



Course guides

220204 - 220204 - Advanced Automation and Control of Industrial Processes

Last modified: 29/05/2020

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 707 - ESAII - Department of Automatic Control.

Degree: MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2013). (Compulsory subject).

Academic year: 2020 **ECTS Credits:** 2.5 **Languages:** Catalan

LECTURER

Coordinating lecturer: JOSEP CUGUERÓ ESCOFET

Others: ENRIQUE JAVIER AJENJO ESCOLANO
RAMON COMASOLIVAS FONT
JAUME FIGUERAS JOVE
FERNANDO GUILLERMO SANABRIA ORTEGA

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

1. Ability to design and project control systems and advanced automated production processes.

TEACHING METHODOLOGY

The course methodology consists of:

- Class sessions.
- Laboratory sessions.
- Self study.

In the class sessions, professors will introduce the theoretical foundations of the subject, concepts, methods and illustrate them with examples and exercises to ease their understanding.

In laboratory sessions, professors guide students in applying theoretical concepts to solve experimental set-ups, based on critical thinking. Activities are proposed with the aim to promote the discussion and use the basic tools necessary to perform an automation system.

Students work on the material provided by the professors.

LEARNING OBJECTIVES OF THE SUBJECT

Develop students' critical analysis and sufficient ability in automation technology selection and control strategies necessary to solve real problems in the field of advanced production and control of industrial processes.

STUDY LOAD

Type	Hours	Percentage
Hours small group	7,5	12.00
Hours large group	15,0	24.00
Self study	40,0	64.00

Total learning time: 62.5 h

CONTENTS

Module 1: Introduction to PLC

Description:

PLC Introduction, CIM pyramid concept.
PLCs classification.
Data Format.
Internal Structure of a PLC.
Memory map of a PLC connectivity with sensors and actuators.
Scan cycle concept.
Structures of multi PLC CPU.
PLCs Programing.

Full-or-part-time: 21h

Theory classes: 4h
Laboratory classes: 2h
Self study : 15h

Module 2: PLCs programming

Description:

The PLC programming standard IEC 1131-3
Programming Languages: IL, ST, LD, FBD
Design and structure of a program: SFC SFC
Examples on programming of PLCs

Full-or-part-time: 20h 30m

Theory classes: 7h
Laboratory classes: 3h 30m
Self study : 10h

Module 3: Industrial communications

Description:

Introducció: Arquitectura CIM del sistema d'automatització i control industrial.
Models de referència del sistema de comunicacions: models OSI i TCP/IP.
Aspectes de nivell físic, enllaç, xarxa, transport i aplicació.

Full-or-part-time: 21h

Theory classes: 4h
Laboratory classes: 2h
Self study : 15h

GRADING SYSTEM

The final grade of the course is calculated in the following way:

- Practical activity, specification and programming of the control system: 50%
- Final written exam: 50%

According to school regulations, no additional assessment activities are needed.



BIBLIOGRAPHY

Basic:

- Piedrafita Moreno, Ramón. Ingeniería de la automatización industrial. 2ª ed. Paracuellos de Jarama: Ra-ma, 2004. ISBN 8478976043.
- Stallings, William. Comunicaciones y redes de computadores [on line]. 7ª ed. Madrid: Pearson Educación, 2004 [Consultation: 05/11/2020]. Available on: http://www.ingebook.com/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=1245. ISBN 8420541109.

Complementary:

- Tanenbaum, Andrew S. Redes de computadoras [on line]. 4ª ed. México [etc.]: Pearson Educación, 2003 [Consultation: 13/11/2020]. Available on: http://www.ingebook.com/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=6206. ISBN 9702601622.
- Pimentel, Juan R. Communication networks for manufacturing. Englewood Cliffs, NJ: Prentice Hall, 1990. ISBN 0131544020.