Study Guide Chapters 17, 18, 19

**Write a response to each item in** **your own words**.

**Chapter 17**

Define genetics in terms of artificial selection, genes, chromosomes. Define molecular biology.

List and describe the 4 principles by which living organisms organize and process genetic information.

Describe a nucleotide in terms of; structure, what it is the building block for, nucleosides

List the nitrogenous bases, general structure, which appears in DNA and RNA, single letter designation.

Describe DNA structure in terms of levels of structure, reading direction, how helix is formed and stabilized.

Define point mutations. List and describe all the types of point mutations.

What are endogenous and exogenous forces, what effect on DNA.

Discuss how the structure of DNA was determined. Describe basic structure, types of DNA.

Discuss supercoiling and it’s role in DNA replication.

Define chromosome. Describe chomosomes in prokaryotes versus eukaryotes. Compare Prokaryotic genomes to eukaryotic genomes

Describe the functions of noncoding DNA sequences.

What are the differences between

DNA and RNA. Describe the process of transcription in detail. What are the 3 most important RNAs produced, characteristics and their function.

**Chapter 18**

Define replication, transcription, and translation. Write the Central Dogma for process of genetic info to protein.

Describe what is meant by semiconservative replication, how established, where does it take place.

Describe DNA synthesis in prokaryotes, include helicases, primer synthesis DNA polynucleotide synthesis, synthesis directionality, replication forks.

Describe characteristics and function of DNA polymerase III (holoenzyme, core polymerase); DNA Polymerase I, DNA polymerase II, IV, V; DNA ligase, DNA topoisomerases.

Describe prokaryote replication process in detail; DNA-binding domain, leading and lagging strand, RNA primer, Okazaki fragments, proofreading, how it ends.

Describe in detail eukaryote replication process; DNA polymerases, Cell cycle timing, preRC, ORC, RLFs, RPA, RFC, how ends

Discuss telomerases.

What is average natural mutation rate? How is DNA repaired. Detail all processes.

What is DNA recombination, importance of, types? Describe and compare 3 models of recombination.

What is transcription? List the basics that are common for all transcription. Key difference between replication and transcription.

Describe prokaryote transcription in detail; RNA poly, TSS, Pribnow box, transcription bubble, termination.

Describe eukaryote transcription in detail; 3 RNA polys, TSS, CPE, TATA box, TFIID, GTFs, PIC assembly, elongation, termination.

Define introns, exons. What is RNA splicing and why is it important?

How is gene expression controlled in prokaryotes versus eukaryotes?

**Chapter 19**

Define protein synthesis. What are the requirements for protein synthesis and the 3 key steps?

Define translation, genetic code, codon, anticodon. Of the 64 codons how many code for amino acid, what are stop codons, start codon?

What are the properties of the Genetic Code?

Describe the Wobble hypothesis and why it explains why a minimum of 32 tRNAs can translate all 61 codons.

Why is translation accuracy higher as a result of the aminoacyl-tRNA synthetase reaction? Describe the 2 steps of this process.

Discuss in detail the 3 phases of translation; initiation, elongation, and termination. Note differences between prokaryote and eukaryote.

Describe translational control in prokaryotes.

What is meant by posttranslational modifications in eukaryotes? Give a brief description of the 8 postranslational processes.