South Central College

BIOL 211 Genetics

Course Outcome Summary

Course Information

Description This is an introductory Genetics course which covers the study of biologically inherited traits. It will emphasize Mendelian genetics as well as molecular genetics. Students will explore classical, population and molecular genetics. Students will learn genetics through lecture, solving genetics problems and demonstrating concepts from lecture through laboratory experimentation. (Prerequisites: BIOL 115 and BIOL 116) (MNTC Goal Area 3)

Total Credits 4

Total Hours 80

Types of Instruction

Instruction Type	Credits/Hours
Lecture	3/48
Lab	1/32

Pre/Corequisites

BIOL 115

BIOL 116

Institutional Core Competencies

Critical and Creative Thinking - Students will be able to demonstrate purposeful thinking with the goal of using a creative process for developing and building upon ideas and/or the goal of using a critical process for the analyzing and evaluating of ideas.

Course Competencies

1. Explain Mendelian genetics.

Learning Objectives

Discuss how the monohybrid cross reveals how one trait is transmitted from generation to generation.
Explain how Mendel's dihybrid cross revealed his fourth postulate: Independent assortment.
Describe how the trihybrid cross demonstrates that Mendel's principles apply to inheritance of multiple traits.
Demonstrate knowledge of transmission genetics by solving genetics problems.
Analyze a pedigree to predict how traits are inherited.

2. Describe the processes of mitosis and meiosis.

Learning Objectives

List and describe the stages of mitosis.
List and describe the stages of meiosis.
Compare and contrast mitosis and meiosis in regard to their purposes.
Compare and contrast mitosis and meiosis in regard to when each occurs.

3. Describe extensions of Mendelian genetics.

Learning Objectives

Describe how alleles alter phenotypes in different ways.
Explain Dominance, codominance, and incomplete dominance.
Explain why phenotypes are often affected by more than one gene.
Explain pleiotropy and provide examples.
Explain X-linkage.
Provide examples of how phenotypic expression is not always a direct reflection of genotype.

4. Explain chromosome mapping in eukaryotes.

Learning Objectives

Describe how crossing over serves as the basis of determining the distance between genes during chromosome mapping.
Determine the gene sequence in Maize using analysis of multiple crossovers during mapping.
Describe how linkage analysis and mapping can be performed in haploid organisms.
Demonstrate how gene mapping is possible using molecular biology.

5. Identify the sex chromosomes and how they determine sexual characteristics.

Learning Objectives

Describe how the Y chromosome determines maleness.
Explain how excessive expression of X-linked genes is prevented.
Discuss differences in sex determination between humans, fruit flies and reptiles.

6. Describe extranuclear inheritance in chloroplasts and mitochondria.

Learning Objectives

Identify the sources of DNA for extranuclear inheritance.
Explain the molecular organization of mitochondrial and chloroplast DNA.
Describe human disorders caused by mutations in mitochondrial DNA.
Contrast the maternal effect with biparental inheritance.

7. Describe the structure of DNA.

Learning Objectives

Describe the molecular structure of deoxyribonucleic acid.
Explain how DNA is organized into chromosomes.

8. Explain the process of DNA replication and recombination.

Learning Objectives

Describe the process of semiconservative replication in eukaryotes.
Describe the process of replication in prokaryotes.
Identify enzymes which play a role in DNA replication and recombination.
Explain analytical techniques which have been useful to the investigation of DNA and RNA.

9. Describe recombinant DNA technology.

Learning Objectives

Describe the basic steps involved in recombinant DNA and the uses of this technology.
Describe the roles restriction enzymes and vectors play in recombinant DNA technology.
Explain how genes can be transferred to eukaryotic cells.
Describe how polymerase chain reaction makes DNA copies without host cells.
Describe the genomic library and its role in cloning.
Describe the various methods for sequencing DNA.

Explain how recombinant DNA technology has revolutionized genome analysis.

10. Describe the process of protein synthesis.

Learning Objectives

Describe the process of transcription.
Describe the process of translation.
Explain how transcription and translation differ between prokaryotes and eukaryotes.
List some conditions that may occur if there are errors in the process of translation.

11. Describe the role of genetics in cancer formation.

Learning Objectives

Identify cancer as a group of genetic diseases caused by mutations.
Identify the cellular functions which when altered can lead to cancer.
Recognize the role viruses have in contributing to cancer development.
Recognize the role environmental agents have in contributing to cancer development.

12. Demonstrate safe laboratory practices.

Learning Objectives

Be aware of any hazardous materials that may be used during experiments.
Handle chemicals and equipment in a safe manner.

SCC Accessibility Statement

South Central College strives to make all learning experiences as accessible as possible. If you have a disability and need accommodations for access to this class, contact the Academic Support Center to request and discuss accommodations. North Mankato: Room B-132, (507) 389-7222; Faribault: Room A-116, (507) 332-7222.

Additional information and forms can be found at: www.southcentral.edu/disability

This material can be made available in alternative formats by contacting the Academic Support Center at 507-389-7222.