

Stochastic Processes: Math 229B

Spring 2004, TTh 11-12:30

Professor: MICHAEL ANSHELEVICH

Description: The course will be based primarily on Øksendal's *Stochastic Differential Equations* book. We will develop the basic theory of [stochastic integrals](#). The theory itself is quite beautiful; in addition, stochastic integration and SDEs have found applications in statistical physics, engineering, and finance, as well as in mathematical fields such as PDEs and differential geometry. Our goal is to build a foundation, so that the students can then use it for the applications they need, for example in the final project (see below).

Prerequisites: Knowledge of measure-theory based probability is essential. Since Math 229A was taught in the fall, we will review the background (Chapter 2 of the textbook) in the beginning of the course. For people who haven't taken Math 229A, familiarity with the notion of stochastic process and basic properties of the Brownian motion will make the first weeks much more manageable.

Grading: based on weekly homeworks and a final project. The project may be based on a book chapter, a paper, or contain new material, and should be on a topic of interest to the student which is also related to the content of the course. The later chapters of the textbook contain a number of such possible applications.

Topics to be covered:

- Background on Brownian motion
- Itô integrals
- Itô formula (change-of-variable formula for stochastic integrals)
- Stochastic differential equations
- Diffusions
- Filtering and other applications will be touched upon, time permitting.

Note: The first lecture will be on April 1.