bs148h, Fall 2004  Final Exam Study Questions

At the final exam I will choose one of these 10 questions for you to answer. You must write your answer on a clean sheet of paper, from memory. I want the best answer you can write in one page (something you wouldn’t be embarrassed to have posted on the www for all the world to see).

I want you to demonstrate that you understand the facts and open issues, and that you can use relevant examples to make your explanation more effective.

Your answer should be much more broad and deep than our typical 2 pt, 5 min quiz. You can prepare however you like. I suggest you discuss your ideas with classmates and at least outline your answers to all the questions. If you want to write out detailed answers and memorize them, that’s OK too.

1. Use examples from lecture or text to help explain (a) the concepts and (b) the processes of adaptation. (c) Explain at least three reasons why adaptations are not ‘perfect.’

2. What is life? Your answer should include (a) the properties listed in the text (and lecture) and (b) a careful analysis of the criteria for detecting life on Mars. (c) Explain the strengths & weakness of each of the criteria and specify what level of biological organization these criteria can be applied to. Apply these properties & criteria to I) real viruses II) computer viruses, III) human fetuses, and IV) the earth.

3. Summarize the Endosymbiotic Theory for the origin of eukaryotes. Use facts & examples to help describe some of the patterns that are consistent with this hypothesis.

4. What is a species? Your answer should include a careful analysis of the alternative species concepts and their strengths & weaknesses, illustrated with examples. What concept is most often used to comply with the US Endangered Species Act?

5. Describe the life cycle of the cellular slime mold Dictyostelium and explain why it serves as a model for questions about the evolution of multicellularity and cooperation.

6. Explain why the Reptiles are not a monophyletic group. A good answer will explain what is a monophyletic group, how we know one when we see it and why it matters.

7. Explain the principle of negative feedback regulation. Use examples from lecture or text to illustrate how this works in the realms of (a) mammal homeothermy, (b) endocrine regulation of blood glucose, (c) posture and the knee-jerk reflex, and (d) population regulation via density dependent demographics.

8. Describe the Nonspecific Defense Mechanisms and Specific Immune Responses that a human would put up against a bacteria that entered the body on a splinter. Explain the roles of (a) Helper (CD4) T cells, (b) Cytotoxic (CD8) T cells, and (c) B cells. Briefly compare and contrast primary and secondary responses.

9. What are the component demographic processes that combine to determine population growth rate? What kinds of ecological processes influence these demographic processes? What is exponential (or geometric) population growth and what conditions should lead to this kind of growth? What is the logistic model and what
additional ecological and demographic processes does it incorporate. What general characteristic tends to make logistic population growth chaotic?

10. What is the Lotka-Volterra competition model and what additional ecological and demographic processes does it incorporate? What, in general, tends to lead to coexistence rather than competitive exclusion in competitive interactions? Illustrate with examples from lecture or the text.