UCLouvain

llsms2226

2022

Credit and interest rate risk

5.00 credits	30.0 h	Q2

This learning unit is not being organized during this academic year.

Teacher(s)	Vrins Frédéric ;
Language :	English
Place of the course	Louvain-la-Neuve
Prerequisites	Advanced courses in probability theory and finance course covering financial markets and products. Corresponding UCl course: • LLSMS2225 (Elements of Stochastic calculus) • LLSMS2100 (Advanced Finance) In addition, this course is reserved for students with a bachelor's degree in business engineering or students with equivalent quantitative method skills.
Main themes	1. Part I : Black-Scholes Model (discrete time Cox-Ross-Rubinstein, continuous time model Black-Scholes-Merton, greeks) 2. Part II: arbitrage-free pricing (fundamental theorem of asset pricing). 3. Part III : Interest rates products (FRAs, Swaps, caps, floors) and pricing (affine short rate model, arbres binomiaux). 4. Part IV : Limits of the model and advanced methods.
Learning outcomes	**At the end of this learning unit, the student is able to :** 1 ***During their programme, students of the LSM Master's in management or Master's in Business engineering will have developed the following capabilities*** 2.2 Master highly specific knowledge in one or two areas of management : advanced and current research-based knowledge and methods. 2.3 Articulate the acquired knowledge from different areas of management. 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. 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. 8.1 Express a clear and structured message, both orally and in writing in their mother tongue, in English and ideally, in a third language, adapted to the audience and using context specific communication standards. 8.3 Persuade and negotiate :understand the needs and viewpoints of others, put forward their reasoning in an appropriate, relevant and persuasive manner, able to bring out points of agreement, even in antagonistic situations.

Evaluation methods	**Continuous evaluation (projects with implementation in R)** • Date: *Will be specified later* • Type of evaluation: *Report + oral presentation (teamwork, 30% of final grade) and assessment of individual contribution during the exam session (10% of final grade, see below)* • Comments: *No* **Evaluation week** • Oral: *No* • Written: *No* • Unavailability or comments: *No* **Examination session** • Oral: *Yes* • Written: *No* • Comments: The final examination is made of three parts : • *exam (exercises + theory) (55% of final grade)* • *One individual report (+/-5 pages) about ethics in financial modeling, to be sent the day before the exam (5% of the final grade)* • *discussion with the teaching assistant to assess the individual contribution of the student in the group project (10% of final grade). Attention : the grade of the project(s) (i.e. both the group and individual contributions to the project, being worth 30% of the final grade) will be set to 0 for the students who would not show up at this individual evaluation.*
Teaching methods	Ex-cathedra courses enriched with exercises on R and group and/or individual projects. Students will be asked to prepare some courses before joining the classes. The main objective of the projects is to make the concepts more concrete and to facilitate the learining processes. Students will have to study and present the valuation and hedging strategy of a derivatives product (to be determined togather with the professor).
Content	Using the technical concepts introduced in LLSMS2225, the objective of this course is to introduce fundamental concepts associated to derivatives valuation under the no-arbitrage assumption. After a detailed derivation of the Black Scholes formula and its connections with LLSMS2225, the focus will be set to interest rates and credit risk modeling.
Bibliography	• Slides, Excel workbook and R code - Hull, J. Options, Futures and Other derivatives. - Portrait & Poncet, Finance de marché, Dalloz, 2009. - Joshi, M. : Concepts and Practice of Mathematical Finance, Cambridge University Press, 2003. - Shreve, S. : Stochastic calculus for Finance I & II, Springer 2004.
Faculty or entity in charge	CLSM

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Actuarial Science	ACTU2M	5		
Master [120] in Economics: General	ECON2M	5		
Master [120] : Business Engineering [CEMS Programme]	INGE2M	5		
Master [120] : Business Engineering [CEMS Programme]	INGM2M	5		