Course guide
340035 - SIEK-N9O10 - Electronic Systems

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: 2023 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

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours large group</td>
<td>45,0</td>
<td>30.00</td>
</tr>
<tr>
<td>Hours small group</td>
<td>15,0</td>
<td>10.00</td>
</tr>
<tr>
<td>Self study</td>
<td>90,0</td>
<td>60.00</td>
</tr>
</tbody>
</table>

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 analyzed and studied

Related activities:
- Class sessions include examples in the form of exercises
- Lab activities (4 sessions)
- Self study (35 hours)
- 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 hours)
- 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 study (24 hours)
- 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 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:**