340098 - SEDI-D5O10 - Electronic Systems for Design

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 INDUSTRIAL DESIGN AND PRODUCT DEVELOPMENT ENGINEERING  
(Syllabus 2009). (Teaching unit Compulsory)  
ECTS credits: 6  
Teaching languages: Catalan, Spanish

Teaching staff

Coordinator: Jordi Prat Tasias

Others: Jordi Prat Tasias  
Joaquín del Río

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.
2. CE32. Ability to analyze 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.

**Study load**

<table>
<thead>
<tr>
<th>Total learning time: 60h</th>
<th>Hours large group: 45h</th>
<th>75.00%</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group:</td>
<td>0.00%</td>
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<tr>
<td></td>
<td>Hours small group:</td>
<td>15h</td>
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<tr>
<td></td>
<td>Guided activities:</td>
<td>0h</td>
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</tbody>
</table>
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### Content

<table>
<thead>
<tr>
<th>Module 1 - Introduction to electronic systems</th>
<th>Learning time: 21h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>Theory classes: 6h</td>
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<tr>
<td></td>
<td>Laboratory classes: 2h</td>
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<tr>
<td></td>
<td>Self study: 13h</td>
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</tbody>
</table>

**Description:**
Historical approach. Definitions of systems and signals. Introduction to electronic systems. Industrial systems. Electronic instrumentation and control systems.

**Related activities:**
- Class sessions include examples in the form of exercises
- Lab activity

**Lab activity 1:** Instrumentation of the Electronics Laboratory

**Specific objectives:**
Knowing what an electronic system is and describing some examples of electronic systems.

<table>
<thead>
<tr>
<th>Module 2: Discrete components and basic circuit analysis</th>
<th>Learning time: 47h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>Theory classes: 12h</td>
</tr>
<tr>
<td>Related activities:</td>
<td>Self study: 31h</td>
</tr>
<tr>
<td>- Class sessions include examples in the form of exercises</td>
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<tr>
<td>- Lab activities</td>
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</table>

**Lab activity 2:** Time response of first order systems.
**Lab activity 3:** AC-DC Power Supply

**Specific objectives:**
To learn the techniques of basic analysis of resistive circuits. To know how to use the basic discrete semiconductors (rectifier and zener diodes, bipolar transistors)
## 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%.

Concerning the theory (80%), two written tests will be available, one in the middle of the course and one at the end. The second written test will allow the recovery of the first one. These two tests may be re-evaluated according to School regulations.

Concerning the laboratory (20%), the students will develop guided practical activities and deliver the results of the measures that are expected to be obtained in each of them.

### Qualification system

<table>
<thead>
<tr>
<th>Module 3: Analog Systems</th>
<th>Learning time: 45h</th>
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<tbody>
<tr>
<td></td>
<td>Theory classes: 12h</td>
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<tr>
<td></td>
<td>Laboratory classes: 2h</td>
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<tr>
<td></td>
<td>Self study : 31h</td>
</tr>
</tbody>
</table>

**Description:**
Amplification. The operational amplifier. Linear and nonlinear applications.

**Related activities:**
- Class sessions include examples in the form of exercises
- Lab activities

Lab activity 4: Amplifier circuits with Operational Amplifiers

<table>
<thead>
<tr>
<th>Module 4: Digital Systems</th>
<th>Learning time: 45h</th>
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<tbody>
<tr>
<td></td>
<td>Theory classes: 12h</td>
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<tr>
<td></td>
<td>Laboratory classes: 2h</td>
</tr>
<tr>
<td></td>
<td>Self study : 31h</td>
</tr>
</tbody>
</table>

**Description:**
Introduction to Boolean Algebra and Digital Encoding. Boolean Algebra and Basic Numeric Formats
Sequential Systems. Introduction to sequential digital circuits.

**Related activities:**
- Class sessions include examples in the form of exercises
- Lab activities

Lab activity 5: Design and implementation of logical functions.

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

As for the written exams, students can take a scientific calculator, and can use a pencil or black/blue ballpen (the red colour is reserved for teacher corrections and annotations).
Using any kind of electronic device with Internet connection (mobile phone, Tablet, or laptop) according to the current school regulations.

Bibliography

Basic:


