

STUDY GUIDE FOR THE NON-CUMULATIVE PORTION OF THE FINAL EXAM

Your Study Guide for the Final Exam should consist of:

- Your first three study guides (As always, you must understand, connect and apply concepts--not just memorize facts).
- The posted class notes from ALL LECTURES. (Note that even if we didn't cover a tiny portion in class, there is nothing we missed that isn't self-explanatory.)
- Your own notes from class.
- Your textbook readings (especially the problems at the end of the chapters--for *all* the readings you've done this semester. Trust me. Those will help.).
- The exam will be approximately 50% on the most recent material and about 50% cumulative, focusing on major ideas.

The following is a brief *checklist* to help you prepare for the non-cumulative part of the exam. But remember: anything in the notes or text readings is fair game!

ECDYSOZOA

Recall the major planes of animal body symmetry, and the types of animal body symmetry.

Know the common names and important characteristics, organ systems, natural history, etc. of each of the following taxa:

- Onychophora
- Tardigrada
- Arthropoda

Know what characteristics are unique to each group. What links them to their related taxa, and what sets them apart?

Know the major groups of arthropods we covered in class, and their general characteristics. Review the major insect groups and be able to recognize basic descriptions of them.

Study the structure and function of the insect compound eye and understand the general importance of insect vision as it applies to pollination and how flowers attract pollinators. Know what a pollination syndrome is, and read the information here: http://www.fs.fed.us/wildflowers/pollinators/What_is_Pollination/syndromes.shtml (there could be bonus questions...)

Know the meaning/significance of: pseudocoelom, coelom, tagmosis, metamerism, open vs. closed circulatory system, ecdysis (and the terms related to arthropod metamorphosis), protostome, deuterostome

DEUTEROSTOMES

Know the characteristics that link deuterostomes together, as well as those that set them apart from the protostomes.

Know the common names and important characteristics, organ systems, natural history, etc. of each of the following taxa:

- Echinodermata (all five classes we studied)
- Hemichordata
- Chordata (including Urochordata, Cephalochordata, and Craniata) Understand the function and significance of the water vascular system, and the return of echinoderms to a radially symmetrical body form.

Know how echinoderms are similar to hemichordates and how they are different.

What synplesiomorphies do vertebrates share with other animals, and what synapomorphies set them apart?

Know the major tissue and organ systems of the vertebrates, their components, function, and structure.

CRANIATES – Use the information at: http://www.bio.miami.edu/dana/160/160S13_16.html

Know the taxonomic and common names of the major vertebrate groups (fish, amphibians, reptiliomorphs (i.e., turtles, lizards, snakes, crocodilians, birds, mammals), as well as their defining characteristics.

What synplesiomorphies do vertebrates share with other animals, and what synapomorphies set them apart?

Know the major tissue and organ systems of the vertebrates, their components, function, and structure.

Know the meaning/significance of: synapsid, anapsid, diapsid, swim bladder, air sacs, ectotherm, endotherm, poikilotherm, homeotherm, dental formula, mammalian epidermal/dermal system and its derivatives

Know the parts of the amniotic egg, and the evolutionary significance of the amniotic egg. What parts of the mammalian placenta are homologous to which amniotic egg structures?

What characteristics set each of the vertebrate groups apart from the other vertebrates?

What are the three main groups of mammals (in terms of reproductive mode), and what are the characters that distinguish them? Which taxa form a clade with primates? (Check out www.tolweb.org to be sure you understand the relationships of the mammals.)

ARCHAEPLASTIDA: PLANTS

Know the synapomorphies and synplesiomorphies that link and separate the members of the algal and land plant taxa? What are the general characteristics of land plants, and which do they share with green algae? With red algae?

Know the meaning of: thallus, stomate, waxy cuticle, cellulose, lignin, tissue, organ

Know the course of events in a generalized alternation of generations, and what is meant by the following terms: sporophyte, sporophyll, sporangium, spore (and know what the prefix "mega" or "micro" in front of these implies), gametophyte, archegonium, antheridium, gamete, zygote, dioecious, monoecious, double fertilization (where is this found?)

Know the meaning/significance and ploidy of: sporophyte, sporangium, spore, megaspore, microspore, sporophyll, megasporophyll, microsporophyll, gametophyte, archegonium, antheridium, ovum, sperm, zygote. (What do each of these look like in the various plant taxa we studied? Which things are homologous to which across the taxa?)

Know the meaning/significance of: dioecious, monoecious, strobilus ("cone" as in pine cone: it's a whorl of sporophylls, not a flower)

PLANTAE

IMPORTANT NOTE: You **MUST** read the textbook chapters on plants to fully understand this material. Much of what I said in class is not written in the web-based notes on our web site, but is repeated in the textbook. You are responsible for it.

Know the meaning/significance of: lignin, endomycorrhizae, sporopollenin, waxy cuticle, stomates, secondary compounds, apical meristems, xylem, phloem.

