

Amath 590: Modeling and Analysis of Stochastic Phenomena in the Life Sciences

SLN: 23535

Prereq: UG course in ODEs and some familiarity with PDEs and Stochastic Processes
DEN 256, TTh 10:00-11:20am

Instructor: Frederic Wan (fredwan@uw.edu)

Biological processes evolving in an uncertain environment are typically characterized mathematically by stochastic processes. The analyses of those modeled by stochastic differential equations (SDE) are mathematically complex and approximate statistics about the phenomena are usually extracted by numerical simulations. Powerful and elegant analytical techniques exist for determining output statistics exactly or with high computational efficiency. This course offers an exposition of some of these techniques through applications to specific stochastic differential equation models, both well known and new. While new and ongoing research to be discussed in areas such as life cycle of *Chlamydia Trachomatis* and robustness of morphogen gradients offer new research opportunities, analytical methods for their stochastic differential equation (SDE) models, many not previously available through graduate texts and courses, will be made accessible in this graduate level course to offer new tools for research in stochastic phenomena.

Grading: course grades will be determined by student performance on 7-8 sets of weekly homework assignments. A weekly review/consultation session will be organized to assist students on course material and homework problems.

