

IDENTIFICATION

Course code : E2CP3PC1
ECTS : 2.5

DURATION

Lectures : 12
Tutorial classes : 14
Labs : 8
Total : 34

Project :
Personnal work :

ASSESSMENT

2 Written exams (2h/2h) + 1 Lab report

TEACHING MATERIALS

Slides + tutorial booklets + lab work book-lets available on Moodle

LANGUAGE

English

CONTACT

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UE : PHYSIQUE-CHIMIE

COURSE : Electricity II

SCOPE OF THE COURSE

OBJECTIVES

Study of linear electric circuits in quasi-stationary sinusoidal alternating regime.

COMPETENCE AND SKILLS

- To know the $U-i$ relationship of an ideal inductor
- To know the $U-i$ relationship of a capacitor
- To relate the input and output voltages of an RC circuit
- To relate the input and output voltages of an RL circuit
- To relate the input and output voltages of an RLC circuit
- To define a filter
- To state the assumptions of an ideal operational amplifier (ALI)
- To describe the limitations of an operational amplifier (ALI)
- To relate the input and output voltages of an operational amplifier (ALI) configuration
- To define a Bode diagram
- To plot the Bode diagram for first- and second-order filters
- To interpret a Bode diagram
- To describe the operating principle of a PID controller

PROGRAM

- **Composition of a measurement chain**
- **Study of circuits in free regime** : RC, RL and RLC and their applications
- **Study of the ideal integrated linear amplifier (ALI)** : principles and basic structures (amplifier, summing amplifier, differentiator, comparator, etc.)
- **Study of electrical transducers** : overview of transducers and their main characteristics
- **Study of a measurement chain** : constraints and characteristics of a measurement chain ; study of the consequences of ALI and transducer imperfections ; case studies
- **Additional electrical analysis** : sinusoidal signals, complex impedances, study of electrical circuits, electrical power and transfer function (application to filtering)

BIBLIOGRAPHY

- *Electrokinetics (PCSI, MPSI, PTSI)* — Éditions Nathan
- *Electronics, electrokinetics* — Éditions Hachette
- *General electricity* — Éditions Dunod
- *Analysis of electrical circuits* — Charles K. Alexander, Matthew Sadiku

REQUIREMENTS

- Differential equations
- Knowledge of derivatives and integrals

- Trigonometric functions
- Exponential function
- Ability to graphically represent sinusoidal and exponential functions
- Ability to deduce the function corresponding to a graph
- Complex numbers (for the alternating current/voltage section)