

Course guide

340098 - SEDI-D5O10 - Electronic Systems for Design

Last modified: 10/07/2023

Unit in charge: Vilanova i la Geltrú School of Engineering
Teaching unit: 710 - EEL - Department of Electronic Engineering.

Degree: BACHELOR'S DEGREE IN INDUSTRIAL DESIGN AND PRODUCT DEVELOPMENT ENGINEERING (Syllabus 2009). (Compulsory subject).

Academic year: 2023 **ECTS Credits:** 6.0 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: Lopez Garcia, Mariano

Others: Lopez Garcia, Mariano
Gaya Suñer, Pedro Francisco
Chico Villegas, Jose Pascual

PRIOR SKILLS

Autonomous learning and taking initiative in problem solvings are necessary skills in this course

REQUIREMENTS

Students registering in this subject are expected to have the subjects "Equacions Diferencials", "Calcul Avançat" and "Sistemes Elèctrics" from previous semesters passed

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

1. CE11. Knowledge of electronical fundamentals.
9. CE32. Ability to analyze electrical circuits in all possible regimes.

TEACHING METHODOLOGY

Basic and theoretical concepts of electronics are provided by means of class lectures and by means of examples in the form of exercises. As for the lab, students will consolidate the main technical concepts by prototyping electronic circuits.

LEARNING OBJECTIVES OF THE SUBJECT

The aim of this subject is to provide the fundamental knowledge and to show the basics of industrial electronics. It will describe the most important technologies of electronic devices and systems available and it will explain the basic methodologies to analyze analog electronic systems.

At the end of the course students will be able to implement their own electronic prototypes.

STUDY LOAD

Type	Hours	Percentage
Hours small group	15,0	25.00
Hours large group	45,0	75.00

Total learning time: 60 h

CONTENTS

- Module 1 - Introduction to electronic systems.

Description:

Historical approach. Definitions of systems and signals. Introduction to electronic systems. Industrial systems. Electronic instrumentation and control systems.

Specific objectives:

Knowing what an electronic system is and describing some examples of electronic systems.

Related activities:

- Class sessions include examples in the form of exercises
- Lab activity

Lab activity 1: Instrumentation of the Electronics Laboratory

Full-or-part-time: 21h

Theory classes: 6h

Laboratory classes: 2h

Self study : 13h

- Module 2: Discrete components and basic circuit analysis

Description:

Passive elements. Laws of Kirchhoff. Thevenin equivalent circuit. Basic analysis of resistive circuits. Introduction to the diode. Introduction to BJT transistor.

Specific objectives:

To learn the techniques of basic analysis of resistive circuits. To know how to use the basic discrete semiconductors (rectifier and zener diodes, bipolar transistors)

Related activities:

- Class sessions include examples in the form of exercises
- Lab activities

Lab activity 2: Time response of first order systems.

Lab activity 3: AC-DC Power Supply

Full-or-part-time: 47h

Theory classes: 12h

Laboratory classes: 4h

Self study : 31h

- Module 3: Analog Systems

Description:

Amplification. The operational amplifier. Linear and nonlinear applications.

Related activities:

- Class sessions include examples in the form of exercises
- Lab activities

Lab activity 4: Amplifier circuits with Operational Amplifiers

Full-or-part-time: 45h

Theory classes: 12h

Laboratory classes: 2h

Self study : 31h

-Module 4: Electronic systems design

Description:

Description of transformer principle of working and their main design parameters. Design of power sinks. Type of batteries and main features.

Specific objectives:

To know the principle of working of transformers, desing of power sinks and applications of each type of battery based on the features of its application.

Related activities:

- Class sessions include examples in the form of exercises
- Lab activities

Lab activity 5: Design of power sinks.

Full-or-part-time: 45h

Theory classes: 12h

Laboratory classes: 2h

Self study : 31h

GRADING SYSTEM

Knowledge of students about electronics will be evaluated through written exams and lab activities. Theoretical concepts correspond to the 80% weight of student evaluation. As for the lab, the weight is 20%.

Concerning the theory (80%), two written tests will be available, one in the middle of the course and one at the end. The second written test will allow the recovery of the first one. These two tests may be re-evaluated according to School regulations.

Concerning the laboratory (20%), the students will develop guided practical activities and deliver the results of the measures that are expected to be obtained in each of them.

EXAMINATION RULES.

As for the written exams, students can take a scientific calculator, and can use a pencil or black/blue ballpen (the red colour is reserved for teacher corrections and annotations).

Using any kind of electronic device with Internet connection (mobile phone, Tablet, or laptop) according to the current school regulations.



BIBLIOGRAPHY

Basic:

- Thomas, Roland E; Rosa, Albert J. Circuitos y señales : introducción a los circuitos lineales y de acoplamiento. Barcelona [etc.]: Reverté, 1991. ISBN 8429134581.
- Madhu, Swaminathan; Unnikrishnan, R. Linear circuit analysis. Englewood Cliffs, N.J.: Prentice-Hall, 1988. ISBN 0135367158.
- Sedra, Adel S; Smith, Kenneth Carless. Microelectronic circuits. 7th ed. New York: Oxford University Press, 2016. ISBN 9780199339143.
- Floyd, Thomas L. Fundamentos de sistemas digitales [on line]. 11a ed. Madrid: Pearson Educación, 2016 [Consultation: 19/02/2024]. Available on : https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=6120. ISBN 9788490353004.
- Floyd, Thomas L. Principles of electric circuits : conventional current. 10th ed. Harlow, Essex: Pearson, 2022. ISBN 9781292358093.
- Franco, Sergio. Design with operational amplifiers and analog integrated circuits. 4th ed. Boston [etc.]: McGraw-Hill, 2015. ISBN 9780078028168.
- Storey, Neil. Electronics: a systems approach [on line]. 6th ed. Harlow, England ; New York: Pearson Education Limited, 2017 [Consultation: 14/02/2024]. Available on : <https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=5186355>. ISBN 9781292114064.