Course guide
340035 - SIEK-N9O10 - Electronic Systems

Last modified: 18/06/2024

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

Degree: BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Compulsory subject).
BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Compulsory subject).
BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Compulsory subject).

Academic year: 2024 **ECTS Credits:** 6.0 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: Castilla Fernandez, Miguel

Others: Castilla Fernandez, Miguel
Miret Tomas, Jaume
Chico Villegas, Jose Pascual
Varela Barreras, Jorge
Sarria Gandul, David

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 analize 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 electronic systems.

STUDY LOAD

Type	Hours	Percentage
Hours large group	45,0	30.00
Hours small group	15,0	10.00
Self study	90,0	60.00

Total learning time: 150 h

CONTENTS

- Module 1 - Introduction. Resistive circuit analysis

Description:
The electronic system, introduction
Basic concepts, Kirchoff laws
Thevenin and Norton equivalents
Systematic analysis, mesh currents
Systematic analysis, node voltages

Specific objectives:
Knowing and learning how to apply the basic electrical rules so that the behaviour of electronic circuits can be analized and studied

Related activities:
- Class sessions include examples in the form of exercises
- Lab activities (4 sessions)
- Self study (35 hores)
- Evaluation sessions (80 min)

Full-or-part-time: 73h
Theory classes: 22h
Laboratory classes: 8h
Guided activities: 2h
Self study : 41h

Module 2 – Passive systems analysis with RLC

Description:
Solving using differential equations
System in Laplace domain
Solving using Laplace domain
Transfer function
Bode diagrams

Specific objectives:
Know and use the basic mathematical tools to solve circuits with memory elements

Related activities:
- Class sessions include examples in the form of exercises
- Lab activities (3 sessions)
- Self study (30 hores)
- Evaluation Sessions (70 min)

Full-or-part-time: 58h
Theory classes: 14h
Laboratory classes: 6h
Guided activities: 2h
Self study : 36h

Module 3 – Circuits with semiconductor elements

Description:
P-N union, circuits with diodes, rectifiers
Zener diode, regulation and limiting voltage circuits
LED diode, photo-diode and opto-coupler
The transistor, amplifiers, commutation circuits and voltage regulators
The operational amplifier, comparers, active filters
Introduction to the digital world, microcontrollers

Specific objectives:
Know and analyze circuits with the basic electronic components electronic : diodes, transistors and operational amplifiers

Related activities:
- Class sessions include examples in the form of exercises
- Self studyl (24 hores)
- Evaluation sessions (60 min)

Full-or-part-time: 19h
Theory classes: 6h
Guided activities: 1h
Self study : 12h

ACTIVITIES

LAB - Lab Activities

Full-or-part-time: 18h
Guided activities: 12h
Self study: 6h

NP1 - First Midterm Exam

Full-or-part-time: 56h
Theory classes: 18h
Guided activities: 2h
Self study: 36h

NP2 - 2nd Midterm Exam

Full-or-part-time: 47h 50m
Theory classes: 14h 20m
Guided activities: 1h 30m
Self study: 32h

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%.

The evaluation of theoretical concepts consists of two individual written exams: one midterm (Nex1 weighed 40%) and a second midterm exam (Nex2 weighed 40%). In examination Nex2 it will be possible to re-evaluate Nex1.

If the final mark of this course is higher or equal to 2, the theoretical exams will be repeated (re-evaluation). In this case, the value of the final mark will be limited to 7.

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 C. Microelectronic circuits. 7th ed. New York: Oxford University Press, 2016. ISBN 9780199339143.
- Floyd, Thomas L. Principios de circuitos eléctricos. 8a ed. México: Pearson, 2007. ISBN 9789702609674.
- Floyd, Thomas L. ; Buchla, David M. Principles of electric circuits : conventional current. 10th ed. Harlow, Essex: Pearson, 2022. ISBN 9781292025667.
- Franco, Sergio. Design with operational amplifiers and analog integrated circuits. 4th ed. Boston [etc.]: McGraw-Hill, 2015. ISBN 9781259253133.