**Bio 2 Exam 4 Study Guide**

Fill in the blank answers will come from the key words or terms from each lecture. Words not used in fill in questions will likely be used in true or false, or multiple choice questions. Short answer and short essay questions will be from emboldened topics, while long essay questions will come from the emboldened and underlined topics.

**Chapter 34: Diversity of fishes**

**Know the following**: Modes of reproduction in fish. Counter current flow of water and blood in fish gills. Difference between osmoconformers and osmoregulators. Know which vertebrates have pronephros, mesonephros,and metanephros. Characteristics of fish in superclass Agnatha, class Chondrichthyes, class Sarcopterygii, class Actinopterygii, and the superorders within Teleosti. Know the common names of the fish in each class.

**Key words or terms**: Oviparous. Ovoviviparous. Viviparous. Osmocoformer. Osmoregulator. Anadromous. Ascending process. Pharyngeal dentition. Photophores. Webarian apparatus. Physostomes. Leptocephalus larvae. Rostral organ. Swim bladder. Lateral line. Ampullae de Lorenzini. Placoid and Ctenoid scales.

**Chapter 34: Origin of Tetrapods, Amphibians and Reptiles.**

**Know the following:** What adaptations facilitated evolution of tetrapods and their movement onto land? Know the four examples of early tetrapods and the key tetrapod adaptations that they possessed. Know the tetrapod and fish characteristics that were found in Tiktaalik. Characteristics of amphibians and the differences among the three amphibian orders. **Know the characteristics that make amphibians good indicators**. Function of the different parts of the amniotic egg. Know which vertebrates have an anapsid, synapsid and diapsid skull. **Know the characteristics of reptiles and how they differ from amphibians**. Know the characteristics of the different reptiles orders (classes?). Know the difference between snakes and lizards. Know the function of the sensory adaptations found in snakes. Know the difference between and poisonous animal and a venomous animal and the effects of the two different types of toxins. Be able to recognize the three families of venomous snakes and the characteristics of each family. Know the ways that you can tell and crocodile and an alligator apart.

**Key words and terms:** Eusthenopteron. Acanthostega. Ichtheyostega. Limnoscelis. Tiktaalik. Cryptodira. Plurodira. Autotomy. Viparidae. Elapsidae. Colubridae

**Chapter 43: Immune System**

**Know the following**: Differences between a pathogen, antigen, epitope and antibody. Two types of immune response and what organisms have each type of immune response. Defense mechanisms involved in an immune response in invertebrates. Barriers to infection in vertebrates. Cells involved in the innate immune response, including the types of phagocytes and their function. **Steps involved in an inflammatory response**, **including the different cell types and their functions.** Types of antimicrobial proteins and their function. Two types of immunity involved in the adaptive immune response (cell-mediated and humoral immunity) and where B and T-cells mature. Shape of receptors found in T-cells and B-cells and types of antigens recognized by each type of receptor. Function of antigen-presenting cells (dendritic cells). **Process of cytotoxic T-cells destroying an infected cell.** Which T-cells have CD4 and CD8 proteins. Two types of B-cells and their function. Function of antibodies. Disruptions in the immune system function.

**Key words or terms**: Pathogen. Antigen. Epitope. Antibody. Lysozymes. Hymocytes. Phagocytes. Neutrophils. Macrophages. Dendritic cells. Eosinophils. Mast cells. Histamine. Interferons. Compliment proteins. Neutral killer cells. Cytokines. Chemokines. Apoptosis. Antigen-presenting cells. Perforin. Granzymes.

**Chapters 48, 49 and 50: Nervous System**

**Know the following:** Difference between central and peripheral nervous system, afferent and efferent divisions, the somatic and autonomic nervous system, and the parasympathetic and sympathetic divisions. Know the different responses of the parasympathetic and sympathetic divisions of the autonomic nervous system. Parts of a neuron and their function. Difference between nerves and ganglions. Types of neurons and their functions. What is a reflex? What is the membrane potential and how is it maintained? Role of the sodium potassium pump. **Know how an action potential is transmitted, including the stages of an action potential, the gated ion channels involved and when they are open or closed, the depolarization of the neuron, and the ions involved in the depolarization.**  Why does the nerve impulse only travel in one direction? Refractory period. **What is the function of the myelin sheath? What happens at the Nodes of Ranvier?** Know the ways a nerve impulse can increase my summation or decrease when inhibitory signals are received. **Be able to explain how a signal passed between neurons, including the function of neurotransmitters and the ligand gated channels**. Function of inhibitory and excitatory neurotransmitters. Know the six major neurotransmitters, their functions and the problems caused by their imbalance. Different regions of the brain and their function. Types of sensory receptors and the senses that use each type of receptor. Differences between tonic and phasic receptors. **Be able to explain how your ear converts a sound wave to an electrical signal. Know the parts of the inner ear, including the vestibular and tympanic canals and the tectorial membrane, and the type of receptors involved.** Parts of the eye and their function. Types of photoreceptors and their function.

