

Wilson Area School District Planned Course Guide

Title of planned course: Keystone Biology Remediation

Subject Area: Science

Grade Level: 10

Course Description: Students who pass their freshmen biology course but do not achieve proficient or above on their Keystone Exam must complete the Keystone Biology Remediation course. This course is a half year course designed to review key topics in preparation for the retake of the exam. The class will meet four times a week.

Time/Credit for this Course: Half year / .4 credit

Curriculum Writing Committee: Wendy Baltz, Jennifer Burd, Ashley White

Curriculum Map

WEEK 1

What is Science?

Scientific Method

ELIGIBLE CONTENT:

- Describe and interpret relationships between structure and function at various levels of biological organization (i.e., organelles, cells, tissues, organs, organ systems, and multicellular organisms).
- Distinguish between the scientific terms: hypothesis, inference, law, theory, principle, fact, and observation.

WEEK 2

Characteristics of Life

Tools and Procedures

ELIGIBLE CONTENT:

- Explain how organisms maintain homeostasis (e.g., thermoregulation, water regulation, oxygen regulation).

WEEK 3

Chemistry of Life (Properties of Water and Macromolecules)

ELIGIBLE CONTENT:

- Describe the unique properties of water and how these properties support life on Earth (e.g., freezing point, high specific heat, cohesion).
- Explain how carbon is uniquely suited to form biological macromolecules.
- Describe how biological macromolecules form from monomers.
- Compare the structure and function of carbohydrates, lipids, proteins, and nucleic acids in organisms.
- Describe the role of an enzyme as a catalyst in regulating a specific biochemical reaction.
- Explain how factors such as pH, temperature, and concentration levels can affect enzyme function.

WEEK 4

Cell Theory, History, Structure and Function

ELIGIBLE CONTENT:

- Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms.
- Compare cellular structures and their functions in prokaryotic and eukaryotic cells.

WEEK 5

Cell Transport

ELIGIBLE CONTENT:

- Describe how the structure of the plasma membrane allows it to function as a regulatory structure and/or protective barrier for a cell.

- Compare the mechanisms that transport materials across the plasma membrane (i.e., passive transport—diffusion, osmosis, facilitated diffusion; and active transport—pumps, endocytosis, exocytosis).
- Describe how membrane-bound cellular organelles (e.g., endoplasmic reticulum, Golgi apparatus) facilitate the transport of materials within a cell.

WEEK 6

Photosynthesis

ELIGIBLE CONTENT:

- Describe the fundamental roles of plastids (e.g., chloroplasts) and mitochondria in energy transformations.
- Compare the basic transformation of energy during photosynthesis and cellular respiration.
- Describe the role of ATP in biochemical reactions.
- Compare the basic transformation of energy during photosynthesis and cellular respiration.

WEEK 7

Cell Respiration

ELIGIBLE CONTENT:

- Describe the fundamental roles of plastids (e.g., chloroplasts) and mitochondria in energy transformations.
- Compare the basic transformation of energy during photosynthesis and cellular respiration.
- Describe the role of ATP in biochemical reactions.
- Compare the basic transformation of energy during photosynthesis and cellular respiration.

WEEK 8

Mitosis

ELIGIBLE CONTENT:

- Describe the events that occur during the cell cycle: interphase, nuclear division (i.e., mitosis or meiosis), cytokinesis.
- Compare the processes and outcomes of mitotic and meiotic nuclear divisions.

WEEK 9 and 10

Meiosis

ELIGIBLE CONTENT:

- Describe the events that occur during the cell cycle: interphase, nuclear division (i.e., mitosis or meiosis), cytokinesis.
- Compare the processes and outcomes of mitotic and meiotic nuclear divisions.

WEEK 11

DNA & RNA (Structure, function, replication)

Mutations

ELIGIBLE CONTENT:

- Describe how the process of DNA replication results in the transmission and/or conservation of genetic information.
- Explain the functional relationships between DNA, genes, alleles, and chromosomes and their roles in inheritance.
- Describe how genetic mutations alter the DNA sequence and may or may not affect phenotype (e.g., silent, nonsense, frameshift).

