2011-2012 Quantitative Finance Sequence

Go to: http://web.mit.edu/lkogan2/www/teaching.htm

Fall

15.450 Analytics of Finance

Quantitative methods of finance

Stochastic (Ito) calculus; derivative pricing models; financial econometrics; dynamic optimization; Monte Carlo simulation.

Application areas

Option pricing and hedging; proprietary trading; portfolio management, risk management. Implementation in MATLAB.

15.S12 (H1) Data Technologies for Quantitative Finance

Tools, techniques, and methods

Market data and sources; data architecture and design; relational and multidimensional databases; and financial analytics with an emphasis on practical, real-world solutions for handling large-scale data sets.

Application areas

Equity and option pricing; quantitative investment strategies; algorithmic trading; portfolio management; and risk management.

IAP + Spring (H1)

Finance Research Practicum

Projects with leading investment banks and asset management firms

Work in teams full-time during January, part-time during Spring (H1). Some projects are onsite at the sponsor.

Examples of past projects

- Develop a model for helping a pension perform "tail-risk hedging"
- Develop a model for valuing and hedging Brazilian interest rate options
- Develop a model for valuing and hedging variable annuity guarantees
- Design and backtest trend-following and mean-reverting strategies using signal processing techniques.

Examples of past project sponsors

Bank of America, Barclays Capital, BlackRock, Credit Suisse, Goldman Sachs, J.P. Morgan, Morgan Stanley, QS Investors.

Finance prerequisites

Required: 15.415 or 15.401, 15.450;
Recommended: 15.S12, 15.433, 15.437, 15.S05.

Spring

Analytics of Finance II

Quantitative equity investment strategies

Practical aspects of the analytics of finance: investment strategies; backtest simulation; data and computational architecture; portfolio construction; trading implementation; and risk management.

Fixed income relative value

Valuation and risk management of fixed income securities, with particular focus on US Treasury and swap markets.

Emphasis is on practical and computational issues faced when applying theoretical models to real applications and data. Although particularly suited to students seeking careers in financial markets, the topics and concepts taught are applicable broadly and will be relevant to professionals in any area of finance.

Finance prerequisites

Required: 15.415 or 15.401, 15.450;
Recommended: 15.S12, 15.S05, 15.433, 15.437.

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