UCL Université catholique de Louvain

LINMA1731

2012-2013

Stochastic processes : Estimation and prediction

5.0 credits	30.0 h + 30.0 h	2q

Teacher(s) :	Vandendorpe Luc (coordinator) ; Absil Pierre-Antoine ;
Language :	Anglais
Place of the course	Louvain-la-Neuve
Prerequisites :	-- FSAB1106 (or equivalent training in signals and systems) -- FSAB1105 (or equivalent training in probabilities and statistics)
Main themes :	The object of this course is to lead to a good understanding of stochastic processes, their most commonly used models and their properties, as well as the derivation of some of the most commonly used estimators for such processes : Wiener and Kalman filters, predictors and smoothers.
Aims :	At the end of this course, the students will be able to : - Have a good understanding of and familiarity with random variables and stochastic processes ; - Characterize and use stable processes and their spectral properties; - Use the major estimators, and characterize their performences ; - Synthetize predictors, filters and smoothers, in both Wiener or Kalman frameworks. *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 :	Evaluation method : the evaluation will be based on a written exam made up of a few exercises (with use of the course textbook), and on an interview about the student's project.
Content :	The course is subdivided into four parts/chapters: -Probabilities, random variables, moments, change of variables. -Stochastic processes, independence, stability, ergodicity, spectral representation, classical models of stochastic processes. -Estimation (for random variables) : biais, variance, bounds, convergence, asymptotic properties, classical estimators. -Estimation (for random processes) : filtering, prediction, smoothing, Wiener and Kalman estimators. -Learning will be based on courses interlaced with practical exercise sessions (exercises done in class or in the computer room using MATLAB). In addition, the training includes a project to be realized by groups of 2 or 3 students.
Other infos :	- Prerequisites : -- FSAB1106 (or equivalent training in signals and systems) -- FSAB1105 (or equivalent training in probabilities and statistics) - Support : course notes, written by the two lecturers, are made available.
Cycle and year of study :	> Bachelor in Mathematics > Bachelor in Engineering > Master [120] in Electrical Engineering > Master [120] in Computer Science and Engineering > Master [120] in Mathematical Engineering > Bachelor in Information and Communication > Bachelor in Philosophy > Bachelor in Pharmacy > Bachelor in Engineering : Architecture > Bachelor in Computer Science > Bachelor in Psychology and Education: General > Bachelor in Economics and Management > Bachelor in Motor skills : General > Bachelor in Human and Social Sciences > Bachelor in Sociology and Anthropology > Bachelor in Political Sciences: General > Bachelor in Biomedicine > Bachelor in Religious Studies > Master [120] in Statistics: General
Faculty or entity in charge:	MAP