Universidad Zaragoza

Academic Year/course: 2024/25

29823 - Control Engineering

Syllabus Information

Academic year: 2024/25
Subject: 29823 - Control Engineering
Faculty / School: 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
Year: 3
Semester: First semester
Subject type: Compulsory
Module:

1. General information

In this subject the student is expected to know and handle with ease the theoretical contents that support the control of systems using the computer. For this purpose, we start from the model that represents the behavior of the system in the domain of discrete time with one (SISO) or several variables (MIMO). Basic control techniques for sampled systems are learned and the design and implementation of control and estimation algorithms is continued. At the practical level, the student implements on computer the designed controllers/stimulators and experiments with them.

2. Learning results

The student:

- Know how to model continuous systems of one or several variables and knows how to handle their discrete representation.
- Know how to apply the basic programming techniques of programmable logic controllers.
- Know how to apply design techniques to computer control.
- Know how to apply the basic techniques of state-space based design. Continuous and sampled systems.
- Know how to program control and estimation algorithms.
- Know how to design a control architecture and choose the most appropriate technology for each component.

3. Syllabus

- Unit 1: Introduction.
- Unit 2: Signal sampling and reconstruction. Analysis of discrete-time systems.
- Unit 3: Design of digital controllers. Technologies.
- Unit 4: System identification.
- Topic 5: Internal description. Continuous and sampled multivariable systems. Analysis. Controllability and observability.
- Unit 6: Control based on internal description.
- Unit 7: Estimation. Design of control systems with observers.
- Unit 8: Fuzzy control

4. Academic activities

At EINA, this subject is English Language Friendly (ELF) in at least one group. The study and class material is available in English and the teachers will attend office hours and prepare and evaluate students in English if they don't speak Spanish.

The learning process designed is followed at EINA and at EUPT.

- Lectures and problem solving clases (42 horas).
- Laboratory practices (18 hours).
- Evaluation tests (6 hours).
- Personal student work (84 hours)

At EUPT, the degree is offered in two different modalities: on-site and blended learning. For the presential modality all of the above applies. On the other hand, students who choose the blended mode in the EUPT will have from the beginning of the course the work material (moodle platform) and the bibliographical references that will allow them to follow the subject independently. In the week in which the on-site students carry out a practice of laboratory or tutored work session, the teacher

will make the adaptations in the sessions and will enable the means (tutorials) to address the doubts that may arise to the students of the blended learning modality.

5. Assessment system

Río Ebro Campus (Zaragoza).

Continuous assessment, which consists of three components:

1. Attendance to all practices with profit.
2. Three tests with theory questions and problems that will preferably consist of quizzes conducted through Moodle and may include multiple choice, matching, numerical calculation and/or open questions. These tests will be conducted solely and exclusively in person. Minimum grade in each test: 4 out of 10.
3. Practical work that can be done in groups, but is defended orally and individually.

To pass the course by continuous assessment it is necessary to fulfill section 1 and obtain an average grade in section 2 greater than or equal to 5.

If the defense of the work is carried out and passed (grade equal to or higher than 5 out of 10 in section 3) there is no saturation in the final grade and the grade obtained in section 2 can be raised up to 3 points. If the defense of the paper is not performed this grade saturates in 7 for the final grade.

Global assessment:

It will consist of a written exam (80% of the grade) that will include all the theoretical/problem/practical contents that have been covered during the term, and an oral/written test (20%).

Teruel Campus.

Continuous Assessment:

1. Three in-person tests on theory and problems (Moodle quizzes/paper exercises). Minimum grade: 4.
2. Attendance and participation in all lab practices (pre-study + reports).
3. Individual project and oral presentation. Minimum grade: 5.

Global Assessment:

1. Individual written test (80%). Minimum grade: 4. Theory and problems.
2. Lab practices (20%): Pre-study + reports, or practical test.

6. Sustainable Development Goals

7 - Affordable and Clean Energy
8 - Decent Work and Economic Growth
9 - Industry, Innovation and Infrastructure