

**Math 522 – Mathematical Modeling H1 EMC /P 2</MCID 1d e(s)**  
discrete or continuous processes that may be deterministic or  
Dimensional analysis and scaling are introduced to prepare a model  
Analytic and computational tools from a broad range of applied math  
be used to obtain information about the models. The mathematical re  
compared to physical data to assess the usefulness of the models. Credit  
be granted for both MATH 486 and MATH 522.-(33)

**Enrollment:** Elective for AM and other majors.

**Textbook(s):** TBD.

**Other required material:** None

**Prerequisites:** Undergraduate knowledge of multivariate calculus, ordinary differential equations and matrices/linear algebra; basic knowledge of probability and Matlab; instructor's consent.

**Objectives:**

- 1.

3. Nonlinear dynamics (ODEs) – stability and bifurcation with applications to epidemics, pharmacokinetics, climate change 4
4. Diffusion models – advection, convection, bifurcation with applications to mixing and transport models, crime detection 8
5. Stochastic models – random walks, Brownian motion, stochastic differential equations with applications to statistical physics, finance 8
6. Exams and add-ons 5

<b>Assessment:</b>	Homework	10-25%
	Projects	10-20%
	Exams	20-30%
	Final Exam	20-30%

**Syllabus prepared by:** Charles Tier and Hemanshu Kaul

**Date:** 4/25/2015