MTH 9862 Stochastic processes for Finance I

Syllabus, Spring 2010

• Brownian Motion.
  1. Review of basic properties and related martingales.
  2. Quadratic Variation process.
• Stochastic Calculus.
  3. Ito’s Integral.
  4. Ito’s Formula in one dimension.
  5. Black-Scholes-Merton equation.
  6. Multivariable Stochastic Calculus
  7. Brownian Bridge (time permitting)
• Risk-Neutral Pricing.
  8. Risk-Neutral Measure and Girsanov’s Theorem in one dimension.
  9. Martingale Representation Theorem and its application to hedging.
 11. Dividend-Paying Stocks.
 12. Forwards and Futures.
• Connections with Partial Differential Equations.
 15. Feynman-Kac formula.
• Exotic Options.
 16. Maximum of Brownian Motion with Drift.
 17. Knock-out Barrier Options.
 18. Lookback Options.
• American Derivative Securities.
 22. American Call.