

ECOLOGY 301 - EXAM 1, Monday 30 Sept, 1996

- (1). Please state and briefly explain the two major objectives of this course (listed on page one of the syllabus).
state and explain objective 1 - state and explain objective 2 -
- (2). Why it is a **misconception** to assert that "good science and scientists are totally objective"? Please list and briefly explain 3 totally different ways that subjectivity enters and is of value to productive scientific endeavor.
reason 1 - reason 2 - reason 3 -
- (3). Please list and explain the two basic "functional characteristics", i.e. energy flow and biogeochemical cycling, of an ecosystem. Please use a diagram in each of your explanations and be sure to indicate what are the basic differences between the paths of energy and nutrients in an ecosystem.
functional characteristic 1 - functional characteristic 2 -
- (4). Please explain three key limitations of using compartment diagrams (little boxes and little arrows to map the network of connections) to study ecosystem level ecology?
limitation 1 - limitation 2 - limitation 3 -
- (5). Please briefly explain four ways in which maintaining high levels of biodiversity in nature is of value to our economy?
1 - 2 - 3 - 4 -
- (6). This question will assess your understanding of the cause of why the tropical and temperate zone rainforests occur where they do.
 - a. Please use a little diagram AND briefly explain why are the lowland tropics so rainy and therefore have such vast forests?
 - b. Please use a little diagram AND briefly explain why the coastal areas of the Pacific northwest (e.g., around Seattle, WA) are so rainy? and therefore have such vast forests?
- (7). This question will test your understanding of the coriolis effect. If the Earth were a perfect cylinder rotating exactly on its cylindrical axis (see sketch), would there be a deflection of a **southbound** air mass starting at the equator, and if so, would it deflect to its left or its right?
Please explain WHY?
- (8). This question will assess your understanding of individual ecology.
 - a. Please state what is the principal objective of individual ecology.
 - b. Please define the components of an individual energy budget. [hint: what do M, G, S, and R represent in the figure below.]
M = G = S = R =
 - c. For an ectothermic animal such as a lizard, how might environmental constraints and limitations affect the total **size** of its energy budget (i.e., gross productivity) from the environmental types listed below?
limitations imposed by the resource environment? -
constraints imposed by the biophysical environment? -
constraints imposed by the social/demographic environment? -
constraints imposed by the predation environment? -
- (9). On page 20, Stiling uses an example drawn from his own work on parasitism rates for two species of insects. Using large samples of data he found "statistically different" rates of parasitism for averages of 8.33% and 8.24%, but then he asked "But is it biologically meaningful?"
 - a. What does Stiling mean by this?
 - b. In general, what is the difference between a "statistical" and a "biological" hypothesis?

(10). Data from a recent census of tree species from a woodlot include 80 individuals of species 1, 60 of species 2, and 20 each of species 3, 4, and 5 (note that the total number of individuals is 200).

- a. What is the total number of species present? _____
- b. According to the equation for the Shannon Diversity Index, H',

$$H' = - \sum_{i=1}^S p_i \ln(p_i)$$

(for which p_i is the proportion of data from the i th species, and S is the total number of species)

...what is the diversity of species present? Please set up the problem, i.e. write out the equation for diversity, but you need not solve it numerically.

- c. Please briefly explain two advantages of using a diversity index, such as H' , to estimate biodiversity rather than simply using the number of species censused?
 advantage 1 - advantage 2 -

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