28818 - Electronic Technology I

Información del Plan Docente

Academic Year	2018/19
Subject	28818 - Electronic Technology I
Faculty / School	175 - Escuela Universitaria Politécnica de La Almunia
Degree	424 - Bachelor's Degree in Mechatronic Engineering
ECTS	6.0
Year	2
Semester	Second semester
Subject Type	Compulsory
Module	---

1.General information

1.1.Aims of the course

1.2.Context and importance of this course in the degree

1.3.Recommendations to take this course

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

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

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The learning process that is designed for this subject is based on the following:
This subject, Electronics Technology I, is conceived as a set of contents divided into four main parts. The first part gathers basic concepts of Electronics, which maybe students have already acquired in other subjects. The second and third parts form the core of the subject. The final block, meet other interesting complementary skills to complete training in Analog Electronics.
The first three blocks will be developed under three fundamental and complementary ways: the theoretical concepts of each teaching unit, solving problems or issues, and laboratory practices, supported in turn by another series of activities such as tutorials and seminars and will be tested, independent for each of the theory parts.
The fourth block will have a different treatment, as a group work previously assigned. Students may have and express their own preferences, but all topics will be assigned. They will prepare presentation materials and defend their work with

a public exhibition, which will be valued by the other students and the teacher.

Strong interaction between the teacher/student. This interaction is brought into being through a division of work and responsibilities between the students and the teacher. Nevertheless, it must be taken into account that, to a certain degree, students can set their learning pace based on their own needs and availability, following the guidelines set by the teacher.

The organization of teaching will be carried out using the following steps:

— **Theory Classes**: Theoretical activities carried out mainly through exposition by the teacher, where the theoretical supports of the subject are displayed, highlighting the fundamental, structuring them in topics and or sections, interrelating them.

— **Practical Classes**: The teacher resolves practical problems or cases for demonstrative purposes. This type of teaching complements the theory shown in the lectures with practical aspects.

— **Seminars:** The total group of theory classes or practical classes may be (or not) divided into smaller groups, if neccesary. They were employed to analyze cases, solving cases, solving problems, etc. Unlike what happens with the practical classes, the teacher is not the protagonist, merely to listen, serve, guide, clarify or evaluate. It seeks to encourage student participation and try to facilitate continuous evaluation of students and meet learning achievement.

— **Laboratory Workshop**: The lecture group is divided up into various groups, according to the number of registered students, but never with more than 20 students, in order to make up smaller sized groups.Students will complete assemblies, measurements, simulations, etc. in laboratory, in the presence of the teacher. The practices will be carried out in groups of two (or three if neccessary) students per session, although reports can be grouped students from two or more sessions. For each part laboratory practices, a guidance of practical tasks (compulsory and optional) will be delivered; the reporting rules will also be specified in a policy paper at the beginning of practical activities. Three times during the semester, students should defend their laboratory work by showing the corresponding practical work and answering some questions from the teacher.
— **Group Tutorials**: Scheduled tracking learning activities, in which the teacher meets with a group of students, in order to guide their autonomous learning work and to track that jobs which require a high degree of advice from the teacher.
— **Individual Tutorials**: Those carried out giving individual, personalized attention with the teacher of the subject or another teacher from the department. Said tutorials may be in person or online.

4.2.Learning tasks

4.3.Syllabus

Contents:

Contents of the subject for obtaining essential learning outcomes.

Theoretical contents:
The theoretical contents are articulated on four blocks (numbers 1-4), sometimes preceded by a block 0 of Introduction to Electronic Technology. The choice of the contents of each part was made by seeking the clarification of the final objective, so that by the union of the adquired knowledge, the student must obtain a structured, easily assimilable for Mechatronics Engineers knowledge.
Each of the blocks consists of different topics, with a temporary assignment of one or two weeks of the course. These

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topics collect the contents needed to the acquisition of learning outcomes, according to the following relationship:
Block 1: ACTIVE AND PASSIVE ELECTRONIC COMPONENTS
1. Passive electronic components
* Resistors, capacitors, inductors
* Manufacturing and identification
2. Active components: semiconductors and diodes
* Semiconductor materials
* Diodes. Types. Crystals. Symbols
* Operation graphs. Identification

3. Active components: Transistors
* Unipolar and Bipolar Transistors
* Crystal structures. Symbols
* Operation graphs. Identification

Block 2: CIRCUITS WITH DIODES AND TRANSISTORS
4. Circuits with diodes
* Rectifiers (and filters)
* Regulators (Zener)

* Other diodes and applications

5. BJT.

* Characteristics

* Polarization
* AC circuit
* Small signal equivalent

6. FET
* Characteristics

* Polarization

* Application of FET. MOSFET. JFET. IGFET.

Block 3: OPERATIONAL AMPLIFIERS AND APPLICATIONS

7. Amplification and voltage Operational Amplifiers

* Types of amplification. Models
* Key features
* Output stages
* Feedback

* Symbols and internal structure
* Input and output circuits
* Key features

9. Basic Linear applications with Operational Amplifiers

* Simple Amplifiers
* Amplifiers simple operations
* Amplifiers complex operations
* Active filters

10. Nonlinear and Switching Circuits Operational Amplifiers

* Precision Rectifiers
* Voltage comparators
* Timers
* Oscillators

Block 4: OTHER SPECIAL APPLICATIONS WITH INTEGRATED CIRCUITS

11. INA and Bi-FET

* Applications for industrial probes: temperature, speed, ...
* Electro-medical applications: biological probes ...
* Audio-frequency applications: sound level meters, vibration, ...

12.- IC 555 timer

* IC study
* Monostable applications
* Astable applications

13. Operational Transconductance Amplifiers

* Study of integrated circuits
* Linear applications
* Nonlinear Applications

14. Operational Transresistance Amplifiers

* Study of integrated circuits
* Linear applications
* Nonlinear Applications

Practical contents:

Each exposed in the previous section, block has associated practical exercises about through practical cases and / or work, leading to the obtaining of results and their analysis and interpretation physical or simulated assembly.

While topics are developed, laboratory practices will be perposed, mainly through the Moodle platform, they will be performed by students / as in weekly sessions of one hour, during the time spent on each block.

4.4.Course planning and calendar

Calendar of classroom sessions and presentation of works

The planned development of the course includes (6 ECTS credits, or 150 hours), which will be distributed as follows:

- 48 hours of theoretical class: 60% of exposition of concepts and 40% of problem resolution (3 hours per week), except in the weeks with a control test, which will be reduced one hour, and in the final weeks that will increase two hours.
- 15 hours of supervised laboratory practices: 1st to 15th week sessions of 1 hour.
- 15 hours of seminars and group work: to complete the practical activities of each block and especially for the preparation of block 4.
- 66 hours of personal study: at a rate of 4 hours per week during the semester, to prepare work, tgo solve exercises, study theory, etc.
- 6 hours of control tests (3 controls of 2 hours), which will be carried out (approximately) in the weeks: 3rd, 7th and 12th.

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At this computation of 150 hours will be added 3 hours of global evaluation test, in two calls.

The dates of the global evaluation tests will be those published officially at http://www.eupla.unizar.es/asuntos-academicos/examenes. Its duration is not included in the calculation of the 150 hours.

The topics of Block 4 (Themes 11, 12, 13 and 14) will be assigned during the development of Block 2 (4th to 7th weeks), being carried out until the end of the 11th week and the exhibition during the final weeks (13th to 15th). More details will be specified along the course.

4.5.Bibliography and recommended resources