

Course Title: Genetics

Prefix and Course Number: BIOL 244

Learning/Performance Expectations (e.g., outcomes, performance objectives, competencies, etc.)

By the end of this course, a student should:

- describe Mendelian inheritance plus extensions
- perform calculations to predict expected genotypic and phenotypic ratios of offspring
- interpret family pedigrees
- explain gene linkage and genetic recombination
- explain the structure and mapping of bacterial and viral genomes
- describe the process of gene expression (and mechanisms of regulation)
- explain and discuss the applications of molecular techniques and evaluate related ethical issues
- describe the impact of genomics on the science of genetics
- apply the Hardy-Weinberg law to predict expected allele and genotype frequencies in a population at equilibrium
- describe mechanisms for speciation

Course Outline:

- I. Chromosome Theory of Inheritance
 - A. Mitosis and Meiosis
 - B. Mendelian Genetics
 - C. Pedigrees
 - D. Extensions of Mendelian Genetics
 - E. Sex Chromosomes and Sex Linkage

- II. Chromosome Mutation
 - A. The Structure and Function of Eukaryotic Chromosomes
 - B. Variation in Chromosome Number
 - C. Variation in Chromosome Arrangement

- III. DNA Structure and Gene Expression
 - A. DNA Structure and Analysis
 - B. Mapping
 - C. Gene Linkage
 - D. Recombination
 - E. The Genetic Code and Transcription
 - F. Translation and Proteins
 - G. Gene Mutation and DNA Repair
 - H. Regulation of Gene Expression in Prokaryotes

- IV. Applications and Molecular Techniques
 - A. Recombinant DNA Technology and Cloning
 - B. Ethical Concerns

- A. DNA Sequencing
- B. Genomics
- C. Bioinformatics
- D. Proteomics

- V. Quantitative Genetics
 - A. Population Genetics
 - B. Evolutionary Genetics