**Biology 3 Final Exam Study Guide**

The exam will consist of true/false, multiple choice, matching, short answer and long answer questions. Topics for essay questions are **emboldened**. Key words are new vocabulary that was introduced within the lecture and will be incorporated into the exam questions.

**Intro to Biology, Ecology, and the Scientific Method**

Know the following: Know the difference characteristics that define living things. Know the steps of the scientific method including the different types of data. What is the difference between biotic and abiotic variables? Know the difference between and independent and dependent variable. What axis are the different variables located on? Know how to interpret different graphs (bar, line, scatter plot). What is the chief unifying principle in all fields of biology. Know the definition for ecology and the different levels of study (individual, population, community, ecosystem).

**Factors that Shape Ecosystems on Earth**

Know the following: Know the differences between oceanic and continental crust concerning age and density. Know the difference between mid-ocean ridges, transform faults and trenches. Know the different types of plate boundaries and the role of each crust at the different plate boundaries. What type of plate boundary is the San Andreas Fault? Know the different factors (biotic and abiotic) that make up an ecosystem. Know the factors that cause the ecosystems on earth. What causes seasonality on earth? Why are most deserts located at 30 degrees north and south latitude? Be able to explain the rain shadow effect. What type of climate do we have in southern California. What is biotic zonation? **Be able to describe biotic zonation using either the intertidal zone or the different plant communities experienced on the palms to pines camping trip.** Know the different southern California plant communities and how they differ. Know the adaptations that southern California plants have evolved to deal with fire. Be able to describe why the vegetation on north and south facing slopes differ and describe how the vegetation differs.

**Physical and Chemical Properties of Ecosystems**

Know the following: Know the different properties of water and the importance of each property in the function of living things (Ex: cohesion allows for water to be transported up the stems of plants). What is coastal upwelling. Know the difference between spring tides and neap tides. Know the different zones within the rocky intertidal. Which zone has the greatest biodiversity? Where are most hard-shelled organisms found? Where are the most soft-bodied organisms found? Where is competition for space greatest? Know the different challenges faced by intertidal organisms. What is a keystone species? and describe the role of sea stars in the rocky intertidal zone and how sea star wasting disease has affected intertidal biodiversity.What is an estuary? **Be able to describe the concept of resource partitioning an be able to provide an example of resource partitioning.**

**Intro to DNA and Genetics**

How many chromosomes do humans have? Know the different sources of genetic variation (crossing over and independent assortment) and when they occur. Know the difference between traits, genes and alleles. Know the difference between an individual’s phenotype and genotype. What’s the difference between a dominant and recessive allele? When are dominant and recessive alleles expressed? Know the difference between homozygous and heterozygous genotypes, including homozygous dominant and homozygous recessive. What is the phenotypic ratio and genotypic ratio in a cross between two heterozygous individuals? Know how to use a punnet square.

**Intro to Evolution**

Know the different types of evidence for evolution. What is a transitional form? What is the difference between analogous and homologous structures? What is convergent evolution

**Means of Evolution**

What is genetic diversity and why is it important? Know the difference between macroevolution and microevolution. What is a population? What are the five mechanisms of microevolutionary change? What is the primary way that new alleles are created? What is gene flow? What is genetic drift and when is it most pronounced? When does the founder effect occur? What is a genetic bottleneck? Know the definition of biological fitness. What is an adaptation? Know the definition of natural selection. Know the different example of natural selection discussed in class including peppered moths, antibiotic resistance, disease resistance, Galapagos finches, and sickle cell anemia. What is coevolution and how is it different from convergent evolution? Know the examples of co-evolution including the cheetah and antelope, flower and pollinator, and newts and garter snake. What is sexual selection and what does it lead to?

**Outcomes of Evolution**

What is a species? Given enough time can microevolutionary changes lead to macroevolution (speciation)? **Be able to describe the steps required for the evolution of a new species (speciation).** What is allopatric speciation? Know the examples of allopatric speciation (frogs, gnatcatchers, terns, salamanders, finches). What is adaptive radiation and when does it commonly occur? What is an ecological niche? Know the taxonomic order (Domain, Kingdom, Phylum, Class, Order, Family, Genus, Species) and which groups are like to contain closely related species (Species in the same genus are likely more closely related than species in the same order). Be able to interpret a phylogeny and locate the last common ancestor between two groups.

