Syllabus

Course Description

Course Title	Basics of Electronics
Course Code	42438
Course Title Additional	
Scientific-Disciplinary Sector	IINF-01/A
Language	Italian
Degree Course	Bachelor in Electronic and Information Engineering
Other Degree Courses (Loaned)	
Lecturers	Prof. Luisa Petti, Luisa.Petti@unibz.it https://www.unibz.it/en/faculties/engineering/academic-staff/person/39580 dr. Giuseppe Ciccone, Giuseppe.Ciccone@unibz.it https://www.unibz.it/en/faculties/engineering/academic-staff/person/49145
Teaching Assistant	
Semester	First semester
Course Year/s	2
CP	9
Teaching Hours	54
Lab Hours	36
Individual Study Hours	135
Planned Office Hours	27
Contents Summary	· Fundamentals of electrical engineering: electrical quantities, concept of bipoles and quadripoles; ideal and real generators; Kirchhoff's laws. · Resistive circuits and adynamic bipoles: resistive bipoles and Ohm's law; Thevenin's and Norton's equivalent circuits; nodal analysis and circuit simplification; superposition principle. · Dynamic circuits and transient response: introduction to

	dynamic bipoles; first and second order circuits; transient response and time-domain analysis. · Sinusoidal circuit analysis: superposition in AC circuits; multi-frequency circuits and signal decomposition; Thevenin's and Norton's models in AC; nodal analysis in sinusoidal regimes. · Power in sinusoidal mode: instantaneous and average power calculations; root mean square (RMS) values, complex power and power factor considerations. · Biports and circuit interconnections: biports and their characteristics; connection methods and practical applications; analysis of biport circuits in both dynamic and sinusoidal regimes. · Operational amplifiers: principles and working of op-amps; circuit configurations and feedback mechanism; analysis of op-amp circuits in dynamic and sinusoidal conditions. · Frequency response and filters: transfer function and system behaviour; Decibel scale and Bode diagrams; design and analysis of filters. · Circuit simulation with SPICE: introduction to SPICE as a simulation tool; modelling and analysis of electrical components; practical applications in circuit design.
Course Topics	· Fundamentals of electrical engineering: electrical quantities, concept of bipoles and quadripoles; ideal and real generators; Kirchhoff's laws. · Resistive circuits and adynamic bipoles: resistive bipoles and Ohm's law; Thevenin's and Norton's equivalent circuits; nodal analysis and circuit simplification; superposition principle. · Dynamic circuits and transient response: introduction to dynamic bipoles; first and second order circuits; transient response and time-domain analysis. · Sinusoidal circuit analysis: superposition in AC circuits; multi-frequency circuits and signal decomposition; Thevenin's and Norton's models in AC; nodal analysis in sinusoidal regimes. · Power in sinusoidal mode: instantaneous and average power calculations; root mean square (RMS) values, complex power and power factor considerations. · Biports and circuit interconnections: biports and their characteristics; connection methods and practical applications; analysis of biport circuits in both dynamic and sinusoidal regimes. · Operational amplifiers: principles and working of op-amps; circuit configurations and feedback mechanism; analysis of op-amp

	circuits in dynamic and sinusoidal conditions. · Frequency response and filters: transfer function and system behaviour; Decibel scale and Bode diagrams; design and analysis of filters. · Circuit simulation with SPICE: introduction to SPICE as a simulation tool; modelling and analysis of electrical components; practical applications in circuit design.
Keywords	Electrotechnics, Electrical Circuits, Dynamic Circuits, Operational Amplifier, SPICE
Recommended Prerequisites	Mathematical Analysis I + II, Linear Algebra, Physics I
Propaedeutic Courses	
Teaching Format	Frontal lectures at the blackboard + Exercises at the blackboard + Practical Laboratories
Mandatory Attendance	suggested
Specific Educational Objectives and Learning Outcomes	to be filled in by the lecturer
Specific Educational Objectives and Learning Outcomes (additional info.)	
Assessment	Written + oral exam, in addition to further points for practical labs
Evaluation Criteria	Knowledge and understanding The student understands the concept of a circuit model and its fundamental components; the fundamental laws and theorems (including their limits of validity) required for circuit analysis; and the operating principles of the main electronic devices. Applying knowledge and understanding The student is able to apply the acquired knowledge to develop circuit models and analyze electrical and electronic circuits. Making judgements The student is able to select the most appropriate methods and tools introduced in the course to achieve the objectives of modeling and analyzing analog and digital electrical and electronic circuits. Communication skills

	The student is able to present the acquired knowledge and competencies using terminology appropriate to the subject. Learning skills The student is able to use the tools and reasoning techniques acquired during the course to further develop their knowledge independently.
Required Readings	“Circuiti elettrici”, Charles K. Alexander, Matthew Sadiku, Giambattista Gruosso, Giancarlo Storti Gajani.
Supplementary Readings	“Elettronica di Millman”, Jacob Millman, Arvin Grabel, Pierangelo Terreni.
Further Information	
Sustainable Development Goals (SDGs)	Quality education