

Due to the COVID-19 crisis, the information below is subject to change, in particular that concerning the teaching mode (presential, distance or in a comodal or hybrid format).

5 credits	30.0 h + 30.0 h	Q1
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Teacher(s)	Craeye Christophe ;Louveaux Jérôme ;Oestges Claude ;Vandendorpe Luc ;
Language :	English
Place of the course	Louvain-la-Neuve
Main themes	This course is part of the Major orientation in the Master in Electrical Engineering. Starting from bases in electromagnetism and transmission lines, LELEC2795 applies the knowledge to various communication 'or related-systems, such as wireless mobile networks, Earth-Satellite communication Systems, Interferometry and Radar systems and wired transmissions.
Aims	<p>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:</p> <ul style="list-style-type: none"> • AA1.1, AA1.2, AA1.3 • AA2.1, AA2.2, AA2.4 • AA3.2 • AA6.1, AA6.3 <p>At the end of the course, the student will be able to :</p> <p>1</p> <ul style="list-style-type: none"> • Calculate the propagation of electromagnetic waves in homogeneous media, as well as reflection and refraction on dielectric and metallic boundaries and calculate the electromagnetic fields in various transmission lines (coaxial cable, waveguide, etc.) • Select the category of antenna systems for a given wireless link • Evaluate the effects of non-idealities of the front-end transmitters and receivers • Understand the principle propagation mechanisms in wireless mobile networks and their impact of system performance • Understand and use performance metrics for wired and wireless communication links and networks • Determine the link between radar data and scattering cross-sections. • Exploit simple imaging or positioning algorithms on data from antenna array systems. • Understand the basic issues and challenges of wired communications (DSL, optical fiber transmission). • Determine the attenuation due to the troposphere on earth-space links for geostationary satellites. <p>-----</p> <p><i>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".</i></p>
Evaluation methods	<p>Due to the COVID-19 crisis, the information in this section is particularly likely to change.</p> <p>The students have a written examination, based on the objectives described above. The students have at disposal the copy of the slides, without any written annotation.</p> <p>The evaluation of the project is a report, individual or for a group of 2 students.</p>
Teaching methods	<p>Due to the COVID-19 crisis, the information in this section is particularly likely to change.</p> <p>The course is organized in</p> <ul style="list-style-type: none"> • 12 courses of 2h • 10 supervised exercises of 2h • 2 laboratories : one using multiple-antenna systems and one on the use of RAPIDS software for the evaluation of an earth-satellite link budget
Content	<ul style="list-style-type: none"> • Radiowave propagation in homogeneous media (reflection and refraction on planar boundaries) • Radiowave propagation in waveguides • Effects of the non-idealities of the front-end of the transmitter and receiver circuits • Concepts of mobile cellular communication systems: cell, interferences, multiple access, multiplexing, fading, diversity • Mobile radio propagation (path-loss, shadowing and fading) • Radar scattering, systems and algorithms • Issues and challenges in wired systems: DSL and optical fibers.

Inline resources	Moodle http://moodleucl.uclouvain.be/course/view.php?id=7817
Bibliography	<ul style="list-style-type: none"> • Syllabus de cours disponibles sur Moodle • Transparents disponibles sur Moodle • Livres de référence disponibles à la BST
Other infos	The following courses (or equivalent) are prerequisites: LELEC1360 Telecommunications and LELEC1350 Electromagnetism or equivalent
Faculty or entity in charge	ELEC

Force majeure

Evaluation methods	<p>An exam with adapted rules will be simulateneously proposed to the students not able to participate on-site and who will have trasmitted before the exam a quantine certificate. The exams to be taken from home will be identical to the one on site but will entail a complementary oral examination.</p> <p>In case of "force majeure" preventing the organization of an on-site exam, the exam from home will be generalized to all students (with a complementary oral exam).</p> <p>In all cases, professors may organize an oral exam for students for whom they have doubts about the grade obtained for the written exam.</p>
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Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Aims
Master [120] in Electrical Engineering	ELEC2M	5		