BIOLOGY 472: COMMUNITIES AND ECOSYSTEMS  
FALL, 1995: COURSE INFORMATION AND OUTLINE

Instructor: S. F. MacLean

Office: 202 Eielson Building (Office of International Programs);  
        phone 5668  
        214 Irving Building; phone 7172 (rarely)

Course prerequisite:  
An introductory course in Ecology (e.g. Biol. 271).

Course Format:  
Three lectures per week - MWF 9:10 - 10:10;  
Readings in the textbook and the original ecological literature.


Grading:

A. Midterms - There will be two midterm examinations, on  
       Wednesdays, October 11 and November 15. Each will  
       contribute 25% to your final grade.

B. Literature reports - On five occasions during the semester you  
       will be choose one or more recent paper(s) from the recent  
       ecological literature and write a brief (ca. 2 page) essay giving  
       the complete literature citation and summarizing (1) the  
       ecological question being addressed; (2) the methods; (3) the  
       major results; and (4) the contribution of the paper to the  
       resolution of some current question or controversy in  
       community or ecosystem ecology. We will discuss several of  
       these in class on each of the dates indicated below.  
       Collectively, these will contribute 25% toward your final  
       grade in the course.

You may chose any five of the following dates to submit reports:  
Fridays: September 22 , October 6 and 20, November 3 and  
(Wednesday) 22, December 8
C. Final Examination

Date: Monday, December 18: 8:00 - 10:00 A.M.

Value: 25% of the final grade.

Both Midterm and the Final exam will involve essay questions selected from a list of sample questions that will be given to you in advance of the exam date.

D. Grading will be either on a curve or by standard percentage (90-100% = A; 80-90% = B; etc.), whichever is more generous to the students. In assigning final grades, the instructor reserves the right to take into account extenuating circumstances that might justify raising a student into a higher grade category. No student will have their grade reduced by subjective considerations.
I. Ecosystem Dynamics - Community Function
   A. Trophic organization and function
   B. Energy Flow
      1. The trophic link
      2. The plant - herbivore link: coevolution?
      3. Ecological efficiencies - constraints on ecosystem structure and diversity
      4. A synthetic model of ecosystem energy flow.
   C. Nutrient Dynamics
      1. Decomposition as an ecosystem process
      2. Nutrient elements contrasted
      3. Ecosystems contrasted
   D. A question of scale: neighborhoods - habitats - landscape - biogeographic regions - global patterns

II. Community structure and organization
   A. Resources, gradients, and the concept of the niche
   B. Causation and the detection of ecological pattern
      - The Null Hypothesis
   C. Competition and niche breadth
      1. Intraspecific and interspecific competition
      2. Models of competitive interactions
      3. The detection of competition in natural and model ecosystems: can we avoid the ghost of competition past?
   D. Species Diversity
      1. Components of diversity
         a. species richness - the number of species
         b. equitability - the distribution of importance among species.
         c. measures of "species diversity"
      2. Latitudinal gradients in species diversity - A plethora of hypotheses; a paucity of tests.
      3. Island biogeography - dynamic diversity.
4. Applied biogeography - The Terran Archipelago and the design of nature preserves.
5. Conclusions (?) - why are there so many kinds of species?

E Community Structure
1. Vertical structure - layering
2. Horizontal structure - pattern
   a. patchiness
   b. pattern description - community ordination and analysis
   c. The causation of pattern - models of the community
      i. the holistic model - Clements
      ii. the individualistic model - Gleason, Whittaker
      iii. the competitive model
3. Succession: change in community structure over time
   a. Post-fire and river-meander succession in Alaska
   b. post-glacial succession - Glacier Bay
   c. Mechanisms of successional change
      i. life-history characteristics
      ii. facilitation
      iii. inhibition
   d. Succession as change in ecosystem function over time