By the end of this unit, students will be able to…

- Describe the differences between prokaryotic and eukaryotic cells.
- Summarize how prokaryotic cells regulate the production of their proteins to conserve energy and minimize waste.
- Define an operon and describe how the *lac operon* is regulated.
- Summarize how the process of methylation can affect the production and regulation of proteins.
- Summarize how transcription factors can affect the production and regulation of proteins.
- Define histones and describe their function in affecting the regulation of protein production.
- Describes the differences between eukaryotic and prokaryotic protein regulation.
- Define epigenetics and how this affects the cells of an organism.
- Describe how mutations occur and how they affect the cells of an organism.
- Describe and define the following kinds of mutations: substitution, insertion, deletion, frameshift, and silent.
- Describe how different kinds of mutations differently affect DNA, mRNA, codons, amino acids, polypeptides, proteins, and cellular/organismal function.
- Identify types of mutations based on images and/or descriptions.
- Define mutagen and provide examples.
- Summarize how a mutation could a) be harmful, b) be neutral, and c) be helpful to an organism.
- Using the vulture as an example, describe how one mutation can completely change a species in a beneficial way.
- Using domesticated species as examples, define a breed and describe how mutations enable breeds to be formed. Clarify the differences between a breed and a new species.