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: 2017
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: Mariano López

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 both digital and analog electronic systems.

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

<table>
<thead>
<tr>
<th>Study load</th>
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<tbody>
<tr>
<td><strong>Total learning time:</strong> 150h</td>
<td>Hours large group:</td>
<td>45h 30.00%</td>
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<tr>
<td></td>
<td>Hours medium group:</td>
<td>0h 0.00%</td>
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<tr>
<td></td>
<td>Hours small group:</td>
<td>15h 10.00%</td>
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<tr>
<td></td>
<td>Guided activities:</td>
<td>0h 0.00%</td>
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<td></td>
<td>Self study:</td>
<td>90h 60.00%</td>
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### Content

<table>
<thead>
<tr>
<th>- Module 1 - Basic Circuit Analysis (AC and DC)</th>
<th>Learning time: 73h</th>
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<tbody>
<tr>
<td></td>
<td>Theory classes: 22h</td>
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<td></td>
<td>Laboratory classes: 8h</td>
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<td></td>
<td>Guided activities: 2h</td>
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<td>Self study : 41h</td>
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**Description:**
Themes in Module 1:

1.1 Steady-state domain (DC): General and Basic Electrical Rules: Ohm's law, Kirchoff, Thevenin/Norton changes, the superposition theorem, voltage/current dividers, etc.


**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

<table>
<thead>
<tr>
<th>- Module 2: Introduction to DC Power Supplies</th>
<th>Learning time: 58h</th>
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<tbody>
<tr>
<td></td>
<td>Theory classes: 14h</td>
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<tr>
<td></td>
<td>Laboratory classes: 6h</td>
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<tr>
<td></td>
<td>Guided activities: 2h</td>
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<td></td>
<td>Self study : 36h</td>
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**Description:**
Themes of Module 2

2.1 Introducció to Linear DC Power Supplies: Instrument main specifications and basic discrete semiconductors

2.2 Main block sections of DC Power Supply: Voltage Transformation, Rectifiers, Filters and Regulators

2.3. Advanced Features of DC Power Supplies: The use of Bipolar Junction Transistors (BJT) and Operational Amplifiers (OPAMP) in the improvement of output features.

**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:**
To know how to use the basic discrete and integrated semiconductors (rectifier and zener diodes, bipolar transistors and operational amplifiers) and learn their basic operation within a DC power supply.
### Module 3: Introduction to Digital Electronics

**Learning time:** 19h  
- **Theory classes:** 6h  
- **Guided activities:** 1h  
- **Self study:** 12h

**Description:**  
Themes of Module 3

3.1 Introduction to Boolean Algebra and Digital Codification: Boolean techniques and basic digital and numerical representations


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

**Specific objectives:**  
To know the basic digital formats for number representation and to get used to the basic simplification techniques used in combinational circuits.

### Planning of activities

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
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<tbody>
<tr>
<td><strong>LAB - Lab Activities</strong></td>
<td>18h</td>
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<tr>
<td></td>
<td>Self study: 6h</td>
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<tr>
<td></td>
<td>Guided activities: 12h</td>
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<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
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<tbody>
<tr>
<td><strong>NP1 - First Midterm Exam</strong></td>
<td>56h</td>
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<tr>
<td></td>
<td>Guided activities: 2h</td>
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<tr>
<td></td>
<td>Theory classes: 18h</td>
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<tr>
<td></td>
<td>Self study: 36h</td>
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<tr>
<th>Activity</th>
<th>Hours</th>
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<tbody>
<tr>
<td><strong>NP2 - 2nd Midterm Exam</strong></td>
<td>47h 50m</td>
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<td>Guided activities: 1h 30m</td>
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<td></td>
<td>Theory classes: 14h 20m</td>
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<td>Self study: 32h</td>
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340035 - SIEK-N9010 - Electronic Systems

**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%)

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:**