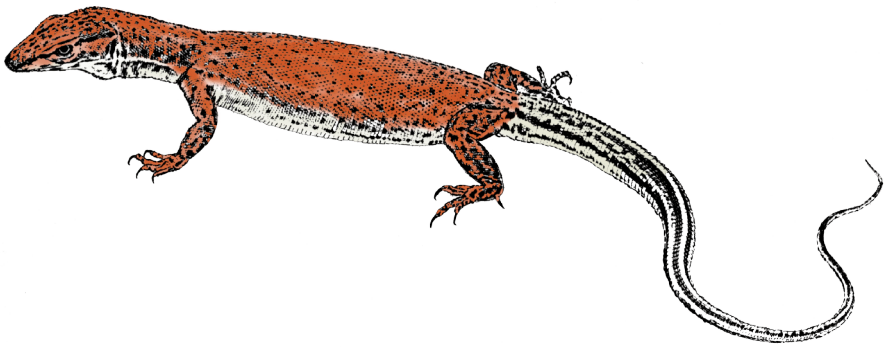
BIO 357. Evolutionary Ecology. Principles of modern ecology, particularly as they relate to natural selection and evolutionary theory. Three lecture hours a week for one semester.



Biology 357: Evolutionary Ecology, Fall 2013

Tuesday-Thursday 12:30-2PM, RLM 5.104

Instructor: Eric R. Pianka

E-mail Address: erp@austin.utexas.edu

Office Hours: PAT 125, Monday 1-2, Friday 1-2) or by appointment (471-7472 or by email)

Textbook

Pianka, ***Evolutionary Ecology, 6th or 7th eBook Edition***
Please read Chapters 1 and 8 (posted on **Blackboard "Course Documents")**

Websites

http://www.zo.utexas.edu/courses/bio357
http://www.zo.utexas.edu/courses/THOC
http://uts.cc.utexas.edu/~varanus/eric.html

Note: Due to budgetary constraints, discussion sections will not meet this year

Suggested Additional Reading:

Case, ***An Illustrated Guide to Theoretical Ecology*** (read pp. 79-100)
Ginzburg and Golenberg, ***Lectures in Theoretical Population Biology***
(read pp. 1-5 and 193-219)
Gotelli, ***A Primer of Ecology*** (read pp. 2-85)

Exams

Three in-class exams during the semester (only the best two will be counted) plus one comprehensive final, scheduled as follows:

First Exam: 26 Sept.
Second Exam: 31 Oct.
Third Exam: 5 Dec.

Final Exam: 13 December, 2-5 PM

Letter Grade

Your lowest hour exam will be thrown out (no "make up" exams!). Your best two exams will each count 25% of your course letter grade. The comprehensive Final counts for 50% of your course grade. These are the only four ways you can earn your grade. No "extra" points are available. Final grades are FINAL, carved in stone, and will not be changed. UT's "new" plus-minus system will be used.

Course Outline, Biology 357: Evolutionary Ecology

(Subjects will be covered in the following order)

Background

Scaling and the hierarchical structure of biology, levels of approach in biology, domain of ecology, definitions and ground work; anthropocentrism, the importance of wild organisms in pristine natural environments, the urgency of basic ecological research; scientific methodology; models; multiple causality; limiting factors, tolerance limits, the principle of allocation; natural selection, self-replicating molecular assemblages; units of selection.

Principles of Population Ecology

Life tables and schedules of reproduction; net reproductive rate and reproductive value; stable age distribution; Leslie matrices; intrinsic rate of increase; evolution of reproductive tactics; avian clutch size; evolution of old age and death rates; population growth and regulation -- Pearl-Verhulst logistic equation; density dependence and independence; *r* and *K* selection; population "cycles," cause and effect; use of space (vagility, home range, territoriality, foraging tactics); evolution of sex; sex ratio; mating systems; sexual selection; fitness and the individual's status in the population; kin selection, inclusive fitness; reciprocal altruism, parent-offspring conflict.

Interactions Between Populations

Direct versus indirect and complex population interactions. Parasitism, Commensalism, Mutualisms, etc.; Competition and Niche Theory: Lotka-Volterra equations and competition theory; diffuse competition; niche overlap and competition; niche dimensionality; niche breadth (specialization versus generalization); evolutionary consequences; laboratory and field experiments; other evidence from nature; future prospects. Predation: Theory; predator-prey oscillations; aspect diversity; "prudent" predation and optimal yield; evolutionary consequences; predator escape tactics; adaptive coloration; mimicry; warning calls; coevolution; plant-herbivore interactions and plant-apparency theory; parasitism; Darwinian medicine; selected other observations and experiments.

The Role of Phylogenetics in Ecology

Phylogenetic systematics, independent contrasts, the comparative method, evolutionary ecomorphology, recovering the history of the vanishing book of life on Earth

Community Ecology

Macrodescriptors; compartmentation in communities (trophic levels, guild structure, and food webs); connectance; pyramids of numbers, biomass, and energy; energy flow and ecological energetics; secondary succession and transition matrices; community matrix; saturation with individuals and with species; species diversity; diversity of lowland rainforest trees; community stability; types of stability; chaotic attractors; evolutionary convergence and ecological equivalents; evolution of communities; pseudo-communities.

Island Biogeography and Conservation Biology

Classical biogeography; biogeographic "rules;" continental drift; island biogeography; species-area relationships; equilibrium theory; compression hypothesis; islands as ecological experiments: Krakatau, Darwin's finches, Hawaiian Drosophilidae, other examples; metapopulations, conservation biology, human impacts on natural ecosystems, hot spots of biodiversity, applied biogeography and design of nature preserves.