Study Guide - Make sure to have a solid understanding of the concepts outlined below. Also, review the homework, lecture slides, your notes from lecture, and the textbook.

* Ch1. Intro to genetics
  1. Evolution –
     + Is change through time
     + Genetic variation is a fundamental component of evolution, otherwise there would be no differences for natural selection to chose among…
     + Natural Selection depends on the environment – go over the Hopi example. Selection favors albinos in the Hopi culture because albinos are revered. Albinos have greater incidence of skin cancer. These observations are consistent with a high rate of albinism in Hopi relative to cultures that do not regard albinism favorably…
     + Is natural selection the only way that evolution can happen?
       1. No, example - artificial selection…
  2. Intro to Genetics
     + What is a genome – all of the molecules of heredity - the genome is made of nucleic acids, DNA and RNA.
     + People have been manipulating organisms genetically for 1000s of years
     + Genetic engineering of insulin
     + Zebrafish gene and human melanin – fish used to understand human skin color variation
       1. Many characters are controlled by multiple genes
       2. Hair and skin color are controlled by more than one gene…
  3. History of Genetics
     + Mendel is the father of genetics, specifically transmission genetics
     + Pangenesis – homunculus..
     + What are the implications of inheritance of acquired characteristics?
     + What is germ plasm theory?
       1. Germ plasm is August Weismann's 19th century concept that heritable information is transmitted only by germ cells in the gonads, not by somatic cells
     + What is cell theory?
       1. according to this theory, all life is composed of cells, cells arise only from preexisting cells, and the cell is the fundamental unit of structure and function in living organisms
* Chemistry and Biology Intro
  1. Basic Chemistry
     + Atom, element, proton, neutron, electron, ion, molecule, types of bonds…
  2. Water, polarity and hydrogen bonding
     + Water is special…
     + polar molecule - uneven distribution of charge
     + Hydrogen bonding review
     + Oxygen is electro-negative and keeps the electrons for itself
     + Acid/base is not covered…
  3. Molecules of Life
     + Polymers are made of monomer
     + Four types of macromolecules important to life
     + The molecule of heredity are nucleic acids - polymer composed of nucleotides
     + DNA is a double helix
     + How do DNA and RNA differ?
     + DNA is found in chromosomes…
* Ch2. Cycle, Mitosis, Meiosis
  1. Basic Cell Structure –
     + Difference between Eukaryote and prokaryotes
  2. Meiosis - It is the separation of chromosomes in the division of sex cells to produce gametes.
  3. Mitosis - It is the separation of chromosomes in the division of somatic cells in plants and animals.
  4. How are mitosis and meiosis different?
  5. What are checkpoints?
  6. Genetic variation in organisms is a caused by, sex, recombination during meiosis, independent assortment of homologous chromosomes during meiosis, & mutation
* Ch3. Inheritance
  1. Segregation – define clearly so I can test this"
  2. monohybrid cross -
     + Cross between two individuals that differ in a single characteristic—more specifically, a cross between individuals that are homozygous for different alleles at the same locus (AA × aa); also refers to a cross between two individuals that are both heterozygous for two alleles at a single locus (Aa × Aa).
     + What are the expected phenotypes? 3:1
     + What are the expected genotypes? 1:2:1
  3. principle of segregation (Mendel’s first law) - Principle of heredity discovered by Mendel that states that each diploid individual possesses two alleles at a locus and that these two alleles separate when gametes are formed, one allele going into each gamete.
  4. concept of dominance - Principle of heredity discovered by Mendel stating that when two different alleles are present in a genotype, only one allele may be expressed in the phenotype. The dominant allele is the allele that is expressed, and the recessive allele is the allele that is not expressed."
  5. Sutton discovered that alleles area on chromosomes…
  6. Punnett squares – know how to do them.
  7. Terminology from ppt and lecture
  8. Ch. 3 up to and including Punnett square
* Scientific method –
  1. What are the steps? Observe, question, hypothesis with expectations, test, do results support hypothesis?
  2. Hypothesis is a possible explanation for an observation or question…