

Alexandria Technical and Community College

BIOL 2230: Genetics

A. COURSE DESCRIPTION

Credits: 4

Lecture Hours/Week: 3

Lab Hours/Week: 2

OJT Hours/Week: *.*

Prerequisites:

This course requires the following prerequisite

BIOL 1450 - General Biology I (Number of Years Valid: 5)

Corequisites: None

MnTC Goals: Goal 03 - Natural Science, Goal 09 - Ethical/Civic Resp

This course is a study of inheritance using classical Mendelian genetics and modern theories of inheritance. Genetic principles at a molecular, cellular, organismal, and population level, including topics of gene and chromosomal abnormalities, gene mapping and genetic recombination, and genetic engineering are examined. Students will explore and reflect on ethical dimensions of political, social, and personal life implications surrounding genetic testing and genetic modification in human and non-human examples. This genetics course includes a laboratory which further explores molecular and classical genetic techniques. Recommended for students majoring in biology and health-related areas.

B. COURSE EFFECTIVE DATES: 04/15/2020 - Present

C. OUTLINE OF MAJOR CONTENT AREAS

1. Discuss the history of genetics.
2. Describe the structure and function of DNA and the steps of the cell cycle, mitosis, and meiosis.
3. Explain Mendelian principles, multi-gene expression, non-mendelian, and epigenetic inheritance and analysis of inheritance.
4. Define gene mapping and genetic recombination in eukaryotes and bacteria.
5. Describe various chromosomal abnormalities, gene mutations, and characteristics of associated conditions.
6. Explain the process of DNA replication, transcription and translation.
7. Discuss the risks and rewards of genetic testing, genetic engineering, gene therapy, and biotechnology.
8. Identify, discuss, and reflect upon the ethical dimensions of political, social, and personal life implications of genetic testing, genetic modification, and its use in biotechnology.
9. Use the scientific method in the formulation and conduction of genetic experimentation.
10. Organize, draft, and revise formal scientific writing.
11. Read, interpret, incorporate, and cite information from primary literature.
12. Perform laboratory exercises to reinforce principles explored in lecture.

D. LEARNING OUTCOMES (General)

1. Demonstrate knowledge of the structure and function of deoxyribonucleic acid (DNA), messenger ribonucleic acid (mRNA), ribosomal ribonucleic acid (rRNA), and transfer ribonucleic acid (tRNA).
2. Explain and apply fundamental concepts related to the storage, transfer, and expression of genetic information at the cellular, organismal, and population level.
3. Use critical thinking skills to understand, evaluate, and analyze processes of inheritance.
4. Demonstrate knowledge of chromosomal abnormalities, gene mutations, and characteristics of associated medical conditions in humans.
5. Demonstrate an ability to apply relevant statistical tests to genetic data.
6. Formulate a hypothesis and conduct and analyze an experiment with a model organism.
7. Organize, draft, and revise formal scientific writing.
8. Read, interpret, incorporate, and cite information from primary literature into writing.
9. Utilize and understand the application of a genetic technology.
10. Demonstrate knowledge of the benefits, risks, political and ethical implications of genetic testing, genetic engineering, and biotechnology.

E. Minnesota Transfer Curriculum Goal Area(s) and Competencies

Goal 03 - Natural Science

1. Demonstrate understanding of scientific theories.
2. Formulate and test hypotheses by performing laboratory, simulation, or field experiments in at least two of the natural science disciplines. One of these experimental components should develop, in greater depth, students' laboratory experience in the collection of data, its statistical and graphical analysis, and an appreciation of its sources of error and uncertainty.
3. Communicate their experimental findings, analyses, and interpretations both orally and in writing.

Goal 09 - Ethical/Civic Resp

1. Examine, articulate, and apply their own ethical views.
2. Understand and apply core concepts (e.g. politics, rights and obligations, justice, liberty) to specific issues.
3. Analyze and reflect on the ethical dimensions of legal, social, and scientific issues.
4. Recognize the diversity of political motivations and interests of others.

F. LEARNER OUTCOMES ASSESSMENT

As noted on course syllabus

G. SPECIAL INFORMATION

None noted