WEEK 12

DNA & RNA (transcription, translation)

Mutations

ELIGIBLE CONTENT:

- Describe processes that can alter composition or number of chromosomes (i.e., crossing-over, nondisjunction, duplication, translocation, deletion, insertion, and inversion).
- Describe how the processes of transcription and translation are similar in all organisms.
- Describe the role of ribosomes, endoplasmic reticulum, Golgi apparatus, and the nucleus in the production of specific types of proteins.

WEEK 13 and 14

Genetics

Biotechnology

ELIGIBLE CONTENT:

- Describe and/or predict observed patterns of inheritance (i.e., dominant, recessive, co-dominance, incomplete dominance, sex-linked, polygenic, and multiple alleles).
- Explain how genetic engineering has impacted the fields of medicine, forensics, and agriculture (e.g., selective breeding, gene splicing, cloning, genetically modified organisms, gene therapy).

WEEK 15 and 16

Evolution

ELIGIBLE CONTENT:

- Explain how natural selection can impact allele frequencies of a population.
- Describe the factors that can contribute to the development of new species (e.g., isolating mechanisms, genetic drift, founder effect, migration).
- Explain how genetic mutations may result in genotypic and phenotypic variations within a population.
- Interpret evidence supporting the theory of evolution (i.e., fossil, anatomical, physiological, embryological, biochemical, and universal genetic code).

WEEK 17

Ecology

ELIGIBLE CONTENT:

- Describe the levels of ecological organization (i.e., organism, population, community, ecosystem, biome, and biosphere).
- Describe characteristic biotic and abiotic components of aquatic and terrestrial ecosystems.
- Describe how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids).
- Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis).
- Describe how matter recycles through an ecosystem (i.e., water cycle, carbon cycle, oxygen cycle, and nitrogen cycle).
- Describe how ecosystems change in response to natural and human disturbances (e.g., climate changes, introduction of nonnative species, pollution, fires).
- Describe the effects of limiting factors on population dynamics and potential species extinction.

WEEK 18

Ecology

ELIGIBLE CONTENT:

- Describe the levels of ecological organization (i.e., organism, population, community, ecosystem, biome, and biosphere).
- Describe characteristic biotic and abiotic components of aquatic and terrestrial ecosystems.
- Describe how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids).
- Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis).
- Describe how matter recycles through an ecosystem (i.e., water cycle, carbon cycle, oxygen cycle, and nitrogen cycle).
- Describe how ecosystems change in response to natural and human disturbances (e.g., climate changes, introduction of nonnative species, pollution, fires).
- Describe the effects of limiting factors on population dynamics and potential species extinction.

Wilson Area School District Planned Course Materials

Course Title: Keystone Biology Remediation

Textbook:

Senior Biology 1: Student Workbook

BioZone, 2011

http://www.biozone.co.nz/preview/Senior_Biology/SB-1-2011/index.html

Supplemental Books:

Ecology

BioZone

Teacher Resources:

Study Island

Curriculum Scope and Sequence

Planned Course: Keystone Biology Remediation

Unit: The Science of Biology

Time frame: 5 Days

State Standards: 3.1.10A, E; 3.2.10.A, B, D; 3.7.10.B; 3.8.10B; 4.3.10.B

Anchor(s) or adopted anchor: S11.A.1.1.1, 2, 3, 4, 5; S11.A.1.2.1,-2; S11.A.2.1.1, 2; 3, 4, 5; S11.A.2.2.1, 2

Essential content/objectives: At end of the unit, students will be able to:

- Explain what the goal of science is and what a hypothesis is.
- Describe and apply the steps of the scientific method.
- Describe how scientists test hypotheses.
- Explain how a scientific theory develops.
- Explain the characteristics of living things.
- Explain how life can be studied at multiple levels.

Core Activities: Students will complete/participate in the following:

- Workbook Assignments
- Graphing Activities
- Study Island

Remediation: Peer Tutoring

Instructional Methods:

- Direct instruction using notes and key terms
- Group Discussion
- Teacher modeling and visual aids
- Independent Student Work

Materials & Resources:

- Workbook
- PowerPoint
- Computers

Assessments:

- Quizzes, tests
- Homework
- Student Participation
- Questioning

Curriculum Scope and Sequence

Planned Course: Keystone Biology Remediation

Unit: Properties of Water and Organic Molecules

Time frame: 3 Days

State Standards: 3.1.10.A, C, E; 3.2.10.B; 4.3.10.C; 4.6.10.A; 4.7.10.B; 4.8.10.A

