UCL Université catholique de Louvain

LELEC2900

2010-2011

Signal processing

5.0 credits	30.0 h + 30.0 h	2q

Teacher(s) :	Macq Benoît ; Vandendorpe Luc ;
Language :	Anglais
Place of the course	Louvain-la-Neuve
Main themes :	Identical to the contents of the course
Aims :	At the end of this lecture, the students will be able to - make the link between the analog description of sampling and sequences, - modify the sampling rate of a discrete time signal i.e., upsample or downsample lowpass or passband signals, deterministic or random; implement these operations by means of efficient structures, in particular polyphase structures, - understand the consequences of sampling the spectrum, - design from a spectral template, finite impulse response (FIR) filters by means of different optimum and suboptimum methods, - design from a spectral template, infinite impulse response (IIR) filters; understand and use the bilinear transform; design filters based on criteria discussed in "INMA2731 : Processus stochastiques", - design systems for processing multidimentional signals, in particular images, - understand and use linear transformations for decorrelation, multiresolution analysis, and sicriminant analysis *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 :	- Sampling : Shannon sampling theorem ; notions of sequence, - Sampling rate conversion : interpolation, downsampling, lowpass and bandpass signals, deterministic and random signals, - Structures and graph theory (introduction), polyphase components, - Discrete Fourier transform, - Finite impulse response filters, - Basics of analog filters and templates, - Bilinear transform and design of infinite impulse response filters - Processing of random signals, - Processing of multidimensional signals, - Denoising and singularity detection, - Orthogonal transforms, - Decorrelative transforms, - Wavelet transform, - Linear discriminant transform, - Non parametric (periodogram) and parametric (process identification) spectral analysis
Other infos :	Teaching and learning method : There will be lectures interleaved with practical training (in teaching room or computation center with MATLAB) Prerequisites : INMA1731 : Random processes : estimation and prediction Assessment : Written examination about exercices, with notes Could be given in English
Cycle and year of study :	> Master [120] in Mathematical Engineering > Master [120] in Electrical Engineering > Master [120] in Electro-mechanical Engineering > Master [120] in Computer Science and Engineering > Master [120] in Biomedical Engineering
Faculty or entity in charge:	ELEC