

# Applied Genetics (4602) Course Overview Curriculum Document

## Course Description

Classical and molecular genetics form the basis of this lab-based life science course. The units of study for the course Applied Genetics includes transmission genetics, molecular genetics, medical genetics, and genetic technology. In addition, students will understand the relevance of new medical and emerging biotechnologies.

### Credits

0.5

### Prerequisites

4110 Biology

### Board Approved

June 2007

### Revised

April 2023

## Required Assessments

District Common Summative Assessments

## Textbooks/Resources

Lewis, R. (2021). *Human Genetics: Concepts and applications*. [Thirteenth Edition]. McGraw Hill Education.  
ISBN: 978-1-264-33374-5

## Course Essential Understandings

As a result of successfully completing this course, students will understand that:

- There are predictable patterns of inheritance
- Genes located on chromosomes encode instructions for proteins that result in the characteristics of an organism.
- Mutations are the underlying cause for disorders that are transgenerational.
- Bioethicists use an agreed set of principles to make decisions regarding new and emerging genetic technologies considering possible outcomes for all stakeholders.

## Course Relevance Questions

- How is genetic information transmitted between generations and what are the implications of mutations on the genome?

## Unit Overviews

Unit Name	Unit Description	Unit Relevance Question	Instructional Standards	Assessed Standards
Unit 1: Transmission Genetics	By the end of this unit, students will understand that there are predictable patterns of inheritance. The following concepts will be explored in this unit: mitosis, meiosis, Mendelian genetics, and non-Mendelian genetics.	How is genetic information passed through generations?	HS-LS1-4 HS-LS3-1 HS-LS3-2 HS-LS3-3	HS-LS3-2 HS-LS3-1 HS-LS3-3 HS-LS1-4
Unit 2: Molecular Genetics	By the end of this unit, students will understand that genes located on chromosomes encode instructions for proteins that result in the characteristics of an organism. The following concepts will be explored in this unit: DNA structure, DNA replication, and protein synthesis.	How do the instructions in the genetic code result in the characteristics of an organism?	HS-LS1-1 HS-LS3-1	HS-LS1-1 HS-LS3-1
Unit 3: Medical Genetics	By the end of this unit, students will understand that mutations cause errors in protein function and are the underlying causes of genetic disorders that can be passed from parent to child. The following concepts will be explored in this unit: genetic disorders, cancer, mutagens, and different types of mutations.	What are the causes of mutations in DNA and what are the consequences that may result?	HS-LS3-1 HS-LS3-2 HS-LS3-3	HS-LS3-1 HS-LS3-2 HS-LS3-3
Unit 4: Genetic Technology	By the end of this unit, students will understand how the universality of the genetic code across all living organisms allows the development and application of new technologies. The following concepts will be explored in this unit: gene therapy, genetically modified organisms, genetic testing and gene editing.	How has technology changed the study, research, and medical practice associated with genetics?	HS-LS3-1 HS-LS3-2	HS-LS3-1 HS-LS3-2