Anchor(s) or adopted anchor: S11.A.1.3.2, 3; S11.A.3.1.2; S11.A.3.3.1; S11.B.1.1.1, 2

Essential content/objectives: At end of the unit, students will be able to:

- List and explain the properties of water.
- Explain why water molecules are polar.
- Differentiate between solutions and suspensions.
- Explain the difference between acidic and basic solutions.
- Describe the structure and function of each group of organic compounds.
- Explain how chemical reactions affect chemical bonds in compounds.
- Describe how energy changers affect how easily a chemical reaction will occur.
- Explain why enzymes are important to living things.

Core Activities: Students will complete/participate in the following:

- Workbook Assignments
- Study Island

Remediation: Peer Tutoring

Instructional Methods:

- Direct instruction using notes and key terms
- Group Discussion
- Teacher modeling and visual aids
- Independent Student Work

Materials & Resources:

- Workbook
- PowerPoint
- Computers

Assessments:

- Quizzes, tests
- Homework
- Student Participation
- Questioning

Curriculum Scope and Sequence

Planned Course: Keystone Biology Remediation

Unit: The Cell

Time frame: 7 Days

State Standards: 3.1.10.A., B, C, E; 3.2.10.A, B; 3.3.10.A, B; 4.1.10.B; 4.3.10.C; 4.6.10.A; 4.7.10.B; 4.8.10.A

Anchor(s) or adopted anchor: S11.A.1.1.1, 2, 4, 5; S11.A.1.3.2, 3; S11.A.3.1.2, 3, 4; S11.A.3.2.1, 2, 3; S11.B.1.1.1, 2, 3

Essential content/objectives: At end of the unit, students will be able to:

- Explain the cell theory and the history of the discovery of cells.
- Differentiate between eukaryotes and prokaryotes as well as plant and animal cells.
- List and explain cell parts and functions.
- Describe what happens during diffusion.
- Differentiate between osmosis, facilitated diffusion and active transport.
- Describe what cell specialization is.
- Identify the organization levels in multicellular organisms.

Core Activities: Students will complete/participate in the following:

- Workbook Assignments
- Organelle Chart
- Study Island

Remediation: Peer Tutoring

Instructional Methods:

- Direct instruction using notes and key terms
- Group Discussion
- Teacher modeling and visual aids
- Independent Student Work

Materials & Resources:

- Workbook
- PowerPoint
- Computers

Assessments:

- Quizzes, tests
- Homework
- Student Participation
- Questioning

Curriculum Scope and Sequence

Planned Course: Keystone Biology Remediation

Unit: Photosynthesis and Cellular Respiration

Time frame: 4 Days

State Standards: 3.1.10.A, E; 3.3.10.A, B; 4.3.10.C; 4.6.10.A; 4.7.10.B

Anchor(s) or adopted anchor: S11.A.3.1.1, 2, 3, 4; S11.B.1.1.1, 2, 3

Essential content/objectives: At end of the unit, students will be able to:

- Explain where plants get the energy they need to produce food.
- Describe the role of ATP in cellular activities.
- State the overall equation for photosynthesis.
- Describe the role of light and chlorophyll in photosynthesis.
- Describe the structure and function of a chloroplast.
- Describe what conditions affect the rate of photosynthesis.
- Explain what cellular respiration is and what happens during glycolysis.
- Differentiate between alcoholic and lactic acid fermentation.
- Compare photosynthesis and cellular respiration, specifically with regard to energy transformations.

Core Activities: Students will complete/participate in the following:

- Workbook Assignments
- Concept Maps
- Study Island

Remediation: Peer Tutoring

Instructional Methods:

- Direct instruction using notes and key terms
- Group Discussion
- Teacher modeling and visual aids
- Independent Student Work

Materials & Resources:

- Workbook
- PowerPoint
- Computers

Assessments:

- Quizzes, tests
- Homework
- Student Participation
- Questioning

Curriculum Scope and Sequence

Planned Course: Keystone Biology Remediation

Unit: Cell Growth and Division

Time frame: 6 Days

State Standards: 3.2.10.A, 3.3.10.A, B, C; 4.3.10.B, 4.6.10.A, 4.7.10.B

Anchor(s) or adopted anchor: S11.A.1.2.1, S11.B.1.1.1, 3; S11.B.2.2.1, 2

Essential content/objectives: At end of the unit, students will be able to:

- Explain the problems growth causes for cells and how cell division helps prevent these problems.
- Name and describe the main events of the cell cycle.
- Describe what happens during the four stages of mitosis.
- Describe how cancer cells are different from other cells.
- Contrast the chromosome number of body cells and gametes.
- Summarize the events of meiosis.
- Contrast mitosis and meiosis.

