

BIO 245: Principles of Genetics

Course description

BIO 245. PRINCIPLES OF GENETICS. An overview of the principles of plant and animal genetics including Mendelian and modern concepts of heredity. Developments in molecular genetics will be addressed through the chemistry and physiology of the gene and the nature of gene action in prokaryotic and eukaryotic cells. Three 50-minute lectures per week and 3 hours of laboratory per week. Prerequisites: BIO 141-142 and two semesters of college mathematics (MAT 142, MAT 143 or higher level) or equivalent. Offered in fall semesters on the St. Thomas campus only.

Goals & Objectives

- Goal #1: To learn and apply concepts of modern transmission and molecular genetics.
 - o Objective 1A: To identify and describe the process and purposes of the cell cycle, meiosis, and mitosis, as well as predict the outcomes of these processes.
 - o Objective 1B: To solve transmission genetics problems, make accurate predictions about inheritance of genetic traits, and map the locations of genes.
 - o Objective 1C: To identify the parts, structure, and dimensions of DNA molecules, RNA molecules, and chromosomes, and be able to categorize DNA as well as describe how DNA is stored.
 - o Objective 1D: To accurately diagram and describe the processes of replication, transcription, translation, as well as predict the outcomes of these processes.
 - o Objective 1E: To describe what causes and consequences of DNA sequence changes and how cells prevent these changes, as well as make predictions about the causes and effects of changes in DNA.
 - o Objective 1F: To describe the processes of gene regulation and predict how a gene will be expressed under specific circumstances.
- Goal #2: To learn and practice common genetics laboratory and field techniques.
 - o Objective 2A: To describe applications and techniques of modern genetic technology, as well as select the correct techniques to solve practical genetic problems.
 - o Objective 2B: To carry out genetics laboratory and field research techniques
 - o Objective 2C: To describe experimental results in written format both informally and in formal manuscript format.

Topics covered

- Inheritance
 - o Mitosis & meiosis
 - o Mendelian genetics
 - o Genetics of sex
 - o Extensions of Mendelian genetics
- Molecular genetics
 - o DNA structure
 - o DNA replication
 - o DNA transcription
 - o RNA translation
 - o Genes & proteins
- Gene mapping

- Linkage & eukaryotic gene mapping
 - Bacterial gene mapping
- Biotechnology
- Genomics
- Gene regulation (prokaryotic & eukarotic)
- Mutation
 - Mechanisms & repair
 - Chromosomal mutations
 - Cancer
- Transposable elements
- Population genetics

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