30307 - Basic principles of electronics

Información del Plan Docente

Academic Year	2016/17
Academic center	110 - Escuela de Ingeniería y Arquitectura
Degree	438 - Bachelor's Degree in Telecomunications Technology and Services Engineering 330 - Complementos de formación Máster/Doctorado
ECTS	6.0
Course	XX
Period	Indeterminate
Subject Type	Basic Education, ENG/Complementos de Formación
Module	---

1.Basic info

1.1.Recommendations to take this course

It is recommended that students have taken the course " Circuits and Systems " of first semester .

1.2.Activities and key dates for the course

The subject is taught in the second semester of the first year of the degree . The exact dates of beginning and end of classes and the dates of completion of laboratory practice , delivering works and exams will be published at the beginning of the course, according to the timetables set by the Centre.

2.Initiation

2.1.Learning outcomes that define the subject

The student, overcoming this subject, achieved the following results:
- **RA1** - The student is able to describe, define and explain the basics of electronic circuits, physical principles of semiconductors and logic families as well as electronic and photonic devices and materials technology.
- **RA2** -The student is able to select and use the physical principles of electronic circuits and semiconductors in solving problems of engineering.
- **RA3** -The student is able to perform circuit mounting in the laboratory and perform measures on them. He/She c an solve efficiently the debugging in simple electronic systems and can use laboratory instruments smoothly and efficiently.
- **RA4** - The student is able to use and explain datasheetss and specifications of electronic devices presented.
- **RA5** -The student is able to plan group work, identifying goals and managing time and tasks.

2.2.Introduction

The subject " Fundamentals of Electronics" is part of basic training block in Electronics , Circuits and Systems .
It is an obligatory subject of 6 ECTS which aims to provide knowledge and skills related to basic electronic fundamentals to the graduate in Engineering Technology and Telecommunication Services . It should also serve as a theoretical and methodological basis for all other electronic matters in upper courses .

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3.Context and competences

3.1.Goals

The subject and its expected results meet the following approaches and objectives:
The overall objective of this course is to provide students with basic knowledge of electronics, as well as to present the usual terminology and enable them to analyze simple electronic circuits. For this purpose, the most common electronic devices are presented, first studying their inner workings. Following the most representative stages of each device are presented and, finally, the methodology for the analysis of electronic devices based on those electronic stages is introduced.

3.2.Context and meaning of the subject in the degree

The course is part of the basic initial formation called "Electronics, Circuits and Systems" covering basic skills and general education of the degree in Engineering Technology and Telecommunication Services. This qualification enables the profession of technical engineer of telecommunications in the specific technologies of telecommunication systems, telematics, electronic systems and sound and image. Th e four itineraries share 60 credits of basic training module to which this course belongs.

3.3.Competences

General / Transversal competences of the degrees of Engineering Ebro River Campus:
1. Ability to solve problems and make decisions with initiative, creativity and critical thinking.
2. Ability to work in a multidisciplinary group and in a multilingual environment.
3. Capacity of information management, handling and application of technical specifications and legislation necessary for the practice of engineering.
Basic training skills:
4. Understanding and mastery of basic concepts of linear systems and related functions and transforms, theory of electrical circuits, electronic circuits, physical principles of semiconductors and logic families, electronic and photonic devices, materials technology and its application to solve engineering problems.

3.4.Importance of learning outcomes

Knowledge and understanding of Electronics are essential for the exercise of the capacities of a graduate in Engineering Technology and Telecommunication Services, so that the skills acquired in this course will be useful for the academic training.
In a society in which Electronics is a "cornerstone", the concepts explained in this course allow students begin to understand the technological bases and operation of multiple electronic devices around us.
The experimental laboratory training is irreplaceable for the graduate in Engineering Technology and Telecommunication Services and allows the student to bring the theoretical concepts to the reality of experimental set-ups approaches. The subject "Fundamentals of Electronics" gives the necessary bases to successfully undertake other electronic related subjects taught in the career.

