

Fundamentals of Ecological and Environmental Modeling

Spring 20XX: 16:215:585 (graduate) and 11:216:431 (undergraduate)

Instructor: Prof. Ming Xu, 132 ENR, 732-932-9211, mingxu@crssa.rutgers.edu

Office hours: Tue 2:00—3:00 or by appointment

Lectures: 123 ENR, Tue 10:55-1:55

Learning Goals:

- 1) Develop a comprehensive understanding of software, hardware, field and laboratory techniques commonly used in the study of ecology, evolution, and natural resources management.
- 2) Demonstrate the ability to design experiments and interpret numeric and graphical data.
- 3) Improving quantitative skills in modeling ecological processes and functions.

Week #	Date	Topic	Readings	Assignment Due
1	Jan 21	Function, difference equation & population growth	Chapter 1 & 2	
2	28	Matrix and modeling with matrix	9.1, 9.2	Problem Set 1
3	Feb 4	Limits and derivative	Chapter 3 & 4	Problem Set 2
4	11	Differentiation and optimization	Chapter 5	Problem Set 3
5	18	Lab 1: Graphing & modeling with Excel		Problem Set 4
6	25	Integration techniques	6.1, 6.2, chapter 7	Lab1 report
7	Mar 4	Application of integration	6.3, 7.7	Problem set 5
8	11	Differential equations (first-order)	Chapter 8	Problem set 6
9	18	Spring break		
10	25	Mid-term		
11	April 1	Lab 2: Introduction to Stella	Stella manual	Problem set 7
12	8	Lotka-Volterra & Predator-prey models	11.4	Lab 2 report
13	15	Lab 3: Modeling with Stella	Stella manual	Problem set 8
14	22	Chaos and system stability	11.1, 11.2	Lab 3 report
15	29	Species habitat modeling (MAXENT)	handout	Problem set 9
15	May 6	Lab 4: Species habitat modeling		Lab 4 report
15	May 14	Presentation day		Term project

Text: Calculus for Biology and Medicine (2nd Edition) by Claudia Neuhauser, 2004

Grading: Attendance 20%

Assignment 40% (including Lab Assignments)

Mid-term 20%

Final project 20%