

## SUBJECT TEACHING GUIDE

G731 - Industrial Robotics and Artificial Sight

Degree in Industrial Technologies Engineering

Academic year 2025-2026

1. IDENTIFYING DATA					
Degree	Degree in Industrial Technologies Engineering			Type and Year	Optional. Year 4
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Subject Area: Electronics and Automation Optional Module				
Course unit title and code	G731 - Industrial Robotics and Artificial Sight				
Number of ECTS credits allocated	6	Term	Semester based (2)		
Web					
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. TECNOLOGIA ELECTRONICA E INGENIERIA DE SISTEMAS Y AUTOMATICA				
Name of lecturer	JOSE RAMON LLATA GARCIA				
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Office	E.T.S. de Ingenieros Industriales y de Telecomunicación. Planta: - 2. DESPACHO (S2017)				
Other lecturers	ALBERTO PURAS TRUEBA				

3.1 LEARNING OUTCOMES
- Knowledge of the different configurations of industrial robots
- Knowledge of kinematic and dynamic control of industrial robots
- Detailed knowledge of the components of a machine vision system.
- Dimensional vision techniques and basic image processing
- To know techniques for visual control of industrial robots.

**4. OBJECTIVES**

Deep understanding of Kinematics, Dynamics and Programming of Industrial Robots.  
 Exhibition and detailed knowledge of 2D Artificial vision techniques.  
 Integration of Robotics and Vision 2D for automatic completion of tasks with industrial robots.

**6. SUBJECT PROGRAM**

**CONTENTS**

1	Introduction to Robot control
2	Direct kinematics. Inverse Kinematics. Kinematic Control paths
3	Robot dynamic modeling.
4	Dynamic control of the robot.
5	Introduction to Artificial Vision. Image acquisition, lighting components. Camera Calibration
6	Basic processing of Image. Edge Detection. morphological transformations
7	Segmentation. Feature extraction. Object recognition

**7. ASSESSMENT METHODS AND CRITERIA**

Description	Type	Final Eval.	Reassessn	%
Solving tasks about Kinematic and Dynamic Control of Robots (50%)	Work	No	Yes	50,00
Solving tasks about Development of Machine Vision Applications (50%)	Work	No	Yes	50,00
<b>TOTAL</b>				<b>100,00</b>

**Observations**

Remote evaluation, of these same exams, is planned in the case of a new health alert by COVID-19 making it impossible to conduct the evaluation in person.

**Observations for part-time students**

They will take theoretical and practical exams.  
 Remote evaluation, of these same exams, is planned in the case of a new health alert by COVID-19 making it impossible to conduct the evaluation in person.

## 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
- Doebelin, Ernest O. Measurement systems : application and design / Ernest O. Doebelin.
- Forsyth, David A. Computer vision : a modern approach / David A. Forsyth, Jean Ponce.
- Terano T., Asai K., Sugeno. M., "Applied Fuzzy Systems". AP Professional, 1994.
- Li-Xin Wang, "Adaptive Fuzzy Systems and Control" Prentice Hall, 1994
- Hines J. W. "Fuzzy and neural approaches in engineering" John Wiley and Sons, 1997