Advanced Biology-Part 2

Michigan State Curriculum Content Standards

Course Description

The Advanced Biology curriculum is organized to mirror a two-semester introductory biology course for biology majors. Some colleges and universities may grant credit for an introductory course after successful completion (generally defined as a 3, 4, or 5 on the Advanced Placement Exam*) of an Advanced Biology program in high school. This credit may free the college student to register for higher-level courses in biology or to register for other courses for which biology is a prerequisite.

The course is designed to cover topics required in a college biology course and will use a textbook used by college students in a biology major. The topics are broken down by the following outline:

I. Molecules and Cells

A. Chemistry of Life

B. Cells

C. Cellular Energetics

II. Heredity and Evolution

A. Heredity

B. Molecular Genetics

C. Evolutionary Biology

III. Organisms and Populations

A. Diversity of Organisms

B. Structure / Function of Plants and Animals

C. Ecology

An in depth study of these topics aims to aid students in the development of a "conceptual framework of modern biology" built around completion of science as a process. In other words, the program is designed to generate student understanding of complex topics through exploration and discovery. The continually changing landscape of modern biology as new theories emerge makes this a daunting challenge, but the students will be well-supported in their studies.

Another aspect of the course is a laboratory requirement, the completion of which is evaluated on the AP Biology Exam. There are twelve required lab activities that supplement the class materials and required topics. The goal of these labs is to help the students make connections between the structural details of biological systems and the overall function of these systems in living organisms and populations. Together with the required reading and classroom interactions, the laboratory activities support the overall goals of the program to provide students with the factual understanding and critical thinking ability to thrive in the changing environment of modern biology.

Text Book

Biology. 7th Edition AP Student Edition plus AP Test Prep Workbook

Authors: Campbell and Reece

Publisher: Pearson

Advanced Biology Part 1 Course Guide

Unit 1 Description: Genetics

This unit will introduce students to advanced topics in Genetics. Students will begin exploring the areas of Mendelian genetics, chromosomal organization, and molecular inheritance.
The unit will then move into specific concepts including the processes of transcription/translation of DNA into viable proteins, the genetics of viruses and bacteria, and the processes involved in gene regulation. Finally, the unit concludes with a look at the latest developments in DNA technology and the exciting field of genomics.

Essential Content

The learner will explore and master:

- The Mendelian principles of Genetics.
- The location of genes on chromosomes which provides the basis for inheritance.
- The molecular structure of DNA and the process of DNA replication.
- The processes involved in the decoding of a gene to produce a functional protein.

The features of bacterial and viral genomes.

The regulation of prokaryotic and eukaryotic genes.

The process of genetic cloning and the applications of DNA technology

Unit 1 Michigan State Curriculum Content Standards

Click here to view the Michigan DOE Curriculum Content Standards.

Unit 1 Lesson 1: Mendel and the Gene Idea

State Standard	Description
B 4.1 A	Draw and label a homologous chromosome pair with heterozygous alleles highlighting a particular gene location.
B 4.1 B	Explain that the information passed from parents to offspring is transmitted by means of genes that are coded in DNA molecules. These genes contain the information for the production of proteins.
B 4.1 c	Differentiate between dominant, recessive, codominant, polygenic, and sex-linked traits.
B 4.1.d	Explain the genetic basis for Mendel's laws of segregation and independent assortment.
B 4.1 e	Determine the genotype and phenotype of monohybrid crosses using a Punnett Square.

Unit 1 Lesson 2: The Chromosomal Basis of Inheritance

State Standard	Description
B 4.1 A	Draw and label a homologous chromosome pair with heterozygous alleles highlighting a particular gene location.
B 4.1 c	Differentiate between dominant, recessive, codominant, polygenic, and sex-linked traits.
B 4.1.d	Explain the genetic basis for Mendel's laws of segregation and independent assortment.
B 4.1 e	Determine the genotype and phenotype of monohybrid crosses using a Punnett Square.
B 4.3 A	Compare and contrast the processes of cell division (mitosis and meiosis), particularly as those processes relate to production of new cells and to passing on genetic information between generations.
B 4.3 B	Explain why only mutations occurring in gametes (sex cells) can be passed on to offspring.
B 4.3 C	Explain how it might be possible to identify genetic defects from just a karyotype of a few cells.
B 4.3 d	Explain that the sorting and recombination of genes in sexual reproduction result in a great variety of possible gene combinations from the offspring of two parents.
B 4.3.e	Recognize that genetic variation can occur from such processes as crossing over, jumping genes, and deletion and duplication of genes.

