BASIC DETAILS:

Subject:	ROBÓTICA		
Id.:	30077		
Programme:	GRADUADO EN INGENIERÍA INFORMÁTICA. PLAN 2008 (BOE 15/12/2008)		
Module:	TECNOLOGIAS HARDWARE		
Subject type:	OPTATIVA		
Year:	3	**Teaching period:**	Segundo Cuatrimestre
Credits:	3	**Total hours:**	75
Classroom activities:	29	**Individual study:**	46
Main teaching language:	Inglés	**Secondary teaching language:**	Castellano
Lecturer:		**Email:**	

PRESENTATION:

This subject is concerned with fundamentals of robotics, including kinematics, dynamics, path planning, control system and computer vision. Also, some mathematical fundamentals are required to understand the topics, such as coordinate transformations, equations of motion, Laplace transformation, transfer functions, among others. The goal is to provide a complete introduction to the most important concepts in the wide field of robotics, though the practices will be mainly focused in mobile robots.

PROFESSIONAL COMPETENCES ACQUIRED IN THE SUBJECT:

General programme competences	G02	Innovative capacity to propose and find new and efficient ways to undertake any task and/ or function within the professional environment - highly motivated by quality.
	G04	Capacity to always commit to working responsibly - creating a strong sense of duty and fulfilment of obligations.
	G05	Capacity to adapt to different environments while being positive and optimistic, orienting your behaviour towards the achievement of goals.
	G06	Capacity to analyse and find a solution to complex problems or unforeseen situations which may arise while working in any type of socio-economic organisation.
	G07	Capacity to work flexibly and with versatility to adapt to the needs and requirements of the work situation.
	G11	Ability to get on in a multicultural or international environment, interacting with people of different nationalities, languages and cultures.
	G13	Capacity to use individual learning strategies aimed at continuous improvement in professional life and to begin further studies independently.
Specific programme competences	E01	Capacity to understand the engineering profession and commitment to serve society under the corresponding professional code of conduct.
	E02	Capacity to apply the intrinsic engineering principles based on mathematics and a combination of scientific disciplines.
	E03	Capacity to recognise the technical principles and apply the appropriate practical methods satisfactorily to analyse and solve engineering problems.
	E04	Capacity to maintain an open mind to innovation and creativity within the framework of the engineering profession.
	E12	Capacity to manage complexity through abstraction, modelling, 'best practices', patterns, standards and the use of the appropriate tools.
Learning outcomes	R1	Resolver problemas de localización de partes mecánicas de un robot.
	R2	Comprender el funcionamiento de sensores y actuadores para robótica.
	R3	Integrar los conocimientos informáticos adquiridos para la programación de un robot.

PRE-REQUISITES:

Students should have a good command of algebra, programming and English.

SUBJECT PROGRAMME:

Subject contents:

1 - Introduction to Robotics
1.1 - Basic concepts in robotics
1.2 - Sensors and actuators
2 - Basic control theory
2.1 - Introduction to Control Systems
2.2 - Mathematical Models of Systems
2.3 - Feedback Control System
2.4 - Frequency Response Methods and stability
2.5 - Proportional, Integral and Derivative Control
3 - Robot programming
3.1 - Introduction to the lab
3.2 - Position control
3.3 - Path planning
4 - Kinematics and dynamics
4.1 - Direct kinematics
4.2 - Inverse kinematics
4.3 - Dynamics
5 - Applications of control theory
5.1 - Computer vision and other applications

Subject planning could be modified due unforeseen circumstances (group performance, availability of resources, changes to academic calendar etc.) and should not, therefore, be considered to be definitive.

TEACHING AND LEARNING METHODOLOGIES AND ACTIVITIES:

Teaching and learning methodologies and activities applied:

During this course a variety of teaching methods will be used including lectures, practical labs, and group work.

Student work load:

Teaching mode	Teaching methods	Estimated hours
Classroom activities	Master classes	11
	Other theory activities	2
	Practical exercises	3
	Coursework presentations	2
	Laboratory practice	7
	Assessment activities	4
Individual study	Tutorials	2
	Individual study	17
	Individual coursework preparation	8
	Group cousework preparation	12
	Project work	5
	Research work	2
	Total hours:	75

ASSESSMENT SCHEME:

Calculation of final mark:

Written tests:	35	%
Individual coursework:	25	%
Group coursework:	35	%
Participation:	5	%
TOTAL	100	%

*Las observaciones específicas sobre el sistema de evaluación serán comunicadas por escrito a los alumnos al inicio de la materia.

BIBLIOGRAPHY AND DOCUMENTATION:

Basic bibliography:

Barrientos, A. Fundamentos de robótica, 2ª ed. McGraw-Hill, 2009. ISBN:978-84-481-5636-7

Recommended bibliography:

Perdue, David J.: The unofficial Lego Mindstorm NXT Inventors Guide. No Starch press, cop. 2008. ISBN:978-1-59327-154-1
Paulo S. R. Diniz Eduardo A. B. da Silva and Sergio L. Netto, Digital Signal Processing System Analysis and Design Cambridge University Press,ISBN-13 978-0-521-88775-5

Recommended websites:

Home - Mindstorms LEGO.com	mindstorms.lego.com/
Standford online course - Introduction to robotics	https://see.stanford.edu/Course/CS223A

* Guía Docente sujeta a modificaciones