

# COURSE OUTLINE

**BIOL-202**

**Genetics Lab**

**1 Credit**

**Science Core Course**

## HOWARD COMMUNITY COLLEGE

### Description

In BIOL-202, students will investigate the basic principles of genetics using various organisms including *Drosophila*, bacteria, fungi, viruses, green plants and human cells. Students will utilize various laboratory techniques including microscopy, photomicroscopy, slide preparation, micro-dissection, paper chromatography, gel electrophoresis, bacterial culture and statistical analysis. Computer simulations will also be utilized. Pre- or Co-requisite: BIOL-201. (3 hours lab)

### Statement on General Education and Liberal Learning

A liberal education prepares students to lead ethical, productive, and creative lives and to understand how the pursuit of lifelong learning and critical thinking fosters good citizenship. General education courses form the core of a liberal education within the higher education curriculum and provide a coherent intellectual experience for all students by introducing the fundamental concepts and methods of inquiry in the areas of mathematics, the physical and natural sciences, the social sciences, the arts and the humanities, and composition. This course is part of the general education core experience at Howard Community College.

### Overall Course Objectives

Upon completion of this course, the student will be able to:

1. Prepare and analyze microscope slides of cells undergoing mitosis and meiosis.
2. Analyze computer simulations of inheritance.
3. Conduct and analyze inheritance experiments utilizing *Drosophila*.
4. Apply chi-square to inheritance data.
5. Determine the map distance between the gene and centromere by crossing strains of *Sordaria*.
6. Prepare and analyze human cheek cells in terms of presence of Barr bodies.
7. Isolate DNA from thymus.
8. Conduct a plasmid transformation of *E.coli*.
9. Analyze the eye pigments of *Drosophila* mutants utilizing paper chromatography.
10. Prepare and analyze a karyotype from a human blood cell culture.
11. Demonstrate the function of the lac operon in *E.coli*.

12. Prepare and stain the polytene chromosomes from Drosophila salivary glands.
13. Determine the size of DNA fragments by electrophoresis.
14. Determine the restriction map of DNA using restriction endonucleases and gel electrophoresis.
15. Analyze population genetics by analyzing the mutant distribution in various generations of maize.
16. Amplifying samples of DNA through Polymerase Chain Reaction.
17. *Arabidopsis* tissue culture and genetic engineering.

### **Major Topics**

- I. Mitosis and the Effect of Colchicine
- II. Meiosis in Lily Anthers
- III. Computer Simulations of Inheritance
- IV. Dihybrid Inheritance and Application of Chi-square
- V. Gene Mapping by Ascospore Analysis in Sordaria
- VI. Human Barr Bodies
- VII. Structure and Isolation of DNA From Thymus
- VIII. Plasmid Transformation of E.coli
- IX. Chromatographic Analysis of Fruit Fly Eye Pigments
- X. Human Karyotype Preparation and Analysis
- XI. The Lac Operon in E.coli
- XII. Polytene Chromosomes from Drosophila Salivary Glands
- XIII. Determining the Size of DNA Fragments by Electrophoresis
- XIV. Restriction Nuclease Mapping of DNA
- XV. Population Genetics

### **Course Requirements**

Grading/exams: Grading procedures will be determined by the individual faculty member but will include the following:

Final grades will be calculated on the basis of lab attendance and techniques, lab quizzes and lab book.

### **Other Course Information**

This course, together with BIOL-201, is a Science core course. This course is a Science elective and an Arts and Science elective.