**MOHAWK VALLEY COMMUNITY COLLEGE**

**UTICA AND ROME, NEW YORK**

**BI142 General Biology 2** C-3, P-2, Cr-4

**Course Description**

This course is a continuation of BI 141 General Biology 1. Topics include classical and molecular genetics, evolutionary processes, and speciation illustrated with trends observed in the simpler animal phyla. Laboratory exercises mirror lecture topics. Prerequisite: BI41 General Biology 1 or permission from Associate Dean of Mathematics and Natural Sciences.

**Student Learning Outcomes Lecture:**

 A. The student will be able to describe the meiotic process and explain how the meiotic process relates to classical Mendelian genetics.

 B. The student will be able to describe the Mendelian laws of segregation and independent assortment and be able to use these laws to solve monohybrid and dihybrid genetic crosses.

 C. The student will be able to solve genetic problems involving the principles of linkage and sex-linked traits, and be able to use the concept of recombination data to map a chromosome's genetic loci.

 D. The student will be able to describe the structure of the DNA molecule and explain how its structure is fundamental to its role as the genetic molecule.

 E. The student will be able to explain how information stored in a cell's chromosomes directs activities within the cell's cytoplasm through the processes of transcription and translation.

 F. The student will be able to describe how the tools of the bio-technologist are used to produce, isolate, and clone recombinant DNA.

 G. The student will be able to explain how Darwin's theories of evolution and the concept of natural selection are used to explain descent with modification.

 H. The student will be able to discuss how evolutionary forces work with population genetics to drive the process of speciation.

 I. The student will be able to describe the major evolutionary trends seen in the evolution of the animal kingdom.

**Student Learning Outcomes Laboratory:**

### A. The student will use both human traits as well as traits of the corn model to demonstrate the role of Mendelian genetics in monohybrid and dihybrid crosses.

### B. The student will use knowledge of Mendelian genetics as well as exceptions to solve genetics problems and pedigree analyses.

C. The student will learn the basic differences in structure that are used to separate the fungal kingdom into its different divisions. They will then assign unknown specimen to their proper division based upon morphological traits

### D. The student will perform genetic crosses with *Sordaria fimicola* generating

###  data used to analyze basic crossover frequencies and linkage studies.

E. The student will build models of DNA to relate its three dimensional shape to its biological functions.

F. The student will apply techniques used by genetic engineers to answer questions on DNA fingerprinting and transformation.

G. The student will manipulate a simulation of a breeding population of rabbits to demonstrate the principles of Hardy Weinberg Equilibrium and natural selection.

H. The student will be able to assign animal specimen to their respective phyla based upon their morphological traits.

I. The student will perform various dissections of selected invertebrate organisms. The student will sketch selected specimens of animal phyla illustrating the major grades in body plans which have driven the evolutionary trends of the animal world.

**Major Topics – Lecture:**

1. Chromosomes, Mitosis, and Meiosis
2. The Basic Principles of Heredity
3. DNA: The Carrier of Genetic Information
4. Gene Expression
5. Gene Regulation
6. DNA Technology and Genomics
7. Introduction to Darwinian Evolution
8. Evolutionary Change in Populations
9. Speciation and Macroevolution
10. The Animal Kingdom: An Introduction to Animal Diversity
11. The Animal Kingdom: The Protostomes
12. The Animal Kingdom: The Deuterostomes

**Major Topics – Laboratory:**

1. An Introduction to Genetics: The Monohybrid Cross using Human Traits and Corn Model
2. Genetics: Dihybrid Cross
3. Practice genetic questions and pedigrees
4. An Introduction to the Fungi
5. Analyze *Sordaria* Results
6. Nucleic Acid Structure and function
7. An Introduction to DNA Technology
8. DNA Fingerprinting
9. Analysis and Evaluation of DNA Technology
10. Bacterial Transformations
11. Evolution: Hardy-Weinberg equilibrium
12. Introduction to Animal Phyla
13. Annelidae
14. Echinodermata

**Reviewed 12/20/2016**

**Last reviewed 7/24/2017 with addition of BI 141 in Course Description to match catalog. DS**

**Reviewed 6/6/18**