EE-406 & EE-407
Fundamentals of Electrical Circuits and Systems I & II

Prof. Jean-Philippe Thiran
Prof. Farhad Rachidi

Section of Electrical Engineering

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EPFL

General information

Main objectives of the two courses EE-406 & EE-407

- Acquire/recall the bases of systems
  - Linear Time-Invariant (LTI) Systems
  - The Frequency Response & Fourier techniques
  - Laplace Techniques for LTI Systems

- Acquire/recall the bases of electric circuits
  - Basis quantities and fundamental theorems
  - Circuit analysis methods
  - Phasors
  - Three-phase circuits
  - Transient analysis

Table of Content

- EE-406: Systems
  - Signals & Systems: Definitions (1 lecture)
  - Linear Time-Invariant (LTI) Systems (2 lectures)
  - The Frequency Response of Stable LTI Systems (2 lectures)
  - Fourier Techniques for Stable LTI Systems (2 lectures)
  - Laplace Techniques for LTI Systems (2 lectures)

- Prerequisites :
  - Analysis

Table of Content

- EE-407: 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

Organization of the course

- 4h per week:
  - Tuesday 1:15pm - 5:00pm
  - Lectures, exercises and lab sessions
    - EE-406 : Sept 9 - Oct 28
    - EE-407 : Nov 4 - Dec 16

- Evaluation:
  - EE-406: 100% exam - on November 18th at 1:15pm in BC02
  - EE-407: 70% exam (during the winter session), 30% LTSpice simulations

Agenda 2025

- EE-406 - Prof. Jean-Philippe Thiran

09.09 @ 1:15pm	Lecture 1	Introduction - systems
09.09 @ 3:15pm	Lecture 2	Linear Time-Invariant Systems
16.09 @ 1:15pm	Lecture 3	Linear Time-Invariant Systems
16.09 @ 3:15pm	Ex 1	Linear Time-Invariant Systems
23.09 @ 1:15pm	Lecture 4	Fourier methods for stable LTI systems
23.09 @ 3:15pm	Lecture 5	Fourier methods for stable LTI systems
30.09 @ 1:15pm	Ex 2	Fourier methods
30.09 @ 3:15pm	Ex 2 (cont'd)	Fourier methods
07.10 @1:15pm	Lecture 6	Frequency Response of stable LTI Systems
07.10 @3:15pm	Ex 3	Frequency Response of stable LTI Systems
14.10 @ 1:15pm	Lecture 7	Transfer Function & Laplace Transform
14.10 @ 3:15pm	Ex 4	Transfer Function & Laplace Transform
28.10 @ 1:15pm	Lecture 8	Transfer Function & Laplace Transform
28.10 @ 3:15pm	Ex 5	Transfer Function & Laplace Transform

Agenda 2025

- EE-407: Prof. Farhad Rachidi (1/2) - Provisional

04.11 @1:15-4:00	Lecture	Introduction, Basic concepts - circuit elements
04.11 @4:15-5:00	LTSpice	LTSpice Exercise 1: Introduction to LTSpice
11.11 @1:15-3:00	Lecture	Kirchhoff's laws, Fundamental theorems
11.11 @3:15-5:00	Exercises	Problem Sets 1 and 2
18.11 @3:15-4:00	Lecture	Nodal analysis, Mesh analysis
18.11 @4:15-5:00	LTSpice	LTSpice Exercise 2 : DC Analysis
25.11 @1:15-3:00	Lecture	Sinusuoidal regime: phasors, impedance, admittance
25.11 @3:15-5:00	Exercise, LTSpice	Problem Set 3, LTSpice Exercise 3: Impedance

Agenda 2025

- EE-407: Prof. Farhad Rachidi (2/2) - Provisional

02.12 @1:15-3:00	Lab Session	Circuits in sinusoidal regime
02.12 @3:15-4:00	Lecture	Sinusuoidal regime: Thévenin/Nortpon equivalents, Active and reactive power
02.12 @4:15-5:00	Exercise, LTSpice	Problem Set 4, LTSpice Exercise 4: Cos phi
09.12 @1:15-4:00	Lecture	Three-phase circuits 1
09.12 @4:15-5:00	Exercise	Problem Set 5
16.12 @1:15-3:00	Lecture	Three-phase circuits 2
16.12 @3:15-5:00	Exercise, LTSpice	Problem Sets 6, 7, 8, LTSpice Exercise 5: 3-phase