



CIRCUIT THEORY

Enrollment year	2021/2022
Academic year	2021/2022
Regulations	DM270
Academic discipline	ING-IND/31 (ELECTROTECHNICS)
Department	DEPARTMENT OF ELECTRICAL, COMPUTER AND BIOMEDICAL ENGINEERING
Course	BIOENGINEERING
Curriculum	PERCORSO COMUNE
Year of study	1°
Period	2nd semester (07/03/2022 - 17/06/2022)
ECTS	6
Lesson hours	45 lesson hours
Language	Italian
Activity type	WRITTEN AND ORAL TEST
Teacher	DI BARBA PAOLO (titolare) - 6 ECTS
Prerequisites	Linear algebra, complex numbers, derivatives and integrals, ODE.
Learning outcomes	Knowledge of electrical quantities and units involved in the study of circuits; knowledge of linear one-port systems and their energy properties; knowledge of circuit laws and their numerical implementation; ability to solve simple circuit problems in DC, low and high frequency, in resonance or transient conditions.
Course contents	DC circuits Basic electrical quantities. One-port systems and their voltage-current characteristic. Ohm's law. Power balance. Electric circuits. Nodes and loops. Kirchhoff's laws. Linear circuit analysis. Circuit theorems. AC circuits Capacitor. Inductor. Signals in the time-domain and their representation.

	Circuit analysis in the frequency domain. Phasors. Impedance and admittance. Real, imaginary and complex power. Frequency response of a passive one-port system. Resonance. Two-port systems. Circuit analysis in the time-domain Analysis of a linear circuit of the n-th order. Natural frequencies, initial values, transient state and steady-state. Linear circuits of the first order. Linear circuits of the second order.
Teaching methods	The lectures are held with the help of blackboard and slide based presentations. The slides are made available to students. Numerical exercises and tutorials are organized too.
Reccomended or required readings	C.A. Desoer, E.S. Kuh. Fondamenti di teoria dei circuiti. Franco Angeli, Milano. A. Savini. Argomenti di elettrotecnica con esercizi. Ed. Spiegel, Milano.
Assessment methods	The final examination consists of a written test and a voluntary interview. The written test consists of two numerical exercises.
Further information	The final examination consists of a written test and a voluntary interview. The written test consists of two numerical exercises.
Sustainable development goals - Agenda 2030	\$lbl_legenda_sviluppo_sostenibile