29817 - Automatic Systems

Información del Plan Docente

Academic Year	2016/17
Academic center	110 - Escuela de Ingeniería y Arquitectura 326 - Escuela Universitaria Politécnica de Teruel
Degree	440 - Bachelor's Degree in Electronic and Automatic Engineering 444 - Bachelor's Degree in Electronic and Automatic Engineering
ECTS	6.0
Course	2
Period	Second semester
Subject Type	Compulsory
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

The learning process that is designed for this subject is based on the following:

The teaching process will involve three main levels: lectures, problems and laboratory, with increasing level of student participation.
* In the lectures the theoretical basis of the automated systems will be presented, illustrated with numerous examples.
* In the classes of problems and issues such cases will be developed involving students.

* Laboratory practices will be developed in small groups where students perform the simulation, implementing and analysing real automation and control systems.
* In addition, to encourage continuous and autonomous student work, additional learning activities to do throughout the semester will be performed.

5.2.Learning activities

The program offered to the student for achieving the expected results includes the following activities ...

Class work: 2.4 ECTS (60 hours)

1) In-person class (type T1) (30 in-person hours).

Lectures of theoretical and practical content. The concepts and fundamentals of automatic systems are presented, illustrated with real examples. Student participation through questions and brief discussions will be encouraged.

2) Classes of problems and cases resolution (type T2) (15 in-person hours).

Problems and cases involving students, coordinated at all times with the theoretical contents will be developed. Students are encouraged to work the problems previously. Some of these hours may engage in learning activities assessable as specified in each course.

3) Lab (type T3) (15 in-person hours).

The student will perform the simulation, implementing and analysing real automation and control systems. A script practice will be available, consisting of sections of previous study and practical realization in the laboratory. The preliminary study must be worked out before the practice. Each practice will be qualified in the laboratory.

Non-in-person work: 3.6 ECTS (90 hours)

4) Study (type T7) (86 non-in-person hours).

Student Personal study of the theoretical part and realization of problems. The ongoing work of the student will be encouraged by the homogeneous distribution of the various learning activities throughout the semester. This includes tutorials, as a direct support for the student, identification of learning problems, orientation in the subject, advising to exercises and assignments ...

5) Evaluation tests (T8) (4 in-person hours).

In addition to the qualifying function, evaluation is also a learning tool with which the student checks the degree of understanding and assimilation reached.

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5.3.Program

The contents developed are:

Lesson 0 Presentation of the subject. Historical introduction

Lesson 1 Control of Discrete Event Systems

Introduction to Industrial Automation Systems. Industrial Programmable Logic Controller. Digital and Analog inputs and outputs. Sensors and actuators. Programming Discrete Event Systems.

Lesson 2 Feedback systems

Properties feedback systems. Steady-state response. Precision. Root locus. Phase and gain margin. Relationship between time and frequency response. Nyquist stability criterion simplified case.

Lesson 3 Control of Dynamic Systems

Feedback systems properties. Steady-state response. Precision. Basic control actions. Controller design. Cancellation of poles and zeros. Root locus. Design of controllers in the frequency domain

Lesson 4 Control Structures

Modifications PID control. Feedforward. Servo drive. Cascade control.

Lesson 5 Industrial Control

Industrial PID controllers. PID control technology. Feedforward control. Control ratio. PWM action. Servo action. Heat Cool action. Empirical tunning.

Practices to perform are:

ZARAGOZA

● Introduction to Programmable Logic Controller.

● Control of discrete event systems. Control stations of the manufacturing cell.

● Control position and speed of a servomotor.

● Control model of a mini

● Implementation of PID controllers in PLCs.

TERUEL

● Introduction to Programming Logic Controller.

● Control of discrete event systems.

● Control of continuous systems. Aeropendulum 1

● Control of continuous systems. Aeropendulum 2

● Implementation of PID controllers in PLCs.

5.4.Planning and scheduling

Lectures and problem classes and practice sessions are held in the laboratory according to schedule set by the center (schedules available on their website).

Each teacher will inform its hours of tutoring.

The other activities will be planned depending on the number of students and will be announced in good time. It will be available on http://add.unizar.es

5.5.Bibliography and recomended resources

- 1. Lewis, Paul H.. Sistemas de control en ingeniería / Paul H. Lewis, Chang Yang . 1a ed. en español Madrid : Prentice Hall, cop. 1999
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- 3. Golnaraghi, Farid. Automatic control systems / Farid Golnaraghi, Benjamin C. Kuo . 9th ed. New York : John Wiley & Sons, cop. 2010
- 4. Montano Gella, Luis. Regulación automática : análisis y diseño en el dominio de la frecuencia / Luis Montano Gella, José Luis Villarroel Salcedo . [1a. ed.] Zaragoza : Universidad, Secretariado de Publicaciones, D.L.1991
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- 6. Ogata, Katsuhiko. Sistemas de control en tiempo discreto / Katsuhiko Ogata ; traducción, José Guillermo Aranda Pérez...[et al.] . [1a. ed. en español] México [etc.] : Prentice Hall Hispanoamericana, cop. 1996
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- 8. Piedrafita Moreno, Ramón. Control de sistemas industriales continuos / Ramón Piedrafita Moreno . Zaragoza : Kronos, 2002
- 9. Piedrafita Moreno, Ramón. Ingeniería de la automatización industrial / Ramón Piedrafita Moreno . 2a ed. amp. y act. Madrid : Ra-Ma, D.L. 2003 [cop. 2004]

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- 10. Silva Suárez, Manuel. Las redes de Petri : en la automática y la informática / Manuel Silva . 1a ed. 1985, 1a reimp. 2002 Madrid : Editorial AC, 2002