

Course guide

205059 - 205059 - Mobile Robots

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: Jaume Fihueras i Jové

Others: Ely Repiso Polo

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 LIDAR systems, computer vision, artificial reasoning, etc).

Projects can be based on different mobile robots platforms and could consider some different programming languages (ROS using C++ and/or python).

Projects will be developed by groups or individually 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

STUDY LOAD

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

Total learning time: 75 h

CONTENTS

Module 1: Mobile Robots: real case study and implementation

Description:

This course is based in the practical development of a "hands-on" application of a mobile robot 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 mobile robotics (that is computer vision, artificial reasoning, PLCs, OPC, SCADA systems, etc).

Applications will be developed by groups and teachers will assess and supervise each student's teamwork in order to help them in the project development and to solve possible doubts.

Related activities:

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.

Full-or-part-time: 75h

Theory classes: 27h

Self study : 48h

GRADING SYSTEM

4 Programming tasks 25% each

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

BIBLIOGRAPHY

Basic:

- Siegart, R.; Nourbakhsh, I.R.; Scaramuzza, D. Introduction to autonomous mobile robots [on line]. 2nd ed. Cambridge: MIT Press, cop. 2011 [Consultation: 03/05/2022]. Available on: <https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=3339191>. ISBN 9780262015356.

- Ollero Baturone, A. Robótica: manipuladores y robots móviles. Barcelona: Marcombo Boixareu, [2005]. ISBN 8426713130.

Complementary:

- Siciliano, B.; Khatib, O. Springer handbook of robotics [on line]. Berlin: Springer, cop. 2008 [Consultation: 03/05/2022]. Available on: <https://link-springer-com.recursos.biblioteca.upc.edu/referencework/10.1007/978-3-540-30301-5>. ISBN 9783540239574.