

STA 2421 DERIVATIVE SECURITIES AND MARKETS (45 Contact Hours)

Pre-Requisites :

SMA 2231: Differential Equations & HBC 2320: Investment Analysis and Portfolio Theory

Co-Requisites

STA 2418: Stochastic Calculus

(a) **Course Purpose**

To introduce students to the fundamental concepts of the derivative market with varying complexities.

(b) **Learning outcomes**

By the end of this course the student should be able to;

- (1) Describe and interpret the general features of basic types of derivative securities, such as forward and futures contracts, swaps, options, and basic structured products.
- (2) Apply the No Arbitrage Principle to price derivatives in an efficient financial market.
- (3) Price derivative securities using mathematical models and numerical methods.
- (4) Design optimal strategies to use derivative instruments for financial risk management and for financial engineering.

(c) **Course Description**

Basics of forwards, futures including development of future markets, type and their applications in trading and hedging, swaps and options. Introduction to options and futures; determinants of option values; portfolio strategies using options; put - call parity, spot - futures parity, early exercise; Valuation via arbitrage arguments and their use. The perfect hedge. Risk neutral pricing binomial model; Black - Scholes model; option deltas and elasticities; delta hedging, pitfalls of dynamic hedging; forward rate agreements (FRA), futures implied forward rates; motivations for swaps, interest rate swaps, cross currency swaps, equity swaps; combining derivatives to engineer new products: stripping, reconstitution. The Greeks: Delta, gamma, vega, theta and rho, delta hedging and risk analysis, Immunization Introduction to interest-rates derivative models and analysis of short rates.

(d) **Teaching Methodology**

Lectures, Assignments, Tutorials, Demonstrations, Case Studies, Class presentation, Group discussion, Practical.

(e) **Instructional Material and Equipment**

Marker boards, markers, dusters, computers and LCD projector.

(f) **Course Assessment**

Assignments (5%), Group work (10%), CATs (15%), End of Semester Examination (70%).



(g) **Course Text Books**

- [1] Hull, J.C., *Options, Futures and other Derivatives*, 5th Edition, Prentice Hall, ISBN-13: 978-0130090560, 2002.
- [2] Panjer, H.H., *Financial Economics with Applications to Investments Insurance and Premiums*, Actuarial Foundation, ISBN-10: 0938959484, 1998.
- [3] Elton E.J., Gruber, M.J., Brown S. J. & Goetzmann, W.N., *Modern Portfolio Theory and Investment Analysis*, John Wiley, ISBN-13: 978-0470388327, 2003.

(h) **Course Journals**

- [1] Review of Derivatives Research Published by Springer. ISSN: 1380-6645 (print version), ISSN: 1573-7144(electronic version).
- [2] Applied Financial Economics, ISSN: 0960-3107 (print version), ISSN: 1466-4305(electronic version).
- [3] Applied Mathematical Finance: ISSN: 1350-486X.

(i) **Reference Text Books**

- [1] Taylor F., *Mastering Derivatives Markets: A Step-by-Step Guide to the Products, Applications and Risks*, 4th Edition, ISBN-13: 978-0273735670, 2011.
- [2] McDonald R.L., *Derivatives Markets*, 3rd edition, Pearson Series in Finance, ISBN-13: 978-0321543080, 2012.
- [3] Zastawniak T. & Capinski M., *Mathematics for Finance: An Introduction to Financial Engineering*, Springer Undergraduate Mathematics Series, 2nd Edition, ISBN-13: 978-0857290816, 2011.
- [4] Fabozzi, F. J., *Handbook of Fixed Income Derivatives*, 5th edition, Irwin, Chicago, 1997.

(j) **Reference Journals**

- [1] Annals of Finance, ISSN: 1614-2446(print version), ISSN : 1614-2454(electronic version).
- [2] Combinatorics Probability and Computing, ISSN: 0963-5483.
- [3] Computational Statistics and Data Analysis, ISSN: 0167-9473

