Universidad Zaragoza

Year : 2019/20

30311 - Analog Electronics

Syllabus Information

Academic Year: 2019/20
Subject: 30311 - Analog Electronics
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 438 - Bachelor's Degree in Telecomunications Technology and Services Engineering
581 - Bachelor's Degree in Telecomunications Technology and Services Engineering
ECTS: 6.0
Year: 2
Semester: 438 - Second semester
581 - 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

Learning process will be developed through three main aspects: lectures, exercises solving and laboratory sessions, activities that will demand an increasing involvement from the students.

These activities will be supported by a recommended bibliography to be completed with some complementary materials that will be available in the virtual platform "Moodle" of the University of Zaragoza, from which the students will be able to download them.

These complementary materials will include different documents like, for example, the following ones:

- Presentation of the subject: showing contact data of the teacher, the description of the objectives and contents of the program, timetables of tutorials, scheduling of classes, dates of laboratory sessions, evaluation criteria and recommended bibliography.

- Conceptual schemes and drawings,

- Manuals for laboratory sessions

- Notes about Power Electronics,

- Collection of exams of past courses.

4.2.Learning tasks

Classroom activities (M1 and M8) will be developed, as stated by the EINA scheduling, in different sessions covering three hours a week, including theoretical (M1) and practical (M4: questions and problem solving) activities.

On the one hand, M1 activities will present and develop the basic concepts and techniques related to the items proposed in the program.

On the other hand, M8 activities will be oriented to resolve some questions and problems proposed in previous exams about the subject, once individually analysed by the pupils, whose activity in these tasks will be adequately motivated and reinforced.

Laboratory activities (M9) will be developed in two hours and a half sessions every other week, so that there will be six of them in the semester, one every fortnight, according to the schedule stated by the EINA.

The personal concern of the pupils in the preparation and development of these activities will be of prime importance to adequately profiting them, a point to be systematically underlined by the professor.

The preparation by the pupils of laboratory activities must be individual, notwithstanding its development in groups of two, depending on the facilities of the laboratory where the activities are to be developed.

A systematic autonomous work of each pupil will be determinant in having a profitable return of his/her learning activities.

4.3.Syllabus

The classroom activities (M1 and M4) will cover a total of 45 hours to the lecturing activities of the proposed subject program.

This program is structured in several thematic blocks and sessions as follows (the amount of lecturing hours tentatively assigned to each of them are shown in brackets: M1+M4):

Classroom activities

INTRODUCTION (1+0=1)

Electronic systems: a block diagram.

Systems and Electronics: a classification.

A) ANALOGUE SIGNALS PROCESSING (19+15=34):

A1.- ELECTRONIC FEEDBACK (3+1=4)

Basic concepts, parameters, types and topologies. Effects.

A.2 - OPERATIONAL AMPLIFIER (2+0=2)

Structure, characteristics and limitations. Ideal operational amplifier.

A3.- IDEAL OPERATIONAL AMPLIFIER (OA) CIRCUITS (14+14=28)

Basic amplifying, calculating and filtering circuits. Instrumentation and conversion basic blocks. Comparators, signal generators and oscillators: basics.

B) ENERGY PROCESSING (7+3=10):

B1.- ELECTROTECHNICAL BASICS (2+0=2)

Energy sources and energy conversion. Power electronic devices.

B2.- ENERGY CONVERSION SYSTEMS (5+3=8)

Conversion types. Conversion blocks: a classification. Power amplifiers and energy conversion. Radiofrequency applications.

Then, M1 classroom activities will tentatively cover about two-thirds of the assigned hours and the remaining third will be spent in M4 practical activities (questions and problem solving).

However, the aim is to transfer to M8 activities some of the hours tentatively assigned to M1 activities, depending on pupils' assimilation of the presented concepts and techniques.

Finally, the laboratory sessions, two hours and a half long as previously stated will be developed in due synchronization with classroom activities, covering

The implementation and characterization of basic blocks presented in classroom lecturing.

Laboratory activities

1 - Operational amplifier without and with feedback

Characterization of the transfer function of circuits based on an operational amplifier without or with feedback.

2 - Operational amplifier basic circuitsDesign, assembly and analysis of the following circuits based on an operational amplifier:The inverting operational amplifierThe non-inverting operational amplifierThe summing amplifierThe voltage subtractor amplifier3 - Filtering and instrumentation stages with operational amplifierDesign, assembly and analysis of the following circuits based on an operational amplifier:The differential amplifierThe integrator amplifierThe instrumentation amplifierThe voltage-to-current converterThe current-to-voltage converter4 - Waveform generating stages with operational amplifierDesign, assembly and analysis of the following circuits based on an operational amplifier:The astable multivibrator The waveform generatorThe voltage-to-frequency converterThe Wien bridge oscillator5 - AM radio transmitterAssembly and analysis of an AM transmitter stage (preamplifier, oscillator and mixer) based on bipolar transistors. 6- AM radioreceptor and power amplifierAssembly of an AM tuner-demodulator and a complementary simmetry amplifier output stage

4.4.Course planning and calendar

They will be as stated by the EINA

4.5.Bibliography and recommended resources

http://biblos.unizar.es/br/br_citas.php?codigo=30311&year=2019