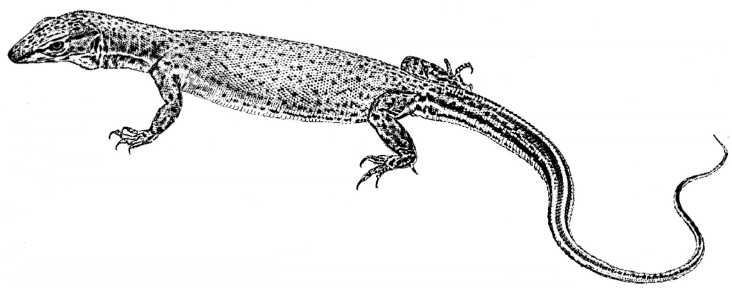
BIO 373. Ecology. An introduction to ecology, the study of relationships among organisms and between organisms and their environment; adaptations, population, communities, and ecosystems. Includes both plants and animals and both terrestrial and aquatic ecosystems. Three lecture hours and one discussion hour a week for one semester. Prerequisite: Biology 325 or 325H with a grade of at least C.



Biology 373: Ecology, Fall 2014

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

Instructors

Eric R. Pianka (Prof.)

E-mail Addresses

Eric R. Pianka (pianka@mail.utexas.edu)
Teaching Assistant (TA@gmail.com)

Office Hours

Eric (PAT 125, Mon., Fri. 1-2) or by appointment (471-7472 or by email)
TA (PAT) or by appointment (no phone, please use e-mail)

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/bio373
http://www.zo.utexas.edu/courses/THOC
http://uts.cc.utexas.edu/~varanus

Discussion Sections

Wednesday
Wednesday
Friday 9-10,
Friday 10-11

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: Oct.

Second Exam: Nov.

Third Exam: Dec.

Final Exam: 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.

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Course Outline, Biology 373: 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 and adaptation, self-replicating molecular assemblages; units of selection; speciation; phylogeny; classification and phylogenetic systematics.

History and Biogeography

Self-replicating molecular assemblages, geological past, classical biogeography, Wallacea, continental drift (plate tectonics)

Meteorology

Major determinants of climate, oceans, local perturbations, variations in time and space, global weather modification

Climate and Vegetation

Plant life forms and biomes, the interface between climate and vegetation; classification of climates and vegetation; microclimate; potential and actual evapotranspiration and productivity; leaf and root tactics; adaptive geometry of trees; soil formation and succession; biogeochemical cycles, soil formation and primary succession, energy flow, primary production and evapotranspiration, ecotones, classification of natural communities, freshwater aquatic ecosystems

Physiological Ecology

Physiological optima and tolerance curves, energetics of metabolism and movement; energy budgets and the principle of allocation; adaptation and deterioration of environment; heat budgets and thermal ecology; water economy in desert organisms; other limiting materials; sensory capacties and environmental cues; adaptive suites and design constraints.

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; 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.