Microprocessor Systems

- 1. Course number and name: 020SMPES3 Microprocessor Systems
- **2.** Credits and contact hours: 4 ECTS credits, 2x1.15 contact hours
- 3. Name(s) of instructor(s) or course coordinator(s): Andre Chkeiban
- **4. Instructional materials**: Course handouts; Technical documents: Microchip 18F2520 data sheet

5. Specific course information

a. Catalog description:

Difference between microprocessors, microcontrollers and DSP – microprocessor architecture; realization of a basic board – Microcontroller architecture (PIC 18F2520) – Implementation of ROM, RAM and DATA EEPROM memory – special registers – addressing modes – inputs/outputs – interrupts – timers – analog to digital converter – asynchronous serial port – read from program memory – comparators – watchdog – sleep mode – Low Voltage Detect – oscillator – configuration words – Design, simulation and realization of microprocessor systems.

- **b. Prerequisites:** 020TEDNI4 Digital Systems Design or 020TEDCI4 Digital Systems Design
- **c. Required** for CCE Telecommunication Networks option students and EE students; **Selected Elective** for CCE Software Engineering option students

6. Educational objectives for the course

- a. Specific outcomes of instruction:
 - Outline the differences between a microprocessor, a microcontroller and a DSP.
 - Analyze the software and hardware operations of a microcontroller.
 - Design organization charts and implement them by structured programming.
 - Program in assembly.
 - Analyze microcontroller data sheets and identify their powers and limitations.
 - Implement inputs/outputs, timers, interrupts, serial port, analog to digital converter, watchdog, sleep mode...
 - Develop and simulate microcontroller-based applications to meet desired functions and needs.

b. PI addressed by the course:

| PI | 2.1 | 2.2 | 2.3 | 2.4 | 2.5 | 3.1 | 3.2 | 6.1 | 6.2 | 7.1 |
|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Covered | X | X | X | X | X | | | | | X |
| Assessed | х | х | X | X | х | X | X | X | X | X |

7. Brief list of topics to be covered

- Difference between a microprocessor, a microcontroller and a DSP (1 lecture)
- Microprocessor internal architecture realization of a basic board (4 lectures)
- PIC 18F2520 internal architecture program memory, data memory special registers
 addressing modes (3 lectures)
- Inputs/outputs Applications on addressing modes and inputs/outputs (+ simulation using Proteus) (3 lectures)
- Interrupts Applications on interrupts (+ simulation using Proteus) (2 lectures)
- Timers Applications on timers (+ simulation using Proteus) (2 lectures)
- Analog to digital converters Applications on analog to digital converters (+ simulation using Proteus) (2 lectures)
- Asynchronous serial port Applications on asynchronous serial port (+ simulation using Proteus) (2 lectures)
- Read from program memory Applications on program memory (+ simulation using Proteus) (2 lectures)
- Comparators Applications on comparators (+ simulation using Proteus) (2 lectures)
- Watchdog sleep mode Applications on watchgod and sleep mode (+ simulation using Proteus) (2 lectures)
- Low Voltage Detect oscillator configuration words (2 lectures)
- Course summary; Q&A session (1 lecture)