Unit 1 Lesson 3: The Molecular Basis of Inheritance

State Standard	Description
B 4.2 B	Recognize that every species has its own characteristic DNA sequence.
B 4.2 C	Describe the structure and function of DNA.
B 4.4 a	Describe how inserting, deleting, or substituting DNA segments can alter a gene. Recognize that an altered gene may be passed on to every cell that develops from it and that the resulting features may help, harm, or have little or no effect on the offspring's success in its environment.

Unit 1 Lesson 4: Advanced Biology Lab # 7—Genetics of Organism

State Standard	Description
B 4.1 A	Draw and label a homologous chromosome pair with heterozygous alleles highlighting a particular gene location.
B 4.1 c	Differentiate between dominant, recessive, codominant, polygenic, and sex-linked traits.
B 4.1.d	Explain the genetic basis for Mendel's laws of segregation and independent assortment.
B 4.1 e	Determine the genotype and phenotype of monohybrid crosses using a Punnett Square.
B 4.3 A	Compare and contrast the processes of cell division (mitosis and meiosis), particularly as those processes relate to production of new cells and to passing on genetic information between generations.
B 4.3 B	Explain why only mutations occurring in gametes (sex cells) can be passed on to offspring.
B 4.3 C	Explain how it might be possible to identify genetic defects from just a karyotype of a few cells.
B 4.3 d	Explain that the sorting and recombination of genes in sexual reproduction result in a great variety of possible gene combinations from the offspring of two parents.
B 4.3.e	Recognize that genetic variation can occur from such processes as crossing over, jumping genes, and deletion and duplication of genes.

Unit 1 Lesson 5: From Gene to Protein--Transcription

State Standard	Description
B 4.2 f	Demonstrate how the genetic information in DNA molecules provides instructions for assembling protein molecules and that this is virtually the same mechanism for all life forms.
B 4.2 g	Describe the processes of replication, transcription, and translation and how they relate to each other in molecular biology.

Unit 1 Lesson 6: From Gene to Protein--Translation

State Standard	Description
B 4.2 f	Demonstrate how the genetic information in DNA molecules provides instructions for assembling protein molecules and that this is virtually the same mechanism for all life forms.
B 4.2 g	Describe the processes of replication, transcription, and translation and how they relate to each other in molecular biology.

Unit 1 Lesson 7: Genetics of Viruses and Bacteria

State Standard	Description
B 2.4 h	Describe the structures of viruses and bacteria.
B 2.4 i	Recognize that while viruses lack cellular structure, they have the genetic material to invade living cells.

Unit 1 Lesson 8: Eukaryotic Genomes: Organization, Regulation, and Evolution

State Standard	Description
B 4.2 f	Demonstrate how the genetic information in DNA molecules provides instructions for assembling protein molecules and that this is virtually the same mechanism for all life forms.
B 4.2 g	Describe the processes of replication, transcription, and translation and how they relate to each other in molecular biology.

Unit 1 Lesson 9: DNA Technology

State Standard	Description
B 4.2 f	Demonstrate how the genetic information in DNA molecules provides instructions for assembling protein molecules and that this is virtually the same mechanism for all life forms.
B 4.2 g	Describe the processes of replication, transcription, and translation and how they relate to each other in molecular biology.
B 4.x2 i	Explain how recombinant DNA technology allows scientists to analyze the structure and function of genes.

Unit 1 Lesson 10: Genomics

State Standard	Description
B 4.2 f	Demonstrate how the genetic information in DNA molecules provides instructions for assembling protein molecules and that this is virtually the same mechanism for all life forms.
B 4.2 g	Describe the processes of replication, transcription, and translation and how they relate to each other in molecular biology.
B 4.2 h	Recognize that genetic engineering techniques provide great potential and responsibilities.
B 4.x2 i	Explain how recombinant DNA technology allows scientists to analyze the structure and function of genes.

