UCL Faculté des sciences appliquées

FSA

INMA2731 STOCHASTIC PROCESSES : ESTIMATION AND PREDICTION

[30h+30h exercises] 5 credits

This course is taught in the 2nd semester

Teacher(s): Michel Gevers, Luc Vandendorpe
Language: french
Level: 2nd cycle course

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.

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.

Content and teaching methods

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 information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)

-Prerequisite : INMA 2700.
-Support : course notes, written by the two lecturers, are made available.
-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.

Other credits in programs

ELEC21	Première année du programme conduisant au grade d'ingénieur civil électricien	(5 credits)	Mandatory
ELEC22	Deuxième année du programme conduisant au grade d'ingénieur civil électricien	(5 credits)	
FSA3DS/EL	Diplôme d'études spécialisées en sciences appliquées (électricité)	(5 credits)	
INFO22	Deuxième année du programme conduisant au grade d'ingénieur civil informaticien	(5 credits)	
INFO23	Troisième année du programme conduisant au grade d'ingénieur civil informaticien	(5 credits)	
MAP21	Première année du programme conduisant au grade d'ingénieur civil en mathématiques appliquées	(5 credits)	
MAP22	Deuxième année du programme conduisant au grade d'ingénieur civil en mathématiques appliquées	(5 credits)	
MAP23	Troisième année du programme conduisant au grade d'ingénieur civil en mathématiques appliquées	(5 credits)	