BI303: Quantitative Module

Spring 2009

Module Information

Course Instructor:	Dr. Adrien Finzi
Module Instructor:	Mark Kramer (mak---AT---bu.edu, 3-1493) 111 Cummington St, Room 239
Module Hours:	1-2 PM / Fridays / 111 Cummington / Room 241
Office Hours:	2-3 PM / Fridays / 111 Cummington / Room 239
Textbook:	The Economy of Nature, 5th Edition R. E. Ricklefs
Course website:	math.bu.edu/people/mak/BI303

Module prerequisites: Calculus I & II. Also, backgrounds in differential equations, linear algebra, and computer programming are useful but not necessary.

Module goal: To develop in greater detail the quantitative material discussed in lecture. We will introduce mathematical and computational techniques and apply these techniques to problems in ecology. You will learn why mathematics is useful in ecology and how to apply mathematical techniques to ecological problems.

Homework / Exams: There will be no homework or exams in this module. All required work for this module will be completed during our weekly one hour meetings. Additional problems and readings will be provided at the course website for those interested.

Grades: You will receive no grade for this course. A written evaluation will be provided, if you request it.

BI303 Term Paper: You may choose to research a quantitative term paper. This paper will be submitted at the end of the semester and satisfy the term paper requirement for the course. You will receive a grade for this term paper (just as the other students). You will also receive extra assistance and guidance in completing this term paper during the module.

Schedule: Here is a suggestion of what we will do. Our schedule is flexible and will be changed to suit the specific interests of the course participants.

WEEK	TOPIC	TEXT	MATH
1	Mites per leaf: the Poisson distribution	Ch 13	Statistics, exponentials, the chi-square test.
2	Solution of logistic growth equation	Ch 13	Calculus tricks.
3	Life Tables	Ch 14 (pg. 274-277)	Matrices, eigenvectors, linear algebra.
4	Exam review		
5	Discrete population models.	Ch 14 (pg. 272)	Cobwebbing.
6	Discrete population models: application to the human population.	Ch 14 (pg. 271, 283-286)	Introduction to fixed points and stability.
7	Discrete population models: application to the human population.		Introduction to bifurcations and chaos.
8	Exam review		
9	Continuous population models: boats and barnacles.	Ch 18 (pg. 352-355)	Application of fixed points and stability.
10	Continuous population models: boats and barnacles.	Ch 18 (pg. 352-355)	Oscillations.

WEEK	TOPIC	TEXT	MATH
11	Continuous models: climate change.	Ch 26 (pg. 511-512)	The saddle node bifurcation.
12	Continuous models: The impact of marine reserve establishment on coral reefs.		Graphical tests of model stability.
13	Continuous models: The impact of marine reserve establishment on coral reefs.		