Course Prefix and Number: <u>BIO 256</u>   Credits: <u>4</u>

Course Title: <u>General Genetics</u>

Course Description

Explores the principles of genetics ranging from classical Mendelian inheritance to the most recent advances in the biochemical nature and function of the gene. Includes experimental design and statistical analysis. Prerequisites: BIO 101 & BIO 102 or equivalent. Lecture 3 hours. Recitation and laboratory 3 hours. 4 credits.

General Course Purpose

BIO 256 is designed as an introduction to genetics and the techniques used for genetic analysis at the biochemical, organismal and population levels. This course has both a lecture and lab component where students are exposed to many different techniques used to assess and apply genetic information to given scenarios. This course is designed to fulfill a second-year laboratory requirement and provide students with a foundation in how genes function, how they are inherited and how we study them.

Course Prerequisites/Corequisites

BIO 101 & BIO 102 or equivalent

Course Objectives

Upon completing the course, the student will be able to:

Scientific Literacy
Evaluate different perspectives, opinions, and statements about biological issues in terms of their logic, content, scientific merit, and biases.

Quantitative Reasoning

Use Punnett squares and probability to predict offspring ratio for different inheritance patterns
Calculate the location of a gene on a chromosome
Describe the process of gene mapping in Eukaryotes

Population Genetics: Hardy Weinberg Equilibrium, Selection, Genetic Drift
Describe importance of genetic variation for evolution
Apply Hardy-Weinberg Equilibrium principles to a population to determine if evolution is occuring
Analyze population data using hardy-weinberg equilibrium principles to predict carriers of mutations and mating outcomes.
Describe and apply various evolutionary tests
Differentiate between different types of selection

Molecular Genetics: Genomes, Genomics, Molecular Techniques, Bioinformatics
Describe methods used to isolate, amplify and study genes of interest
Describe methods used to identify and alter genes of interest
Compare genome sequencing approaches and applications
Discuss the limitations of genetic research
Interpret a basic phylogenetic tree

Genetics in Society: Societal Impact, Genethics, Medicine
Discuss the ethical, legal, medical, and social implications of the study of genetics

Major Topics to be Included

Nature of a Gene: DNA replication, Transcription, Translation, Mutations
Gene Expression and Regulation: Gene expression, Gene regulation, Epigenetics, Sex determination, developmental genetics
Eukaryotic Cell Cycle: Mitosis, Meiosis, Chromosome Structure, Chromosomal Abnormalities
Mendelian Genetics: Mendelian crosses, pedigree analysis, Chi square analysis
Non-Mendelian Genetics: Sex-Linked traits, Incomplete dominance, codominance, Qualitative traits, Linkage mapping
Population Genetics: Hardy Weinberg Equilibrium, Selection, Genetic Drift
Molecular Genetics: Genomes, Genomics, Molecular Techniques, Bioinformatics
Genetics in Society: Societal Impact, Genethics, Medicine

Effective Date/Updated: January 1, 2022