STUDY GUIDE FOR NON-COMPREHENSIVE PORTION OF FINAL

The final exam will have 100 points of questions covering the first 3 exams and 100 points of questions covering ecosystem services, threats to ecosystems and biodiversity, and the most recent lectures (since Exam 3). Review the previous study guides to study for the comprehensive portion of the final exam.

Be able to explain the key concepts at the end of the chapters, as well as answer the test our knowledge questions. Know the information described below, and the terminology associated with each of these learning objectives.

Use of the term “understand” means to understand, be able to define and be able to explain the structure, process, etc.

Know everything we’ve studied. I have tried to summarize everything in the objectives below.

1. Know what ecology is. Understand what organismal, population, community and ecosystem ecology are. Know what the biosphere is, and the various climatic factors that affect the biosphere.

2. Understand why temperatures vary at different latitudes, and how the tilt of the earth affects the seasons. Know how uneven heating impacts air circulation (winds), and the how the rotation of the earth impacts the winds. Know the general pattern of ocean currents, and how ocean water impacts climate of coastal regions. Understand global, regional and local climate variations, including monsoon patterns, rain shadows and microclimates.

3. Know what a biome is. Know the following biomes and their characteristics: tropical rainforest, tropical deciduous forest, tropical montane forest, savanna, desert, chaparral, temperate grasslands, temperate deciduous forests, temperate rainforests, boreal forest (taiga), arctic tundra, alpine tundra

4. Know the various freshwater and marine habitats: streams, rivers, wetlands, lakes; photic, aphotic, pelagic (neritic and oceanic), and benthic (intertidal and abyssal) zones, estuaries. Understand where phytoplankton can survive and the impact of this on the community.

5. Understand what a species’ geographic range is, as well as the distribution within the range. Know what types of factors determine each of these and be able to give examples of these factors.

6. Understand the patterns of spatial dispersion of a population (random, clumped, uniform), and their causes.

7. Understand what life tables are and how they are used. Understand the three types of survivorship curves, and what they tell a scientist about a population. Understand and be able to explain the survival strategies of r-selected species and K-selected species.

8. Understand and be able to use per capita growth rate equations. Understand intrinsic rate of increase and how it would vary for r- and K-selected species.

9. Know what demography is. Understand, be able to define and be able to use the terms population, population size, population density. Understand the concepts of population growth and the factors that contribute to it (births, deaths). Understand and be able to explain stable, declining and increasing populations. Understand age structure diagrams, generation time and sex ratio;
understand the significance of these to demographers. Be able to use age structure diagrams to predict future size of a population.

10. Understand geometric growth curves. Understand and be able to explain exponential and logistic growth curves and the factors that affect each. Understand and be able to explain the concepts of carrying capacity, density-dependent limiting factors and density independent limiting factors. Understand what happens when a species overshoot the environment’s carrying capacity. Understand why the human population has been able to increase exponentially for so long.

11. Understand coevolution. Understand how species interactions decrease competition and increase species diversity in a community. Understand the concepts of fundamental niche and realized niche. Understand resource partitioning and the principle of competitive exclusion. Understand the ultimate survival goals of species, and adaptations which assist species in obtaining these goals. Understand the many adaptations used by species to survive, including symbioses, various types of mimicry, cryptic coloration, aposematic coloration, etc. Be able to give examples of all of these.

12. Understand what a community is, community ecology, the interactive and individualistic views of the nature of communities, and what the evidence indicates about these views. Know what an ecotone is. Understand community structure and the different types of structure found in different communities. Understand the concepts of species richness, species abundance and species diversity. Understand that high species diversity (biodiversity) means a healthy community/ecosystem.

13. Know what keystone species are, and their impact on communities. Be able to give examples.


15. Understand the following, as well as their interrelationships: ecosystem; biotic environment; abiotic environment; community; community ecology; population; species; autotrophs; heterotrophs; food chain; food web; trophic levels; producers; primary consumers; herbivores; secondary consumers; tertiary consumers; quaternary consumers; carnivores; omnivores; solar energy; photosynthesis; energy pyramid, biological magnification (=biological amplification)

16. Understand how energy and nutrients (matter) move through ecosystems.

17. Understand the first and second laws of thermodynamics

18. Understand the biogeochemical cycles and their components: carbon cycle; water cycle; nitrogen cycle. Be able to explain and diagram each cycle.

19. Understand the current threats to ecosystems and species diversity: habitat destruction, invasive species, overexploitation, pollution, global climate change.

20. Know what genotype frequency and allele frequency are. Understand the Hardy-Weinberg principle, including the conditions under which it is true, and be able to calculate whether or not a species is at genetic equilibrium.


22. Understand and be able to explain types of speciation, including species divergence. Understand and be able to explain the significance of breeding between populations preventing speciation, and the necessity of reproductive isolating mechanisms in order for speciation to occur. Understand and be able to explain the various types of isolating mechanisms that maintain separate species.
23. Understand and be able to explain macroevolution, and the role natural selection plays in this process. Understand and be able to explain the variety of evidence for macroevolution: including evidence from fossils, plate tectonics, biogeography, comparative embryology, comparative anatomy, comparative biochemistry, and experimental evolution. Understand the significance of interpreting fossil data.

24. Know and understand the services ecosystems provide to the human population. Understand that every aspect of the ecosystem is critical to its health.

25. Know what biodiversity is, and understand the significance of species extinction. Know the causes, effects and details of the 6th (current) major period of species extinction, including the various threats to biodiversity. Understand how these issues affect the human population. (This info is from the Communities and Ecosystem lecture, as well as the Biodiversity and Conservation lecture.)

26. Understand the causes, effects and details of global climate change.

27. Know what an endangered species is. Know what biodiversity hotspots and sites of imminent extinction are. Know the significance of these sites for conservationists, including the relative size of the areas and the percentage of species depending on them.

28. Understand conservation biology and the theoretical concepts applied by conservation biologists. Know the problems they encounter and be able to give examples of species at the heart of conservation efforts. Know what a Population Viability Analysis is. Understand how size of a protected area relates to species richness. Understand landscape ecology, including size of protected areas and corridors between such areas. Understand what beta diversity is, how it can be increased and why it increases under certain conditions.

29. Understand the practical strategies used in conservation biology. Understand why it is important to have local support, and how that support can be obtained.

30. Understand all the questions asked in the lab manual, and know all the terms listed in the lab manual, as well as those given to you by Professor Garrison or the TAs.