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	x	x	x	x	x	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)