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340035 - SIEK-N9O10 - Electronic Systems

Coordinating unit: 340 - EPSEVG - Vilanova i la Geltrú School of Engineering

Teaching unit: 710 - EEL - Department of Electronic Engineering

Academic year: 2018

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

ECTS credits: 6 Teaching languages: Catalan, Spanish

Teaching staff

Coordinator: Jaume Miret

Others: Miguel Castilla
Luís García de Vicuña
Mariano López
Jaume Miret

Opening hours

Timetable: Office hours vary each semester according to professor availability.
Check on the EPSEVG web site for more information.

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.

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Study load

Total learning time: 150h	Hours large group:	45h	30.00%
	Hours medium group:	0h	0.00%
	Hours small group:	15h	10.00%
	Guided activities:	0h	0.00%
	Self study:	90h	60.00%

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Content

- Module 1 - Introduction. Resistive circuit analysis

Learning time: 73h

Theory classes: 22h
Laboratory classes: 8h
Guided activities: 2h
Self study : 41h

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

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

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

Module 2 – Passive systems analysis with RLC

Learning time: 58h

Theory classes: 14h
Laboratory classes: 6h
Guided activities: 2h
Self study : 36h

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

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

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

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Module 3 – Circuits with semiconductor elements	Learning time: 19h Theory classes: 6h Guided activities: 1h Self study : 12h

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

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

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

Planning of activities

LAB - Lab Activities	Hours: 18h Self study: 6h Guided activities: 12h
NP1 - First Midterm Exam	Hours: 56h Guided activities: 2h Theory classes: 18h Self study: 36h
NP2 - 2nd Midterm Exam	Hours: 47h 50m Guided activities: 1h 30m Theory classes: 14h 20m Self study: 32h

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Qualification 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 3, the theoretical exams will be repeated (re-evaluation). In this case, the value of the final mark will be limited to 5.

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. Principles of electric circuits : conventional current version. 9th ed. Harlow, Essex: Pearson, 2014. ISBN 9781292025667.

Franco, Sergio. Design with operational amplifiers and analog integrated circuits. 4th ed. Boston [etc.]: McGraw-Hill, 2015. ISBN 9781259253133.