UCLouvain

lmat2470

2020

Due to the COVID-19 crisis, the information below is subject to change, in particular that concerning the teaching mode (presential, distance or in a comodal or hybrid format).

5 credits	30.0 h	Q2

Teacher(s)	Hainaut Donatien ;
Language :	French
Place of the course	Louvain-la-Neuve
Main themes	Processes, martingales et Markov chain in discrete and continuous time. Stopping times. Poisson Process, Brownian motian and Itô calculus
Aims	1 • To choice the most adapted process for modeling a random phenomenon. • To analyze the properties of discrete and continuous processes. • To construct martingale processes. • To analyze the stability of a Markov chain. • To use Poisson counting processes, homogenous and non-homegenous • To infer the infinitesimal dynamics of a function driven by a Brownian motion, with the help of stochastic calculus. - - - - *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	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** Each student receives 5 exercices to solve. He writes up the solutions and orally presents them to the professor. who may ask theoretical questions related to the subject of the proposed exercices.
Content	Part I: 1. Revision of probability theory 2. Martingales in discrete time 3. Markov Chaine in discrete time and with a finite number of states Part II: 1. Poisson processes and Poisson measures 2. Continuous Markov process with a finite number of states 3. Brownian motien & Itô's calculus 4. Continuous time martingales 5. Continuous Markov processes with infinite number of state
Bibliography	• NEVEU, J., Martingales à temps discret, Masson, 1972. BREIMAN, L., Probability, Addison-Wesley, 1968. • CHOW, Y.S. and M. TEICHER, Probability Theory: Independence, Interchangeability, Martingales, Springer-Verlag, 1987. • CHUNG K.L., A Course in Probability Theory. Harcourt, Brace & World Inc., 1968. • KARLIN S. and H.M. TAYLOR, A First Course in Stochastic Processes, Academic Press, 1975.
Other infos	Prerequisite : The courses MAT1322 Théorie de la mesure and MAT1371 Probabilités are an essential prerequisite.
Faculty or entity in charge	MATH

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Aims
Master [120] in Mathematics	MATH2M	5		
Master [120] in Actuarial Science	ACTU2M	5		
Master [60] in Physics	PHYS2M1	5		
Master [120] in Physics	PHYS2M	5		
Master [120] in Statistic: General	STAT2M	5		