60820 - Control engineering

Información del Plan Docente

Academic Year	2017/18
Subject	60820 - Control engineering
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	532 - Master's in Industrial Engineering
ECTS	6.0
Year	1
Semester	First semester
Subject Type	Optional
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as

- Lectures, where the main theoretical concepts of the course will be presented and illustrated with practical

examples.
- Practice sessions with problem-solving tasks and student participation.
- Laboratory sessions, where practical work is carried out individually or in pairs and students put into practice the concepts of interest, and implement the designed control schemes in simulation and real systems.

5.2.Learning tasks

The course includes the following learning tasks:

- **T1 Lectures** (30 hours). The teacher presents the theoretical and practical content of the course. The concepts and fundamentals of computer control are illustrated with examples. Student participation through questions and brief discussions is encouraged.
- **T2 Practice sessions** (15 hours). Problems and case studies with student participation, coordinated with the theoretical contents. Students are encouraged to work on the problems previously.
- **T3 Laboratory sessions** (15 hours). The student carries out the simulation, implementation of real control and analysis of automation systems. Task instructions will be available, which consists of a previous study and the different activities of the task. The preliminary study should be done prior to the session.
- **T7 Individual assignment** (86 hours). It consists of an individual study of theoretical concepts and implementation problems. The ongoing work of the student is encouraged by the homogeneous distribution throughout the semester of the various learning activities.
- **T8 Assessment tests** (4 hours). In addition to their grading function, the tests are also a learning tool with which the student checks the degree of understanding and assimilation acquired.

5.3.Syllabus

The course will address the following topics:

Lectures

- Topic 1. Introduction.
- Topic 2. Sampling and reconstruction of signals.
- Topic 3. Z-Transform.
- Topic 4. Analysis of discrete-time systems
- Topic 5. Design of digital controllers. Industrial PID.
- Topic 6. System identification.
- Topic 7. Modeling discrete event systems.
- Topic 8. Implementation of industrial automation controllers.

Laboratory sessions

- Analysis of discrete systems and design of a digital controller.
- System identification.
- Modeling and analysis of a discrete event system.
- Design and implementation of control and supervision.
- Simulation of hybrid systems.

5.4.Course planning and calendar

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course, will be provided on the first day of class or please refer to the EINA website or http://add.unizar.es

5.5.Bibliography and recommended resources

Bibliography: [BB-Bibliografía Básica / BC-Bibliografía Complementaria]

- BB Kuo, Benjamin C.. Sistemas de control automático / Benjamin C. Kuo ; traducción, Guillermo Aranda Pérez ;

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- BB Lewis, Paul H.. Sistemas de control en ingeniería / Paul H. Lewis, Chang Yang . - 1a ed. en español Madrid : Prentice Hall, cop. 1999
- BC Bolton, W.. Ingeniería de control / W. Bolton . - 2a. ed. México : Alfaomega ; Barcelona : Marcombo, cop. 2001
- BC Franklin, Gene F.. Digital Control of Dynamic Systems / Gene F. Franklin, J. David Powell, Michael L. Workman . - 2a. ed. Reading, Massachusetts [etc.] : Addison-Wesley Publishing, cop. 1990
- BC Ogata, Katsuhiko. Ingeniería de control moderna / Katsuhiko Ogata ; traducción Sebastián Dormido Canto, Raquel Dormido Canto ; revisión técnica Sebastián Dormido Bencomo ; revisión técnica para Latinoamérica Amadeo Mariani ... [et al.] . - 5ª ed. Madrid : Pearson Educación, D.L. 2010
- BC Ogata, Katsuhiko. Sistemas de control en tiempo discreto / Katsuhiko Ogata ; traducción, José Guillermo Aranda Pérez...[et al.] . - 2ª ed. México [etc.] : Prentice Hall Hispanoamericana, cop. 1996

URL:

- Aström and Murray; Feedback Systems: An Introduction for Scientists and Engineers, Princeton University Press Seborg, Edgar y Mellic& Process Dynamics and Control, Wiley and Sons - Capítulo 26