What are the synapomorphies and symplesiomorphies that link and separate the major plant taxa? Know the general defining characteristics of the Bryophytes versus the Tracheophytes, and each smaller group within them. Which are most closely related to each other?

Refer to your text and notes to fully understand the structure of the three organs of plants.

Know the basic parts of a flower, and which parts are male and female. Know what is meant by double fertilization, known only in angiosperms.

Know the various types of plant cells (parenchyma, sclerenchyma, collenchyma, epidermis and its various cell types, etc.) and tissues (ground, vascular, dermal; simple and complex) and their functions. Know the plant organs and their general anatomy and function.

Know the basic anatomy of root, stem, and leaf. Know the meaning/significance of: epidermis, cortex, pith, vascular tissue, stele, vascular cambium, annual ring, springwood, summerwood, heartwood, sapwood, bark (and its components), cork cambium

INTRODUCTION TO ECOLOGY

Know the meaning/significance of: species, population, community, ecosystem, biosphere, biotic vs. abiotic

Understand the scope of the various levels of ecological study: global, landscape, ecosystem, community, population, and organismal

Understand the significance and importance of abiotic ecological factors, and how they affect ecosystem structure

Understand the concepts of soil horizons and soil maturation. Know what is found in O, A, B, and C horizons.

Know the meaning/significance of: solar irradiance, tropics, subtropics, temperate regions, polar regions.

Understand why the tilt of earth's axis generates seasons, and how those differ between northern and southern hemispheres.

Understand the general pattern of global air circulation, and how that contributes to biome formation.

Be familiar with the general features of the major terrestrial biomes, and be able to recognize a list of organisms you'd be likely to find in each one.

For aquatic biomes, know the meaning/significance of: photic vs. aphotic zone, littoral zone, benthic zone, abyssal zone

Know what is meant by: oligotrophic, eutrophic, and mesotrophic systems, and be able to recognize an example of each one if it were described for you.

ORGANISMAL ECOLOGY

Know the meaning/significance of: poikilotherms vs. homeotherms, endotherms vs. ectotherms, regulator vs. conformer;

anadromous, catadromous, evolutionary vs. individual (short term) adaptation; acclimation, acclimatization, eury- and steno-organisms (with respect to various environmental factors such as temperature, salinity, etc.)

Understand the concept of the ecological niche

COMMUNITY ECOLOGY

Know the meaning/significance of the theoretical types of symbiosis, and be able to recognize examples of each.

Know the meaning/significance of: mimicry, aposematism, crypsis, Batesian Mimicry, Mullerian Mimicry, poisonous vs. venomous

Know the meaning/significance of herbivory, parasite, host, parasitoid, endoparasite, ectoparasite, intermediate host, definitive host, pathogen, coevolution,

Know how to apply the concepts of species diversity, species richness and relative abundance of species in an ecosystem

Understand the meaning of trophic levels, primary producer, primary, secondary, etc. consumers, food chain, food web

Know the difference between the Energetic Hypothesis vs. the Dynamic Stability Hypothesis of food chain length.

Know the meaning/significance of: dominant species, keystone species, foundation species. If I were to describe a situation regarding one of them, be able to identify which type of species I'm talking about.

ECOSYSTEM ECOLOGY

Understand the meaning/significance/characteristics of: energy flow (Second Law of Thermodynamics), matter recycling in ecosystems (Law of Conservation of Mass), Gross Primary Production (GPP) vs. Net Primary Production (NPP), biomass, Energy and Biomass pyramids.

Be able to calculate transfer efficiency.

Recall the major features of a generalized biogeochemical cycles, e.g., Carbon Cycle, Water Cycle, Nitrogen Cycle, and Phosphorus Cycle (which is pretty much the same as any other mineral cycle.)

POPULATION ECOLOGY

Understand basic population dynamics (births, deaths, immigration, emigration)

Understand the concepts of: density, dispersion (and how these are determined)

Understand basics of demography: life tables, survivorship curves, cohort, Type I, II, and III survivorship curves, infant mortality, life expectancy

Understand the differences between population growth that is arithmetic, exponential (= geometric), and logistic.

Understand the concepts of intrinsic rate of increase (r), and carrying capacity (K). What life history strategies are typical of r-selected and K-selected species?

What factors can limit populations? Which are density dependent? Independent?

There's more to understanding this material than just passively reading it. You must understand it at many levels. If you're not sure about a word or concept...GOOGLE IT! You'll be surprised at the amazing and cool stuff you'll find.

REMEMBER: you won't do well on the GRE, DAT, MCAT or any other professional entry exam unless you can not only remember all the facts, but connect them, apply them and solve problems with them. These exams are just a tiny taste of things to come in your future.

If you study for ALL of your classes with this in mind, you will do much better and become a smarter, wiser person.

GOOD LUCK on all your finals, and in all your courses to come!