



# STAT 490

## Stochastic Differential Equations

Spring 2009  
Day Course

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Students requiring accommodations as a result of disability, must contact the Centre for Students with Disabilities 778-782-3112 or [csdo@sfu.ca](mailto:csdo@sfu.ca)

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Instructor: [Dr. Paul Tupper](#)

### **Prerequisite:**

STAT 270 and MATH 310 or MACM 316 or STAT 380. This course is taught in conjunction with MATH 495.

### **Textbook:**

*Handbook of Stochastic Methods*, 3<sup>rd</sup> ed., by C.W. Gardiner, Springer-Verlag 2004. ISBN: 3-540-20882-8

The text is out of print at present, but new and used copies are available from many online bookstores. The website [bookfinder.com](http://bookfinder.com) can provide you with a list of such bookstores along with the price they are selling the text for. Any edition of the text will suffice for the class.

### **Outline:**

This course is an introduction to stochastic differential equations (SDEs) and related topics. My goal is to get students comfortable with SDEs for modelling and simulation purposes. Homework will involve both analytical and computational work. The application areas I know best are physics and chemistry, so the course will be tilted this way. However, the tools we'll learn are useful in many different areas, particularly finance, engineering, and biology. Topics: Review of basic probability and Markov processes. Brownian motion, the Ito integral, Ito processes and the Ito formula, SDEs, Ito versus Stratonovich, simulation methods for SDEs, strong and weak convergence, the Fokker-Planck equation, the Feynman-Kac equation, Brownian and Langevin dynamics, various applications.

### **Grading Scheme:**

Homework: 40%

Midterm: 30%

Final: 30%

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*Students should be aware that they have certain rights to confidentiality concerning the return of course papers and the posting of marks. Please pay careful attention to the options discussed in class at the beginning of the semester. Students are reminded that Academic Honesty is a cornerstone of the acquisition of knowledge. Scholarly integrity is required of all members of the University. Please consult the General Guidelines of the calendar for more details.*

Revised November 2008