Unit 2 Description: Evolution & Plant Form and Function

This unit will continue the study of genetics by covering the genetic basis of development. This will include a detailed look at the embryologic development of multi-cellular organisms.
The unit then moves into the exciting topic of evolution by highlighting the Darwinian theory of evolution. It continues with a discussion on the principles behind the evolution of populations and the origin of species. The classification of species via phylogeny and systematics is explored in depth.
Finally, the unit concludes with an introduction to plant diversity on Earth. This section discusses the origin and evolution of plants. It also begins a discussion on plant structures and functions as well as their growth and development.
The students will also complete two of thee required Advanced Biology Labs in this unit. These labs are titled **Molecular Biology** and **Population Genetics**.

Essential Content

The learner will explore and master:

Embryonic development involves the processes of cell division, cell differentiation, and morphogenesis.

The Darwinian theory of Evolution.

The field of population genetics is the foundations for the study of evolution.

Speciation creates macroevolutionary change.

Phylogeny aims to classify organisms based on evolutionary history.

The colonization of land plants.

The evolution of seed plants.

The structure and function of plant anatomy.

The growth and development processes of plants.

Unit 2 Michigan State Curriculum Content Standards

Unit 2 Lesson 1: Genetic Basis for Development

State Standard	Description
B 4.1 B	Explain that the information passed from parents to offspring is transmitted by means of genes that are coded in DNA molecules. These genes contain the information for the production of proteins.
B 4.1.d	Explain the genetic basis for Mendel's laws of segregation and independent assortment.
B 4.2 B	Recognize that every species has its own characteristic DNA sequence.
B 4.2 C	Describe the structure and function of DNA.
B 4.3 A	Compare and contrast the processes of cell division (mitosis and meiosis), particularly as those processes relate to production of new cells and to passing on genetic information between generations.
B 4.2 f	Demonstrate how the genetic information in DNA molecules provides instructions for assembling protein molecules and that this is virtually the same mechanism for all life forms.
B 4.2 g	Describe the processes of replication, transcription, and translation and how they relate to each other in molecular biology.
B 4.2 h	Recognize that genetic engineering techniques provide great potential and responsibilities.
B4.x2i	Explain how recombinant DNA technology allows scientists to analyze the structure and function of genes.
B 4.3 g	Explain that cellular differentiation results from gene expression and/or environmental influence (e.g., metamorphosis, nutrition).

Unit 2 Lesson 2: Advanced Biology Lab #8-Molecular Biology

State Standard	Description
B 1.1 A	Generate new questions that can be investigated in the laboratory or field.
B 1.1 C	Conduct scientific investigations using appropriate tools and techniques (e.g., selecting an instrument that measures the desired quantity—length, volume, weight, time interval, temperature—with the appropriate level of precision).
B 1.1 E	Describe a reason for a given conclusion using evidence from an investigation.
B 1.2 A	Critique whether or not specific questions can be answered through scientific investigations.
B 1.2 h	Describe the distinctions between scientific theories, laws, hypotheses, and observations.
B 3.x5 g	Diagram and describe the stages of the life cycle for a human disease-causing organism.

Unit 2 Lesson 3: Descent with Modifications

State Standard	Description
B 5.1 A	Summarize the major concepts of natural selection (differential survival and reproduction of chance inherited variants, depending on environmental conditions).
B 5.1 B	Describe how natural selection provides a mechanism for evolution.
B 5.1 c	Summarize the relationships between present-day organisms and those that inhabited the Earth in the past (e.g., use fossil record, embryonic stages, homologous structures, chemical basis).
B 5.1 d	Explain how a new species or variety originates through the evolutionary process of natural selection.
B 5.1 e	Explain how natural selection leads to organisms that are well suited for the environment (differential survival and reproduction of chance inherited variants, depending upon environmental conditions).
B 5.1 f	Explain, using examples, how the fossil record, comparative anatomy, and other evidence supports the theory of evolution.
B 5.1 g	Illustrate how genetic variation is preserved or eliminated from a population through natural selection (evolution) resulting in biodiversity.

