240608 - Electronic Workshop

Coordinating unit: 240 - ETSEIB - Barcelona School of Industrial Engineering
Teaching unit: 710 - EEL - Department of Electronic Engineering
Academic year: 2018
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

Degree competences to which the subject contributes

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></th>
<th>Hours large group:</th>
<th>Hours medium group:</th>
<th>Hours small group:</th>
<th>Guided activities:</th>
<th>Self study:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total learning time:</strong></td>
<td>112h 30m</td>
<td>0h</td>
<td>45h</td>
<td>0h</td>
<td>67h 30m</td>
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<td>40.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>60.00%</td>
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</tbody>
</table>
# 240608 - Electronic Workshop

## Content

<table>
<thead>
<tr>
<th>Instrumentation</th>
<th>Learning time: 7h 30m</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Practical classes: 2h</td>
</tr>
<tr>
<td></td>
<td>Laboratory classes: 1h</td>
</tr>
<tr>
<td></td>
<td>Self study : 4h 30m</td>
</tr>
</tbody>
</table>

**Description:**
Instrumentation review. Basis of internal operation.

<table>
<thead>
<tr>
<th>Design of a source of DC voltage</th>
<th>Learning time: 7h 30m</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Practical classes: 2h</td>
</tr>
<tr>
<td></td>
<td>Laboratory classes: 1h</td>
</tr>
<tr>
<td></td>
<td>Self study : 4h 30m</td>
</tr>
</tbody>
</table>

**Description:**
Design of a 5VDC.

**Related activities:**
Experimental DC source with rectifier, filter and 7805 regulator.

<table>
<thead>
<tr>
<th>Design of a signal wave generator</th>
<th>Learning time: 7h 30m</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Practical classes: 2h</td>
</tr>
<tr>
<td></td>
<td>Laboratory classes: 1h</td>
</tr>
<tr>
<td></td>
<td>Self study : 4h 30m</td>
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</table>

**Description:**
Design of periodical signals based on discrete devices. Timer CI 555, OPAMP.

**Related activities:**
Experimental work.

<table>
<thead>
<tr>
<th>Design of a 3D structure based on LEDs</th>
<th>Learning time: 7h 30m</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Laboratory classes: 1h</td>
</tr>
<tr>
<td></td>
<td>Practical classes: 2h</td>
</tr>
<tr>
<td></td>
<td>Self study : 4h 30m</td>
</tr>
</tbody>
</table>

**Description:**
Introduction to soldering

**Related activities:**
Soldering of a 3D structure with LEDs
## Introduction to PIC microcontrollers (Microchip)

**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.

**Learning time:** 45h
- Practical classes: 12h
- Laboratory classes: 6h
- Self study: 27h

## Bluetooth technology

**Related activities:**
Experimental use of a commercial Bluetooth module.

**Learning time:** 7h 30m
- Practical classes: 2h
- Laboratory classes: 1h
- Self study: 4h 30m

## Control of an external element through Bluetooth

**Description:**
Sending information through Bluetooth modules.

**Related activities:**
Experimental control of the on/off state of an external device with Bluetooth.

**Learning time:** 7h 30m
- Practical classes: 2h
- Laboratory classes: 1h
- Self study: 4h 30m

## Solar cell characterization

**Description:**
Introduction to solar cells. Maximum power point.

**Related activities:**
Experimental characterization of a solar cell.

**Learning time:** 7h 30m
- Practical classes: 2h
- Laboratory classes: 1h
- Self study: 4h 30m
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).

\[ \text{NFinal} = \frac{\text{NP1} + \text{NP2} + \text{NP3} + \text{NP4}}{4} \]

There are no exams in the subject.

**Bibliography**