Core Activities: Students will complete/participate in the following:

- Workbook Assignments
- Study Island

Remediation: Peer Tutoring

Instructional Methods:

- Direct instruction using notes and key terms
- Group Discussion
- Teacher modeling and visual aids
- Independent Student Work

Materials & Resources:

- Workbook
- PowerPoint
- Computers

Assessments:

- Quizzes, tests
- Homework
- Student Participation
- Questioning

Curriculum Scope and Sequence

Planned Course: Keystone Biology Remediation

Unit: DNA and RNA

Time frame: 15 Days

State Standards: 3.3.10.A, B, C, D; 3.4.10.d; 3.7.110.B; 3.8.10.B, C; 4.2.10.c; 4.6.10.S; 4.7.10.B, C

Anchor(s) or adopted anchor: S11.A.2.2.1, 2; S11.B.1.1.1, 2; S11.B.1.1.3; S11.B.2.1.2, 3; S11.B.2.2.1; S11.B.3.3.3

Essential content/objectives: At end of the unit, students will be able to:

- Summarize the relationship between genes and DNA.
- Describe the overall structure of a DNA molecule.
- Relate the DNA molecule to chromosome structure.
- Summarize the events of DNA replication.
- Contrast and compare DNA and RNA.
- Describe the three main types of RNA.
- Describe transcription and the editing of RNA.
- Summarize translation.
- Explain the relationship between genes and proteins.
- Contrast gene mutations and chromosomal mutations.
- Explain the purpose of selective breeding.
- Explain how and why scientists manipulate DNA.
- Summarize what happens during transformation.
- Describe the usefulness of some transgenic organisms to humans.
- Summarize the main steps in cloning.

Core Activities: Students will complete/participate in the following:

- Workbook Assignments
- Study Island

Remediation: Peer Tutoring

Instructional Methods:

- Direct instruction using notes and key terms
- Group Discussion
- Teacher modeling and visual aids
- Independent Student Work

Materials & Resources:

- Workbook
- PowerPoint
- Computers

Assessments:

- Quizzes, tests
- Homework
- Student Participation
- Questioning

Curriculum Scope and Sequence

Planned Course: Keystone Biology Remediation

Unit: Genetics

Time frame: 12 Days

State Standards: 3.3.10.A, B, C, D; 3.4.10.D; 4.6.10.A, B; 4.7.10.C

Anchor(s) or adopted anchor: S11.B.1.1.2, 3; S11.B.2.2.1, 2, 3; S11.B.2.1.2, 3

Essential content/objectives: At end of the unit, students will be able to:

- Summarize Mendel's conclusion about inheritance.
- Differentiate between genotypes and phenotypes.
- Differentiate between dominant and recessive traits.
- Explain Mendel's Law of Segregation and Law of Independent Assortment
- Explain the concept of alleles and chromosomal inheritance.
- Complete monohybrid, codominant, incomplete dominant and sex – linked punnett squares.
- Interpret a pedigree.
- Give an example of a trait that has multiple alleles.
- Describe examples of inheritance of human traits.
- Explain how small changes in DNA can cause genetic disorders.
- Be able to give examples of human genetic disorders and chromosomal disorders.
- Describe sex linked disorders and why they are more common in males than females.
- Summarize nondisjunction and the problems it can cause.

