

EE-405

Fundamentals of electrical circuits and systems

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Cursus	Sem.	Type
Energy Science and Technology	MA1	Opt.

Language of teaching	English
Credits	4
Session	Winter
Semester	Fall
Exam	Written
Workload	120h
Weeks	14
Hours	4 weekly
Courses	2 weekly
Exercises	2 weekly
Number of positions	

Summary

This course provides an overview of fundamental concepts of signal processing and electric circuits.

Content

Part 1: Signal Processing

What is a signal: typology

Analysis and synthesis of deterministic signals

Projection theorem

Fourier series

Fourier Transform

Sampling, quantization and reconstruction

Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT)

Part 2: Fundamentals of Electric Circuits

Electrical circuit

Usual quantities (Charge, current, voltage, power and energy)

Usual circuit elements (Resistance, capacitance, inductance, voltage and current sources)

Kirchhoff's laws

Fundamental Theorems (Superposition, Thévenin, Norton, Maximum Power Transfer)

Analysis Methods (Nodal Analysis, Mesh Analysis)

Circuit in Sinusoidal Regime (Phasors, impedance)

Three-Phase Circuits

Transients Analysis

Teaching methods

Ex cathedra lectures, exercise and lab sessions

Assessment methods

Written exam

Resources**Bibliography**

Part 1:

John G. Proakis and Dimitris G. Manolakis, «Digital Signal Processing», Prentice Hall, 2007

Part 2:

Charles K Alexander and Matthew Sadiku, «Fundamentals of Electric Circuits», Mc Graw Hill, 2017

Ressources en bibliothèque

- [Digital Signal Processing / Proakis](#)
- [Fundamentals of Electric Circuits / Alexander](#)