



Course Name: Principles of Genetics

Course Number: BIO* E260

Credits: 3

Catalog description: An introductory course in genetics. Covers the basic principles of genetics from Mendel to recombinant DNA, with focus on human inheritance. Topics of emphasis include cancer, diseases with a genetic component, functional genomics, and modern methods of molecular genetics. 3 hours lecture per week.

Prerequisite: BIO* 121

Corequisite, or Parallel:

General Education Competencies Satisfied:

HCC General Education Requirement Designated Competency Attribute Code(s):

SCKX Scientific Knowledge & Understanding

Additional CSCU General Education Requirements for CSCU Transfer Degree Programs:

SCRX Scientific Reasoning

Embedded Competency(ies):

None

Discipline-Specific Attribute Code(s):

SCI Science elective

Course objectives:

General Education Goals and Outcomes:

Scientific Knowledge & Understanding: Students will gain a broad base of scientific knowledge and methodologies in the natural sciences. This will enable them to develop scientific literacy, the knowledge and understanding of scientific concepts and processes essential for personal decision making and understanding scientific issues.

Scientific Reasoning (for CSCU Transfer Degree Programs): Students will become familiar with science as a method of inquiry. Students will develop a habit of mind that uses quantitative skills to solve problems and make informed decisions.



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Course Specific Objectives:

1. Interpret the findings of the classical experiments in genetics using the scientific method.
2. Solve basic genetic problems using the fundamental principles of Mendelian and non-Mendelian inheritance.
3. Analyze how basic concepts in genetics impact agriculture, the pharmaceutical industry, and the treatment and diagnosis of disease.
4. Apply principles of population genetics to speciation, gene inheritance, and phenotypic variation.
5. Recognize ethical issues arising from the application of modern genetics.

Course Content:

CLASSICAL GENETICS:

- I. Introduction
 - a. A brief history of advances of molecular biology
 - b. Scientific method and application to the field of genetics
 - c. Hypothesis vs. theory
 - d. Central dogma of genetics
 - e. Genetic code
- II. Mendelian Genetics
 - a. Inheritance of single traits in human pedigrees
 - b. Complex genetic traits
- III. The Cell Cycle
 - a. Mitosis and Meiosis
- IV. Chromosome Theory of Heredity
 - a. Human chromosomes
 - b. Sex-linked patterns of inheritance
 - c. Linkage and recombination

MOLECULAR GENETICS:

- V. Genetic Mapping
 - a. Positional cloning
- VI. Introduction to Cytogenetics
 - a. Genetic polymorphisms
 - b. Karyotypes
 - c. Chromosome abnormalities
 - d. Sex determination
- VII. Detailed DNA Structure
 - a. Mechanisms of DNA replication
 - b. Sickle cell anemia
 - c. Nucleoside analogue drugs and the treatment of AIDS
- VIII. Manipulation of DNA Molecules
 - a. DNA hybridization
 - b. Gene expression
 - c. Protein structure



IX. Molecular Genetics of Gene Expression

a. Mechanism of translation

b. Gene regulation

X. Cloning and Recombinant DNA

a. Human Genome Project

b. Functional Genomics

Date Course Created:

Date of Last Revision: 04/05/2017