



ELECTRONICS FOR DIGITAL SYSTEMS LAB

Enrollment year	2017/2018
Academic year	2019/2020
Regulations	DM270
Academic discipline	ING-INF/01 (ELECTRONICS)
Department	DEPARTMENT OF ELECTRICAL, COMPUTER AND BIOMEDICAL ENGINEERING
Course	ELECTRONIC AND COMPUTER ENGINEERING
Curriculum	PERCORSO COMUNE
Year of study	3°
Period	2nd semester (02/03/2020 - 12/06/2020)
ECTS	6
Lesson hours	84 lesson hours
Language	Italian
Activity type	WRITTEN AND ORAL TEST
Teacher	VACCHI CARLA (titolare) - 6 ECTS
Prerequisites	Knowledge of the basic laws governing electrical circuits. Principles of Digital Electronics (elementary standard cells, combinatorial and sequential logic, arithmetic circuits, memories). Basics of C language. The student should have some familiarity in using laboratory equipments (oscilloscope, power supply, signal generator).
Learning outcomes	<p>The course is offered to those students intended to deepen their skills in the design of medium-complexity digital electronic systems to be implemented by means of microcontrollers.</p> <p>Methodological aspects are covered as well as the analysis of practical topics which include experimental activities, examples and case studies. As a consequence the examination at the end of the course will ensure that the student has learned methods to describe, simulate and analyze the behavior of a system and that is able to design a digital (or mixed analog/digital) system from specifications.</p>

Course contents	<p>Microcontrollers Internal structure, peripherals, timer, A/D converter, clock oscillators, communication protocols, digital interfaces for sensors and actuators.</p> <p>Interconnections Protocols, connectors, components. Drivers for analog and digital loads, PWM driving of loads, signal conditioning, signal integrity. Asynchronous and Synchronous transmission.</p> <p>Regulators and references Linear regulators and Switching regulators. Voltage and current references. Ground and power distribution.</p> <p>Laboratory Design of a digital system based on microcontroller (C language). Examples of digital functions realized by microcontroller and FPGA. Evaluation boards are available to test the designs.</p>
Teaching methods	<p>Lectures (hours/year in lecture theatre): 22 Practical class (hours/year in lecture theatre): 8 Practicals / Workshops (hours/year in lecture theatre): 54 The lectures are given using slides, with explanations and practice at the blackboard. In the laboratory different problems are introduced, followed by practical exercises with CAD and instruments.</p>
Reccomended or required readings	<p>Notes provided by the professor (italian). Slides used in the lectures, examples of written tests, selected articles, datasheets, reports, application notes, a list of http links containing white papers on the different subjects are available on the course website http://www-3.unipv.it/vacchi/didattica/ESDigLab270.php</p>
Assessment methods	<p>The exam consists of a written (30 min, maximum +2/30 on the final score) and a practical test (2h30 maximum 30/30 on the final score) on microcontrollers. The written test aims at assessing the students' knowledge of the theoretical aspects through numerical exercises, multiple choice questions and the design of small mixed analog/digital systems from their specifications. The practical test will be held in laboratory, to verify the ability to design digital systems in C language . Ability to design systems, being able to choose the most convenient technique, will be evaluated.</p>
Further information	<p>Attendance is highly recommended</p>
Sustainable development goals - Agenda 2030	<p>\$Ibl legenda sviluppo sostenibile</p>