240608 - Electronic Workshop

Coordinating unit: 240 - ETSEIB - Barcelona School of Industrial Engineering
Teaching unit: 710 - EEL - Department of Electronic Engineering
Academic year: 2019
Degree: BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Teaching unit Optional)
BACHELOR'S DEGREE IN MATERIALS ENGINEERING (Syllabus 2010). (Teaching unit Optional)
BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2010). (Teaching unit Optional)
ECTS credits: 4,5
Teaching languages: Catalan, Spanish

Teaching staff
Coordinator: ROSA RODRIGUEZ MONTAÑES
Others: ROSA RODRIGUEZ MONTAÑES - RAFAEL MARTIN LAMAISON URIOSTE

Prior skills
Electronics

Specific
1. Knowledge of electronics fundamentals.

Transversal
2. SELF-DIRECTED LEARNING. Detecting gaps in one's knowledge and overcoming them through critical self-appraisal. Choosing the best path for broadening one's knowledge.

Teaching methodology
All the sessions will be done at the teaching laboratory (Department of electronics). The methodology used will be the so-called PBL Project Based Learning.

Learning objectives of the subject
After following the subject, students will be able to
- design small electronics projects/systems (digital and analog).
- build simple experimental electronic systems (protoboard or solded PCB).
- operate small electronic systems.
- design low complexity PCBs (Printed Circuit Board)
## Study load

<table>
<thead>
<tr>
<th>Total learning time: 112h 30m</th>
<th>Hours large group:</th>
<th>0h</th>
<th>0.00%</th>
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</thead>
<tbody>
<tr>
<td>Hours medium group:</td>
<td>45h</td>
<td></td>
<td>40.00%</td>
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<tr>
<td>Hours small group:</td>
<td>0h</td>
<td></td>
<td>0.00%</td>
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<tr>
<td>Guided activities:</td>
<td>0h</td>
<td></td>
<td>0.00%</td>
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<tr>
<td>Self study:</td>
<td>67h 30m</td>
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<td>60.00%</td>
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## Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Learning time: 7h 30m</th>
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<tbody>
<tr>
<td><strong>Instrumentation</strong></td>
<td></td>
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<tr>
<td><strong>Design of a source of DC voltage</strong></td>
<td></td>
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<tr>
<td><strong>Design of a signal wave generator</strong></td>
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<tr>
<td><strong>Design of a 3D structure based on LEDs</strong></td>
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### Description:

- **Instrumentation**: Review. Basis of internal operation.
- **Design of a source of DC voltage**: Design of a 5VDC.
- **Design of a signal wave generator**: Design of periodical signals based on discrete devices. Timer CI 555, OPAMP.
- **Design of a 3D structure based on LEDs**: Introduction to soldering.

### Related activities:

- Experimental DC source with rectifier, filter and 7805 regulator.
- Experimental work.
- Soldering of a 3D structure with LEDs.
| **Introduction to PIC microcontrollers (Microchip)** | **Learning time:** 45h  
Practical classes: 12h  
Laboratory classes: 6h  
Self study : 27h |
|---|---|
| **Description:**  
Introduction to PIC microcontrollers. Internal architecture. Programming with high level language C.  
**Related activities:**  
Experimental use of PIC16F690 for controlling the 3D structure of LEDs |
| **Bluetooth technology** | **Learning time:** 7h 30m  
Practical classes: 2h  
Laboratory classes: 1h  
Self study : 4h 30m |
| **Related activities:**  
Experimental use of a commercial Bluetooth module. |
| **Control of an external element through Bluetooth** | **Learning time:** 7h 30m  
Practical classes: 2h  
Laboratory classes: 1h  
Self study : 4h 30m |
| **Description:**  
Sending information through Bluetooth modules.  
**Related activities:**  
Experimental control of the on/off state of an external device with Bluetooth. |
| **Solar cell characterization** | **Learning time:** 7h 30m  
Practical classes: 2h  
Laboratory classes: 1h  
Self study : 4h 30m |
| **Description:**  
Introduction to solar cells. Maximum power point.  
**Related activities:**  
Experimental characterization of a solar cell. |
The final mark will be obtained from 4 partial marks derived from experimental small projects performed during the course. This final mark (NFinal) will result from the averaged partial marks (NP1, NP2, NP3, NP4).

\[ N_{\text{Final}} = \frac{(NP1 + NP2 + NP3 + NP4)}{4} \]

There are no exams in the subject.

**Bibliography**