**Plant Structure and Function**

Know some common examples of plants that can be found in each group of plants (ex. Mosses, ferns, pine trees, flowering plants). Know the different types of vascular tissue (xylem and phloem) and what each type of tissue transports. Know the different parts of the flower including the male and female reproductive parts. **Be able to explain how plants transport water from the roots to the leaves**. What adaptations have plants evolved to reduce water loss?

**Photosynthesis**

What organisms make up the base of all food webs? What goes in and what comes out of the stomata? Know the two stages of photosynthesis including the reactants and products of each step. What are the four main greenhouse gases? Know the different types of evidence for climate change? What greenhouse gas has shown the greatest increase since 1990?

**Intro to Life, Protists, and Fungi**

Know the three domains of life. Which domains are made up of prokaryotic cells and which one has eukaryotic cells? What are the characteristics of the domain bacteria? Know the differences between Prokaryotic and Eukaryotic cells. What is eutrophication? What causes eutrophication? What can eutrophication lead to? Know how dead zones are formed. What is biomagnification. Know how coral bleaching occurs.

**The Diversity of Life**

Know the characteristics of animals. Know the two major groups of animals (protostomes and deuterostomes) and how each of them develops.What is an invertebrate and what proportion of animals are invertebrates? Know the characteristics of sponges, cnidarians, flatworms, annelids, roundworms, molluscs, arthropods, echinoderms and chordates, concerning their development, symmetry, digestion, and skeleton, as well as the distinguishing characteristics (synapomorphies) of each phyla (matching). Which phyla is most closely related to chordates? What are the four characteristics of chordates? Know the four adaptations that led to the success of terrestrial vertebrates. What is an indicator species? Know the characteristics of reptiles, birds and mammals, concerning the number of heart chambers, the thermoregulatory strategy (endothermic or ectothermic), the reproductive strategy and the type of eggs they lay. What are the characteristics of mammals?

**Cellular Respiration, Thermoregulation, Comparative Anatomy, and Circulation**

**Describe the relationship between cellular respiration and photosynthesis, and how these two processes support life on earth.** What is the purpose of cellular respiration? Know the differences between ectotherms, endotherms, homeotherms and poikilotherms and the thermoregulatory strategies of the major vertebrate groups (fish, amphibians, reptiles, birds, and mammals). Know the different modes of heat loss or gain. Know the advantages and disadvantages of the endothermic and ectothermic thermoregulatory strategies (we did this on the board). Know the different functions of the circulatory system. Know the difference between arteries, capillaries, and veins. Where does gas, nutrient and waste exchange occur? Know the differences between an open and closed circulatory system, including the efficiency, vessels present, fluid, and examples of organisms with each type of system**.** Know how blood moves through the circulatory system and what chambers receive blood and which chambers pump blood. Know the different types of nitrogenous waste and which vertebrate groups produce each type of waste.

**Population and Community Ecology**

What is ecology? Know the different level of study within ecology. What is the difference between exponential growth and logistic growth? What is the carrying capacity and how is it related to environmental resistance? Has the human population reached its carrying capacity? What is meant by density dependent? Know the differences between the life history strategies of *r* and *K*-selected species.Know the different types of interactions between species and whether they are positive or negative with respect to the fitness of each species. What is an ecological niche? What is resource partitioning and what does it lead to? Coexistence. What is a keystone species? Know the examples of mutualistic relationships in nature. What is biodiversity? What is genetic diversity and how does it relate to adaptive potential? Know the different trophic levels and the percentage of biomass that transfers to the next trophic level. Which level is made up of herbivore? Carnivores? **Be able to draw a food web and label the different trophic levels**

**Biogeography and Human Impacts**

How many mass extinction events have occurred in the past and what’s causing the current mass extinction event? What is biodiversity and why is it important? Know the difference between extrinsic and intrinsic value. What is the greatest threat to biodiversity? What is succession? What is the difference between primary and secondary succession and what is a climax community? What is a pioneering species? What is habitat fragmentation? What are habitat islands and sky islands, and how are they associated with island biogeography? How is a source population different from a sink population? What are wildlife corridors and how do they help wildlife? What is eutrophication and what does it cause? How does overfishing differ from normal fishing? What is fishing down the food web mean? What is bycatch? What is shark finning? What is an invasive species? What are the characteristics that make something a successful invader? What are some of the ways that invasive species can negatively impact ecosystems? What are some of the ways that invasive species have been introduced? What is the Endangered Species Act of 1973 and what are the outcomes of the act? What are some of the ways that humans are working to preserve endangered species?