

Stochastic Differential Equations with applications to biology

Instructor: Hal Smith, halsmith@asu.edu
Fall 2018

The course will cover basic theory following the text of Oksendal (see below) and consider applications from the third reference. We begin with Brownian motion, stochastic calculus, and then basic well-posedness for stochastic differential equations (SDEs). The instructor is not an expert in SDEs so we will learn together.

Students will be expected to do a project which they present in class. This could be a class presentation of a portion of one of the texts.

Prerequisites: Measure theory and familiarity with stochastic processes. For example, APM506, APM541, MAT570.

One possible SDE version of Logistic growth:

$$dX(t) = rX(t)(1 - X(t)/K)dt + \sqrt{rX(t)}dW(t)$$

References:

Stochastic Differential Equations, 6th ed., B. Oksendal, Springer, 2007.

An Introduction to Stochastic Differential Equations, L.Evans, Amer. Math Soc. 2013.

An Introduction to Stochastic Processes with Applications to Biology, 2nd ed., L. Allen, CRC Press, 2011.