**Biology III – Essay #1 Prompt**

Your goal for this essay should be to synthesize the various components. This means describing the important concepts from each topic ***and*** demonstrating how they link together.

This prompt is intended as a guide, feel free to deviate from it if you wish to pursue a different narration angle. Feel free to weave the content together in any way you wish, you don’t need to follow this outline point by point, whatever makes sense to you, so long as your narrative is comprehensible. Have fun with it and be creative!

**Mendelian Genetics**

For this section, you’ll want to fully describe Mendel’s experimental design and demonstrate how his results led him to his conclusions. You should use diagrams, pictures, etc. to illustrate your explanations.

Make sure to explain how Mendel’s Principles of Dominance and Probability elucidate his results.

What do the Laws of Segregation and Independent Assortment state? You should show how these laws apply to actual phenomena. Show/explain how these laws apply at different stages of meiosis (gamete formation).

Finally, Describe some of the phenomena that don’t fit neatly into Mendel’s concepts of dominant and recessive traits. Make sure to provide examples. Why don’t Mendel’s laws apply to every instance of inheritance?

Why had Mendel been so successful in his experiments? What did he have to do to get his results? How was this approach both, simultaneously, a stroke of genius and a limitation?

**Biology III – Essay #2 Prompt**

**DNA, RNA and Protein Biosynthesis**

What were the groundbreaking experiments that proved DNA was the genetic material?

Why is DNA considered a chemical language? What are the basic units involved in the structure of DNA? How are they arranged? How is RNA different?

Describe the process that leads to the synthesis of complementary DNA strands. What is the purpose of DNA Replication? When/where does it occur?

Describe the biosynthesis of RNA and the process of translation that leads to protein production. What is the enzymatic pathway that leads from genes to proteins? What role do proteins play in the body? What roles do different types of RNA play? How is DNA “read/interpreted?”

You may use diagrams, pictures, etc. to illustrate your explanations.

How do genes actually give rise to specific physical traits? Give examples.

**Biotechnology**

Provide a full explanation for how the biotechnologies of Gel Electrophoresis and PCR work (unless you’ve already done so in your lab write-ups). How do they relate to the natural processes of DNA replication and protein biosynthesis?

What are the applications for these technologies and new the gene-editing tool CRISPR?

Characterize the ethical debate on the use of these technologies. Where do you stand on the issue? Please back up your position with thoughtful analysis.