Mathematical Modeling
MATH 115 - Lecture A
Spring Quarter 2002
Course # 44530

Instructor: Edriss S. Titi
Office: Multipurpose Science & Technology Building Room 249
Telephone: (949)- 824-3156
E-mail: etiti@math.uci.edu
2:30am-3:30PM **Place**: RH 114
Time: MWF 11:00-11:50am.

Background: The formulation of a qualitative questions about an observed scientific phenomenon as mathematical problems was always the motivation and an integral part of the development of mathematics. In this course, the students will be involved in the derivation and the analysis of mathematical models in engineering, physical sciences, economics, biology and social sciences. This in turn will give them a greater appreciation for this important mathematical activity in science and engineering.

What distinguishes this course from other mathematical courses is that only after the model is derived will the right mathematical tools be developed to analyze and solve the problem at hand. That is we do not know in advance whether we will be using tools from algebra, diffenrential equations, geometry, numerical analysis, or any combination of the above, to solve the problem under consideration. The mathematical tools by themselves are precise and usually give accurate answers to the *model*. However, this answer might be out of the scope of the validity of this model. In this course, we will emphasize such issues about the limitations and the validity of the mathematical model.

The main purpose of this course will be to equip students with the appropriate applied mathematical skills to involve them in modeling and solving real world industrial and economics problems.

The topics covered in this course might vary from instructor to instructor. Below is the grading policy of this course, and a sample syllabus with proposed topics.

Grading Policy: There will be one Take Home midterm, by the fifth week, which is worth 25% of the grade of the course. There will be a comprehensive Take Home final exam, or a final project, which forms 35% of the grade of the course.

Homework: Homework will be assigned each lecture. It will be collected once a week, on Wednesday, during the lecture, graded and returned to you. The Homework forms 40% of the total grade of the course.

References:

Alexandre Joel Chorin and Jerold Marsden,*A Mathematical Introduction to Fluid Mechanics,* New York : Springer-Verlag, 1993 Edition

Robert L. Devaney, *An Introduction to Chaotic Dynamical Systems*f, Redwood City, Calif. : Addison-Wesley, 1989.

Michael, Mesterton-Gibbons, *A Concrete Approach to Mathematical Modelling* New York : Wiley & Sons, 1995.

Edward A. Bender,*An Introduction to Mathematical Modeling*, New York Wiley, 1978.

Fredric Y. M. Wan, *Mathematical Models and Their Analysis* , Harper and Row Publishers, New York, 1989.