Electromagnétisme

Lecturer
Frédéric ROBERT (Coordinator)

Course mnemonic
ELEC-H2001

ECTS credits
5 credits

Language(s) of instruction
French

Course period
First term

Course content

Part 1: circuit theory
- lumped element circuits, ideal 1-ports, ideal 2-ports, Thevenin/Norton equivalence, impedance matching
- solving a circuit: référence procedure (resistive circuits), additional theorems, reactive circuits in time-domain, reactive circuits in frequency domain (phasors, impedances)

Part 2: field theory
- reminding Maxwell equations and their physical interpretation
- electrostatics in vacuum and in matter (dielectric materials)
- conducting materials
- magnetostatics in vacuum and in matter (magnetic materials)
- quasi-statics and magnetic circuits

Objectives (and/or specific learning outcomes)

At the end of this teaching unit, students should be able to
- solve analytically any electrical circuit, using a structured approach including the choice of the most appropriate (combination of) method(s) in the time-domain and/or frequency domain
- define and realize the corresponding lab measurements (current and voltage) using electrical sources, multimeter and oscilloscope
- formalize and solve analytically simple electromagnetic field theory problems (excluding propagation) where materials are involved
- explain the physical interpretation of the concepts used in circuit theory and field theory

Pre-requisits and co-requisits

Courses having this one as pre-requisit

ELEC-H3001 | Electricité appliquée | 5 crédits, ELEC-H312 | Power electronics | 5 crédits and ELEC-H313 | Instrumentation | 5 crédits

Courses having this one as co-requisit

ELEC-H301 | Electronique appliquée | 5 crédits, ELEC-H305 | Circuits logiques et numériques | 5 crédits and ELEC-H311 | Signaux et systèmes de télécommunications | 5 crédits

Teaching method and learning activities

Lectures, application exercises, laboratories

Contribution to the teaching profile

This teaching unit mainly contributes to develop the following competences (in French):
- Formaliser, dans un langage scientifique rigoureux, des questions ou problèmes techniques et scientifiques aux contours définis inspirés de situations réelles, les résoudre en mobilisant des capacités d'abstraction, de modélisation, de simulation et d'analyse disciplinaire, en s'inscrivant dans les exigences de la recherche universitaire, et situer ces problématiques par rapport aux enjeux sociétaux
- Maîtriser et mobiliser un corpus pluridisciplinaire en sciences et sciences de l'ingénieur en s'appuyant sur la compréhension des principes et lois qui les fondent et sur une approche critique du savoir
- Elaborer un raisonnement scientifique structuré en mettant en œuvre les langages et les outils propres aux sciences et sciences de l'ingénieur
- Communiquer, partager des informations et argumenter – oralement, graphiquement et par écrit, en français et en anglais – en s'adaptant au but poursuivi et à l'interlocuteur visé

Other information

Contact(s)

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Contact teaching assistant: Sami MEZHOUD - sami.mezhoud(at)ulb.ac.be

Evaluation method(s)

Other

Evaluation method(s) (additional information)

Written exam (two parts: theory and practice)

Determination of the mark (including the weighting of partial marks)

Written exam part 1 (theory) 45% + written exam part 2 (practice) 55% + lab bonus

Assisting the 6 lab sessions is mandatory (any absence will be sanctioned in the final mark).

Main language(s) of evaluation

French

Programmes

Programmes proposing this course at the Brussels School of Engineering

BA-IRCI | Bachelor in Engineering Sciences | option Bruxelles/unit 2