29818 - Analogical Electronics

Información del Plan Docente

Academic Year	2016/17
Academic center	110 - Escuela de Ingeniería y Arquitectura 326 - Escuela Universitaria Politécnica de Teruel
Degree	440 - Bachelor's Degree in Electronic and Automatic Engineering 444 - Bachelor's Degree in Electronic and Automatic Engineering
ECTS	6.0
Course	2
Period	Second semester
Subject Type	Compulsory
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation
- The course will be based on combining theoretical explanations with practical exercises, laboratory work, assignments and a seminar.
- Lectures will provide theoretical background on fundamentals of analog electronic systems.
- Case studies and real applications will be worked out at the classroom.
- The students will do laboratory work in small groups, building and analyzing analog electronic circuits.
- Individual and group assignments will be proposed.
- Student participation is considered very important in order to acquire the learning outcomes and skills needed.

5.2.Learning activities

Classroom activities 2.4 ECTS (60 hours)

1) Course lectures (T1) (30 hours)

The fundamentals of analog electronics including essential background concepts are presented and illustrated with real examples.

2) Case studies (T2) (15 hours)

Different case studies will be worked out at the classroom. Students are encouraged to prepare them in advance. Assignments could also be worked out in this part

3) Laboratory work (T3) (15 hours)

Six laboratory sessions will be carried out. Each session will be evaluated in the laboratory. Students have to prepare sessions in advance.

Personal work: 3.6 ECTS (90 hours)

4) Assignments (T6) (4 hours)

Individual and group assignments will be proposed.

5) Personal study (T7) (82 hours)

Continuous study will be promoted among students. They can also attend tutorials to solve the specific problems they can face in the course.

6) Evaluation activities (T8) (4 hours)

Assessment will be based on coursework (laboratory work and assignments) and final examination.

5.3.Program

Unit 0. Introduction to Analog Electronics

1) Definition

2) Context

3) Functions and Applications

Unit 1. BJT and MOSFET: Dynamic Equivalent Circuits

1) Biasing. Operating Point
2) Signal Coupling
3) Small Signal Analysis
4) Frequency Limitations

Unit 2. Amplification and Feedback

1) Frequency Response
2) Fundamental Amplifier Configurations
3) Coupling between Stages
4) Differential Amplifier
5) Feedback: Characterization and Stability
6) Effects of Negative Feedback

Unit 3. Operational Amplifier (I)

1) Basic Structure. Equivalent Circuit
2) Basic Amplifier Configurations
3) Non-Linear Limitations
4) Current and Voltage Regulation
5) Basic Linear Configurations
6) Non-Ideal Effects
7) Linear Single Supply Configurations
8) Stability Analysis of Voltage Feedback Operational Amplifiers
9) Types of Operational Amplifiers

Unit 4. Voltage Regulators

1) Linear Voltage Regulator

2) Limitations and Parameters
3) Fixed Output Linear Regulator
4) Adjustable Output Linear Regulator
5) Specific Linear Regulators

Unit 5. Operational Amplifier (II)

1) Non-Linear Operation
2) Voltage Comparators
3) Astable, Monostable and Bistable
4) Wave Generation. Voltage to Frequency Conversion
5) Sinusoidal Oscillators
6) Non Linear Single Supply Configurations

5.4.Planning and scheduling

Timetables for classroom and laboratory sessions will be published prior to the beginning of the course at the web of the EINA https://eina.unizar.es/ and EUPT https://eupt.unizar.es/

5.5.Bibliography and recomended resources

- Boylestad, Robert L.. Electrónica : teoría de circuitos y dispositivos electrónicos / Robert L. Boylestad, Louis Nashelsky ; traducción, Rodolfo Navarro Salas ; revisión técnica, Francisco Rodríguez Ramírez . - 10ª ed. México [etc.] : Prentice Hall, 2009
- Circuitos electrónicos : discretos e integrados / Donald L.Schilling...[et al.] . - 3a.ed. Madrid [etc.] : McGraw-Hill, D.L.1994
- Franco, Sergio. Diseño con amplificadores operacionales y circuitos integrados analógicos / Sergio Franco ; traducción Javier Enríquez Brito ; revisión técnica J. M. David Báez López, M. I. Luis Arturo Haro Ruiz . - 1ª ed. en español México D. F. : McGraw-Hill Interamericana, cop. 2005
- Millman, Jacob. Microelectrónica / Jacob Millman, Arvin Grabel . - 6a ed. totalmente actualizada, 1a reimp. Barcelona : Editorial Hispano-Europea, 1993
- 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