

SEMESTER <i>Eight</i>	DEPARTMENT <i>Control Engineering</i>	COURSE TITLE <i>Embedded Systems</i>
COURSE CODE <i>EC803</i>	HOURS 3 UNITS 3	COURSE SPECIFICATIONS <i>Theoretical Content</i>

1- Introduction Embedded Systems

- What is an Embedded System?
- Some Interesting Examples of Embedded Systems
- Embedded Computer Architecture.

2- Advanced hardware Embedded components

- Embedded processors
- Memory types
- Direct memory access "DMA"
- Serial Ports: RS-232, UARTs)
- Adding Peripherals Using SPI
- Adding Peripherals Using I2C
- USB : Introduction to USB, USB Packets, Physical Interface, Implementing a USB Interface.
- Networks : CAN(control area network) , Ethernet: Adding an Ethernet Interface

3- Embedded systems programming using C language)

- Identifier Declaration.
- C Statements, Structures, and Operations.
- Operators and Expressions.
- Logical instructions & Bit Shift Operators.
- Array and pointer
- Working with Emulators and Simulators.
- Working with time: interrupts, counters and timers

4- Building Hardware

- Tools as Development Kits , Measurement Tools, In-Circuit Emulators and Construction Tools.
- Quick Construction: Breadboarding, Wirewrapping,
- Building It: Powering Up for the First Time, Add in the Processor, Some Thoughts on

Debugging, JTAG.

4- Hardware Exercise Programs:

In this topic it must programming embedded systems with c language for many applications such as:

- Keypad test program.
- LCD test program.
- A/D Converter Theory.
- Serial Peripheral Buses.
- Interface to sensor and actuator

References:

1. *John Catsoulis, Designing Embedded Hardware, O'Reilly, 2005*
2. *Ibrahim, Dogan, Advanced PIC microcontroller projects in C: from USB to RTOS with the PIC18F series.2008*
3. *Tim Wilmshurst, Designing embedded systems with PIC microcontrollers:principles and applications , 2007.*
4. *Kirk Zurell, C Programming for Embedded Systems, 2000*