



Universitat de Lleida

DEGREE CURRICULUM  
**CONTROL AND ROBOTICS  
SYSTEMS DESIGN**

Coordination: Marcel Tresanchez Ribes

Academic year 2015-16

## Subject's general information

<b>Subject name</b>	CONTROL AND ROBOTICS SYSTEMS DESIGN
<b>Code</b>	102127
<b>Semester</b>	2nd Q. Continued evaluation
<b>Typology</b>	Obligatory
<b>ECTS credits</b>	6
<b>Theoretical credits</b>	3
<b>Practical credits</b>	3
<b>Coordination</b>	Marcel Tresanchez Ribes
<b>Office and hour of attention</b>	Office (2.07) or Robotics Lab (2.04) at the EPS building. Monday 10:00-11:00 AM.
<b>Department</b>	Computer Science and Industrial Engineering
<b>Modality</b>	Presencial
<b>Important information on data processing</b>	Consult <a href="#">this link</a> for more information.
<b>Language</b>	Catalan
<b>Degree</b>	Degree in Automation and Industrial Electronic Engineering
<b>Distribution of credits</b>	Lectures: 3 Credits Practical work: 3 Credits
<b>Office and hour of attention</b>	Office (2.07) or Robotics Lab (2.04) at the EPS building. Monday 10:00-11:00 AM.
<b>E-mail addresses</b>	mtresanchez@iei.udl.cat

Marcel Tresanchez Ribes

## Subject's extra information

It is recommended to have coursed previously "Senyals i Sistemes" and "Teoria Bàsica del Control" subjects.

## Learning objectives

Acquire the ability to design control and industrial automation systems.

Know the working of control systems in robotic systems.

Learn principles and applications of robotic systems

Identify and analyze the different parts of a robot

Understand the operation of a robot and be able to planning their possible application

## Competences

### Specific competences

GEEIA25. Knowledge and capacity for modelling and simulation of systems.

GEEIA26. Knowledge of automation and technical regulation of control and his application to the industrial automation.

GEEIA27. Knowledge of principles and applications of robotic systems.

GEEIA29. Capacity to design systems of industrial automation control.

### Cross-disciplinary competences

EPS1. Capacity to solve problems and prepare and defence arguments inside the area of studies.

EPS2. Capacity to gather and interpret relevant data, within the area of study, to judge and think about relevant subjects of social, scientific and ethical nature.

## Subject contents

### T.1. Applied Control

T.1.1. Practical application of control systems

T.1.2. PID applied control

T.1.3. Control by PWM signal

T.1.4. Operation of stepper and DC motors

T.1.5. Electronic solutions for motor controlling

T.1.6. Examples of applied control

## T.2. Robot control

- T.2.1. Direct kinematics model
- T.2.2. Methodology of Hartenberg-Denavit
- T.2.3. Inverse kinematics model

## T.3. Applications

- T.3.1. Programming of robots in industry
- T.3.2. Feedback control of robots using image processing

## Development plan

The development of the subject will be based on the practical work performed at different laboratories of the university.

The contents and description of the practical work will be available at the web.

The development of the practical work will be based on the MATLAB programming environment.

## Evaluation

The evaluation is based on the weighted practical work performed during the course.

$$NC = ( NP1*P1 + NP2*P2 + NP3*P3 + NP4*P4 + NP5*P5 + NP6*P6 )$$

If **NC** is lower than 5.0 there will be an optional exam with a weight of 8 points, the final mark will be computed with:

$$NF = NR + ( NC \times 0,2 )$$

## Bibliography

- Notes from the subject.
- Philip J. McKerrow, Addison-Wesley: **Introduction to Robotics**. ISBN 0-534- 914370-5.
- A. Barrientos, L.F. Peñín, C. Balaguer, R. Aracil: **Fundamentos de robótica**, McGraw Hill, 1997. ISBN: 8448108159.
- K.S. Fu, R.C. González, C.S.G. Lee. McGraw-Hill: **Robótica: Control, Detección, Visión e Inteligencia**. ISBN 84-7615-214-0
- P. M. Taylor, Eds. Ceac: **Control Robótico**. ISBN 0-333043821-3
- Reyes Cortés, Fernando, **Robótica: Control de robots manipuladores**. Barcelona: México: Marcombo: Alfaomega 2011. ISBN: 9788426717450.
- Craig, John J.: **Robótica**. 3a ed. México: Pearson Educacion, 2006. ISBN: 9702607728.