Probability Theory and Stochastic Calculus

Syllabus

* Probability theory
  + Probability spaces
  + Random variables
  + Stochastic processes
* Information and conditioning
  + Conditional expectation
  + Martingales
* Brownian motion
* Stochastic calculus
  + Itô’s integral
  + Itô formula
* Stochastic differential equations
* Connection with PDEs
  + Feynman-Kac theorem
* Change of measure
  + Girsanov theorem
  + Martingale representation theorem
* Black-Scholes model

Textbooks

* Shreve (2004). Stochastic calculus for finance II, Springer.
* Ballotta, L. and Fusai, G. (2018). Tools from Stochastic Analysis for Mathematical Finance: A Gentle Introduction. Available at SSRN: <https://ssrn.com/abstract=3183712>