UCLouvain

llsms2225

2017

Elements of Stochastic Calculus

5 crédits	30.0 h	Q1

Enseignants	Vrins Frédéric ;
Langue d'enseignement	Anglais
Lieu du cours	Louvain-la-Neuve
Préalables	Mathematics, informatics, probability and statistics at Bachelor level. In particular, the corresponding UCL courses are • Mons : MQANT1110 (Mathématiques de Gestion I), MQANT1113 (Statistiques et Probabilité), MQANT1109 (Informatique de gestion) • LLN : LINGE1114 (Analyse), LINGE1113 (Probabilité),LINGE1225 (algorithmique et programmation en économie et gestion)
Thèmes abordés	1. Part I: Basic probability concepts (probability space, sigma-fields, random variables, distribution, statistics and sampling via Monte Carlo). 2. Part II : Stochastic processes and related concepts. 3. Part III : random walks and Brownian motion. 4. Part IV : stochastic calculus (stochastic integrals, stochastic differential equation, Ito's lemma, Girsanov theorem)
Acquis d'apprentissage	**During their programme, students of the LSM Master's in management or Master's in Business engineering will have developed the following capabilities'** 1 2.2. Master highly specific knowledge in one or two areas of management : advanced and current research-based knowledge and methods. 2.4. Activate and apply the acquired knowledge accordingly to solve a problem. 3.1. Conduct a clear, structured, analytical reasoning by applying, and eventually adapting, scientifically based conceptual frameworks and models,to define and analyze a problem. 3.5. Produce, through analysis and diagnosis, implemantable solutions in context and identify priorities for action. 6.1. Work in a team : Join in and collaborate with team members. Be open and take into consideration the different points of view and ways of thinking, manage differences and conflicts constructively, accept diversity. - - - - *La contribution de cette UE au développement et à la maîtrise des compétences et acquis du (des) programme(s) est accessible à la fin de cette fiche, dans la partie « Programmes/formations proposant cette unité d'enseignement (UE) ».*
Modes d'évaluation des acquis des étudiants	**Continuous evaluation** • Date: Will be specified later • Type of evaluation: Teamwork (25%) and individual work (15%) • Comments: No **Evaluation week** • Oral: No • Written: No • Unavailability or comments: No **Examination session** • Oral: Yes • Written: No • Unavailability or comments: 60% : Made of two parts : a pratical part and a theoretical part An oral exam (60%) made of two parts : 1. A practical part (test student's skills to apply and use the main concepts) 2. A theoretical part (evaluate the understanding depth). Teamworks during the year (25%) and an individual work (15%) that will be discussed during the exam.

Méthodes d'enseignement	15 courses of 2h each including programming sessions on R. Students will be asked to prepare some courses. The objective of the group and home works is to make the concepts more concrete.
Contenu	Fundamental mathematical concepts to understand the behavior of systems whose behavior features randomness. These skills will be extensively used inLLSMS2226 (derivatives pricing)
Bibliographie	Slides, reference books and R code **lectures conseillées** : • Hassler, Stochastic Processes and Calculus: an elementary introductions with applications, Springer 2016 • Mikosh, M. Elementary Stochastic Calculus (with Finance in view), Wolrd Scientific, 1998. • Joshi, M. : Concepts and Practice of Mathematical Finance, Cambridge University Press, 2003. • Shreve, S. : Stochastic calculus for Finance I & II, Springer 2004.
Faculté ou entité en charge:	CLSM

Programmes / formations proposant cette unité d'enseignement (UE)				
Intitulé du programme	Sigle	Crédits	Prérequis	Acquis d'apprentissage
Master [120] en ingénieur de gestion	INGE2M	5		
Master [120] en sciences économiques, orientation générale	ECON2M	5		
Master [120] en ingénieur de gestion	INGM2M	5		