**Bio 1 Exam 2 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**

**Chapter 8: Photosynthesis**

Know the equations for photosynthesis and cellular respiration. **Be able to describe the relationship between cellular respiration and photosynthesis.** What organisms make up the base of all food webs? What are photons? What are pigments? Know the three main pigments found in plants and the light wavelengths that they absorb. Why do leaves of deciduous trees turn orange, red, and yellow in the fall? Know the different parts of the leaf and chloroplast including the stomata, thylakoid and stroma? 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? How is light used in the light reactions? What molecule starts the Calvin Cycle? What does Rubisco do? What is the product of the Calvin Cycle? What is photorespiration? Know the table of the different photosynthetic pathways? Which pathways use Pep carboxylase? Which pathway opens the stomata at night and close the stomata during the day? 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? What sector has shown the greatest increase in greenhouse gases? What is carbon sequestration? What is a carbon sink?

**Key words and terms:** Photon, pigments, chlorophyll a, chlorophyll b, carotenoids, stomata, chloroplasts, thylakoids, stroma, photorespiration, C3, C4, CAM, greenhouse gas, carbon dioxide, methane, nitrous oxide, fluorinated gases, carbon sequestration, carbon sink

**Chapter 25: Plant Structure and Function**

**Know the evolutionary history of plants and be able to construct a phylogenetic tree with the four main categories of plants (seedless nonvascular, seedless vascular, gymnosperms, and angiosperms). Be able to correctly place the key adaptations (vascular tissue, seeds, and flowers) on a phylogenetic tree of plants**. Know some common examples of plants that can be found in each group of plants (ex. Mosses, ferns, pine trees, flowering plants). Know which groups have spores and which groups have seeds. Know the different types of vascular tissue (xylem and phloem) and what each type of tissue transports. What is function of roots? What is the difference between gymnosperms and angiosperms? What is a seed and what is the function of the different parts (cotyledons, endosperm)? How are gymnosperm seeds and pollen dispersed? Know the differences between monocots and eudicots concerning number of cotyledons, leaf venation, vascular tissue, roots, and flower parts. **Know the different parts of the flower including the male and female reproductive parts (fill in)**. How is the pollen of many angiosperms dispersed? What is pollination? Why have flowers evolved to look the way they do? What is happening during double fertilization? What is transpiration and how is it involved in water transport in plants (cohesion-tension hypothesis). **Be able to explain the cohesion-tension hypothesis.** Be able to describe the trade of between leaf size and water loss. What adaptations have plants evolved to reduce water loss?

**Key words and terms**: Phylogenetic tree, spores, xylem, phloem, stem, leaves, buds, roots, root hairs, mycorrhizae, gymnosperm, angiosperm, seed, cotyledon, endosperm, monocot, eudicot, taproot, sepal, petal, carpel, stigma, style, ovary, stamen, anther, filament, pollination, double fertilization, transpiration, cohesion-tension hypothesis, cuticle

**Chapter 9: Mitosis and Cancer**

What is Deoxyribonucleic acid (DNA) and what is it made up of? What is a nucleotide and how is it different from a nitrogenous base? What are the four nitrogenous bases and which ones are always paired together? What is a gene? Know the difference between chromatin and chromosomes. How many chromosomes do humans have? Know the difference between haploid and diploid and which cells are haploid and which cells are diploid. What are gametes? What are somatic cells? What percentage of human DNA codes for proteins? Know the different steps of the cell cycle (Interphase, Gap 1, S Phase, Gap 2, Mitotic Phase) and the phases when DNA replication and cell division occurs. Know the difference between mitosis and cytokinesis. Know the parts of a chromosome after DNA replication (sister chromatids, centromere). Know the enzymes involved in DNA replication and their function (helicase, DNA polymerase). Know how to create a complementary strand of DNA when given a template strand of DNA. Which direction does DNA polymerase move? Know the difference between the leading and lagging strand. **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.** Know the difference in cytokinesis between plants and animal cells (cell plate and cleavage furrow). What is cancer? Know the different characteristics of cancer cells. Difference between benign and malignant cancer. What are the different types of treatment used to treat cancer?

