**Bio 3 Exam 4 Study Guide**

Key words or terms from each lecture are new words introduced during the lecture that will likely be used in true or false, or multiple-choice questions. **Short answer free response questions will come from emboldened topics.** **Long answer free response questions will come from the emboldened and underlined topics**

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

Know the difference between exergonic and endergonic reactions and which type of reaction that photosynthesis and cellular respiration are. **Be able to describe the relationship between cellular respiration and photosynthesis**. Know the reactants and products of both photosynthesis and cellular respiration (chemical formulas). What is the difference between ATP and ADP? Why is ATP important in living things? What is the purpose of cellular respiration? Where does cellular respiration occur? How much ATP is produced from a single glucose molecule? What is homeostasis? Know the difference between regulators and conformers. 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. What is torpor? What is the difference between hibernation and estivation? Vasoconstriction and vasodilation. **Be able to explain the process of counter-current heat exchange**. Know the different animal diets. Know the advantages and disadvantages of the endothermic and ectothermic thermoregulatory strategies (we did this on the board). Which mammal has a higher metabolic rate, a mouse or an elephant? Why? Know the different parts of the digestive tract and their function. Know the initial and main site of digestion for carbohydrates, proteins, and fats. What is the function of the epiglottis? Know the function of the different digestive glands (liver, gall bladder, and pancreas). How do the digestive tracts of carnivores and herbivores differ? How do the digestive tracts of ruminants and hind-gut fermenters differ? How do bird digestive tracts differ from humans? Know the different functions of the circulatory system. What are the different components in you blood? What does hemoglobin do? 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 the difference between the pulmonary circuit and the systemic circuit. Which vertebrates have a single circuit systems and which ones have a double circuit system? Know many heart chambers are found in each vertebrate group. **Know the names of the four heart chambers, the major arteries and veins entering and leaving the heart, the heart valves and the direction of blood flow through the heart. (fill in).** Know how blood moves through the circulatory system and what chambers receive blood and which chambers pump blood. Know the cardiac cycle. What is the name of the period of heart contraction? Heart relaxation? Where is blood pressure the greatest? Know the different types of nitrogenous waste and which vertebrate groups produce each type of waste. What is the function of the lymphatic system? What are the three divisions of the immune system? Know which organisms have non-specific (innate) immunity, and which ones have specific (adaptive) immunity). Know the different types of reproduction and whether they produce identical of genetically different offspring. Know the three modes of sexual reproduction and which vertebrates perform each type of reproduction.

**Key words and terms:** Exergonic, endergonic, adenosine triphosphate, adenosine diphosphate, phosphorylation, mitochondria, homeostasis, regulators, conformers, ectotherms, endotherms, homeotherms, poikilotherms, conduction, convection, radiation, evaporative cooling, torpor, hibernation, estivation, vasodilation, vasoconstriction, herbivore, omnivore, carnivore, pharynx, esophagus, stomach small intestine, large intestine, ruminant, hind-gut fermenter, erythrocytes, leukocytes, platelets, arteries, arterioles, capillaries, venules, veins, hemolymph, atria, ventricle, pulmonary circuit, systemic circuit, inferior and superior vena cava, aorta, pulmonary artery, pulmonary vein, atrioventricular valve, semi lunar valve, systolic, diastolic, ammonia, urea, uric acid, lymphatic system, lymph, lymph nodes, lysozymes, asexual reproduction, sexual reproduction, ovuliparity, oviparity, viviparity,

**Population and Community Ecology**

What is ecology? Know the different level of study within ecology. What is demography? Know the for factors that influence population size (natality, mortality, immigration, emigration). What is fecundity and why is it important? What is the growth rate and how is it determined (natality – mortality)? 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? What limits the population size in *r* and *K*-selected species? **Be able to compare and contrast *r* and *K*-selected life history strategies, including the stability of their environment, organism size, energy invested in offspring, number of offspring produced, life expectancy, and number of reproduction events. Be able to graph the different survivorship curves (Type I, Type II, and Type III) and label which survivorship curve depicts and *r*- and a *K*-selected organism.** Know the different types of interactions between species and whether they are positive or negative with respect to the fitness of each species. What’s the difference between interspecific and intraspecific competition? What is an ecological niche? Can two species occupy the same ecological niche in the same area? Competitive exclusion principle. What is resource partitioning and what does it lead to? Coexistence. **Be able to describe the differences between the fundamental and realized niche of a species**. What is a keystone species? **What is a coevolutionary arms race? Be able to provide an example of a coevolutionary arms race.** Know the examples of mutualistic relationships in nature. What is biodiversity? What are the three levels of biodiversity? What is genetic diversity and how does it relate to adaptive potential? What is species diversity and what are the benefits of species diversity? 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? What is ecosystem diversity and what ecosystems are under threat? What are ecosystem services? Know the examples of ecosystem services.

**Key words and terms:** Ecology, individuals, population, community, ecosystem, demography, natality, mortality, immigration, emigration, fecundity, growth rate, exponential growth, logistic growth, carrying capacity, environmental resistance, density dependent, *K*-selected species, *r*-selected species, competition, predation, parasitism, mutualism, commensalism, interspecific competition, intraspecific competition, ecological niche, competitive exclusion principle, resource partitioning, coexistence, fundamental niche, realized niche, keystone species, coevolutionary arms race, biodiversity, genetic diversity, adaptive potential, species diversity,

**Biogeography and Human Impacts**

How many mass extinction events have occurred in the past and what’s causing the current mass extinction event? What mass extinction event resulted in the loss of the dinosaurs? Which mass extinction event resulted in the loss of the most species? Know the four different eras of geologic time and the main evolutionary advances that occurred during each era. **Know the difference between vicariance and dispersal and be able to explain how the connection of the Panama isthmus altered the biogeography of different species.** What is biodiversity and why is it important? Know the difference between extrinsic and intrinsic value. Which type of animals are under the greatest threat of extinction? Why? What is an indicator species? What factors are required to designate something as a biodiversity hotspot? What does endemic mean? What is the greatest threat to biodiversity? What is the greatest reason for deforestation? 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 and how is it associated with urbanization? 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? According to the equilibrium theory of island biogeography, how does the size of the island and its distance from the mainland affect the rate of immigration and the rate of extinction? Which type of islands support the greatest number of species? The least? What are wildlife corridors and how do they help wildlife? What is eutrophication and what does it cause? Hypoxia. How does overfishing differ from normal fishing? Know the factors that lead to overfishing. What is fishing down the food web mean? What is bycatch? Why are marine plastics harmful to marine life? What is shark finning? What percentage of climate scientists agree that climate trends are due to human activity? **What is an invasive species? What are the characteristics that make something a successful invader?** **Be able to provide an example of an invasive species?** 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?

**Key words and terms**: Ecosystem, abiotic, biotic, biodiversity, extrinsic value, intrinsic value, Indicator species, biodiversity hotspot, endemic, habitat loss, deforestation, subsistence farming, habitat fragmentation, urbanization, eutrophication, hypoxia, overfishing, bycatch, aquaculture, climate change, invasive species, horticulture, Endangered Species Act, captive breeding, seed bank, critical habitat,