

Circuit basics



Component

École Nationale
Supérieure
d'Électrotechnique
d'Électronique
d'Informatique
d'Hydraulique
et des
Télécommunications

In brief

- > **Amety's Code:** N5AE03B
- > **Open to exchange students:** No

Presentation

Objectives

Become familiar with the description, composition, and topologies of linear electrical circuits, as well as the characteristic relationships of linear passive components. Master the use of Kirchhoff's laws in circuits and the characteristic equations of linear components. Understand the derivation of first- and second-order differential equations for first- and second-order circuits, as well as the corresponding responses in any time domain and in steady-state sinusoidal conditions. Be aware of international standards in writing and notation.

Description

- 1) Basic concepts: electrical circuits – Electrical quantities and SI units – Kirchhoff's laws – Basic electrical signals
- 2) Circuit elements: characteristic relationships – Linear or linearized model – Current/voltage/power relationship – Electrical or magnetic energy storage
- 3) First-order circuit: general equation – steady-state solution – DC and AC solutions – steady-state sinusoidal solution – Complex notation – Spectral representation

- 4) Second-order circuit: general equation – solution for steady state – solution for DC and AC regimes – solution for steady sinusoidal regime – Complex notation – Spectral representation – Resonances
- 5) Laplace transform applied to the study of circuits in any time regime