EE-405   Fundamentals of electrical circuits and systems

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Cursus	Sem.	Type
Energy Science and Technology	MA1, MA3	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 Transfrom (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 All, 2007

Part 2:
Charles K Alexander and Matthew Sadiku, «Fundamentals of Electric Circuits», Mc Grew Hill, 2017

Ressources en bibliothèque

- Digital Signal Processing / Proakis
- Fundamentals of Electric Circuits / Alexander