**Key words and terms:** Dendrites. Axon. Synaptic terminals.Schwann cells. Oligodendrocytes. Nerve. Ganglion. Nodes of Ranvier. Membrane potential. Gated ion channels. Depolarization. Action potential. Axon hillcock. Refractory period. Synapse. Synaptic cleft. Neurotransmitter. Ligand-gated ion channel. Forebrain. Midbrain. Hindbrain. Cerebrum. Cerebellum. Corpus callosum. Dicephalon. Thalamus. Hypothalamus. Pituitary gland. Pons. Medulla oblongata. Motor cortex. Thermoreceptors. Mechanoreceptors. Chemoreceptors. Photoreceptors. Electromagnetic receptors. Tympanic membrane. Malleus. Incus. Stapes. Oval window. Cochlea. Vestibular and Tympanic canals. Tectorial membrane. Pupil. Lens. Iris. Ciliary body. Retina.

**Chapter 34: Birds**

**Know the following:** Characteristics of birds. Key adaptations for flight. Reptile and bird features on Archaeopteryx. **Differences between reptiles, birds and mammals** **including the jaw bones, ear bones, heart, red blood cells, thermoregulation and reproduction (Table).** Parts of a feather. Different between pennaceous and plumulaceous feathers and the feathers characterized as each type of feather. Know the function of the different types of feathers. Function of feathers. Different types of plumage coloration. **Costs and benefits of molting.** Anatomy of birds and the fusion of the different bones. Muscles used in upstroke and downstroke in flight. Three theories on the evolution of flight. **Sequence of respiration in birds**.Thermoregulatory strategies in birds. **Advantages and disadvantages of flocking.** Ways that males attract mates. Different breeding systems in birds. Know the three families of song birds. Know the types of nests and the examples of birds that have each nest. Different types of bird development. Two major groups of birds and their characteristics.

**Key words and terms:** Calamus. Rachis. Barbs and barbules. Vane. Pennaceous. Plumaceous. Contour feathers. Semiplume. Filoplume. Bristle. Downy. Monogamy. Polygamy. Polygyny. Polyandry. Polygynandry. Brood parasitism. Altericial. Precocial. Palaeognathae. Neognathae

**Chapter 34: Mammals**

**Know the following**: Synapomorphies of mammals. Advances during the evolution of mammals and when the first appeared, including the limb orientation, palate, lower jaw bone, placement of articular and quadrate, and dentition. Different tooth types and their function. Difference between digestive tracts in carnivores and herbivores. Different modes of locomotion. Different times of activity. Hormones active in milk production and secretion. **Differences between monotremes, marsupials and eutherians, including body temperature, mode of nourishment (egg, yolk-sac placenta, or placenta), presence of nipples, number of vagina and uteri, neocortex development and presence of a corpus callosum.** Different orders and groups (Mysticeti and Odonticeti) of mammals and their distinguishing characteristics.

**Key words or terms:** Plantigrade. Digitigrade. Unguligrade. Diunral. Crepuscular. Nocturnal. Prolactin. Oxytocin. Cloaca. Baculum. Neocortex. Corpus callosum.

**Desert Field Trip**

**Know the following:** Definition of a desert. What causes evaporation? Three different ways a desert can form and the cause of our local deserts. Know the names of the four North American deserts and whether they are a hot or cold desert. The percentage of the Earth’s surface represented by deserts. Which rattlesnakes have venom that is neurotoxic, hemotoxic, or neuro and hemotoxic. Know which plant are found in the Mojave Desert and which ones are found in the Sonoran Desert. Difference between Bactrian and Dromedary camels. Difference between leopards and jaguars. Characteristics of a giraffe. Relatives of hyenas. Fastest land animal in North America and the reason for its speed.