

LSE OPTIONS, FUTURES AND OTHER FINANCIAL DERIVATIVES

Overview

This course delivers the concepts and models underlying the modern analysis and pricing of financial derivatives. The underlying philosophy of the course is to first provide the firm foundations for understanding derivatives in general.

The required technical tools will be explained carefully, allowing students to learn the language and to be able to converse with derivatives professionals. Once the tools are in place, those same tools can then be applied to any derivative. Special emphasis will be put on those derivatives that shape the modern world.

The first half of the course involves the review of the required tools, the setup of the pricing framework, the intuition of the methodology and the application to plain vanilla derivatives.

The second half of the course applies those techniques to more advanced topics: exotic derivatives, volatility modelling (including stochastic volatility, local volatility and volatility derivatives such as variance swaps) and interest-rate derivatives.

Key information

Prerequisites: Calculus and statistics at intermediate undergraduate level. Students must have a good grounding in differential calculus, including Taylor series, and some grounding in integration (including computing expectations of random variables).

Assessment: Mid-session exam (50%), and final exam (50%)

Outcomes

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Content

Key topics

- Arbitrage and Risk-Neutral Pricing
- Basic Properties of Forwards and Options
- The Binomial model of Cox, Ross and Rubinstein
- A primer on Stochastic Calculus and continuous-time modeling
- The Model of Black and Scholes
- Greeks and Hedging Schemes
- Forwards and Futures
- American Options
- Exotic and Path-Dependent Options, Structured Products
- Historical Volatility, Implied Volatility and Heston's Stochastic Volatility model

- Local Volatility
- Variance and Correlation Swaps
- Introduction to Fixed-Income and Interest Rate derivatives
- Interest Rate Options

Course structure and assessments

The structure of the course will be a mixture of lectures and classes. Students will be given problem sets before at the beginning of the course, and you are expected to prepare the daily problem set before attending class that day.

The assessment will consist of two two-hour exams, each worth 50% of the overall mark.

Reading materials

- The main reading material will be the detailed handouts distributed at the beginning of the course. Optionally, the following MBA-level books are standard textbooks in the financial industry:
- J.C. Hull, *Options, Futures and Other Derivatives*, 9th edition, Pearson (2015).
- R.L. McDonald, *Derivatives Markets*, 3rd edition, Pearson (2013).
- K. Redhead, *Financial Derivatives*, Prentice Hall (1997).
- P. Veronesi, *Fixed Income Securities*, Wiley (2010).
- **A more detailed reading list will be supplied prior to the start of the programme*