4.Evaluation

This subject has a cathegory of exceptionality of continuous assessment in the practical part, which implies the obligation of attendance and monitoring by the student. Therefore, the rating on this activity moves to global grade without resit possibility. Such practical part includes two interrelated activity evaluations:
AE1. Delivery of results of practical work, with preparatory instances of the contents of practical sessions.
Its value will be 10% of the final grade for the course.

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This activity covers the learning outcome RA2, RA3, RA4 and RA5.
AE2. Evaluation of development and results of the practice session.
Evaluation criteria will be based on the following aspects:
- Order, disposition and mounting of circuit components.
- Correct use and handling of laboratory instruments
- Ability for localization and correction of errors in the mounted circuits
- Check of results based on circuit operations explained in the lectures.
Its value will be 25% of the final grade for the course.
This activity covers learning outcomes RA3, RA4 and RA5.
On the dates indicated by the Centre as days of global evaluation of the course, a written test covering the contents of the program subject that appears in the "Activities and resources," separated into two evaluation activities that present a minimum grade to be held to pass the course:
AE3. Questionnaire with fundamental theoretical and practical questions.
The qualification criteria evaluates reasoning ability of student on electronic stages with specific applications.
Its value is 30% of the final grade for the course with a minimum grade that must be passed of 2.5 out of 10 points.
This activity covers learning outcomes RA1 and RA2.

AE4. N umerical resolution of practical exercises applied to more complex electronic circuits.
The qualification criteria will assess the student's ability to use a methodology hypothesis in the resolution and verification of exercises.
Its value is 35% of the final grade for the course with a minimum grade that must be passed of 2.5 out of 10 points.
This activity covers learning outcomes RA1 and RA2.
The final grade for the course will be calculated as:
0.1xAE1+0.25xAE2+0.3xAE3+0.35xAE4
If the minimum grades, in any of the sections of the theoretical and practical examination corresponding to the AE1 (practical work) and AE2 (laboratory practicess) scores, are not passed then their scores are not added to the final grade, being then the subject grade calculation:
0.3xAE3 + 0.35xAE4
The subject is overcome with a totall rating of 5 out of 10.
GLOBAL TEST (OFFICIAL CALLS)
Overall student assessment will be made by the following tests:
- Theoretical-practical exam: scores of 0 to 10 points (65%). This test matches AE3 and AE4 activities.
- Laboratory examination: rating from 0 to 10 points (25% if presented the evaluation activity AE1, or 35% if not submitted such evaluation activity throughout the course).
The exam will consist of the implementation of similar circuits developed during the course in laboratory practice sessions. D esign methodology, the circuit operation and management of laboratory instruments will be valued.
Due to preparation needs of the associated logistics of the laboratory test, in order to attend the test it is necessary that the student solicitude to be made within the time limit that will be communicated in class.
The overall rating of the course will be:
0.1xAE1+0.25xAE2+0.3xAE3+0.35xAE4; if the student has passed the evaluation activity AE1, or it will be:
0.35xAE2 + 0.3xAE3 + 0.35xAE4; if the student has not passed AE1 evaluation activity.

If the minimum grades, in any of the sections of the theoretical and practical examination corresponding to the AE1 (practical work) and AE2 (laboratory practicess) scores, are not passed then their scores are not added to the final grade, being then the subject grade calculation:

0.3xAE3 + 0.35xAE4
The subject is overcome with an overall rating of 5 out of 10.

