DEGREE CURRICULUM

MECATRONICA III

Academic year 2014-15

MECHATRONICS III 2014-15

Subject's general information

Subject name	MECATRONICA III
Code	102138
Semester	2nd
Typology	Optional
ECTS credits	6
Groups	1
Theoretical credits	3
Practical credits	3
Office and hour of attention	Monday, from 19:00 to 20:30, and Thursday from 10:00 to 11:30 at 0.07 office (CREA building).
Department	Informàtica i Enginyeria Industrial
Teaching load distribution between lectures and independent student work	40% lectures 60% independent student work
Modality	Presencial
Important information on data processing	Consult this link for more information.
Language	Catalan
Degree	Grau
Office and hour of attention	Monday, from 19:00 to 20:30, and Thursday from 10:00 to 11:30 at 0.07 office (CREA building).
E-mail addresses	mnogues@diei.udl.cat

MECHATRONICS III 2014-15

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 hand 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. Domini d'una llengua estrangera.

Competències Transversals EPS:
- EPS4. Posseir habilitats d'aprenentatge necessàries per emprendre estudis posteriors o millorar la seva formació amb un cert grau d'autonomia.
- EPS9. Capacitat de treball en equip, tant unidisciplinar com multidisciplinari

Competències Específiques definides per l'EPS:
- GEM-EPS28. Coneixements aplicats a sistemes de mesura i actuadors industrials
- GEM-EPS29. Capacitat per dissenyar i implementar sistemes de control i automatització de sistemes mecànics.
- GEM-EPS30. Coneixements aplicats a mecanismes multicos i robòtica.

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 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 i 15 - Topic 4

Lab exercises

- Digital signal processing with Arduino

- DC motors and step-by-step **s**peed control with Arduino

- SPI Communication with Arduino

- Remote Control of a variable frequency driver (Arduino / PLC)

- Sorting station with a Catesian 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 teh grading is based on the set of practices that are developed in the laboratory, which include 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