

Academic Year/course: 2022/23

29823 - Control Engineering

Syllabus Information

Academic Year: 2022/23

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

2. Learning goals

3. Assessment (1st and 2nd call)

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The methodology that will be used in this course is as follows. The course will include lectures, problem-solving sessions, and practical activities.

- Lectures will provide the theoretical background and will introduce the connections between the theoretical concepts and practical applications.
- The course will include specific problem-solving sessions, where case studies and practical exercises will be considered, discussed and solved. Written assignments will be proposed as well.
- During the laboratory sessions, students will work in small groups to solve problems using the available equipment (simulation tools and/or real platforms). These activities will usually include the development of a preliminary study, where students will have to apply the ideas explained during the lectures to the particular problem associated with the laboratory activity.
- In addition, in order to better motivate students, special learning activities related to industrial applications may be performed, subject to the available equipment.

4.2. Learning tasks

The course includes the following learning tasks:

OFF-SITE AND PRACTICAL ACTIVITIES (60 hours):

1) Lectures (T1) (30 hours)

Fundamentals of the theoretical concepts and practical applications. Computer-based automatic control will be explained, emphasizing its importance and the connections with practical applications.

2) Case studies and problem-solving (T2) (15 hours)

Students, working in small groups, will solve case studies and practical problems, using the ideas introduced during the lectures.

3) Laboratory work (T3) (15 hours)

Students will analyze, simulate, study, and verify different automatic control policies, applied to several practical examples. Sessions will be organized in small groups, adapted to the laboratory requirements.

The specific laboratory sessions and the timetable will be announced in moodle, at the official webpage associated with the course. An example of laboratory topics includes:

- Digital control of a prototype model
- System Identification
- State-space model building and analysis of a system
- Automatic control of a system using state feedback control
- Design of state observers for controlling state-space systems

PERSONAL WORK (90 hours):

4) Personal study (T7) (82 personal hours)

Students are assumed to employ this time studying and understanding the theoretical concepts, solving problems, making practical exercises, and preparing the laboratory sessions in advance. All the teachers/professors involved in the course have associated "tutorial" hours, which will be announced at "moodle". Students can use these tutorial hours to solve questions arising while studying or solving exercises, and to get suggestions on strategies to address the course.

5) Evaluation activities (T8) (8 hours)

In addition to grading purposes, evaluation activities are as well a learning tool that can be used by students to check the knowledge and understanding they have acquired on the topics involved in the course.

4.3. Syllabus

The course will address the following topics:

- Introduction to computer-based control systems
- Sampling methods. Analysis of discrete-time systems
- Design of computer-based controllers
- Model building and system identification
- State-space system design and analysis.
- Controllability and observability in control systems.
- State feedback controllers
- State observer design strategies
- Fuzzy control

4.4. Course planning and calendar

Timetables for classroom and practical sessions will be published prior to the beginning of the course at the web of the EINA <https://eina.unizar.es/> and EUPT <https://eupt.unizar.es/>
Each teacher will publish his tutoring hours.

The other activities will be planned depending on the number of students and will be announced well in advance. It will be available on <https://moodle2.unizar.es/add/>