Course guide
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).
Academic year: 2023  ECTS Credits: 4.5  Languages: Catalan, Spanish, English

LECTURER

Coordinating lecturer: Vicenç Parisi Baradad
Others: Vicenç Parisi Baradad

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 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.

STUDY LOAD

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

Total learning time: 112.5 h
## CONTENTS

### Instrumentation

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

**Full-or-part-time:** 4h 30m  
- Practical classes: 3h  
- Self study : 1h 30m

### Introduction to microcontrollers

**Description:**
Introduction to microcontrollers. Internal architecture. Programming with high level language C.

**Related activities:**
Experimental use of an ATmega328P for controlling the 3D structure of LEDs

**Full-or-part-time:** 9h  
- Practical classes: 6h  
- Self study : 3h

### PWM as a signal generator (Pulse Width Modulation)

**Description:**
Use of the PWM peripheral as a signal generator and as a D/A converter

**Full-or-part-time:** 9h  
- Practical classes: 6h  
- Self study : 3h

### DC motor control

**Description:**
Use of H bridges to control the direction and speed of a DC motor

**Full-or-part-time:** 4h 30m  
- Practical classes: 3h  
- Self study : 1h 30m

### Distance measurement using ultrasound sensors

**Description:**
content english

**Full-or-part-time:** 9h  
- Theory classes: 3h  
- Practical classes: 6h
Line detection with infrared sensors

**Description:**
content english

**Full-or-part-time:** 9h
Practical classes: 6h
Self study : 3h

Development of an autonomous line follower robot

**Description:**
content english

**Full-or-part-time:** 18h
Practical classes: 12h
Self study : 6h

**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).

\[ N_{\text{Final}} = \frac{NP1 + NP2 + NP3}{3} \]

There are no exams in the subject.