

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)	Ars Pierre ;Devolder Pierre ;
Language :	English
Place of the course	Louvain-la-Neuve
Prerequisites	<i>The prerequisite(s) for this Teaching Unit (Unité d'enseignement – UE) for the programmes/courses that offer this Teaching Unit are specified at the end of this sheet.</i>
Main themes	The first part is devoted to the application of option theory to the value of life insurance contracts (contract with a guaranteed rate or unit linked contracts). The second part is an introduction to stochastic optimal control and its actuarial applications.
Aims	<p>1 The aim of this course is to apply the methods of stochastic finance in insurance and pension funds. At the end of the course, the students must be able to apply the concepts of quantitative finance to various concrete problems of insurance</p> <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	<b>Due to the COVID-19 crisis, the information in this section is particularly likely to change.</b> Evaluation : Class participation and written examination.
Content	Content The following topics will be developed: Part 1 / STOCHASTIC METHODS OF VALUATION 1. Classical actuarial valuation 2. Deflators, discounting and fair value 3. Life insurance with participation 4. Unit linked insurance 5. Look back options and pricing 6. Valuation of the surrender option 7. Option on annuity PART 2 / STOCHASTIC CONTROL 1. Presentation of the financial market 2. Introduction to stochastic control 3. Dynamic optimization in continuous time 4. Introduction to Malliavin calculus 5. Actuarial applications Methods In-class activities X0 Lectures X0 Exercices/PT At home activities X0 Exercices to prepare the lecture X0 Paper work
Bibliography	<p>Les transparents se basent principalement sur</p> <ul style="list-style-type: none"> <li>• MOLLER T. &amp; STEFFENSEN M. : Market-valuation methods in life and pension insurance (Cambridge, 2007)</li> <li>• HARDY M. : Investment guarantees: modeling and risk management for equity linked insurance (Wiley, 2003)</li> <li>• DEVOLDER P., JANSSEN J. &amp; MANCA R. : Stochastic methods for Pension Funds (Wiley, 2012 )</li> <li>• REBONATO R. : Volatility and Correlation: The Perfect Hedger and the Fox (Wiley, 2004)</li> <li>• TANKOV P. : Calibration de modèles et couverture de produits dérivés 2006, (<a href="http://www.proba.jussieu.fr/pageperso/tankov/">http://www.proba.jussieu.fr/pageperso/tankov/</a>)</li> <li>• TANKOV P. : Surface de volatilité 2012, (<a href="http://www.proba.jussieu.fr/pageperso/tankov/">http://www.proba.jussieu.fr/pageperso/tankov/</a>)</li> </ul>
Other infos	Support : Slides provided through moodle.
Faculty or entity in charge	LSBA

<b>Programmes containing this learning unit (UE)</b>				
Program title	Acronym	Credits	Prerequisite	Aims
Master [120] in Actuarial Science	ACTU2M	5	LINMA2725 AND LACTU2020 AND LACTU2170	