

## I Catalog Description:

This course offers a detailed study of eukaryotic cell anatomy, metabolism, and division, including the study of Mendelian genetics and the molecular genetics of eukaryotes. Prokaryotic cellular structure (eubacteria and archaea), microbial genetics and viruses are also studied. The scientific method is discussed in the lecture component, and students implement elements of the process in various laboratory exercises. This course is one of three courses in the biology series designed for biology majors, including those students planning to pursue a career in medicine, dentistry, or other life sciences.

## II Course Objectives. The student will be able to:

Identify the characteristics of living things, and distinguish between organisms classified within the six kingdoms of living things.

Apply the principles of the scientific method to experimental cases.

Distinguish between the major types of biologically significant polymers.

Recognize and provide examples of the classes of amino acids and various types of polysaccharides and lipids.

Relate cellular structures with their functions.

Describe membrane structure and the various modes of transport across the membrane.

Utilize a compound light microscope.

Estimate the size of cells viewed with the compound microscope.

Explain the role of enzymes in cellular metabolism.

Describe catabolic (glycolysis and cellular respiration) and anabolic (photosynthesis) pathways and relate them to organismal function and bioenergetics.

Identify the various mechanisms of cell signaling.

Recognize the phases of mitosis using the compound microscope.

Compare and contrast the processes of mitosis and meiosis.

Apply Mendel's Model of Heredity to predict outcomes of genetic crosses.

Describe the structure of DNA and its replication process.

Explain in detail the processes of transcription and translation in eukaryotic cells.

Utilize restriction enzymes and gel electrophoresis.

Evaluate the suitability of agarose gel electrophoresis for DNA fragment separation.

Compose a laboratory report with the following elements (or variations thereof): Title, Abstract, Introduction, Materials and Methods, Results, Discussion, and References.

Identify genetic abnormalities caused by nondisjunction and gene mutation.

Describe mechanisms for controlling gene expression in prokaryotic and eukaryotic cells.

Demonstrate aseptic technique, the Gram stain and spore stain procedures.

Compare and contrast the lytic and lysogenic cycles of viruses.

Describe the characteristics of significant bacterial divisions.

Explain the effects that prokaryotes have on the environment.

## III Student Learning Outcomes - Upon completion of the course, the student should demonstrate the following skills:

The student will understand and apply principles of the scientific method, recognizing an idea based on reproducible evidence.

The student will be able to describe key activities at each stage of mitosis.

The student will be able to use the compound and dissecting microscope to observe cells and microorganisms.