# Syllabus

## *Course Description*

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| **Course Title** | Electronic Systems |
| **Course Code** | 42416 |
| **Course Title Additional** | |
| **Scientific-Disciplinary Sector** | IINF-01/A |
| **Language** | Italian |
| **Degree Course** | Bachelor in Electronics and Cyber-Physical Systems Engineering |
| **Other Degree Courses (Loaned)** | |
| **Lecturers** | Dott. Alessandro Torrisi,<br>Alessandro.Torrisi@unibz.it<br>https://www.unibz.it/en/faculties/engineering/academic-staff/person/49858 |
| **Teaching Assistant** | |
| **Semester** | First semester |
| **Course Year/s** | 3 |
| **CP** | 6 |
| **Teaching Hours** | 36 |
| **Lab Hours** | 24 |
| **Individual Study Hours** | 90 |
| **Planned Office Hours** | 18 |
| **Contents Summary** | Electronic Systems course covers the interconnection between analog and digital electronic circuits, The course provides basics on power supply generation, circuits for digital electronics like oscillators and state machines; microcontroller units and its application, like IoT systems, integration of sensors and networking |
| **Course Topics** | - Power supply generation and distribution: switching mode power supplies and linear regulators, heat management, battery management.<br>- Boolean algebra, combinational logic and sequential logic, |

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| | programmable logic electronics (taxonomy; ALU, PAL, FPGA)<br>- Microcontroller units: architecture, peripherals, signals and bus signal distribution, clock generation and distribution.<br>- IoT systems: sensors, data acquisition and networking (WiFi, Bluetooth, LoRa) |
| **Keywords** | supply,<br>logic circuit,<br>mirocontrollers |
| **Recommended Prerequisites** | Basics of Electronics,<br>Electronic Devices,<br>Fundamentals of Systems and Control |
| **Propaedeutic Courses** | |
| **Teaching Format** | Frontal lectures, exercises, and laboratories |
| **Mandatory Attendance** | Strongly recommended. Non attending students should contact the lecturer at the start of the course to agree on the modalities of the independent study. |
| **Specific Educational Objectives and Learning Outcomes** | Knowledge and understanding :<br>Thanks to training in Electronic Engineering, graduates in Electronic and Cyber-Physical Systems Engineering will be able to:know and understand the fundamental principles, techniques and methods of designing, prototyping and testing basic electronic systems;<br><br>Applying knowledge and understanding:<br>Thanks to training in Electronic Engineering, graduates in Electronic and Cyber-Physical Systems Engineering will be able to:<br>- apply the knowledge of Electronics to analyze and understand the behavior of digital and programmable circuits, using the most appropriate approach;<br>- carry out simple experimental activities on electronic systems, acquiring measurements relating to the system and its behavior.<br><br>Making judgements:<br>The graduate has the ability to judge and discern between different solutions to problems, evaluating the alternatives and methodologies to be applied, regarding fundamental analog and digital electronic circuits.The graduate has the ability to participate in data collection, analysis and the formulation of critical |

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| | judgments and project proposals.<br><br>Communication skills:<br>The graduate is able to communicate, understand and process texts on technical issues. In this case, not only the contents of the essay will be evaluated, but also the candidate's synthesis, communication and presentation skills.<br><br>Ability to learn:<br>The graduate acquires the methodological tools for study and in-depth study, even individual, and possesses the knowledge necessary to deal with subsequent levels of university education (master's degree or first level master's degree). |
| **Specific Educational Objectives and Learning Outcomes (additional info.)** | A student who successfully completes the course will be able to:<br>- design the schematics of basic power supply units introduced in the course including linear and switching mode power supplies;<br>- recognize limitations and trade-off in power supply management techniques, including battery and heat management of the system;<br>- test the design specifications of power supplies, measuring DC voltages and currents with a multimeter, observing the behavior of power supplies with an oscilloscope;<br>- analyze and design basic digital circuits featuring logic gates, flip-flop and oscillators;<br>- recognize architectures of common used digital and programmable logic circuits, including state machines, MCUs and FPGAs;<br>- develop basic applications featuring MCUs, using an industrygrade development IDE (integrated development environment) |
| **Assessment** | Oral exam about 30 min or course project |
| **Evaluation Criteria** | The assessment criteria will be:<br>- the accuracy of the answers given in the oral examination, with particular attention to the resolution procedure adopted and the formal correctness of the same;<br>- the ability to solve design issues presented during the course project and the final evaluation report. |
| **Required Readings** | Tbd |

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| **Supplementary Readings** | Tbd |
| **Further Information** | |
| **Sustainable Development Goals (SDGs)** | Affordable and clean energy, Industry, innovation and infrastructure, Decent work and economic growth |