Syllabus

Course Description

Course Title	Fundamentals of Information Science and Microcontroller Programming
Course Code	42174
Course Title Additional	
Scientific-Disciplinary Sector	IINF-04/A
Language	English
Degree Course	Bachelor in Industrial and Mechanical Engineering
Other Degree Courses (Loaned)	
Lecturers	dr. Davide Carminati, Davide.Carminati@unibz.it https://www.unibz.it/en/faculties/engineering/academic-staff/person/55216
Teaching Assistant	
Semester	First semester
Course Year/s	1
CP	6
Teaching Hours	36
Lab Hours	24
Individual Study Hours	90
Planned Office Hours	18
Contents Summary	- Basics of programming in the C/C++ language - Introductory analog and digital electronics - Introductory motor control and sensor reading - Introduction to computer architecture
Course Topics	The course will introduce basic concepts in information and computer science (hardware and software), particularly those topics of fundamental importance to Engineering and confirm the theoretical learnings in lab projects and class assignments.
Keywords	Electronics, programming, microcontroller

Recommended Prerequisites	
Propaedeutic Courses	
Teaching Format	Frontal lectures and lab and coding exercises.
Mandatory Attendance	Attendance at assigned laboratory sections is required; lecture attendance is very strongly recommended.
Specific Educational Objectives and Learning Outcomes	Intended Learning Outcomes (ILO) Knowledge and understanding Through the application of the principles of Information Science and Microcontroller Programming, students should be able: 1. To know basic software design procedures. 2. To know how to develop simple microcontroller programs. 3. To understand how to interface a microcontroller with simple sensors and actuators. 4. To understand the principles of simple electromechanical systems. Applying knowledge and understanding 5. To apply software design principles, programming, and hardware interfacing in theoretical examples and hands-on laboratory exercises that complement the lectures and sustain arguments. Making judgments 6. To make autonomous judgments on the choice of the right tools such as data types, programming approaches, or electrical components. The labs will also require students to gather and interpret relevant data. Communication skills 7. To correctly and properly present information, ideas, problems, and solutions during the labs. Learning skills 8. To acquire extended skills in Information Science and Microcontroller Programming and be able to use this new knowledge as a solid foundation for further study in more advanced courses in Engineering.
Specific Educational Objectives and Learning Outcomes (additional info.)	
Assessment	Examination of the course is conducted via a written exam and lab. The written exam consists of two parts: i) a part with short

	questions to assess the knowledge and understanding of the theoretical fundamentals of the course topics. ii) a part with exercises on Datatypes and Operations, exercises on the dimensioning of electrical circuits, as well as exercises on code writing. The single experiments of the lab will be examined by i) the correct functionality of the student's own implementation as described in the relative task description ii) the ability of the single students in the lab groups to explain the selected approaches iii) the level of observation of physical processes iv) the overall implementation, documentation, and appearance of the electrical circuit and software code of the selected approach. Formative assessment: Labs: max 8/30 points; ILOs assessed: 1-7; Summative assessment: Written exam: max 25/30 points (3-4 hours); ILOS assessed: 1-4,6,8;
Evaluation Criteria	Written Final Exam: Completeness and correctness of answers. Labs: Completeness and correctness of the student's own implementation, the ability of students to explain the selected approaches, the level of observation of physical processes, and the overall implementation, documentation, as well as appearance of the electrical circuit and software code of the selected approach. Students are required to receive an overall grade of greater than 18/30 points in order to pass the course.
Required Readings	Smith, A. G. Introduction to Arduino: A piece of cake, CreateSpace Independent Publishing Platform, 2011. ISBN: 978-1463698348 Hard copies available in library reserves, or can be downloaded here – http://www.introtoarduino.com/downloads/IntroArduinoBook.pdf Subject Librarian: David Gebhardi, David.Gebhardi@unibz.it and Ilaria Miceli, Ilaria.Miceli@unibz.it
Supplementary Readings	Blum, J. Exploring Arduino: Tools and Techniques for Engineering

	Wizardry, John Wiley & Sons, 2013. ISBN: 978-1-118-54936-0
Further Information	Software used: Arduino IDE freely available at: https://www.arduino.cc/en/software It needs to be installed on the student's personal laptop. The Ubuntu operating system is recommended, but MacOS or Windows with WSL are also acceptable.
Sustainable Development Goals (SDGs)	Quality education