

Academic Year/course: 2021/22

60805 - Advanced Control and Electronic Implementation

Syllabus Information

Academic Year: 2021/22

Subject: 60805 - Diseño electrónico y control avanzado

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 532 - Master's in Industrial Engineering

ECTS: 6.0

Year: 1 and 2

Semester: 532-First semester o Second semester
107-Second semester

Subject Type: Compulsory

Module:

1. General information

1.1. Aims of the course

The student, for passing this subject, should demonstrate the following results...

- Develop an electronic project with parts of specification, design, installation and project documentation .
- Build blocks using analog, digital and power circuits. The verified in the laboratory.
- Knows the basic rules and know how to write the documentation associated with an electronic project.
- Applies the techniques of computer control design for multivariable systems.
- Knows and knows how to apply the techniques of analysis and design based on the state space and observers.
- Knows and applies identification techniques to extract dynamic models of real systems systems and simulate their behavior.
- Can design a control architecture of a complex system and choose the right technology for each component associated implementing regulations.

1.2. Context and importance of this course in the degree

The subject and its expected results meet the following approaches and objectives:

This course provides an integrated view, where advanced techniques are developed two disciplines: the control theory and design of electronic systems based on analog, digital and power circuits.

1.3. Recommendations to take this course

This subject is raised in the Master of Industrial Engineering to complement the knowledge and skills of students in the fields of Electronics and Control Systems. Students of this master are graduates who have completed courses in which the bases of these materials are presented. Students who by their degree of origin have not completed are required to study two subjects related 6 ECTS each one with digital and power electronics and the other with the control and automation systems.

2. Learning goals

3. Assessment (1st and 2nd call)

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. It provides an integrated view of advanced techniques used in two fields: the control theory and design of electronic systems based on analog, digital and power circuits.

4.2. Learning tasks

The course includes the following learning tasks:

- **Lectures.** Presentation of the main theoretical contents illustrated with examples.
- **Practice sessions.** Problem-solving and implementation of the lecture contents.
- **Practical sessions.** The students will assemble (real or virtual) and check the circuit operation and the performance of the algorithms.

4.3. Syllabus

The course will address the following topics:

Section 1. Advanced control skills

1. Modelling of systems with internal description
2. Multivariable continuous and sampled systems
3. Stability. Controllability and observability
4. linear control based on internal description
5. Observers. Control design variables estimation
6. Nonlinear control

Section 2. Advanced electronic design skills

1. Top- Down methodology for electronic design
2. Prototyping techniques in digital and analog systems
3. Implementation of control systems in electronics (instrumentation, A/D conversion, microprocessor hardware implementation)
4. Documentation and debugging an electronic design

4.4. 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.

A detailed analysis of the various activities to develop will be established once the University and the Center have approved the academic calendar (which can be consulted on the website of the EINA).