

**MACF 401 (MAST 729), Sec. B**  
Mathematical & Computational Finance I  
*Winter 2016*

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- Office Hours:** TBA
- Class Schedule:** Tuesday-Thursday, 16:15-17:30 in H 400-2, SGW Campus.
- Texts:** *Stochastic Calculus for Finance I: The Binomial Asset Pricing Model*, by Steven Shreve, Springer, 2005. (Required)  
*Quantitative Finance: An Object-Oriented Approach in C++*, by Erik Schlogl, Chapman & Hall/CRC, 2014. (Recommended)
- Outline:** This course is an introduction to mathematical and computational finance. The focus is on the general theory through a thorough study of Binomial Models. The topics covered include:
- The binomial no-arbitrage price model: one-period, multi-period;
  - State prices: change of measure, Radon-Nikodym derivatives, capital asset pricing model; utility maximization and optimal investment
  - European and American derivative securities: call and put options, stopping times; exotic derivative securities
  - Random walks: first passage times, reflection principal; perpetual American put option
  - Interest-rate derivatives: binomial model for interest rates, bonds, fixed income derivatives, forward measure; Ho-Lee and Black-Derman-Toy models
  - Forward and Futures contracts;
  - Hedging: the Greeks, Delta hedging.
  - Convergence of the Binomial Model to the Black-Scholes model. The Black-Scholes Formula.
  - Numerical methods
- Evaluation:** Weighted average of Assignments (20%), Midterm Examination (35%), and the Final Examination (45%). Some assignment problems will require Programming. MACF program students are strongly encouraged to use C++ or Java for these problems, as these are the industry standards for Quantitative Finance.