UCLouvain

lelec2595

2019

Electric Power Systems Quality

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)	De Jaeger Emmanuel ;
Language :	English
Place of the course	Louvain-la-Neuve
Main themes	• The topic of voltage disturbances and quality of electric power supply, positioned in the general context of electromagnetic compatibility (EMC) • Types and characteristics of the main disturbances, disturbance sources, methods of measurement and evaluation, propagation mechanisms, adverse effects, immunity • Modelling and calculation of electrical power networks (public or industrial) and electrical installations in disturbed operation • Technical solutions to solve power quality problems
Aims	In consideration of the reference table AA of the program "master in electrical engineering ", this course contributes to the development, to the acquisition and to the evaluation of the following experiences of learning: • AA2.1, AA2.2, AA2.3 • AA3.3 • AA5.4, AA5.6 • AA6.1 **Specifically, at the end of the course, studens will be able to :** • Identify, describe and analyze a problematic situation regarding electrical voltage disturbances (diagnosis, curative approach) • Prevent problematic situations at the project stage of electrical installations (preventive approach) 1 • Propose realistic solutions from the technical and economic perspectives Spe To this end, they wil be able to : • Describe precisely and explain physical phenomena and mechanisms underlying power quality, • Select measurement techniques, adequate analysis and assessment methods, • Model and quantify problematic situations, • Interpret and correctly apply the standardization concepts, • Analyze and interpret information from technical and scientific literature relating to issues addressed in the course Transversal learning outcomes: • Be familiar with standardization practices in electrotechnology, • Structure, detail and present an engineering calculation report - - - - *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 assessed during an oral examination comprising: • The resolution of a problem, sketching a realistic but inevitably simplified situation compared to a complex real industrial case (numerical exercise, aiming primarily to assess understanding phenomena, mastering modelling and computational techniques, together with the fast quantified assessment of a situation) • A discussion realizing a broad sweep of the whole matter, starting from relatively general questions or typical industrial case studies. Students may have the courses and their personal notes supports. Homework is proposed during the semester and is evaluated. It counts for half of the points of the final grade, *provided that the student has obtained at least 50% of the points for the exam* . In case the student does not obtain at least 50% of the points for the exam, the final grade is equal to the grade obtained for the exam.
Teaching methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** - The course consists of lectures that aim to describe the general context, key concepts, methods of calculation and evaluation as well as give and discuss some specific technological information. - Practical sessions (supervised exercise sessions) are organized. These exercises can make use of dedicated software tools
Content	- Generalities about electromagnetic compatibility and basic concepts used in voltage quality (short-circuit power concept, types of networks - TN, TT, IT ... - Basic concepts of standardization, compatibility levels, immunity levels, general principles of measuring methods, basics of quality statistical analysis, quality indices etc.) - Reliability and continuity of power supply - Rapid changes of the load; voltage fluctuations and frequency deviations - Voltage distortion, harmonics, transients and interharmonics (in the frequency range from 0 to 150 kHz) - Unsymmetrical three-phase systems (voltage unbalance) - Voltage dips and short interruptions - Voltage swells and overvoltages - For each family of studied phenomena: sources and disturbances generating mechanisms, modelling, special techniques of measurement and evaluation, propagation of disturbances in the network, adverse effects, immunity of sensitive loads, choice of technological solutions (at the source, in the network or at the level of disturbed installations).
Inline resources	Moodle http://moodleucl.uclouvain.be/course/view.php?id=5323
Bibliography	Transparents du cours, recueil de documentation, liens sur Moodle
Other infos	It is recommended to have previously completed the course LELEC2520 or an equivalent According to the opportunities and practical availability, the course can be completed by a technical visit and / or seminars given by experts from industry
Faculty or entity in charge	ELEC

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Aims
Master [120] in Electrical Engineering	ELEC2M	5		
Master [120] in Electro-mechanical Engineering	ELME2M	5		