

# Bio 1 Final Exam Study Guide

The final exam will include true or false, multiple choice, and matching questions. You can earn up to 5 pts extra credit for answering any of long answer questions. **Long answer questions will come from the emboldened and underlined topics**

## **Chapter 1: Intro to Biology**

What are the characteristics that define living organisms? What must a hypothesis be for it to be considered a good hypothesis?

## **Chapter 2: Basic Chemistry, Water, pH**

Know the different parts of the atom (protons, neutrons, and electrons) and their charges. What is an element? What makes a stable atom? Know the differences between covalent bonds, ionic bonds and hydrogen bonds. How does an atom become an ion? What is a polar molecule? Know the properties of water. Cohesion.

**Key words and terms:** proton, neutron, electron, element, molecule, compound, isotope, covalent bond, ionic bond, hydrogen bond, polar molecule, non-polar molecule, cation, anion, solute, solvent, solution, cohesion, surface tension, specific heat, evaporative cooling

## **Chapter 3: Macromolecules**

Know the four major macromolecules and their common monomers and polymers. What do enzymes do? What does it mean when an enzyme has become denatured? How can enzymes become denatured? How is the function of an enzyme altered once they become denatured? Where do substrates bind to an enzyme? What are enzymes made up of?

**Key words and terms:** Polypeptide, amino acid, denaturing, nucleotide, nitrogenous base

## **Chapter 31: Digestion and Excretion**

Know how many Calories per gram are found in each nutrient. Know the initial and main sites of macromolecule digestion. Where does most nutrient absorption occur.

## **Chapter 4: The Cell**

What are the three domains of life? Know the different organelles and their functions. Which organelles are involved in protein synthesis? What are the differences between plant and animal cells?

**Key words and terms:** Prokaryotic, Archaea, Eukaryotic, nucleus, rough endoplasmic reticulum, smooth endoplasmic reticulum, golgi complex, lysosomes, transcription, translation, mitochondria, ATP,

## **Chapter 5: The Plasma Membrane**

What is diffusion? What is a concentration gradient? What is osmosis and how is it similar and different from diffusion? Know the terms for the different solute concentrations of a solution (tonicity, hypertonic, isotonic, hypotonic). Know what happens to plant and animal cells when placed in different solute concentrations (lyse, normal, shriveled, and turgid, flaccid, and plasmolyzed). Be able to predict the direction of osmosis when cells are placed in different solutions. Know the different types of transport through the membrane (passive: simple diffusion, facilitated diffusion, and active transport). Which type of transport requires energy?

**Key words and terms:** diffusion, concentration gradient, dynamic equilibrium, osmosis, tonicity, hypertonic, isotonic, hypotonic, lysis, plasmolysis, passive transport, simple diffusion, facilitated diffusion, active transport, exocytosis, endocytosis

## **Chapters 6 and 7: Energy and Cellular Respiration**

Know the steps of cellular respiration, where each step occurs in the cell, the input and output of each step, and the products of each step. What is the final electron acceptor at the end of the electron transport chain? Know the different types of thermoregulatory strategies in animals (endothermic, ectothermic, poikilothermic, and homeothermic). Know the different types of heat gain or loss (conduction, convection, radiation, evaporation).

**Key words and terms:** cellular respirations, photosynthesis, ATP, ADP, glycolysis, Krebs cycle, electron transport chain, homeostasis, regulators, conformers, endothermic, ectothermic, poikilothermic, and homeothermic.

## **Chapter 8: Photosynthesis**

**Compare and contrast photosynthesis and cellular respiration. Provide the chemical equation for each process. What are the products of each process? Where does each process take place? What are the main steps of each process (three in cellular respiration and two in photosynthesis)? How are the two separate processes related?** What organisms make up the base of all food webs? What goes in and what comes out of the stomata? Be able to describe the two stages of photosynthesis. Provide a summary of what happens in each step. What are the reactants and products of each step? Where does each stage take place? What donates an electron to photosystem II in the light reactions? What are the products of the light reactions? What molecule starts the Calvin Cycle? What does Rubisco do? What is the product of the Calvin Cycle?

## **Chapter 25: Plant Structure and Function**

Know the evolutionary history of plants and the key adaptations (vascular tissue, seeds, and flowers) 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.