Unit 2 Lesson 4: The Evolution of Populations

State Standard	Description
L 5.p1 A	Define a species and give examples.
L 5.p1 B	Define a population and identify local populations.
B 4.1 B	Explain that the information passed from parents to offspring is transmitted by means of genes that are coded in DNA molecules. These genes contain the information for the production of proteins.
B 4.1.d	Explain the genetic basis for Mendel's laws of segregation and independent assortment.
B 4.2 B	Recognize that every species has its own characteristic DNA sequence.
B 4.2 C	Describe the structure and function of DNA.
B 4.3 A	Compare and contrast the processes of cell division (mitosis and meiosis), particularly as those processes relate to production of new cells and to passing on genetic information between generations.
B 4.2 f	Demonstrate how the genetic information in DNA molecules provides instructions for assembling protein molecules and that this is virtually the same mechanism for all life forms.
B 4.2 g	Describe the processes of replication, transcription, and translation and how they relate to each other in molecular biology.
B 4.2 h	Recognize that genetic engineering techniques provide great potential and responsibilities.
B4.x2i	Explain how recombinant DNA technology allows scientists to analyze the structure and function of genes.
B 4.3 g	Explain that cellular differentiation results from gene expression and/or environmental influence (e.g., metamorphosis, nutrition).
B 5.3 e	Explain how changes at the gene level are the foundation for changes in populations and eventually the formation of new species.

Unit 2 Lesson 5: Advanced Biology Lab # 9-Population Genetics

State Standard	Description
B 1.1 A	Generate new questions that can be investigated in the laboratory or field.
B 1.1 C	Conduct scientific investigations using appropriate tools and techniques (e.g., selecting an instrument that measures the desired quantity—length, volume, weight, time interval, temperature—with the appropriate level of precision).
B 1.1 E	Describe a reason for a given conclusion using evidence from an investigation.
B 1.2 A	Critique whether or not specific questions can be answered through scientific investigations.
B 1.2 h	Describe the distinctions between scientific theories, laws, hypotheses, and observations.
B 3.5 A	Graph changes in population growth, given a data table.
B 3.5 B	Explain the influences that affect population growth.
B 5.3 A	Explain how natural selection acts on individuals, but it is populations that evolve. Relate genetic mutations and genetic variety produced by sexual reproduction to diversity within a given population.

Unit 2 Lesson 6: The Origin of Species

State Standard	Description
L 5.p1 A	Define a species and give examples.
L 5.p1 B	Define a population and identify local populations.
B 4.1 B	Explain that the information passed from parents to offspring is transmitted by means of genes that are coded in DNA molecules. These genes contain the information for the production of proteins.
B 4.1.d	Explain the genetic basis for Mendel's laws of segregation and independent assortment.
B 4.2 B	Recognize that every species has its own characteristic DNA sequence.
B 4.2 C	Describe the structure and function of DNA.
B 4.3 A	Compare and contrast the processes of cell division (mitosis and meiosis), particularly as those processes relate to production of new cells and to passing on genetic information between generations.
B 4.2 f	Demonstrate how the genetic information in DNA molecules provides instructions for assembling protein molecules and that this is virtually the same mechanism for all life forms.
B 4.2 g	Describe the processes of replication, transcription, and translation and how they relate to each other in molecular biology.
B 4.2 h	Recognize that genetic engineering techniques provide great potential and responsibilities.
B4.x2i	Explain how recombinant DNA technology allows scientists to analyze the structure and function of genes.
B 4.3 g	Explain that cellular differentiation results from gene expression and/or environmental influence (e.g., metamorphosis, nutrition).
B 5.3 e	Explain how changes at the gene level are the foundation for changes in populations and eventually the formation of new species.

Unit 2 Lesson 7: Phylgony and Systematics

State Standard	Description
B 5.3 e	Explain how changes at the gene level are the foundation for changes in populations and eventually the formation of new species.

Unit 2 Lesson 8: Plant Diversity I

State Standard	Description
B 2.5 f	Relate plant structures and functions to the process of photosynthesis and respiration.
B 2.5 g	Compare and contrast plant and animal cells.

Unit 2 Lesson 9: Plant Diversity II

State Standard	Description
B 2.5 f	Relate plant structures and functions to the process of photosynthesis and respiration.
B 2.5 g	Compare and contrast plant and animal cells.

Unit 2 Lesson 10: Plant Structure, Growth, and Development

State Standard	Description
B 2.5 f	Relate plant structures and functions to the process of photosynthesis and respiration.
B 2.5 g	Compare and contrast plant and animal cells.

