


5.00 credits

30.0 h + 30.0 h

Q2

Teacher(s)	De Jaeger Emmanuel ;
Language :	English
Place of the course	Louvain-la-Neuve
Main themes	<ul style="list-style-type: none"> • Electrical power systems engineering, focusing on: • Power system transients, • Power systems faulted operation, • Power systems protection, • Power systems stability, • Power systems reliability, • Power Quality
Learning outcomes	<p>At the end of this learning unit, the student is able to :</p> <p>Contribution of the course to the program objectives</p> <p>In view of the LO frame of reference of the "Master Electrical Engineering", this course contributes to the development, acquisition and evaluation of the following learning outcomes:</p> <ul style="list-style-type: none"> - AA1.1, AA1.2, AA1.3 - AA2.1, AA2.2 - AA3.3 - AA6.1 <p>Specific LO of the course</p> <p>Specifically, at the end of the course, students will be able to:</p> <ol style="list-style-type: none"> 1. <ul style="list-style-type: none"> • Identify, describe and analyze problematic situations regarding voltage disturbances (diagnosis, curative approach), transient behaviour and faulted operation in power systems • Apply the principles of power system protection • Prevent problematic situations at the planning or project stage of electrical grids and installations (preventive approach) • Propose realistic solutions, from the technical and economic perspectives, and apply appropriate measures to improve power systems stability and solve power quality problems <p>To this end, they will be able to:</p> <ul style="list-style-type: none"> • Describe precisely, explain, model and quantify underlying physical phenomena and mechanisms, • Use specialized engineering software tools, • Interpret and correctly apply the standardization concepts, • Analyze and interpret information from technical and scientific literature relating to issues addressed in the course.
Evaluation methods	<p><i>Students are assessed during a written and/or oral examination dealing with both theoretical concepts and the discussion of practical situations (practical industrial case study, numerical exercises).</i></p> <p><i>Half of the final grade will be awarded to the homework and projects assessment, provided that the student passes the oral exam (that is, score # 10/20). 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.</i></p>
Teaching methods	<ul style="list-style-type: none"> • Lectures • Practical sessions (supervised classroom exercise sessions) <p><i>Engineering practice: supervised homework and projects in groups</i></p>
Content	<ul style="list-style-type: none"> • Transient analysis of power systems • Dynamics of synchronous machines • Unbalanced operation of power systems and unsymmetrical faults analysis • Power systems protection • Power systems small-disturbance stability and large-disturbance (transient) stability • Frequency stability • Voltage stability

	<ul style="list-style-type: none"> • Power quality: basic concepts of electromagnetic compatibility, harmonics, voltage rapid fluctuations and flicker, voltage dips and interruptions, overvoltages <p>Reliability and quality of supply costs for a power system</p>
Bibliography	<ul style="list-style-type: none"> • Reference textbooks <p><i>Electric Energy Systems - Analysis and Operation</i> (A. Gomez-Exposito, A.J. Conejo, C. Canizares) <i>Handbook of Electrical Power System Dynamics</i> (M. Eremia, M. Shahidehpour)</p> <ul style="list-style-type: none"> • Copy of the slides <p>Complementary documentation</p>
Other infos	<ul style="list-style-type: none"> • This course is the logical follow-up of course LELEC2520. It is recommended to have previously completed the latter or an equivalent <p>According to the opportunities and practical availability, the course can be completed by a technical visit and / or seminars given by experts from industry</p>
Faculty or entity in charge	ELEC

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Electrical Engineering	ELEC2M	5		
Master [120] in Electro-mechanical Engineering [Version 2020]	ELME2M	5		