Course Syllabus for “Embedded system design for Industry 4.0”

Industry 4.0 PhD

(years 2022-23 /2023-24)

Course title	Embedded system design for Industry 4.0
Scientific Discipline Sector	ING-INF/01
Hours of instruction	20 hours
CFU	2 CFU
Semester	First semester
Goal	The course aims to provide both a theoretical and practical introduction to embedded systems for IoT and Industry 4.0. After a brief introduction to embedded systems and a rundown of the systems currently available on the market, the flow of HW, FW and SW design will be illustrated. The second part is a laboratory and aims to prepare students for the final project. It will be shown how to create a project, how to manage peripherals and how to interface the board with low-cost sensors and actuators.
Syllabus	Theoretical part 1) Introduction to embedded systems - definitions, general characteristics, fields of application 2) Overview of platforms and systems on the market 3) Hardware, firmware and software design flow 4) Deepening: ARM microcontroller architecture (STM32L5 and Nordic BLE nRF52832). Raspberry Pi – architecture and peripheral Practical laboratory part 5) Peripheral and protocol management (BLE, GPIO, UART, IIC, SPI, PWM) 6) Examples for low-cost sensor and actuator management
Bibliography	Slides provided during the lessons
Examination method	Final project