

Electrotechnique et Electronique de Puissance

Electrotechnics and Power Electronics - 1st level

IDENTIFICATION

CODE : GE-3-S1-EC-Etep1
ECTS : 4.0

HOURS

Lectures : 20.0 h
Seminars : 26.0 h
Laboratory : 12.0 h
Project : 0.0 h
Teacher-student
contact : 58.0 h
Personal work : 28.0 h
Total : 86.0 h

ASSESSMENT METHOD

1 final examination - 2 hours
2 intermediary exams - 1 hour
1 Lab examination - 1hour

TEACHING AIDS

Course and Laboratory textbooks
PPT files on-line (moodle)

TEACHING LANGUAGE

French

CONTACT

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AIMS

This CE comes under the teaching unit Etep1 (UE32) and contributes to the following skills:

1) Implement the physical properties of materials for the field of electrical engineering (level 2)

- Ability: Implement ferromagnetic materials in continuous operation.
- Ability: To model a continuous magnetic circuit.
- Ability: To implement permanent magnets in magnetic circuits.
- Ability: Implement and size an inductor.

- Knowledge: Relationships that couple electrokinetics and magnetism.
- Knowledge: Relationships that explain the forces of interaction.

2) Implement the various elements of energy production, electrical energy transmission and energy conversion (level 2)

- Sub-skill: Implement single-phase and three-phase electrical circuits

- Ability: To implement different linear dipoles in a single-phase and three-phase circuit.
- Capacity: Implement single or multi-mesh circuits in single-phase and three-phase.
- Capacity: Implement single or multi-mesh circuits in single-phase and three-phase.

- Knowledge: Calculations of line currents, apparent, active and reactive powers in single-phase and three-phase.

- Sub-skill: Implement DC machines: Shunt and series excitation machines

- Ability: Model the steady state operation of a system driven by an electrical machine.
- Ability: To calculate the electrical quantities in the windings of a machine.
- Ability: Wire, start, control the speed of an electrical machine.

- Knowledge: Know the constitution and operating principle.
- Knowledge: Understand the interactions between the rotating machine and the associated mechanical system in the four quadrants.
- Knowledge: Know the equivalent diagrams in steady state.

In addition, it requires mobilizing the following skills:

- Skills in science for the engineer:
 - Analyze a real or virtual system (or problem).
 - Exploit a model of a real or virtual system.
 - Implement an experimental approach.
 - Design a system that meets specifications.
 - Process data.
 - Communicate an analysis or a scientific approach.
- Skills in humanities, documentation and physical and sports education:
 - Know yourself, manage yourself physically and mentally.
 - Work, learn, evolve independently.
 - Interact with others, work in a team.
 - Be creative, innovate, undertake.
 - Work in an international and intercultural context.

CONTENT

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- Part 1: Single-phase and three-phase electrical circuits in sinusoidal regime
 - Electrical energy and its transport within a balanced single-phase and three-phase network
 - Electric power on linear loads
 - Electrical power on non-linear load
- Part 2: Magnetism
 - Snap Reminders
 - Circuits and magnetic materials
 - Inductance and air gap
 - Magnet and electromagnet
- Part 3: Electromechanical conversion and DC machines
 - Basics of electromechanical conversion
 - DC machine: operating principle in the 4 quadrants, modeling in steady state, starting and speed variation.

BIBLIOGRAPHY

Luc Lasne - Electrotechnique et énergie électrique - Collection Sciences Sup DUNOD
Cahen - Electrotechnique - Machines, Réseaux - Editions : Gauthier Villard

PRE-REQUISITE

Scientific Bachelor level - L2

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