29919 - Basic principles of electronics

Información del Plan Docente

Academic Year	2017/18
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	435 - Bachelor's Degree in Chemical Engineering
ECTS	6.0
Year	3
Semester	Half-yearly
Subject Type	Compulsory
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 learning process will be developed in two main levels: theory and problem classes and laboratory. The student participation level keeps growing as the subject basics are being assimilated.
- In the theory and problem classes the electronics theoretical grounding will be presented focusing the student into practical cases related as much as possible with his specialty.
- The simulation works proposed have a double purpose: To optimally assimilate the theoretical concepts and to prepare the laboratory classes.

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- The laboratory classes will be developed in small groups and the students will assemble and test the circuits and systems previously presented in the theory classes. The laboratory classes are oriented towards the implementation of a full industrial application electronics system, and the students will develope a full industrial application control system in the last laboratory class. The materials required for the subject development will be available in the moodle platform of the subject, and the student will be able to download the following documents:

- Course presentation including: professor contact info, tutorship, theory and laboratory classes timeta=< grading criteria for the different assesment activities; subject goals and program description, and bibliography.
- Slides presented in the theory classes.
- Instructions for the laboratory classes.
- Compilation of support problems for the assesment activities.

5.2.Learning tasks

1. Theory classes (30 hours, attending)

The approach to the contents is performed through the presentation of the functions that electronics play in the general and chemical industry, in a route traced around an application project to be developed through the laboratory classes. The electronics devices and systems are introduced as they appear in this project.

2. Problem classes (15 hours, attending)

In this activity application problems are resolved in an interactive atmosphere. Students are encouraged to resolve the problems by themselves previously to the classes.

3. Laboratory classes (15 hours, attending)

The electronics laboratory is not a familiar place for students, and they have to learn the adequate attitude of seriousness, prudence and observance. For the execution of the laboratory exercises the students have access to laboratory instructions previously provided by the department. These instructions include the circuit descriptions and the guides, goals and specifications required for the activity development.
It is required that the students make the previous work specifically indicated in the laboratory instructions. The previous work and the report prepared during the laboratory exercise development take part in the assesment process.

4. Practical works (30 hours, non-attending)

They include the laboratory classes preparation, and the continuous assesment activities. The particular activities will be announced in the classes and the moodle platform of the subject.

5. Personal study and work (55 hours, non-attending)

It is very important a constant and regular work oriented towards the theoretical study and the problem resolution.

6. Tutorship (attending)

The students can consult any subject related difficulties with the professors. A timetable is available to this purpose.

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7. Assesment (5 hours, attending)

In addition to the grading function, the assesment is also a learning tool for the students: they can check their assimilation level of the subject.

5.3.Syllabus

THEORY PROGRAM

Block 1. Electronics functions in Chemical Engineering. Electronics systems and blocks. Basic laboratory instrumentation. electronics simulation.

Block 2. Power supply systems. Power supply AC/DC. Associated devices: diodes. Diode types: internal structure, models, circuits and applications. Applications and types of Power supply Systems: Photovoltaic, Batteries, AC/DC, DC/DC. Integrated lineal and switched regulators.

Block 3. Control and Display Systems.
Information processing: Digital electronics. Boole algebra. Combinational and sequential blocks. Digital System Implementation: CMOS technology, PLDs, Microprocessors and Microcontrollers. Comparison and generation of signals using operational amplifiers.
Power control. Associated devices: Bipolar and Unipolar Transistors, Thyristors. Internal structure, models, circuits and applications.

Block 4 Sensors and amplification. Types of sensors: Characteristics and applications. Amplification and filtering based on lineal stages with operational amplifiers. Applications.

LABORATORY PROGRAM

P1) Laboratory instrumentation.
P2) Power supply.
P3) Digital counting circuit.
P4) Microprocessor based control and display system.
P5) Power control.
P6) Industrial system integration. Sensors and control circuits.

5.4.Course planning and calendar

The theory and problem classes and the laboratory classes follow the timetable set by the center and it is published previously to the course beginning. The tutorship timetible is announced by the professors at the course beginning. Other activities are planned depending on the number of students and are announced in advance.

5.5.Bibliography and recommended resources

BB	1. Storey, Neil. Electrónica : de los sistemas a los componentes / Neil Storey Wilmington, Delaware : Addison-Wesley Iberoamericana, 1995
BB	4. Malik, Norbert R.. Circuitos electrónicos

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: análisis, diseño y simulación / N. R. Malik ; traducción, Miguel Angel Pérez García, Mª Antonia Menéndez Ordas, Cecilio Blanco Viejo ; revisión técnica, Juan Meneses Chaus ... [et al.] . - [1ª ed. en español], reimp. Madrid [etc.] : Prentice Hall, 2003

BB 5. Savant, Clement J., Jr.. Diseño electrónico : circuitos y sistemas / C.J. Savant Jr., Martin S. Roden, Gordon L. Carpenter ; traducción, Gabriel Nagore Cázares ; revisión técnica, Jorge Luis Sánchez-Téllez . - 3ª ed. México : Pearson Educación, 2000

BC 2. Pollán Santamaría, Tomás. Electrónica digital. I, Sistemas combinacionales / Tomás Pollán Santamaría. - 3ª ed. Zaragoza : Prensas Universitarias de Zaragoza, 2007

BC 3. Pollán Santamaría, Tomás. Electrónica digital. II, Sistemas secuenciales / Tomás Pollán Santamaría. - 3ª ed. Zaragoza : Prensas Universitarias de Zaragoza, 2007

BC 6. Rashid, Muhammad H.. Circuitos microelectrónicos : análisis y diseño / Muhammad H. Rashid ; revisor técnico de la obra Ricardo García López Madrid [etc.] : Thomson, D.L. 2002