Unit 3 Description: Plant Form and Function & Ecology

This unit will continue the study of the plant kingdom. It will provide student's with an overview of the processes of vascular transport, nutrition, and reproduction in plants. The unit will also cover plant responses to internal and external signals.
The unit then moves on to introduce students to the field of Ecology. It introduces students to the area of behavioral ecology as well as population and community ecology. Finally, the unit concludes with a look at ecosystems and the principles involved in conservation biology.
The students will also complete three of the required Advanced Biology Labs in this unit. These labs are titled **Transpiration, Animal Behavior,** and **Dissolved Oxygen and Aquatic Primary Productivity.**

Essential Content

The learner will explore and master:

The process of vascular transport in plants.

The mechanisms of nutrient uptake by plants.

The reproductive mechanisms of angiosperms.

The utilization of biotechnology in the agricultural community.

The multitude of responses which occur in plants to internal and external signals.

Ecology as the study of the interaction between organisms and their environment.

Identify the features of the Earth's major biomes.

Outline the major concepts of behavioral ecology.

The science behind the Earth's flucuating populations.

The dynamics of community ecology.

Define ecosystems and the relationships that occur within them.

The strategies for biological conservation.

Unit 3 Michigan State Curriculum Content Standards

Unit 3 Lesson 1: Transport in Vascular Plants

State Standard	Description
B 2.5 f	Relate plant structures and functions to the process of photosynthesis and respiration.
B 2.5 g	Compare and contrast plant and animal cells.
B 2.5 h	Explain the role of cell membranes as a highly selective barrier (diffusion, osmosis, and active transport).

Unit 3 Lesson 2: Advanced Biology Lab # 10-Transpiration

State Standard	Description
B 2.5 f	Relate plant structures and functions to the process of photosynthesis and respiration.
B 2.5 g	Compare and contrast plant and animal cells.

Unit 3 Lesson 3: Plant Nutrition and Reproduction

State Standard	Description
B 2.5 f	Relate plant structures and functions to the process of photosynthesis and respiration.
B 2.5 g	Compare and contrast plant and animal cells.
B 3.5 d	Describe different reproductive strategies employed by various organisms and explain their advantages and disadvantages.

Unit 3 Lesson 4: Angiosperm Reproduction

State Standard	Description
B 2.5 f	Relate plant structures and functions to the process of photosynthesis and respiration.
B 2.5 g	Compare and contrast plant and animal cells.
B 3.5 d	Describe different reproductive strategies employed by various organisms and explain their advantages and disadvantages.

Unit 3 Lesson 5: Plant Responses to Internal and External Signals

State Standard	Description
B 2.5 f	Relate plant structures and functions to the process of photosynthesis and respiration.
B 2.5 g	Compare and contrast plant and animal cells.
B 3.3 b	Describe environmental processes (e.g., the carbon and nitrogen cycles) and their role in processing matter crucial for sustaining life.

Unit 3 Lesson 6: Introduction to Ecology and Behavioral Ecology

State Standard	Description
B 3.5 e	Recognize that and describe how the physical or chemical environment may influence the rate, extent, and nature of population dynamics within ecosystems.

Unit 3 Lesson 7: Advanced Biology Lab # 11-Animal Behavior

State Standard	Description
B 1.1 A	Generate new questions that can be investigated in the laboratory or field.
B 1.1 C	Conduct scientific investigations using appropriate tools and techniques (e.g., selecting an instrument that measures the desired quantity—length, volume, weight, time interval, temperature—with the appropriate level of precision).
B 1.1 E	Describe a reason for a given conclusion using evidence from an investigation.
B 1.2 A	Critique whether or not specific questions can be answered through scientific investigations.
B 1.2 h	Describe the distinctions between scientific theories, laws, hypotheses, and observations.

Unit 3 Lesson 8: Population and Community Ecology

State Standard	Description
B 3.5 e	Recognize that and describe how the physical or chemical environment may influence the rate, extent, and nature of population dynamics within ecosystems.
B 5.2 c	Trace the relationship between environmental changes and changes in the gene pool, such as genetic drift and isolation of subpopulations.
B 5.3 B	Describe the role of geographic isolation in speciation.
B 5.3 C	Give examples of ways in which genetic variation and environmental factors are causes of evolution and the diversity of organisms.

Unit 3 Lesson 9: Ecosystems and Conservation Biology

State Standard	Description
B 3.2 A	Identify how energy is stored in an ecosystem.
B 3.2 B	Describe energy transfer through an ecosystem, accounting for energy lost to the environment as heat.
B 3.2 C	Draw the flow of energy through an ecosystem. Predict changes in the food web when one or more organisms are removed.

