



Universitat de Lleida

DEGREE CURRICULUM  
**MECATRONICA III**

Academic year 2015-16

## Subject's general information

<b>Subject name</b>	MECATRONICA III
<b>Code</b>	102138
<b>Semester</b>	2nd
<b>Typology</b>	Optional
<b>ECTS credits</b>	6
<b>Groups</b>	1
<b>Theoretical credits</b>	3
<b>Practical credits</b>	3
<b>Office and hour of attention</b>	Monday, from 19:00 to 20:30, and Thursday from 10:00 to 11:30 at 0.07 office (CREA building).
<b>Department</b>	Informàtica i Enginyeria Industrial
<b>Teaching load distribution between lectures and independent student work</b>	40% lectures 60% independent student work
<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>	Grau
<b>Office and hour of attention</b>	Monday, from 19:00 to 20:30, and Thursday from 10:00 to 11:30 at 0.07 office (CREA building).
<b>E-mail addresses</b>	mnogues@diei.udl.cat

NOGUES AYMAMI, MIQUEL

## Subject's extra information

This subject wants to integrate the knowledge acquired in both Mechatronics I and Mechatronics II, and therefore considered necessary to enroll in both subjects.

## Learning objectives

The aim of this course is to bring practical knowledge acquired in the subjects Mechatronics I and Mechatronics II. It is therefore a hands-on subject, and microcontrollers (Arduinos) and PLC (Siemens) are used. Digital and analogic signals and also communications are implemented for controlling workstations that are available in the laboratory.

## Competences

- UdL2. Command of a foreign language.

Cross-disciplinary competences in the EPS:

- EPS4. To have the skills required to undertake new studies or improve the training with self-direction.
- EPS9. Capacity for unidisciplinary and multidisciplinary teamwork.

Competències Específiques definides per l'EPS:

- GEM-EPS28. Applied knowledge to measuring systems and industrial actuators.
- GEM-EPS29. Capacity to design and implement control systems and automation of mechanical systems.
- GEM-EPS30. Applied knowledge to multibody mechanism and robotics.

## Subject contents

Topic 1. Introduction to mechatronic systems

Topic 2. Introduction to robotic systems

Topic 3. Industrial communications and distributed control

Topic 4. Modelling dynamic systems and setting open control loops

## Methodology

The course has a practical orientation, and therefore it is essential to attend all practice classes in the laboratory. Because the course is 6 ECTS, it will be a two-hour session per week of theory where the basic concepts of different subjects are introduced, and two hours per week which will take the practical part of the course, involving programming tasks and control setting up.

## Development plan

Week 1, 2, 3 and 4 - Topic 1

Week 5, 6 and 7 - Topic 2

Week 8, 9 and 10 - Topic 3

Week 11, 12, 13, 14 and 15 - Topic 4

**Lab exercises**

- Digital signal processing with Arduino
- DC motors and step-by-step speed control with Arduino
- SPI Communication with Arduino
- Remote Control of a variable frequency driver (Arduino / PLC)
- Sorting station with a Cartesian manipulator (Arduino / PLC)
- Loading-buffer-shorting pneumatic workstation (Arduino / PLC)

## Evaluation

As the subject is focused in the practice work, it is not planned to hold examinations, and the grading is based on the delivery work that are developed in the laboratory, which includes theoretical and practical topics.

The weighting factors of each lab exercises for the final mark are:

- Digital Signal Processing (1 point)
- DC motors and step-by-step speed control (2 points)
- Communications (1 point)
- Speed control of an asynchronous motor (2 points)
- Sorting station with a Cartesian manipulator (2 points)
- Loading-buffer-shorting pneumatic workstation (2 points)

## Bibliography

- "Sistemas modernos de control. Teoría i pràctica", Ricard c. Dorf. Editorial Addison-Wesley Iberoamericana. ISBN 0-201-64417-7
- "Ingeniería de control moderna", Katsuhiko Ogata. Editorial Prentice Hall. ISBN 0-13-589128-0
- "Mechatronics. A Foundation course", Clarence W. de Silva. Editorial CRC Press. ISBN 978-1-4200-8211-1
- "Modeling and analysis of Dynamic Systems", Ramin S. Esfandiari, Editorial CRC Press. ISBN 978-1-4398-0845-0
- "Fundamental of Robotics. Analysis & Control", Robert J.Schilling, Editorial Prentice Hall. ISBN 0-13-344433-3
- "Modeling and control of engineering Systems", Clarence W. de Silva. Editorial CRC Press. ISBN 978-1-4200-7686-8