





5 credits

30.0 h + 30.0 h

Q2

Teacher(s)	Absil Pierre-Antoine ;Vandendorpe Luc coordinator ;
Language :	English
Place of the course	Louvain-la-Neuve
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	<p>1.1; 1.2; 1.3 3.1; 3.2; 3.3 4.2</p> <p>At the end of this course, the students will be able to :</p> <p>1</p> <ul style="list-style-type: none"> • 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 performances ; • Synthesize predictors, filters and smoothers, in both Wiener or Kalman frameworks. <p>-----</p> <p><i>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".</i></p>
Evaluation methods	<ul style="list-style-type: none"> • Project during the course semester • Exam • Other activities, such as quizzes and homework exercises, can be taken into account in the final grade.
Teaching methods	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.
Content	<p>The course is subdivided into four parts/chapters:</p> <ul style="list-style-type: none"> • 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.
Inline resources	http://moodleucl.uclouvain.be/course/view.php?id=4753
Bibliography	Les notes de cours des co-titulaires sont disponibles.
Faculty or entity in charge	MAP

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Aims
Master [120] in Electrical Engineering	ELEC2M	5		
Master [120] in Statistics: General	STAT2M	5		
Minor in Engineering Sciences: Applied Mathematics	LMAP100I	5		
Additionnal module in Mathematics	LMATH100P	5		
Additionnal module in Mathematics	TMATH100P	5		