lelec1370

2019

Measurements and electrical circuits

In view of the health context linked to the spread of the coronavirus, the methods of organisation and evaluation of the learning units could be adapted in different situations; these possible new methods have been - or will be - communicated by the teachers to the students.

5 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
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.
Aims	**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 :** 1 • 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. - - - - *The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".*
Evaluation methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** Students are evaluated individually in a written exam, on the basis of the learning outcomes mentioned above. The exam essentially focuses on solving exercises and/or answering theoretical problems (no book/notes are allowed, only a form provided with the questions can be used).
Teaching methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** 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 http://moodleucl.uclouvain.be/course/view.php?id=5543
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 LFSAB1201 (Physics 1) and LFSA1502 (Project 2) are prerequisites.

Faculty or entity in charge	ELEC

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Aims
Master [120] in Mechanical Engineering	MECA2M	5		
Minor in Engineering Sciences: Electricity (only available for reenrolment)	LELEC100I	5		
Minor in Electricity	LFSA133I	5		
Specialization track in Electricity	LELEC100P	5		