



Course Description

PCB3060L | Principles of Genetics Laboratory | 2.00 credits

This laboratory course is designed to complement PCB 3060 Principles of Genetics. Students will learn hands-on skills with emphasis on laboratory principles, techniques, and instrumentation within the field of genetics. Prerequisites: BSC 2010, 2010L, 2011, 2011L. Corequisites: PCB3060.

Course Competencies:

Competency 1: The student will demonstrate an understanding of the role of probability in genetics by:

1. Comprehending the role of hypothesis testing and experimental design in genetics research
2. Applying Chi-square analysis to study inherited traits in model organisms

Competency 2: The student will demonstrate practical knowledge of Mendelian genetic analysis by:

1. Analyzing monohybrid, dihybrid, and trihybrid crosses using *Drosophila* and *Zea mays* as model systems
2. Evaluating human pedigrees to determine whether different human genetic disorders are dominant or recessive

Competency 3: The student will demonstrate an understanding of modern genetics by:

1. Analyzing the results of experiments that illustrate incomplete dominance, codominance, epistasis, and recombination
2. Analyzing the results of experiments that illustrate linkage and crossing over
3. Determining the sequence of specific genes on a chromosome by using the results of experiments that illustrate crossing over
4. Summarizing differences between genetic, cytological, and physical maps

Competency 4: The student will demonstrate practical knowledge of DNA technologies by:

1. Extracting DNA from bacterial cells.
2. Conducting Polymerase Chain Reaction (PCR) to amplify specific genes
3. Using restriction enzymes and gel electrophoresis to distinguish gene alleles
4. Performing a bacterial transformation with recombinant DNA

Competency 5: The student will demonstrate an understanding of gene mutations and mutagens by:

1. Demonstrating how mutagens affect DNA sequences and gene products

Competency 6: The student will demonstrate knowledge of the preparation and analysis of human mitotic chromosomes by:

1. Summarizing morphological characterization of human chromosomes via karyotyping
2. Barr body analyses use salivary gland polytene chromosomes of *Drosophila virilis*

Competency 7: The student will demonstrate practical knowledge of genetic recombination in bacteria by:

1. Demonstrating how the genetic information from one bacterium is transferred to another
2. Demonstrating how viruses can be used to mediate bacterial DNA transfer

Competency 8: The student will demonstrate an understanding of the role of changes in gene frequencies in populations by:

1. Analyzing gene frequencies in natural populations (or using model organisms) to determine if they meet the conditions for Hardy-Weinberg equilibrium

Learning Outcomes:

- Communicate effectively using listening, speaking, reading, and writing skills
- Use quantitative analytical skills to evaluate and process numerical data
- Solve problems using critical and creative thinking and scientific reasoning
- Create strategies that can be used to fulfill personal, civic, and social responsibilities.

- Demonstrate knowledge of ethical thinking and its application to issues in society
- Use computer and emerging technologies effectively
- Aesthetic/Creative Activities 8: Demonstrate an appreciation for aesthetics and creative activities
- Describe how natural systems function and recognize the impact of humans on the environment