5.Activities and resources

5.1.General methodological presentation

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The proposed methodology seeks to promote the continued work of the student.
Activities with the whole class group, divided into lectures and classroom practices in which application problems are solved in the field of telecommunications. T he student participation in these activities is sought. In parallel, the student must perform work study staff for better utilization of classes.
Laboratory practices are obligatory and distributed throughout the semester. Their assessment will form part of the final grade for the course. G roups of two students are formed to work on each laboratory assembly and to prepare at home the practical preparatory work.
The autonomous work, studying the matter and applying it to solving exercises, is essential in the process of student learning to overcome evaluation activities.
The material for the development of the subject will be available in the virtual platform "Moodle" from the University of Zaragoza from which students can download the following documents:
Presentation of the subject including: contact details of teachers, tutoring schedules, teaching, practice and evaluation dates; qualification criteria of the different assessment activities; description of the objectives and program of subject and the most relevant bibliographic references.
- Slides of lectures (preparation of evaluation activities AE1, AE2, AE3 and AE4).
- Scripts of the practical sessions, descriptive guide of instrumental laboratory and tutorial of simulation program required for evaluation activities AE1 and AE2.
- Collection of datasheets of the main components of the practical sessions used in the evaluation activity AE2.
- Collection of theoretical and practical questions to support AE3 evaluation activity.
- Collection of problems to support the evaluation activity AE4.
- Collection of Examinations of previous courses with solutions, as support for activities AE3 and AE4.

5.2.Learning activities

1- Lectures (30 hours in-person)
In this activity, fundamental contents of the subject are exposed and done in the classroom .

2- Classroom Practice (15 hours in-person)
In this activity they are resolved in a participatory manner some implementation problems. Pupils are encouraged to resolve prior to the class on their own the problems that will be indicated by the teacher.
3- Laboratory (15 hours in-person)
The labs in this subject have exceptionality of continuous assessment, which implies the obligation of assistance and monitoring by the student. Therefore, the rating on this activity moves to global grade without resit possibility. Students have practical scripts provided in advance by the department, containing a description of the circuit mountings and guidelines for the development of the activity. In order of due use of the session, the student needs to go to class laboratory practice properly prepared. The laboratory is a ambient which is not familiar for first-year students, who must learn to maintain a necessary attitude of seriousness, prudence and observance.

4- Practical work (5 hours not in-person)
These works , with preparatory instances of the contents of practical sessions, will be not in-person studies within the practice group .
5- Study and personal work (80 hours not in-person)
It is very important that students develop steadily, and distributed throughout the semester , the personal studio and problem solving works .
6- Tutoring (in-person)

Time to attend the teacher to solve the subject doubts of the student. For this, the student has a tutoring schedule .
7- Evaluation (5 hours in-person)
In addition to its qualifying function , the evaluation is also a learning tool with which the student tests the degree of understanding and assimilation that has reached in the matter.

5.3.Program

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Theoretical contents:

Item 1. Previous knowledge
Item 2. Semiconductors . D iodes
Item 3. BJT Transistor
Item 4. FET Transistor
Item 5. Operational Amplifier
LABORATORY PRACTICE PROGRAM AND PRACTICAL WORK:
1. Introduction to Electronics Laboratory .
2. I nput and output impedances . Audio amplifier I
3. D iodes and BJT in switching . A udio amplifier II .
4. Audio amplifier III (amplifier stage with BJT)
5. Audio amplifier IV . A udio amplifier V. MOS transistor .
6. Operational Amplifier . Audio amplifier VI

5.4.Planning and scheduling

Lecture and problem classes and practice sessions in the laboratory are held according to schedule set by the center and published prior to the start date of the course. Each teacher initially inform the tutoring schedule . The other activities will be planned depending on the number of students and will be announced in good time .

5.5.Bibliography and recomended resources

N. R. Malik - *Circuitos Electrónicos: análisis, simulación y diseño* . Madrid, Prentice-Hall, 1996.

J.Mira, A.E.Delgado, S.Dormido, M.A.Canto - *Electronica Digital* . 2ª edición, Ed Sanz y.Torres SL, 2001

Ll.Prat - *Circuitos y dispositivos electrónicos, fundamentos de electrónica* . Edicions UPC, 1994.

M.H.Rashid - *Circuitos Microelectrónicos. Análisis y diseño* . Ed.Thomson, 2002

Savant, Roden, Carpenter - *Diseño Electrónico* . Prentice Hall - 3ra. Ed. 2000

N.Storey - *Electrónica. De los sistemas a los componentes* . Wilmington, Delaware, Addison-Wesley, 1995.