**Bio 1 Exam 4 Study Guide**

Key words or terms and new vocabulary from each lecture, which will likely be used in true or false, or multiple-choice questions. **Short answer and short essay questions will come from emboldened topics.** **Long essay questions will come from the emboldened and underlined topics**

**Chapter 30: Circulatory and Respiratory System**

Know the different functions of the circulatory system. Know the differences between an open and closed circulatory system, including the efficiency, vessels, speed and control, and fluid of each system. Also be able to provide an example of an organism with each type of system. Know the different components of blood including the formed elements (erythrocytes, leukocytes, platelets) and the plasma, and the function of each component. What is the function of hemoglobin? What determines oxygen binding to hemoglobin? Know the different blood vessels (veins, venules, capillaries, arteries, arterioles) and the function of each vessel. Know the correct pathway of blood through the circulatory system. Where does gas exchange occur in the body? What is the function of the heart? What chambers receive blood? What chambers pump blood? What is the difference between the pulmonary circuit and the systemic circuit? **Be able label the chambers of the heart and the major vessels entering or leaving the heart, and be able to draw the pathway of deoxygenated and oxygenated blood through a diagram of a heart (Fill in).** What are the function of the valves? Know which animals have a four-chambered heart (mammals, birds, crocodiles), three-chambered heart (reptiles and amphibians), and a two-chambered heart (fish). Know the periods of heart contraction (systole) and relaxation (diastole). Know where the blood pressure is greatest. What controls your breathing rate? What is the function of coronary arteries? What is the difference between low-density lipoproteins and high-density lipoproteins? Which one causes atherosclerosis? What is the difference between hypertension, a stroke, a heart attack and atherosclerosis? What is the function of the lymphatic system and what type of fluid is transported through the lymphatic system? What are lymph nodes?

**Key words and terms**: Open circulatory system, closed circulatory system, red blood cells, erythrocytes, hemoglobin, white blood cells, leukocytes, platelets, plasma, veins, venules, capillaries, arteries, arterioles, heart, atria, ventricles, pulmonary circuit, systemic circuit, systole, diastole, coronary arteries, hypertension, heart attack, stroke, atherosclerosis, lymphatic system, lymph, lymph nodes

**Chapter 27: Nervous System and Senses**

Know the difference between the central nervous system and the peripheral nervous system. Know the difference between the afferent nervous system and the efferent nervous system, and the neurons associated with each system. What is the role of interneurons? Know the difference between the somatic and autonomic nervous system and which body functions are controlled by each system. Know the difference between the parasympathetic and sympathetic divisions and the responses of each system. Know the different parts of the neuron and the function of each part. What is the function of myelin sheaths, and what are the nodes of Ranvier? What is a reflex? What is the membrane potential and why is it important? Resting potential. What gated ion channels are found in the axon and what is there function? What is depolarization? What is an action potential? **Be able to describe the steps involved in the propagation of an action potential and the steps that restore the membrane potential.** Why does the action potential only travel one way through the axon? Refractory period. How is a nerve signal transferred between neurons? What is the function on neurotransmitters? Know the different types of receptors and the senses that use each type of receptor. What is the difference between tonic and phasic receptors? **Be able to describe how a sound wave is interpreted by the different parts of the ear and transmitted to the brain.** What is the function of the semicircular canals? Know the different parts of the eye and the function of each part. What is the difference between rods and cons? What is happening in the eye of someone who is nearsighted? Farsighted?

**Key words and terms:** Central nervous system, peripheral nervous system, afferent division, efferent division, sensory neuron, interneuron, motor neuron, somatic nervous system, autonomic nervous system, parasympathetic division, sympathetic division, dendrites, axon, cell body, synaptic terminals, myelin sheath, action potential, nerve, reflex, membrane potential, resting potential,

Sodium potassium pump, gated ion channels, depolarization, refractory period, nodes of Ranvier, synapse, synaptic cleft, neurotransmitter, mechanoreceptors, thermoreceptors, chemoreceptors, photoreceptors, electromagnetic receptors, rods, cones, tonic receptors, phasic receptors, oval window, cochlea, semicircular canals, pupil, lens, iris, ciliary body, retina, farsighted, nearsighted

**Chapter 43: Immune System**

**Know the following**: Differences between a pathogen, antigen, epitope and antibody. What is a virus and why is it considered non-living? Know the three divisions of the immune system. Which organisms have an adaptive immunity? Know the barriers to infection in vertebrates. Cells involved in the innate immune response, including the types of phagocytes and their function. What do mast cells release? **Steps involved in an inflammatory response**, **including the different cell types and their functions.** Two types of cells involved in the adaptive immune response (cell-mediated and humoral immunity) and where B and T-cells are made. Know how B-cells and T-cells differ in their function. Which cells destroy infected cells? Which cells produce antibodies? Four functions of antibodies. Why can’t anybody receive blood from anybody else? Function of antigen-presenting cells (dendritic cells). **Explain how vaccines work and why we don’t get as sick if we’ve been vaccinated.**

**Key words or terms**: Pathogen. Antigen. Epitope. Antibody. Lysozymes. Phagocytes. Neutrophils. Macrophages. Dendritic cells. Mast cells. Histamine. Cytokines. Antigen-presenting cells.

**Chapters 34 and 35: 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? Know the different kinds of 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?** 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? **Be able to describe biomagnification.** 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,

**Chapter 36: Ecosystems and Human Impacts**

What is an ecosystem? What are some of the biotic and abiotic factors of an ecosystem? What are the two most important factors in determining the habitat and biome type? What type of biome is found in southern California? What factors cause the different ecosystems on Earth? Where is the concentration of solar energy the greatest? What causes the seasons on earth? What holds more moisture, warm air or cool air? What are Hadley cells and how do they influence the distribution of deserts on Earth? What is the rain shadow effect? What type of climate do we have in southern California? What are the two ecosystems found in southern California and how do they differ? What is biodiversity and why is it important? Know the difference between extrinsic and intrinsic value. How many mass extinction events have there been on Earth? What is causing the sixth mass extinction event? When did the dinosaurs go extinct? 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 habitat fragmentation and how is it associated with urbanization? What is eutrophication and what does it cause? Hypoxia. How does overfishing differ from normal fishing? What is bycatch? What percentage of climate scientists agree that climate trends are due to human activity? **What is an invasive species? Be able to provide an example of 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?

**Key words and terms**: Ecosystem, abiotic, biotic, biome, Hadley cell, rain shadow effect, chaparral, coastal sage scrub, 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,