

# COURSE ANNOUNCEMENT

## Mathematical Modeling

### MATH 420/620

Spring Semester 2009  
MW 1:00–2:15pm  
AB 635

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Math 420/620 introduces a number of mathematical modeling techniques. We'll consider a variety of analytical and numerical methods that solve various problems appearing in applications. The emphasis is on the interdependence of mathematics and the applied and natural sciences. To succeed in the course students need to have basic knowledge of calculus and probability/statistics beforehand.

In this course we'll consider: basic optimization techniques in one variable, in many variables; discrete and continuous dynamical systems, eigenvalue method for dynamical systems and computational methods; discrete and continuous probability models; stochastic models. Each presented topic will be motivated by a real life problem. To solve the problem we'll introduce mathematical tools suitable for the analysis. Many problems are motivated by population dynamics and we'll show how different solution methods lead to various conclusions on the behavior of the solutions.

Consideration of many topics of mathematical modeling requires a lot of auxiliary information from different areas of analysis, differential equations, linear algebra, etc. Such information will be compactly presented during the course as needed.

Grade in the course will be based on homework projects and maybe one midterm exam. Homework assignments would include theoretical and computational part. Students are supposed to work in groups on hw projects and each group is supposed to submit a report. The main computing language will be MAPLE due to the large number of in-built subroutines with various algorithms. Students can use other computing languages if they prefer them. Students registered for Math 620 will be required to do a final project.

**Main Text:** Mark M. Meerschaert, *Mathematical Modeling*, 3rd edition, Elsevier Academic Press 2007.