

BIO 250 GENETICS

COURSE DESCRIPTION:

Prerequisites: BIO 112

Corequisites: None

This course covers principles of prokaryotic and eukaryotic cell genetics. Emphasis is placed on the molecular basis of heredity, chromosome structure, patterns of Mendelian and non-Mendelian inheritance, evolution, and biotechnological applications. Upon completion, students should be able to recognize and describe genetic phenomena and demonstrate knowledge of important genetic principles. *This course has been approved to satisfy the Comprehensive Articulation Agreement for transferability as a premajor and/or elective course requirement.* Course Hours Per Week: Class, 3; Lab, 3; Semester Hours Credit, 4

LEARNING OUTCOMES:

1. Students will be able to explain the scientific method.
 - a. Formulate testable hypotheses
 - b. Evaluate the validity of research results
2. Students will be able to describe the flow of genetic information from DNA to RNA to protein.
 - a. Describe the composition and structure of DNA and the basic steps of DNA replication
 - b. Describe the composition and structure of RNA and the basic steps of transcription
 - c. Describe the composition and structure of protein and the basic steps of translation
 - d. Describe the structure and function of a gene
 - e. Describe examples of human genetic disorders caused by gene mutations and chromosomal rearrangements
3. Students will be able to describe and apply the principles of Mendelian genetics.
 - a. Explain Mendel's Principles of Segregation and Independent Assortment
 - b. Describe the chromosomal basis of inheritance
 - c. Explain linkage, recombination, and the mapping of genes on chromosomes
 - d. Describe non-Mendelian inheritance
4. Students will be able to explain how genes are regulated
 - a. Explain the regulation of genes in prokaryotes
 - b. Explain the regulation of genes in eukaryotes
 - c. Describe cell-cycle regulation and the genetics of cancer
 - d. Explain how genetics is used to study development
 - e. Describe the genetic analysis of populations

OUTLINE OF INSTRUCTION:

- I. DNA
 - A. Structure
 - B. Replication
- II. Gene Control of Proteins
 - A. Transcription
 - B. Translation
- III. DNA Mutations
 - A. DNA Damage
 - B. DNA Repair
 - C. Transposable elements
- IV. Recombinant DNA Technology
- V. Gene Cloning and Manipulation
- VI. Genomics
- VII. Mendelian Genetics
- VIII. Chromosomes and Heredity
- IX. Bacteria and Phage Genetics
- X. Regulation of Gene Expression in Bacteria and Phage
- XI. Regulation of Gene Expression in Eukaryotes
- XII. Developmental Genetics
- XIII. Genetics of Cancer
- XIV. Non-Mendelian Inheritance
- XV. Population Genetics
- XVI. Molecular evolution

REQUIRED TEXTBOOKS:

To be selected by Instructor/Discipline Chair.