**Fall 2016 Final Study Guide**

**Technology of Biology**

**You may include diagrams, pictures, haikus, poems, stories, etc in your answers as appropriate and helpful in order to demonstrate your understanding of the topic of each question. Quality, not necessarily quantity, is what I am looking for! Be thorough and thoughtful!**

**Chapter 11 Introduction to Genetics**

1. Compare and contrast mitosis and meiosis

*Examples of vocabulary to use*: 1N, 2N, # cells formed, crossing over, prophase, metaphase, anaphase, telophase

2. Discuss the concept of probability with regards to inheritance of traits. What is a Punnett square and what can it be used for? What are the limitations of Punnett squares?

*Examples of vocabulary to use*: averages, sample size, dominant, recessive, probability, predicted ratios, coin toss, traits, phenotype, genotype

3. Discuss what independent assortment is and why it is important. Give an example. In what type of cells does it happen?

*Examples of vocabulary to use*: independent assortment, segregation, homologous chromosomes, genetic variation

4. Define incomplete dominance and give examples. Define codominance and give examples. Define multiple alleles and give examples. Define polygenic trait and give examples.

**Chapter 12 DNA and RNA**

5. Discuss how mutations, changes in gene regulation and/or gene expression or cell cycle regulation causes a human disease or affects human development.

*Examples of vocabulary to use*: cancer or another disease, Hox genes, point mutations, frame shift mutations, chromosomal mutations, nonsense, missense, gene regulation, gene expression, cell cycle checkpoints, inherited mutations, mutations caused by environmental factors.

6. How does the structure of DNA and chromosomes result in the way DNA replicates?

*Examples of vocabulary to use*: complementary bases, sugar phosphate backbone, double helix, chromatin, semi-conservative, parent strand, daughter strand, A,T,C,G, template

7. Compare and contrast replication and transcription-what, where, why, when and how.

*Examples of vocabulary to use*: DNA polymerase, RNA polymerase, nucleus, mRNA, DNA, double stranded, single stranded, gene expression

8. What is translation? Describe the steps, location, machinery and molecules necessary.

*Examples of vocabulary to use*: ribosome, cytoplasm, messenger RNA, ribosomal RNA, transfer RNA, codon, anticodon, amino acid, intron, exon, translation, peptide

**Chapter 13 Genetic Engineering**

9. What is an application of genetic engineering, what are the costs and benefits of the application, and what are the bioethical issues involved with the applications

**Chapter 14 Human Genetics**

10. What is a karyotype and how is it used by genetic counselors or forensic scientists? What does a normal human karyotype look like and what does an abnormal one, for example one from an individual with Down’s syndrome or Turner’s syndrome look like?

*Examples of vocabulary to use*: discuss number of chromosomes, diploid, nondisjunction, somatic chromosomes, sex chromosomes

11. What is a pedigree and how is it used by genetic counselors? Analyze and interpret the following pedigree for a family that has a genetic predisposition to Huntington’s Disease and discuss what you would advise to each of the youngest generation family members regarding having children if you were their genetic counselor

*Examples of vocabulary to use*: trait, affected individual, carrier, offspring, siblings

