Electric Science AB

Finalità
This course aims at providing basic knowledge of electric science as propaedeutics to other teachings

Programma
Electric Science A
Analysis of DC electric circuits
From Maxwell field theory to lumped parameters circuits. Fields, charge and current.
Kirchhoff’s current and voltage laws.
Node and loop analysis.
Network theorems. Thevenin’s and Norton’s theorem. Maximum power transfer theorem.
Stationary magnetic field: magnetic circuit, inductance coefficient.
Constant electric field: capacitance coefficient.
Quasi-stationary electromagnetic field: dB/dt and dD/dt effects, assumptions' validity. Stray inductance and capacitance.
Electric circuits transient analysis in time domain.
Analysis of AC electric circuits
Phasor representatives of sinusoidal signals.
Steady-state circuit analysis using phasors.
Sinuosoidal steady-state power calculations.
Analysis of Three-Phase circuits.

Electric Science B
Transfer functions. Frequency response of linear circuits. Bode Plots.
First and second order filters.

Analysis of electric circuits in case of voltage and current dependent sources: node and loop analysis, Thevenin’s and Norton’s theorem.

Two-port systems: impedance, admittance and hybrid parameters, voltage and current gains. Different connections.

Electric circuits transient analysis in Laplace domain.

Magnetically coupled circuits: equations, reflected impedance. Transformers.

Modalità d'esame
A written text, and a verbal test.

Propedeuticità
Mathematics, Calculus, Physics.

Testi consigliati
Alexander, Sadiku, “Electric Circuits, McGraw Hill, 2000.
I.D. Mayergoyz, W. Lawson, “Elementi di teoria dei circuiti”, UTET.
R.C. Dorf, J.A. Svoboda, “Circuiti elettrici”, Apogeo, Milano.