SUBJECT TEACHING GUIDE

G1013 - Industrial Robotics and Computer Vision

Degree in Industrial Electronic Engineering and Automatic Control Systems

Academic year 2019-2020

1. IDENTIFYING DATA				
Degree	Degree in Industrial Electronic Engineering and Automatic Control Systems		Type and Year	Optional. Year 4
Faculty	School of Industrial Engineering and Telecommunications			
Discipline	Subject Area: Systems and Automation Engineering Optional Module			
Course unit title and code	G1013 - Industrial Robotics and Computer Vision			
Number of ECTS credits allocated	6	Term	Semester based (2)	
Web				
Language of instruction	English		Mode of delivery	Face-to-face

Department	DPTO. TECNOLOGIA ELECTRONICA E INGENIERIA DE SISTEMAS Y AUTOMATICA
Name of lecturer	CARLOS TORRE FERRERO
E-mail	carlos.torre@unican.es
Office	E.T.S. de Ingenieros Industriales y de Telecomunicación. Planta: - 3. DESPACHO PROFESORES (S3021)
Other lecturers	

3.1 LEARNING OUTCOMES

- Good knowledge of the following issues:
  The different setups of industrial robots.
  Kinematic and dynamic control of industrial robots.
  The different components of a computer vision system.
  2D computer vision techniques and basic image processing.
  Visual control techniques of industrial robots.

4. OBJECTIVES

Deep Understanding of Kinematics, Dynamics and Control of Industrial Robots .
Exposition and detailed knowledge of 2D Vision Techniques.
Integration of Robotics and 2D Computer Vision for automatically performing different tasks by means of Industrial Robots .

6. COURSE ORGANIZATION

CONTENTS	
1	Introduction to Robot Control.
2	Direct Kinematics. Inverse Kinematics. Kinematic Trajectory Planning.
3	Dynamic Modeling of Industrial Robots.
4	Dynamic Control of a Robot Manipulator. Introduction to Robot Programming
5	Introduction to Computer Vision. Image Acquisition, illumination, components. Camera Calibration.
6	Basic Image Processing. Edge Detection. Morphological Transformations.
7	Segmentation. Feature Extraction. Object Recognition.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Kinematic and Dynamic Control of Industrial Robots	Work	No	Yes	30,00
Development of Computer Vision Applications for the resolution of tasks	Work	No	Yes	30,00
Laboratory Reports: Computer Vision	Laboratory evaluation	No	No	20,00
Laboratory Reports: Industrial Robotics	Laboratory evaluation	No	No	20,00
TOTAL				100,00

Observations

All the reports and oral presentations must be in English. The students will receive a penalty for each task that is not handed in before the deadline. It is mandatory to attend the lab sessions (at least 80%) in order to pass this course.

Observations for part-time students

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

Kelly, R., Santibañez, V. Control de Movimiento de Robots Manipuladores. Prentice Hall 2003.
Torres F., Pomares J. Gil, P.m Puente S. Aracil R. "Robots y Sistemas Sensoriales"
K.S.Fu, R.C. González, C.S.G. Lee, "Robótica, Control, Detección, Visión e Inteligencia" Ed. Mc Graw Hill, 1988.
Groover, MP.Weiss M., Nagel R.N., Odrey N.G., "Robótica Industrial, Tecnología, Programación y Aplicaciones". Ed. Mc Graw Hill, 1989.
Barrientos. L.F. Penín, C. Balaguer. R. Aracil. "Fundamentos de Robótica". Mc Graw Hill, 1997
Castleman, Kenneth R. Digital image processing / Kenneth R. Castleman. 1996
Forsyth, David A. Computer vision : a modern approach / David A. Forsyth, Jean Ponce.