

Anthro 5471 / Biol 5471 (3 credits)
Lecture: MW 10:45–11:35PM
Lab: F 10:45–11:35PM
Professor Alan Rogers

Spring 2010
ST 216
Marriott 1120
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<http://www.anthro.utah.edu/~rogers/courses.html>

Fundamental Methods of Evolutionary Ecology

Description and objectives Evolutionary ecology is the scientific discipline that uses evolutionary theories to understand the ecology and behavior of plants and animals (including people). As these theories are often quantitative, budding evolutionary ecologists need training in the relevant quantitative methods. This course fills that need. It will cover optimization models, game theory, kin selection, and life history. Satisfies the *Quantitative Intensive Requirement*.

Prerequisites Junior, Senior or Graduate standing; one semester Calculus (Math 1100, 1170, 1210, or equivalent); one semester Ecology.

Grading 3 exams (60 pts total), weekly labs (40 pts total), and occasional quizzes. The exam on which you get the lowest score will count half as much as the other two. The low half of your lab scores will count half as much as the high half. Each assignment is curved, and grades are based on the higher of the raw and curved scores.

Teaching and learning methods Two lectures per week and one lab. Course makes extensive use of *Maple*, a computer program that simplifies equations, solves them, and plots the results.

Date	Lecture
Jan 11 M	Intro: Command line
13 W	Maple
15 F	Lab: Command line quiz; Maple exercise
18 M	*** NO CLASS
20 W	Derivatives

Reading material

- [R] Rogers, Alan R. 2010. *Fundamental Methods of Evolutionary Ecology*. (class web site)
- [B] Bowles, Samuel. 2009. Did warfare among ancestral hunter-gatherers affect the evolution of human social behaviors? *Science* 324: 1293-1298. (class web site)
- [M] McElreath, Richard and Robert Boyd. 2007. Ch. 5, Animal Communication. *Mathematical Models of Social Evolution*.

Contact After class & by appt. Office: room 206a Stewart Bldg. Phone: 581-5529. Email: rogers at anthro dot utah dot edu.

Plagiarism Any cheating or plagiarism will result in a failing grade for the course. See sections II and V of the Student Code (<http://www.admin.utah.edu/ppmanual/8/8-10.html>).

ADA statement The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Union Building, 581-5020 (V/TDD). CDS will work with you and the instructor to make arrangements for accommodations. (www.hr.utah.edu/oeo/ada/guide/faculty)

Reading
R:1 & A or B
R:2
R:4

	Maxima & minima	R:3
	22 F Lab: Optimization	
	25 M 2nd-order conditions	R:3
	27 W Selection	R:4
	29 F Lab: Selection	
Feb	01 M Maple 2	R:5
	03 W Clutch size: Smith-Fretwell	R:6
	05 F Lab: More Maple (proc and for)	
	08 M Clutch size: sibling competition	R:6
	10 W Foraging: Diet choice	R:7
	12 F Lab: Clutch size	
	15 M *** NO CLASS	
	17 W Foraging: Patch model	R:7
	19 F Exam 1	
	22 M Review exam	
	24 W Game theory 1: Graphical approach	R:8
	26 F No Lab: Game theory 2: Hawks, doves and sex ratio	R:8
Mar	01 M Game theory 3: ESS algebra	R:9
	03 W Game theory 4: Asymmetric games	R:9
	05 F Lab: Foraging	
	08 M Evolution of culture	R:11
	10 W Variance and covariance	R:C
	12 F Lab: Game theory	
	15 M Covariance selection 1	R:12
	17 W Cooperation and conflict	B
	19 F Exam 2	
	22–26 *** NO CLASS	
	29 M Kin selection	R:13
	31 W Parent-offspring conflict	R:13
Apr	02 F Lab: Covariance selection	
	05 M Costly signalling	R:14
	07 W Renewal equation	R:15
	09 F Lab: Kin selection	
	12 M Leslie matrix	R:15
	14 W Stable age distribution	R:15
	16 F Lab: Age structure	
	19 M Life history I	R:16
	Homework due: Ch. 15	
	21 W Life history II	R:16
	23 F Lab: Life history	
	26 M Menopause	R:16
	28 W Review	
	Homework due: Ch. 16	
Apr	30 F Final exam 8:00–10:00AM	