| | |
|---|---|
| **Centre** | **University College of Engineering of Vitoria-Gasteiz** |
| **Name of subject** | **26005 – Embedded Systems** |
| **Qualification** | **Degree in Industrial Electronic Engineering and Automatics** |
| **Type** | **Elective** |
| **Credits** | **6 ECTS** |
| **Year** | **4** |
| **Term(s)** | **1st** |
| **Department** | **Electronic Technology** |
| **Language** | **Spanish** |

## Outcomes / Objectives

Microcontrollers, high-level programming, concurrence and communications protocols

## Syllabus

PIC microcontrollers. Study of the architecture and most important peripherals. C development environment. Development toolchain and libraries for handling devices. Concurrent processes. Programming strategies for UART access, data acquisition, state machines. CAN, LIN, USB, TCP/IP communications protocols. Direct study and implementation of simple protocols and those requiring the use of a manufacturer's stack.

# Methodology

### Teaching Method

| Face-to-Face Teaching Hours | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Lectures** | **Seminars** | **Classroom practice** | **Lab. practice** | **Computer sessions** | **Clinical practice** | **Workshops** | **Industrial workshops** | **Field practice** |
| 30 | | | 30 | | | | | |
| **Student Hours of Non Face-To-Face Activities** | | | | | | | | |
| **Lectures** | **Seminars** | **Classroom practice** | **Lab. practice** | **Computer sessions** | **Clinical practice** | **Workshops** | **Industrial workshops** | **Field practice** |
| 15 | | | 75 | | | | | |

# Assessment System

### General criteria

### Clarification regarding assessment

## Compulsory materials

Microcontroller development cards.

## Bibliography

### Basic Bibliography


- "Advanced PIC microcontroller projects in C" Dogan Ibrahim Ed. Newnes
- Especificación LIN http://www.lin-subbus.org/index.php?pid=8&lang=en
- Especificación CAN www.semiconductors.bosch.de/pdf/can2spec.pdf
- Microchip USB Framework MCHPFSUSBMicrochip TCP/IP Stack AN833


### In-depth Bibliography


- AVR308 Software LIN SlaveUSB
- Especificación: http://www.usb.org/developers/docs/usb_20.zip
- USB in a nutshell http://www.beyondlogic.org/usbnutshell/usb-in-a-nutshell.pdf
- "Embedded Software Know It All" Labrosse. Ed. Newness
- "The Art Of Designing Embedded Systems" Ganssle. Ed. Newness


## Websites

- www.microchip.com
- www.embedded.com