

City University of Hong Kong

Information on a Course
offered by the Department of Economics and Finance
with effect from Semester A in 2012 / 2013

Part I

Course Title: Advanced Topics in Financial Engineering

Course Code: EF5080

Course Duration: 1 semester (39 hours)

Credit Units: 3

Level: P5

Medium of Instruction: English

Prerequisites: EF5050 Derivatives and Risk Management
EF5210 Option Pricing
EF5213 Spreadsheet Modelling in Finance

Precursors: Nil

Equivalent Courses: EF5221 Seminar in Financial Engineering

Exclusive Courses: Nil

Part II

Course Aims

This course aims to expose students to current topics in financial engineering. The focus is on the advanced pricing techniques for interest rate derivatives.

Course Intended Learning Outcomes (CILOs)

Upon successful completion of this course, students should be able to:

No.	CILOs	Weighting (if applicable)
1.	Understand modern interest rate models, and assess their practicalities in real interest rate market	

2.	Master the advanced numerical and analytical pricing techniques of interest rate derivatives, and design complex algorithms and solution for exotic products	
3.	Develop integrated solutions to tackle real-life problems in the pricing of interest rate derivatives	

Teaching and Learning Activities (TLAs)

(Indicative of likely activities and tasks designed to facilitate students' achievement of the CILOs. Final details will be provided to students in their first week of attendance in this course)

CILO No.	TLAs	Hours/week (if applicable)
CILO 1	Lectures and class discussions	
CILO 2	Lectures and class discussions	
CILO 3	Lectures and class discussions	

Assessment Tasks/Activities

(Indicative of likely activities and tasks designed to assess how well the students achieve the CILOs. Final details will be provided to students in their first week of attendance in this course)

CILO No.	Type of Assessment Tasks/Activities	Weighting (if applicable)	Remarks
CILO 1	Assignments		
CILO 2	Assignments		
CILO 3	Assignments		

Assessment Methods

	Classwork (Presentation, Discussion & Report, etc)	Final Exam	Total
CILO 1-3	100%	Nil	100%

Grading of Student Achievement:

According to the defined grading criteria in Academic Regulations for Taught Postgraduate Degrees.

Part III

Keyword Syllabus

Term structures of interest rates. Vasicek Model. CIR Model. Jamshidian Model. No-arbitrage Models. Hull-White Model. Black's Model. Heath-Jarrow-Morton Model. Ritchken-Sankarasubramanian model. LIBOR Market Model.

Recommended Reading

Text(s)

O.A. Vasicek, " An equilibrium characterization of the term structure", *Journal of Financial Economics*, **5** (1977), p177-188.

F. Jamshidian, "An exact bond option pricing formula", *Journal of Finance*, **44** (March 1989), 205-209.

J. Hull and A.White,"One-factor interest-rate models and the valuation of interest-rate derivative securities", *Journal of Financial and Quantitative Analysis*, vol **28**, (June 1993), page 235-254.

J. Hull and A.White,"Valuing Derivative Securities using the Explicit Finite Difference Method", *Journal of Financial and Quantitative Analysis*, vol **25**, (June 1990), page 87-100.

J. Hull and A.White,"Bond option pricing based on a model for the evolution of bond prices", *Advances in Futures and Options Research*, vol **6**, (1993), page 1-13.

J. Hull and A.White,"Pricing interest-rate derivative securities", *Review of Financial Studies*, vol **3**, no. 4 (1990), page 573-592.

J. Moraleda and T. Vorst, Pricing American interest rate claims with humped volatility models, *Journal of Banking and Finance* **21** (1997) pp 1131-1157).

P. Ritchken and L. Sankarasubramanian, "Volatility structures of forward rates and the dynamics of the term structure", *Mathematical Finance*, vol **5**, 1 (1995), page 55-72.

A. Li, P. Ritchken, and L. Sankarasubramanian, "Lattice models for pricing American interest rate claims", *Journal of Finance*, vol **50**, 2 (1995), page 719-737.

D. Heath, R. Jarrow, and A. Morton,"Bond pricing and the term structure of interest rates : a new methodology for contingent claims valuation", *Econometrica*, vol **60**, (January, 1992), page 77-105.

L. Clewlow and C. Strickland, "Pricing interest rate exotics by Monte Carlo simulation", Chapter 17 in: *Monte Carlo: Methodologies and Applications for Pricing and Risk Management*. Risk Books, London, U.K (1998).

A. Brace, D. Gatarek, and M. Musiela, "The market model of interest rate dynamics", *Mathematical Finance*, vol 7, (April, 1997), page 127-147.

J. James and N. Webber, *Interest Rate Modelling*, Wiley (2000).