Unit 3 Lesson 10: Advanced Biology Lab #12 - Dissolved Oxygen and Aquatic Primary Productivity

State Standard	Description
B 1.1 A	Generate new questions that can be investigated in the laboratory or field.
B 1.1 C	Conduct scientific investigations using appropriate tools and techniques (e.g., selecting an instrument that measures the desired quantity—length, volume, weight, time interval, temperature—with the appropriate level of precision).
B 1.1 E	Describe a reason for a given conclusion using evidence from an investigation.
B 1.2 A	Critique whether or not specific questions can be answered through scientific investigations.
B 1.2 h	Describe the distinctions between scientific theories, laws, hypotheses, and observations.
B 5.2.a	Describe species as reproductively distinct groups of organisms that can be classified based on morphological, behavioral, and molecular similarities.
B 5.2 b	Explain that the degree of kinship between organisms or species can be estimated from the similarity of their DNA and protein sequences.
B 5.2 c	Trace the relationship between environmental changes and changes in the gene pool, such as genetic drift and isolation of subpopulations.

Unit 4: AP Biology Exam Review

This unit will help prepare students for the Advanced Biology Examination. It will introduce the student to the format of the AP exam and the grading procedures for scoring the exam. Each lesson will include a practice free-response question followed by an online review for each topic. There will also be the oppotunity to practice multiple-choice questions in the supplemental review text **Preparing for the Biology AP Exam.** The review sessions with provide a unit-by-unit review of the advanced biology material.

Essential Content

The learner will explore and master:

The format and grading procedures for the AP Biology Exam.

Successful completion of sample free-response questions.

Organization of an effective study outline for each topical unit of study.

Unit 4 Michigan State Curriculum Content Standards

Unit 4 Lesson 1: Chemistry of Life Review Session

State Standard	Description
B 2.2 B	Recognize the six most common elements in organic molecules (C, H, N, O, P, S).
C 3.4 A	Use the terms endothermic and exothermic correctly to describe chemical reactions in the laboratory.
C 3.4 B	Explain why chemical reactions will either release or absorb energy.
C 4.3 A	Identify the location, relative mass, and charge for electrons, protons, and neutrons.
C 4.8 B	**D**escribe the atom as mostly empty space with an extremely small, dense nucleus consisting of the protons and neutrons and an electron cloud surrounding the nucleus.
C 4.8 C	Recognize that protons repel each other and that a strong force needs to be present to keep the nucleus intact.
C 4.10 A	List the number of protons, neutrons, and electrons for any given ion or isotope.
C 4.10 B	Recognize that an element always contains the same number of protons.
C 5.5 A	Predict if the bonding between two atoms of different elements will be primarily ionic or covalent.

Unit 4 Lesson 2: Cells I Review Session

State Standard	Description
B 2.1 A	Explain how cells transform energy (ultimately obtained from the sun) from one form to another through the processes of photosynthesis and respiration. Identify the reactants and products in the general reaction of photosynthesis.
B 2.5 B	Explain how major systems and processes work together in animals and plants, including relationships between organelles, cells, tissues, organs, organ systems, and organisms. Relate these to molecular functions.
B 2.5 g	Compare and contrast plant and animal cells.
B 2.5 h	Explain the role of cell membranes as a highly selective barrier (diffusion, osmosis, and active transport).
B 2.5 i	Relate cell parts/organelles to their function.

Unit 4 Lesson 3: Cells II Review Session

State Standard	Description
B 2.1 A	Explain how cells transform energy (ultimately obtained from the sun) from one form to another through the processes of photosynthesis and respiration. Identify the reactants and products in the general reaction of photosynthesis.
B 2.5 B	Explain how major systems and processes work together in animals and plants, including relationships between organelles, cells, tissues, organs, organ systems, and organisms. Relate these to molecular functions.
B 2.5 g	Compare and contrast plant and animal cells.
B 2.5 h	Explain the role of cell membranes as a highly selective barrier (diffusion, osmosis, and active transport).
B 2.5 i	Relate cell parts/organelles to their function.

Unit 4 Lesson 4: Molecular Genetics Review Session

State Standard	Description
B 4.2 B	Recognize that every species has its own characteristic DNA sequence.
B 4.2 C	Describe the structure and function of DNA.
B 4.4 a	Describe how inserting, deleting, or substituting DNA segments can alter a gene. Recognize that an altered gene may be passed on to every cell that develops from it and that the resulting features may help, harm, or have little or no effect on the offspring's success in its environment.

