Industrial Process and Control

1. **Course number and name:** 020PRNES6 Industrial Process and Control

2. **Credits and contact hours:** 4 ECTS credits, (2 lectures per week) x 1:15.

3. **Instructor's or course coordinator's name:** Elie Renno

4. **Instructional materials:** Professor textbook and practical applications

5. **Specific course information**
   a. **Catalog description:**
      Programmable Logic Controllers (PLC) – Distributed Control Systems (DCS) – Supervisory Control And Data Acquisition (SCADA) – Human Machine Interface (HMI) – Remote Terminal Unit (RTU) - Fieldbus (MODBUS, PROFIBUS, PROFINET, HART) – CPU memory (executive, system, data, program) – Memory types (RAM, ROM, EPROM, EEPROM) - Data type (input, output, digital, analog) – SCADA architecture (field level, automation level, management level) – Intelligent Electronic Devices (IED) – Communication (message, sender, receiver, master, slave, serial, parallel) – Transmission (simplex, duplex, point to point, multipoint, guided, unguided) – Topology (mesh, star, bus, ring, hybrid) – Transmission media (twisted pair, coaxial, patch cable, crossover cable, fiber optic) – Data coding – Operational Block (OB) – Function (FC) – Function Block (FB) – DataBlock (DB) – Scan cycle – Interrupt – MODBUS data types (discrete input, coil, input register, holding register).

   b. **Prerequisites: None**

   c. **Selected elective** for EE students.

6. **Educational objectives for the course**
   a. **Specific outcomes of instruction:**
      - Comprehending the PLC parts and internals; Understanding SCADA and DCS systems.
      - Tackling the notions of networking and communication in industry; Recall on number systems and data types.
      - Mastering the concepts of storage, addressing and debugging in PLCs; Writing a PLC program.
      - Designing and connecting an industrial automation system; simulating and testing the PLC and HMI software.
      - Understanding the Modbus protocol; building and commissioning a hands-on Modbus application.

   b. **PI addressed by the course:**

PI							
Covered							
Assessed							

7. **Brief list of topics to be covered:**
    - PLC Parts and Internals
    - Scada & DCS
    - Networking & Communication
    - Number Systems
    - Storage, Addressing & Debugging in PLCs
    - Writing a PLC Program
    - Design and connection of an automation system
    - Simulation of a PLC program
    - Modbus Protocol