Course guides
240608 - 240608 - Electronic Workshop

Unit in charge: Barcelona School of Industrial Engineering
Teaching unit: 710 - EEL - Department of Electronic Engineering.
Degree: BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject).
BACHELOR'S DEGREE IN MATERIALS ENGINEERING (Syllabus 2010). (Optional subject).
BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2010). (Optional subject).

Academic year: 2020  ECTS Credits: 4.5  Languages: Catalan, Spanish

LECTURER

Coordinating lecturer: ROSA RODRIGUEZ MONTAÑES
Others: ROSA RODRIGUEZ MONTAÑES

PRIOR SKILLS

Electronics

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
1. Knowledge of electronics fundaments.

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 laboratoty (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>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours medium group</td>
<td>45,0</td>
<td>40.00</td>
</tr>
<tr>
<td>Self study</td>
<td>67,5</td>
<td>60.00</td>
</tr>
</tbody>
</table>

Total learning time: 112.5 h
## Instrumentation

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

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

## Design of a source of DC voltage

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

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

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

## Design of a signal wave generator

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

**Related activities:**
Experimental work.

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

## Design of a 3D structure based on LEDs

**Description:**
Introduction to soldering

**Related activities:**
Soldering of a 3D structure with LEDs

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

Full-or-part-time: 45h
Practical classes: 12h
Laboratory classes: 6h
Self study: 27h

Bluetooth technology

Related activities:
Experimental use of a commercial Bluetooth module.

Full-or-part-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.

Full-or-part-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.

Full-or-part-time: 7h 30m
Practical classes: 2h
Laboratory classes: 1h
Self study: 4h 30m
Design of a battery charger

**Description:**
Introduction to battery chargers. Basic concepts.

**Related activities:**
Experimental control of a battery charger.

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

Design of a printed circuit board (PCB)

**Description:**
Printed Circuit Boards (PCBs). Design and software.

**Related activities:**
Design of a simple PCB (2 sides)

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

GRADING SYSTEM

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.