Spring 2012

MATH 4390 Introduction to Mathematical Biology

TEXTBOOK: Mathematical Models in Biology, Leah Edelstein-Keshet, SIAM, 2005. ISBN: 978-0-898715-54-5.

PREREQUISITE: MATH 2407 and MATH 2402 or MATH 2412 and consent of instructor.

COURSE GOALS: Interactions between the mathematical and biological sciences have been increasing rapidly in recent years. These interactions should be felt at the undergraduate level. The goal of this course is to impart to students the excitement and usefulness of mathematics as fundamental tools in formulating, analyzing and interpreting biological problems. The course is designed for mathematics students and also non-mathematics students who have had only the basics of calculus and linear algebra. The course focuses on ideas, not on theorem-proof-remark style mathematics. The topics can be chosen from a variety of life sciences fields such as population dynamics, enzyme kinetics, epidemics, and forest succession, etc.

COURSE OBJECTIVES: Through this course, biology students should have benefit from learning how mathematical tools help them pursue their own interests and mathematics students gain from seeing some of the interesting areas open them. This course will introduce students the basic concepts and useful tools in modeling based on difference and differential equations. During the course, students will learn the theory and the applications of linear and nonlinear difference equations to population dynamics, the theory and the applications of linear and nonlinear ordinary differential equations to population dynamics, and a few qualitative techniques such as dimensional analysis, phase plane analysis, linearization, and stability. Also, this course will introduce mathematical software such as MATLAB or Maple for manipulating the model.

COURSE CONTENTS:

Chapter 1: Linear Difference Equations Applied to Population Growth.
Chapter 2 & 3: Nonlinear Difference Equations Applied to Population Growth.
Chapter 4, 5 & 6: Linear and Nonlinear Differential Equations Applied to Population Growth.

EVALUATION METHOD:
There are a midterm, a final, homework and a group project in class.

GRADING POLICY:	**MIDTERM**	**30%**
	FINAL EXAM	**40%**
	GROUP PROJECT (ORAL/WRITTEN)	**20%**
	HOMEWORK	**10%**

ALL EXAMS MUST BE TAKEN BY ALL THE STUDENTS. THERE WILL BE NO OTHER MAKE-UP EXAMS!

HOMEWORK ASSIGNMENT: Due at every exam day. The solutions to homework problems will be answered in class or through office hours by making questions.
ACADEMIC HONESTY POLICY: All students are subject to UHD's Academic Honesty Policy and to all other university-wide policies as they are set forth in the UHD University Catalog and Student Handbook.

STATEMENT ON REASONABLE ACCOMMODATIONS: UHD adheres to all applicable federal, state, and local laws, regulations, and guidelines with respect to providing reasonable accommodations for students with disabilities. Students with disabilities should be notified to register with Disabled Student Services (in S409) and contact the instructor in a timely manner to arrange for appropriate accommodations. **Whenever possible, and in accordance with 504/ADA guidelines, UHD will attempt to provide reasonable academic adjustments/auxiliary aids to students who request and require them. Students may call 713-226-5227 for more assistance.**