Core Activities: Students will complete/participate in the following:

- Workbook Assignments
- Punnett Square Problems
- Study Island

Remediation: Peer Tutoring

Instructional Methods:

- Direct instruction using notes and key terms
- Group Discussion
- Teacher modeling and visual aids
- Independent Student Work

Materials & Resources:

- Workbook
- PowerPoint
- Computers

Assessments:

- Quizzes, tests
- Homework
- Student Participation
- Questioning

Curriculum Scope and Sequence

Planned Course: Keystone Biology Remediation

Unit: Evolution

Time frame: 7 Days

State Standards: 3.1.10.A, E; 3.2.10.A; 3.3.10.C, D; 3.4.10.D; 4.7.10.C

Anchor(s) or adopted anchor: S11.A.1.1.1, S11.A.1.1.2, S11.A.1.1.3, S11.A.1.1.4, S11.A.1.1.5, S11.B.2.1.1, S11.B.2.1.2, S11.B.2.1.3, S11.B.2.1.4,

Essential content/objectives: At end of the unit, students will be able to:

- Describe the pattern Darwin observed among organisms of the Galapagos Islands.
- Identify how Lamarck thought species evolved.
- Describe how natural variation is used in artificial selection.
- Explain how natural selection is related to a species' fitness.
- Identify evidence Darwin used to present his case for evolution.
- State Darwin's theory of evolution by natural selection.

Core Activities: Students will complete/participate in the following:

- Workbook Assignments
- Concept Map
- Study Island

Remediation: Peer Tutoring

Instructional Methods:

- Direct instruction using notes and key terms
- Group Discussion
- Teacher modeling and visual aids
- Independent Student Work

Materials & Resources:

- Workbook
- PowerPoint
- Computers

Assessments:

- Quizzes, tests
- Homework
- Student Participation
- Questioning

Curriculum Scope and Sequence

Planned Course: Keystone Biology Remediation

Unit: Ecology

Time frame: 6 Days

State Standards: 3.1.10.A, B, C, E; 3.2.10.A, B; 3.8.10.C; 4.1.10.B; 4.2.10.C, D; 4.3.10.B, C; 4.4.10.C; 4.6.10.A; 4.8.10.A

Anchor(s) or adopted anchor: S11.A.1.2.1, 2; S11.A.1.3.1, 2, 3, 4; S11.A.3.1.1, 2, 3, 4; S11.A.3.2.1, 2; S11.A.3.3.1, 2, 3; S11.B.3.1.1, 2, 3, 4, 5; S11.B.3.2.1, 2, 3; S11.B.3.3.1, 2

Essential content/objectives: At end of the unit, students will be able to:

- Identify the levels of organization that ecologists study.
- Trace the flow of energy through living systems.
- Evaluate the efficiency of energy transfer among organisms in an ecosystem.
- Describe how matter cycles through the living and nonliving parts of an ecosystem.
- Describe how the availability of nutrients affects the productivity of an ecosystem.
- Explain how biotic and abiotic factors influence an ecosystem.
- Identify interactions that occur within communities.
- Explain the process of succession.
- Identify the characteristics of major land biomes.
- List the characteristics used to describe a population.
- Identify the factors that affect population size.
- Identify factors that limit population growth.

Core Activities: Students will complete/participate in the following:

- Workbook Assignments
- Practice Food Webs
- Study Island

Remediation: Peer Tutoring

Instructional Methods:

- Direct instruction using notes and key terms
- Group Discussion
- Teacher modeling and visual aids
- Independent Student Work

Materials & Resources:

- Workbook
- PowerPoint
- Computers

Assessments:

- Quizzes, tests
- Homework
- Student Participation
- Questioning

Curriculum Scope and Sequence

Planned Course: Keystone Biology Remediation

Unit: Humans in the Biosphere

Time frame: 2 Days

State Standards: 3.1.10.C, E; 3.2.10.A; 3.8.10.C; 4.2.10.C; 4.3.10.B; 4.4.10.C; 4.8.10.A

Anchor(s) or adopted anchor: S11.A.1.2.1, 2; S11.A.1.3.1, 2, 4; S11.B.3.3.1, 2, 3

Essential content/objectives: At end of the unit, students will be able to:

- Describe human activities that can affect the biosphere.
- Explain how environmental resources are classified.
- Identify the characteristics of sustainable use.
- Describe how human activities affect land, air and water resources.
- Define biodiversity and explain its value.

Core Activities: Students will complete/participate in the following:

- Workbook Assignments
- Study Island

Remediation: Peer Tutoring

Instructional Methods:

- Direct instruction using notes and key terms
- Group Discussion
- Teacher modeling and visual aids
- Independent Student Work

Materials & Resources:

- Workbook
- PowerPoints
- Computers

Assessments:

- Quizzes, tests
- Homework
- Student Participation
- Questioning