### 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.

### 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
340035 - SIEK-N9O10 - Electronic Systems

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>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Total learning time</strong>: 150h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hours large group:</td>
<td>45h</td>
<td>30.00%</td>
</tr>
<tr>
<td>Hours medium group:</td>
<td>0h</td>
<td>0.00%</td>
</tr>
<tr>
<td>Hours small group:</td>
<td>15h</td>
<td>10.00%</td>
</tr>
<tr>
<td>Guided activities:</td>
<td>0h</td>
<td>0.00%</td>
</tr>
<tr>
<td>Self study:</td>
<td>90h</td>
<td>60.00%</td>
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</tbody>
</table>
### 340035 - SIEK-N9O10 - Electronic Systems

#### Content

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

**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 analyzed and studied

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

**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>LAB - Lab Activities</th>
<th>Hours: 18h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Guided activities: 12h</td>
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<tr>
<td></td>
<td>Self study: 6h</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>NP1 - First Midterm Exam</th>
<th>Hours: 56h</th>
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<tbody>
<tr>
<td></td>
<td>Guided activities: 2h</td>
</tr>
<tr>
<td></td>
<td>Self study: 36h</td>
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<tr>
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<td>Theory classes: 18h</td>
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</table>

<table>
<thead>
<tr>
<th>NP2 - 2nd Midterm Exam</th>
<th>Hours: 47h 50m</th>
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<tbody>
<tr>
<td></td>
<td>Guided activities: 1h 30m</td>
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<tr>
<td></td>
<td>Self study: 32h</td>
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<tr>
<td></td>
<td>Theory classes: 14h 20m</td>
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</table>
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:


