STAT 591: Advanced Topics: Stochastic calculus and applications to math finance

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Textbook: I will use my own lecture notes. Below lists several good reference books for this course on the subject:

1. Bernt Oksendal, *Stochastic Differential Equations - An introduction with applications.*
2. Richard F. Bass, *Stochastic Processes.*
3. Ioannis Karatzas and Steven E. Shreve, *Brownian Motion and Stochastic Calculus.*

Course Conent:

1. The theory: Brownian motion, Continues time martingales, Markov properties of Brownian motion, Construction of Brownian motion, Stochastic integrals, Itô's formula, Applications of Itô's formula, The Girsanov theorem.
2. Applications to math finance: Black-Scholes formula, local volatility models and the fundamental theorem of finance.

Prerequisite: Stat 501 and Stat 502, or consent of instructor.

Grading: The grades of the course will be based on homework assignments and attendance.