Biology 213. Diversity and Ecology, Spring 2005

Professor Eric R. Pianka

Course Website: http://www.zo.utexas.edu/courses/bio213/

Each of us quite naturally perceives ourself to be at the center of things, but no one would deny that other events ultimately have their influence, too. Likewise, many people unconsciously place humanity at the exact center of the universe. In this view, the utility of anything is measured by how it can be used by humans. For many, everything has its dollar value. Such anthropocentrism is understandable, but narrow and misguided.

It is a worthwhile exercise to imagine that something else, such as an ant, a lizard, an oak tree, or an HIV virus, is really the focus of the Cosmos. From such a perspective, the almighty dollar quickly loses its primacy. Survival and reproduction assume a lot more significance. What good are lizards? What good are **you**?

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PAT 125 (471-7472) Office hours: Tu-Th 1-2PM

Teaching Assistant: Ann Thijs, email:annthijs@mail.utexas.edu
BIO 316 BA (475-7851) Office hours: 9-11 AM on Mondays and
from 10-11 AM on Fridays.

Lectures: Tuesday and Thursday, 11-12 AM. Taylor 2.006

Discussion Sections: Attendance required (counts for 20% of your course grade). Homework will be assigned and quizzes will be given.

Prerequisites: Bio 211 and 212 with grades of C or higher are required. Students who enroll in 213 who have not met these prerequisites will be dropped after the fourth class day.

This course assumes knowledge of High School algebra and geometry. You will be expected to be able to understand 3-dimensional graphs and be able to manipulate simple equations.

Philosophy: We will attempt to teach you the basic ecology and evolution that everyone should know -- we will also do our utmost to encourage you to **think!**

Text: None required
Optional, but recommended: Pianka, E. R. 2000. Evolutionary Ecology, 6th ed. Addison-Wesley Longman.

Grading and Grades:

Your performance in discussion sections counts 20%.

Exams:

Thursday, February 17th

Thursday, March 31st

Thursday, May 5th

Best 2 of the above 3 hour exams will count 20% each (40% total)

Final Exam, May 11th, 9-12 AM Comprehensive (40%)

There will be NO "make up" exams!

You will be expected to "know" everything the instructors say in lecture and discussion sections, including pauses and nuances, as well as everything assigned in reading assignments. Exams will be in multiple choice format. Each 60 minute exam will cover about one-third of the class. Everyone must take at least two of the three hour exams plus the comprehensive 3 hour final exam. No "Make Up" exams will be given (if you press us on this, you will get grilled by both of us in your own 2 hour private oral examination!).

No "extra points" are available.

Final Grades are final, carved in stone, and non-negotiable (please don't even bother to question them!). They are a measure of your own phenotype, and not our reponsibility. We expect you to accept your own performance as an integral part of yourself.

Outline of Subjects covered in this Course

Introduction:

Definitions and groundwork; the scientific method; domain of ecology, environment; limiting factors, tolerance limits, the principle of allocation; natural selection, self-replicating molecular assemblages; levels of selection, levels of approach to science, speciation, phylogeny, classification and systematics, adaptation, the species concept, origin of life, prokaryotes and eukaryotes, introduction to the diversity of organisms. Domains, traits (and example organisms) of kingdoms [archaebacteria, eubacteria, protists, fungi, plants, animals]. One major taxon (Lizards) will be examined in depth: we will investigate classification, phylogeny, hstory and biogeography. Evolution will be related to the history of earth (plate tectonics)

Meteorology

Climate and Vegetation

Classification of communities; interface between climate and vegetation; plant life forms and biomes.

Physiological Ecology

Resource acquisition and allocation, leaf tactics, 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

Vital statistics of populations, life tables and schedules of reproduction; net reproductive rate and reproductive value; stable age distribution; intrinsic rate of increase; population growth and regulation; Pearl-Verhulst logistic equation; density dependence and independence; *r* and *K* selection; population “cycles,” cause and effect; evolution of reproductive tactics; evolution of old age and death rates; sociality, use of space; evolution of sex; sex ratio; mating systems; sexual selection; fitness and the individual's status in the population; kin selection, reciprocal altruism, parent-offspring conflict and group selection.

Interactions Between Populations

Complex examples of population interactions; indirect interactions; competition theory; competitive exclusion; balance between intraspecific and interspecific competition; evolutionary consequences of competition; laboratory experiments and evidence from nature; character displacement and limiting similarity; future prospects; Predation; predator-prey oscillations; "prudent" predation and optimal yield; theory of predation; functional and numerical responses; selected experiments and observations; evolutionary consequences of predation: predator escape tactics; aspect diversity and escape tactic diversity; coevolution; plant apparency theory; evolution of pollination mechanisms; symbiotic relationships.

Community Ecology

Classification of communities; succession; transition matrices; aquatic systems; community organization; trophic levels and food webs; the community matrix; guild structure; primary productivity and evapotranspiration; pyramids of numbers, biomass, and energy; energy flow and ecological energetics; saturation with individuals and with species; species diversity; diversity of lowland rainforest trees; community stability; evolutionary convergence and ecological equivalents; ecotones, vegetational continuua, soil formation and primary succession; evolution of 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, and other examples; metapopulations, conservation biology, human impacts on natural ecosystems, hot spots of biodiversity, applied biogeography and the design of nature preserves.