Probabilistic Models & Stochastic Differential Equations

Randomness is amenable to a mathematical description when viewed as a probabilistic phenomenon. This course is an introduction to the mathematical and computational tools developed for the understanding of systems that include the feature of randomness. These methods incorporate ideas of probability theory into simple mathematical models of discrete or continuous processes. Many of these models form the basis of those used in the sciences, finance and engineering. The goal is to obtain an understanding of the statistics of model outcomes, or the properties of the random processes.

This course will begin with introductory reviews of the theory of probability and the calculus of mathematical models. The aim is to develop tools for a quantitative understanding of the most basic stochastic systems: Markov models, Brownian motion and stochastic differential equations. *The analysis of these models combines ideas of elementary probability, advanced calculus (differential equations and Fourier series) and numerical computing — participants should have previous experience in some, but not necessarily all of these areas.* Matlab will be the default computing environment for the class, and most of the numerical work will involve modification of downloaded scripts.

Professor:	David Muraki, office K10538, phone 778.782.4814
Lectures:	Monday at 10:30-11:20pm in AQ 5037
	Thursday at 10:30-12:20pm in AQ 5016
Office Hours:	Monday 3:00-5:00pm (2:30-3:20 on *outside the box* days)
	or by special appointment (arrangements by phone/e-mail)
Readings:	*Stochastic Tools in Mathematics and Science*
	Chorin & Hald, Springer (2009) – SFU online
	other readings assigned in lecture, or on class websites
Web Access:	webct & *www.math.sfu.ca/∼muraki*: follow class links
	updated weekly — assignments, computing demos & announcements
	wiki: *https://wiki.sfu.ca/spring13/math495-795/index.php/Main_Page*
	student postings & lecture notes
Communication:	webct-based discussion postings as primary class e-mail
	muraki@sfu.ca: private class-related e-mail correspondence only
	muraki@math.sfu.ca: urgent correspondence only please
E-policy:	see webct discussion posting; E-contracts required for exception
Computing:	Matlab & Maple are the recommended computing environments
	lecture & homework scripts will be posted on class webpage
	Matlab & Maple access: campus network & assignment lab (AQ3144)
Responsibilities:	weekly assignments ($\approx 40\%$)
	active participation in class, **notetaking** & webct discussions
	midterm ($\approx 25\%$) & final exam ($\approx 35\%$)