LELEC2880

2014-2015

Modem design

5.0 credits	30.0 h + 30.0 h	2q

Teacher(s) :	Louveaux Jérôme ; Vandendorpe Luc ;
Language :	Anglais
Place of the course	Louvain-la-Neuve
Inline resources:	> http://icampus.uclouvain.be/claroline/course/index.php?cid=ELEC2880
Main themes :	Identical to description
Aims :	At the end of this lecture, the students will be able to - use and understand, for a signal correpted by additive white noise gaussian, the link between the signal, its analytical version, its complex envelope and the Rice components, - use MATLAB to implement a filter in the previous formalism, - expand a digitally modulated signal onto basis functions, - derive the decision rule of an optimal receiver according to the Bayes criterion, for a digital modulation, - establish and compute the bit error rate characterizing the coherent or noncoherent demodulation of a digital transmission corrupted by AWGN, - explain "a priory" and "a posteriory" entropy, - compute the entropy of a source and the Shannon channel capacity, - from the maximum likelihood criterion, derive a Viterby equalizer, - for a Wiener criterion, derive the equations to be fulfilled by a linear or decision feedback equalizer, and solve these equations, - show the relevance of the matched filter by means of a fractionally spaced equalizer and apply this result to other systems, - implement in MATLAB, Viterbi, linear and DF equalizers, - explain from the ML criterion DA or NDA type phase estimators, and understand the tools to characterize the performance of these estimators, - explain from the ML criterion, estimators for the sampling instant (timing recovery) of the DA and NDA types and explain their performance, - understand and provide a mathematical description of multicarrier modulations, cyclic extension and explain the motivation for MC modulation. *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".*
Content :	Introduction to digital communication systems Random signals, modulations and detection Coherent and noncoherent demodulation Basics of Information theory Convolutional codes and introduction to turbo codes Adaptive modulation and coding Equalization (Linear and decision-feedback) Multi-carrier and OFDM systems Synchronization (time, frequency and phase)
Cycle and year of study :	> Master [120] in Electrical Engineering > Master [120] in Mathematical Engineering
Faculty or entity in charge:	ELEC