San Francisco State University
Department of Mathematics
Course Syllabus

MATH 460
Mathematical Modeling

Prerequisites

MATH 325 and MATH 376 or 245.

Bulletin Description

Deterministic and stochastic techniques used in mathematical modeling, illustrated and developed through problems originating in industry and applied research.

Course Objectives

The principal aim of Mathematical Modeling is for students to learn the methods for representing specific real-world systems by mathematical constructs. Students who successfully complete this course should:

- Understand the basic principals of mechanical vibrations, population dynamics, and traffic flow.
- Be capable of solving first order linear partial differential equations, in particular equations modeling wave phenomena; be capable of presenting qualitative information concerning non-linear wave equations.
- Be capable of linearizing non-linear systems of equations and determining the stability properties of equilibria.
- Approximating the properties of targeted real-world systems from the properties of their appropriate mathematical models.

Evaluation of Students

Students will be graded on their ability to devise, organize and present complete solutions to problems written in correct mathematical English. While instructors may design their own methods of evaluating student performance, these methods must include in-class examinations, graded homework assignments and a final exam.

Course Outline

Topics	Number of

	Weeks
Mechanical Vibrations & Phase Plane Analysis	4
Population Dynamics	3
Partial Differential Equations: 1st & 2nd order wave equations	3
Traffic flow	4

Textbooks and Software

Mathematical Models, by Richard Haberman.
Partial Differential Equations for Scientists and Engineers, by Stanley Farlow.

Submitted by: David Ellis Date: 22 September 2006