LELEC2796
2014-2015

Wireless communications

5.0 credits	30.0 h + 30.0 h	1q

Teacher(s) :	Vandendorpe Luc ; Oestges Claude (coordinator) ;
Language :	Anglais
Place of the course	Louvain-la-Neuve
Inline resources:	> http://icampus.uclouvain.be/claroline/course/index.php?cid=ELEC2796
Main themes :	This course is one of the last courses in the telecommunication cursus. LELEC2796 deals with the PHY layer of wireless communication systems, along three axes : radio channels, signal processing techniques and communication standards.
Aims :	With respect to the AA referring system defined for the Master in Electrical Engineering, the course contributes to the develoopment, mastery and assessment of the following skills : Axis 1 (1.1, 1.2, 1.3), Axis 2 (2.1, 2.2, 2.4), Axis 3 (3.1), Axis 4 (4.1, 4.2, 4.4), Axis 5 (5.2, 5.3, 5.6), Axis 6 (6.1, 6.3) b. At the end of the course, the student will be able to : -- Define concepts enabling to fully characterize radio channels (narrow- and wideband, as well multi-antenna channels) -- Explain through analytical models and Matlab simulations the impact of the propagation channel and co-channel interference on system performance -- Describe and compare various multiple access techniques (TDMA/FDMA/CDMA) -- Explain, via mathematical representations, and analyze receive techniques (Rake receiver, joint detection, OFDM, SIMO/MISO/MIMO) -- Describe the radio interface of wireless communication standards (GSM, UMTS, IS95/UTRA, 3G-LTE), together with the underlying concepts -- Present (written report and oral presentation) the results achieved within a group project, consisting in the Matlab implementation of a wireless system in a real-world channel *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 :	Regarding the course, the oral evaluation is individual (no book/notes allowed) and based on clearly announced objectives (see above). Regarding the project, the evaluation relies on a written group report and an oral group presentation.
Teaching methods :	The course is organized as 14 lectures 5 to 6 exercise sessions a group project
Content :	Introduction to wireless communication systems Random signals, modulations and detection Mobile transmission channels GSM standard Multiple access techniques CDMA, Rake reception and diversity UTRA and WCDMA standards Multi-carrier and OFDM systems Multi-antenna channels and systems MIMO techniques LTE and LTE-A standards
Bibliography :	Supports -- Notes and slides available on iCampus -- Reference books available at BST
Other infos :	It is advized to follow LELEC2796 during Master 2.

Cycle and year of study :	> Master [120] in Electrical Engineering > Master [120] in Computer Science and Engineering
Faculty or entity in charge:	ELEC