**Key words and terms**: Deoxyribonucleic acid, nucleotide, sugar-phosphate backbone, nitrogenous base, adenine, thymine, guanine, cytosine, gene, chromatin, histone, chromosome, genome, karyotype, haploid, gametes, diploid, somatic cells, mitosis, cytokinesis, template strand, complementary strand, sister chromatids, centromere, Interphase, Gap 1, S Phase, Gap 2, mitosis, cytokinesis, Prophase, Metaphase, Anaphase, Telophase, cleavage furrow, cell plate, cancer, benign, malignant, chemotherapy, radiation, immunotherapy.

**Chapter 10: Meiosis**

Know what cells undergo meiosis and what cells undergo mitosis, and which ones are haploid and which ones are diploid. What are homologous chromosomes and what do two duplicated homologous chromosomes form (tetrad)? What separates during each meiosis division? **Be able to describe the differences between mitosis and meiosis concerning number of daughter cells, if the daughter cells are haploid or diploid, 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 how many chromosomes line up on the metaphase plant during mitosis, meiosis I, and meiosis II. **Know the different sources of genetic variation (crossing over and independent assortment) and when each of these processes occurs**. What sex chromosomes do females have and which ones do males have? Who determines the sex of the child? Spermatogenesis. Where is sperm produced? What organs are involved in sperm production and which ones are involved in semen production? Know the parts of the female reproductive anatomy. When are females eggs initially produced? When does the egg complete meiosis II? How many eggs result from the two meiosis cell divisions? What are polar bodies? Know the function of follicle stimulating hormone (FSH), estrogen, progesterone, and luteinizing hormone. Which hormone stimulates the thickening of the endometrium? Which hormone promotes ovulation? Which hormone stimulate the oocyte to complete meiosis I? Know the difference between identical and fraternal twins concerning the number of egg and sperm and placentas.

**Key words and terms**: Mitosis, meiosis, somatic cells, gametes, haploid, diploid, homologous, tetrad, daughter cell, crossing over, independent assortment, polar body, identical twin, fraternal twin, spermatogenesis, oogenesis, seminiferous tubules, epididymis, vas deferens, seminal vesicle, prostate gland, uterus, endometrium, fallopian tube (oviduct), ovary, cervix, Oogenesis, follicle stimulating hormone (FSH), estrogen, progesterone, luteinizing hormone,

**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)? What is RNA polymerase and what is its function? What is a codon? What is start codon and what is a stop codon? What is an anti-codon? What contains the anti-codon? Know how to covert a DNA sequence to an mRNA sequence (transcription) and then an amino acid sequence (translation). Which nitrogenous bases bind with which other bases during transcription? Know the different types of RNA. What are the three binding sites in the ribosome and what occurs at each binding site. What is the function of transfer RNA (tRNA)? Be able to describe the four steps of Translation**.**  **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?** Can more than one ribosome translate an mRNA strand at once? What is a mutation? Point mutation. Know the four different types of mutations? What is gene regulation and what are the three forms of gene regulation? What are transcription factors and what do they do? What are introns, exons? Be able to perform alternative splicing with a mRNA sequence containing introns and exons. Bioengineering. Biotechnology. Genetic engineering. What is artificial selection? What are restriction enzymes and what are they used for? What are plasmids? What are GMOs and what are some of the reasons why GMOs are under controversy?

**Key words and terms**: Ribonucleic acid, transcription, translation, RNA polymerase, codon, anti-codon, amino acid, polypeptide, messenger RNA, transfer RNA, ribosomal RNA, A site, P site, E site, mutation, point mutation, silent mutation, missense, nonsense, frameshift, introns, exons, alternative splicing, bioengineering, biotechnology, transgenic organism, genetically modified organism (GMO), restriction enzymes, plasmids, artificial selection

**Bio Article #3: Rising Carbon Dioxide Levels and Plants**

Know how an increase in CO2 levels affected the growth and stomatal conductance in plants.