

5.0 credits	30.0 h + 30.0 h	1q
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Teacher(s) :	Louveau Jérôme ; Craeye Christophe ; Janvier Danielle ; Oestges Claude ; Vandendorpe Luc ;
Language :	Anglais
Place of the course	Louvain-la-Neuve
Inline resources:	http://icampus.uclouvain.be/claroline/course/index.php?cid=ELEC2795
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>With respect to the AA referring system defined for the Master in Electrical Engineering, the course contributes to the development, mastery and assessment of the following skills :</p> <p>AA 1 (1.1, 1.2, 1.3), AA 2 (2.1, 2.2, 2.4), AA 3 (3.2), AA 6 (6.1, 6.3)</p> <p>At the end of the course, the student will be able to :</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) <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 :	The students have a written examination, based on the objectives described above. The evaluation of the project is a report, individual or for a group of 2 students.
Teaching methods :	<p>The course is organized in</p> <ul style="list-style-type: none"> -- 12 courses of 2h -- 10 supervised exercises of 2h -- 2 laboratories using multiple-antenna systems (groups of 2 students).
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.

Bibliography :	-- Syllabi available on iCampus -- Slides available on iCampus -- Reference books available at the Science and Technology Library
Other infos :	The following courses (or equivalent) are prerequisites: LELEC1360 Telecommunications and LELEC1350 Electromagnetism or equivalent
Cycle and year of study :	> Master [120] in Biomedical Engineering > Master [120] in Electrical Engineering > Master [120] in Computer Science and Engineering
Faculty or entity in charge:	ELEC