**Key words and terms:** xylem, phloem, stem, sepal, petal, carpel, stigma, style, ovary, stamen, anther, filament

## **Chapter 9: Mitosis and Cancer**

How many chromosomes do humans have? **Know the different phases of the cell cycle, including interphase (G1, S, and G2) and mitosis (Prophase, Metaphase, Anaphase, Telophase, Cytokinesis) and be able to briefly describe what occurs during each step**

**Key words and terms:** Deoxyribonucleic acid, nucleotide, nitrogenous base, adenine, thymine, guanine, cytosine, gene, chromosome, gametes, somatic cells, mitosis, sister chromatids, centromere, Interphase, Gap 1, S Phase, Gap 2, mitosis, cytokinesis, Prophase, Metaphase, Anaphase, Telophase, cleavage furrow

## **Chapter 10: Meiosis**

Know what cells undergo meiosis and what cells undergo mitosis, and which ones are haploid and which ones are diploid. What separates during each meiosis division? Be able to describe the differences between mitosis and meiosis concerning number of daughter cells, number of cell divisions, type of cells going through meiosis and mitosis, and whether or not genetic diversity is increased as a result of each process. Know the different ways that genetic variation is increased during meiosis (crossing over) and when it occurs. Who determines the sex of the child?

**Key words and terms:** Mitosis, meiosis, somatic cells, gametes, homologous, crossing over

## **Chapters 13, 14 and 15: Transcription and Translation**

Know the difference between DNA and RNA concerning the number of strands and the nucleotides associated with each nucleic acid. What is the purpose of transcription and translation? Where does each process occur (nucleus or cytoplasm)? Know how to convert a DNA sequence to an mRNA sequence (transcription) and then an amino acid sequence (translation). Know the different types of RNA. What is the function of transfer RNA (tRNA)? **Be able to describe the process of protein synthesis. What are the two processes involved in protein synthesis and where does each step occur in the cell. What proteins are used in each process? What is produced as a result of each process?**

**Key words and terms:** Ribonucleic acid, transcription, translation, RNA polymerase, codon, anti-codon, amino acid, polypeptide, messenger RNA, transfer RNA, ribosomal RNA

## **Chapter 11: Mendelian Genetics**

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?

**Key words and terms:** Genetic, heredity, trait, gene, allele, genotype, phenotype, dominant allele, Recessive allele, homozygous, heterozygous

## **Chapter 12: Units of Heredity**

What is the difference between an autosomal dominant disorder and an autosomal recessive disorder? What is a carrier?

**Key words and terms:** recessive disorder, autosomal recessive disorder

## **Chapter 16: Intro to Evolution**

Do organisms evolve traits out of need? Know the different types of evidence for evolution. What is a transitional form? What is the difference between analogous and homologous structures?

**Key words and terms:** transitional forms, radiometric dating, morphology, homology, analogous structures, convergent evolution, vestigial traits, embryology,

## **Chapter 17: Means of Evolution**

What are the five mechanisms of microevolutionary change? Be able to briefly describe each mechanism and be sure to state whether it is random or non-random with respect to fitness. What is gene flow? What is genetic drift and when is it most pronounced? Know the definition of biological fitness. What is an adaptation? Know the definition of natural selection. Is natural selection all about survival? What is sexual selection and what does it lead to? Sexual dimorphism.

**Key words and terms:** microevolution, macroevolution, mutation, deleterious mutation, geneflow, genetic drift, natural selection, biological fitness, adaptation, selective pressure, sexual selection

### **Chapter 18: Outcomes of Evolution**

What is a species? Biological species concept. What is reproductive isolation and why is it important in the definition of species? Know the difference between macroevolution and microevolution. 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 are the two different types of speciation called? How does each type of speciation occur? What is the difference between microevolution and macroevolution.** What is allopatric speciation? How does sympatric speciation differ from allopatric speciation? Is evolution goal oriented? 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)

**Key words and terms:** reproductive isolation, macroevolution, microevolution, allopatric speciation, adaptive radiation, sympatric speciation

### **Chapters 21-24: Diversity of Life**

Be able to provide the four adaptations that led to the success of terrestrial vertebrates. What are the synapomorphies of mammals?

**Key words and terms:** jaws, lungs, limbs, amniotic egg

### **Chapter 30: Circulatory and Respiratory System**

Do humans have an open or closed circulatory system? 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? Know the chambers of the heart and the major vessels entering or leaving the heart.

**Key words and terms:** Open circulatory system, closed circulatory system, veins, venules, capillaries, arteries, arterioles, heart, atria, ventricles, pulmonary circuit, systemic circuit

### **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. Know the difference between the parasympathetic and sympathetic divisions and the responses of each system. Know the different types of receptors and the senses that use each type of receptor. What is the difference between tonic and phasic receptors?

**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, mechanoreceptors, thermoreceptors, chemoreceptors, photoreceptors, electromagnetic receptors

### **Chapters 34 and 35: Population and Community Ecology**

Know the different levels of study within ecology. Know the different types of interactions between species and whether they are positive or negative with respect to the fitness of each species. Know the different trophic levels. Which level is made up of herbivores? Carnivores?

**Key words and terms:** Ecology, individuals, population, community, ecosystem, competition, predation, parasitism, mutualism, commensalism, primary producers, primary consumers, secondary consumers, tertiary consumers

### **Chapter 36: Ecosystems and Human Impacts**

What causes the seasons on earth? What percentage of climate scientists agree that climate trends are due to human activity?