018
Degree:	MASTER'S DEGREE IN SPACE AND AERONAUTICAL ENGINEERING (Syllabus 2016). (Teaching unit Optional) MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2013). (Teaching unit Optional) MASTER'S DEGREE IN AERONAUTICAL ENGINEERING (Syllabus 2014). (Teaching unit Optional)
ECTS credits:	3
Teaching languages:	English

### Teaching staff

Coordinator:	Rita Maria Planas Dangla
Others:	Juan Carlos Hernandez Palacín, Jan Pascual Alsina

### 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 asses 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 iin order to robotize tasks ans processes.

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. To introduce the student to the complexity of the integration of different technologies with the robotics world.

### Study load

Total learning time: 75h	Hours large group:	27h	36.00%
	Hours medium group:	0h	0.00%
	Hours small group:	0h	0.00%
	Guided activities:	0h	0.00%
	Self study:	48h	64.00%

### Content

Applied Robotics: real case study and implementation	Learning time: 75h Theory classes: 27h Self study : 48h
<p><b>Description:</b> 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 mobile robots or 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.</p> <p><b>Specific objectives:</b></p> <ul style="list-style-type: none"> <li>. To authorize the student for the comprehension and analysis of the problems that appear during the process of automation of tasks using robots.</li> <li>. To acquire skills in the use of robots.</li> <li>. To acquire skills iin order to robotize tasks ans processes.</li> <li>. To introduce the student to the complexity of the integration of different technologies with the robotics world.</li> </ul>	

### Qualification system

Partial laboratory test: 20%  
Project results: 50%  
Small project modification: 30%

The course will provide procedures enabling to retrieve teh partial unsatisfactory marks.

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### Regulations for carrying out activities

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 developed 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?] Available on: <[http://rab.ict.pwr.wroc.pl/irb1400/datasys\\_rev1.pdf](http://rab.ict.pwr.wroc.pl/irb1400/datasys_rev1.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.

#### Others resources:

RobotStudio Simulator Trial Version (ABB)