



Numeraire, The Girsanov Theorem, Fundamental Theorems of Asset Pricing

Exotic Options : Asian Options, All-or-Nothing Options, Gap Options, Barrier Options, Compound Options, Monte Carlo Simulation

Interest Rate Modelling and Derivatives : Introduction to Interest Rate Derivatives, Interest Rate Derivatives and the BSM Approach, Continuous-Time Short-Rate Models (Rendelman-Bartter Model, Vasicek Model, Cox, Ingersoll and Ross Model), Interest-Rate Trees (Black, Derman and Toy Model, Hull and White Model)

Advanced Option Pricing Models : Measurement and Behaviour of Volatility, Autoregressive Conditional Heteroskedasticity, Generalized ARCH, The Cox Model, The Merton (1976) Model, The Heston (1993) Model, The Bates (1996) Model, The Heston and Nandi (2000) Model

Implied Volatility and Empirical Issues : Implied Volatility, Volatility Smiles, Hedging in the Presence of Volatility Smiles, Empirical Facts on Equity Volatility Smiles, Model Calibration

Actuarial Applications : Guaranteed Minimum Death Benefit, Guaranteed Minimum Maturity Benefit, Guaranteed Minimum Withdrawal Benefit, Guaranteed Minimum Income Benefit, Guaranteed Minimum Accumulation Benefit, Key Risks of Variable Annuities, Hedging and Risk Management of Variable Annuities, Lapse Behaviour, Pros and Cons of Variable Annuities

This course is accredited under the Canadian Institute of Actuaries (CIA) University Accreditation Program (UAP) for the 2017-2018 academic year. Achievement of the established exemption grade in this course may qualify a student for exemptions from writing certain preliminary exams. Please note, a combination of courses may be required to achieve a single exemption. Please see <http://www.cia-ica.ca/membership/uap> for full details.

Grading

Assignments & In-Class Activities	15%
Oral Presentation	5%
Quizzes	10%
Midterm 1	15%
Midterm 2	15%
Final Exam	40%

The pass mark is 50%. The final grade will be allocated according to the student's achievement in the course. Under no circumstances will late assignments be accepted.

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Materials

