UCLouvain

lelec1370

2023

Measurements and electrical circuits

5.00 credits	30.0 h + 30.0 h	Q2

Teacher(s)	Craeye Christophe ;Dehez Bruno ;Oestges Claude (coordinator) ;
Language :	French
Place of the course	Louvain-la-Neuve
Prerequisites	LEPL1201
Main themes	This course deals with electrical circuits and measurement techniques, serving as basis of the cursus in Electrical Engineering. It is also highly coupled with the project LELEC1101.
Learning outcomes	**At the end of this learning unit, the student is able to :** 1 **Contribution of the course to the program objectives (N°)** Axis 1 (1.1, 1.2, 1.3), Axis 6 (6.1) **Specific learning outcomes of the course** **At the end of the course, the student will be able to :** • Analyze and understand electrical circuits made of resistors, capacitors, (coupled) inductors, ideal operational amplifiers and sources • Calculate voltages and currents in AC steady-state (phasors) and in transient state (Laplace transform) • Represent the transfer function of an electrical circuit (Bode analysis) and identify its function (filtering, integration, amplification, etc.) • Identify the different two-port networks within a complex circuit, calculate the individual characteristics and derive the overall characteristics (serie or parallel connections) • Calculate the consumption of an electrical circuit (active and reactive power) • Solve polyphase circuits (in particular, three-phase circuits) • Understand and design typical measurement circuits: bridge circuits (sensitivity, accuracy) and instrumentation amplifier • Understand the concepts of sensitivity, accuracy and measurement errors (including error combinations) in the field of electrical measurements.
Evaluation methods	Students are assessed individually and in writing on the basis of the particular objectives announced earlier. An optional test on phasor calculus may be organised during the term, and counts for 25% of the final grade if it is to the advantage of the student. The written examination is based on exercises without any support (only an unannotated form provided to students at the beginning of the year is accepted).
Teaching methods	Teaching is organized in weelkly courses and supervized exercise sessions. A mid-semester interrogation is organized around the 5th week about AC steady-state analysis.
Content	• Resistive circuits and operational amplifiers • AC steady-state analysis: phasors, variable-frequency analysis (Bode) • Filter two-port-networks • Magnetically-coupled networks • Time-domain analysis and Laplace transform • Steady-state power analysis • Polyphase circuits • Measurement techniques
Inline resources	Moodle https://moodle.uclouvain.be/course/view.php?id=756
Bibliography	• Engineering Circuit Analysis, J.D. Irwin & R.M. Nelms, éd. J. Wiley and Sons, 2011 • Transparents des cours et APE disponibles sur Moodle.
Other infos	The courses LEPL1201 (Physics 1) and LEPL1502 (Project 2) are prerequisites.

Faculty or entity in charge	ELEC

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Learning outcomes
Specialization track in Electricity	FILELEC	5		
Master [120] in Mechanical Engineering	MECA2M	5		
Minor in Electricity	LMINOELEC	5		
Mineure Polytechnique	MINPOLY	5		