Unit 4 Lesson 5: Evolution I Review Session

State Standard	Description
B 5.1 A	Summarize the major concepts of natural selection (differential survival and reproduction of chance inherited variants, depending on environmental conditions).
B 5.1 B	Describe how natural selection provides a mechanism for evolution.
B 5.1 c	Summarize the relationships between present-day organisms and those that inhabited the Earth in the past (e.g., use fossil record, embryonic stages, homologous structures, chemical basis).
B 5.1 d	Explain how a new species or variety originates through the evolutionary process of natural selection.
B 5.1 e	Explain how natural selection leads to organisms that are well suited for the environment (differential survival and reproduction of chance inherited variants, depending upon environmental conditions).
B 5.1 f	Explain, using examples, how the fossil record, comparative anatomy, and other evidence supports the theory of evolution.
B 5.1 g	Illustrate how genetic variation is preserved or eliminated from a population through natural selection (evolution) resulting in biodiversity.

Unit 4 Lesson 6: Evolution II Review Session

State Standard	Description
B 5.1 A	Summarize the major concepts of natural selection (differential survival and reproduction of chance inherited variants, depending on environmental conditions).
B 5.1 B	Describe how natural selection provides a mechanism for evolution.
B 5.1 c	Summarize the relationships between present-day organisms and those that inhabited the Earth in the past (e.g., use fossil record, embryonic stages, homologous structures, chemical basis).
B 5.1 d	Explain how a new species or variety originates through the evolutionary process of natural selection.
B 5.1 e	Explain how natural selection leads to organisms that are well suited for the environment (differential survival and reproduction of chance inherited variants, depending upon environmental conditions).
B 5.1 f	Explain, using examples, how the fossil record, comparative anatomy, and other evidence supports the theory of evolution.
B 5.1 g	Illustrate how genetic variation is preserved or eliminated from a population through natural selection (evolution) resulting in biodiversity.

Unit 4 Lesson 7: Evolutionary History of Biological Diversity

State Standard	Description
B 5.1 A	Summarize the major concepts of natural selection (differential survival and reproduction of chance inherited variants, depending on environmental conditions).
B 5.1 B	Describe how natural selection provides a mechanism for evolution.
B 5.1 c	Summarize the relationships between present-day organisms and those that inhabited the Earth in the past (e.g., use fossil record, embryonic stages, homologous structures, chemical basis).
B 5.1 d	Explain how a new species or variety originates through the evolutionary process of natural selection.
B 5.1 e	Explain how natural selection leads to organisms that are well suited for the environment (differential survival and reproduction of chance inherited variants,
B 5.1 f	depending upon environmental conditions).
B 5.1 g	Explain, using examples, how the fossil record, comparative anatomy, and other evidence supports the theory of evolution.
	Illustrate how genetic variation is preserved or eliminated from a population through natural selection (evolution) resulting in biodiversity.

Unit 4 Lesson 8: Plant Form and Function Review Session

State Standard	Description
B 2.5 f	Relate plant structures and functions to the process of photosynthesis and respiration.
B 2.5 g	Compare and contrast plant and animal cells.
B 3.3 b	Describe environmental processes (e.g., the carbon and nitrogen cycles) and their role in processing matter crucial for sustaining life.

Unit 4 Lesson 9: Animal Form and Function Review Session

State Standard	Description
B 2.5 f	Relate plant structures and functions to the process of photosynthesis and respiration.
B 2.5 g	Compare and contrast plant and animal cells.
B 3.3 b	Describe environmental processes (e.g., the carbon and nitrogen cycles) and their role in processing matter crucial for sustaining life.

Unit 4 Lesson 10: Ecology Review Session

State Standard	Description
B 3.5 e	Recognize that and describe how the physical or chemical environment may influence the rate, extent, and nature of population dynamics within ecosystems.
B 5.2 c	Trace the relationship between environmental changes and changes in the gene pool, such as genetic drift and isolation of subpopulations.
B 5.3 B	Describe the role of geographic isolation in speciation.
B 5.3 C	Give examples of ways in which genetic variation and environmental factors are causes of evolution and the diversity of organisms.