

Wilson Area School District Planned Course Guide

Title of Planned Course: Applied Biology

Subject Area: Biology

Grade Level: 9

Course Description: This course is designed to educate students on the unity and diversity of life. This includes topics such as biological processes, the understanding of structure and function within these processes, and the relationships between living organisms and their environments. Students will be applying this knowledge through laboratories, written essays, and scenario-based questions.

Time/Credit for this Course: 5 days per week / 1.0 Credit

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**Wilson Area School District
Planned Course Materials**

Course Title: Applied Biology

Textbook: _____ Biology: Exploring Life _____ (title)

_____ Prentice Hall _____ (publisher)

_____ 2004 _____ (copyright date)

_____ www.biology.com _____ (web address)

Supplemental Books: Biology (Prentice Hall), 2002, www.prenticehall.com

Teacher Resources: internet, magazines, teacher created materials

Wilson Area School District Planned Course Mapping

August- *The Study of Life*: what is a living organism, biological properties of water, organic molecules essential to life, homeostasis

September- *Study of Life. Ecology*: biomes, roles of organisms in cycles, chemical/energy cycles in ecosystems, change in ecosystems (natural/ man-made), biodiversity, and succession

October: *Cell and Cell Membranes*: functions of organelles and membranes, prokaryotes vs. eukaryotes, plant cells vs. animal cells, types of movement across membranes. *Cellular Processes*: how energy is acquired and produced in plant cells and animal cells, the role of ATP in living organisms

November: *Cellular Processes. DNA and RNA*: the structure and function of DNA and RNA, DNA replication, transcription, translation, the role of enzymes, mutations

December: *DNA and RNA. Mitosis and Meiosis*: structure and function of chromosomes, cellular growth and repair, steps of mitosis, steps of meiosis, somatic vs. germ cells, how meiosis contributes to diversity in sexual reproduction.

January: *Genetics*: gene expression, Punnett square problems. *Evolution*: natural selection, the role of mutations, artificial selection and biotechnology, common ancestry.

February: *Evolution. Classification*: Linnaean classification, binomial nomenclature, reasons for classification, evolution in classification, domains and kingdoms in living organisms.

March: *Viruses and Bacteria*: types of prokaryotes, structure and function of prokaryotes, human use of bacteria and viruses, structure and function of virus, cycles of viral infection/growth. *Zoology*: importance of being multicellular, structure and function from the cellular to multicellular level, characteristics of all animals, chordate characteristics, a brief tour of animal kingdoms.

April: *Zoology. Botany*: structure and function of plant tissues, plant reproduction, monocots vs. dicots, adaptation in plants, types of roots.

May: Wrap-up, review, connections.

June: Exams

Curriculum Scope & Sequence

Planned Course: Applied Biology

Unit: The Study of Life

Time Frame: 10 days

State Standards: 3.1.10.A, 3.1.10.E, 3.3.10A, 3.3.10.B, 3.3.10.C, 3.3.10.D, 3.4.10.A, 3.4.10.D, 4.3.10.C, 4.6.10.A, 4.7.10.B, 4.7.10.C

Anchor(s) or adopted anchor: S11.A.3.3.1, S11.B.1.1.1, S11.B.1.1.3, S11.B.2.1.4, S11.B.1.1.3, S11.B.2.2.2, S11.C.1.1.1, S11.C.1.1.3

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

- List the characteristics of a living organism
- Describe homeostasis and relate it to the cellular level of organization
- Describe the chemical makeup of cells and the four major macromolecules
- List and describe the properties of water that make it an essential compound for life
- List the organic molecules that are essential for life

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

- class notes, lecture, inquiry worksheets, water activities, organizational diagrams

Extensions: Macromolecule diagrams, What is Life? collage

Remediation: Review worksheets, flashcards, tutor

Instructional Methods: Lecture, group work, individual work/research

Materials & Resources: Textbook, worksheets, computers

Assessments: Section quizzes, unit exam

Curriculum Scope & Sequence

Planned Course: Applied Biology

Unit: Ecology

Time Frame: 20 days

State Standards: 3.1.10.C, 3.1.10.E, 3.3.10.A, 3.3.10.B, 3.3.10.C, 3.4.10.B, 4.2.10.D, 4.3.10.B, 4.3.10.C, 4.6.10.A, 4.7.10.B

Anchor(s) or adopted anchor: S11.B.3.1.2, S11.B.3.1.1, S11.B.3.1.2, S11.B.3.1.3, S11.B.1.1.4, S11.B.1.1.5, S11.B.3.2.1, S11.B.3.2.2, S11.B.3.2.3, S11.C.2.1.2

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

- Describe what defines a biome, and list and describe major land and aquatic biomes
- Students will be able to describe the flow of energy and chemicals in ecosystems (carbon, nitrogen, and hydrologic cycles)
- Explain what happens when natural and man-made changes occur in systems
- Describe the roles of biological organisms within a food web (energy consumers, energy producers, and decomposers)
- Describe the chemical assembly and recombination of matter and energy through the cycles of a food chain and the loss of energy through heat
- Explain the importance of biodiversity for a healthy ecosystem
- Describe the events of succession

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

- Class notes, lecture, inquiry worksheets, chemical/energy cycle diagrams, population scenarios and laboratory, opinion essays, videos, magazine articles, food web diagrams

Extensions: Biome project, food web project, Study Island

Remediation: Review worksheets, flashcards, tutor, Study Island

Instructional Methods: Direct Instruction with class notes, cooperative group work, group discussion, independent student work

Materials & Resources: Textbook, worksheets, computers, lab materials, powerpoints

Assessments: Section quizzes, class activities, class discussions, homework, project rubric, unit exam

Curriculum Scope & Sequence

Planned Course: Applied Biology

Unit: Cell and Cell Membranes

Time Frame: 20 days

State Standards: 3.1.10.A, 3.3.10.B, 3.1.10.C, 3.1.10.E, 3.3.10.C, 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, S11.A.3.1.2, S11.B.1.1.1, S11.B.1.1.2, S11.B.1.1.3, S11.B.2.2.2

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

- Explain the importance of cell membranes and organelles for the breakdown and production of energy in a cell
- Compare and contrast animal and plant cells as well as prokaryotes and eukaryotes
- Describe the structure of cellular membranes and identify the functions of proteins in the cellular membrane
- List and describe the types of movement of various substances across cellular membranes (active, passive, bulk, osmosis)
- Identify and describe the functions of the various organelles within a cell and how these parts work together
- Relate the structures within cells to their individual functions

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

- class notes, cell analogy poster, inquiry worksheets, organelle charts, diffusion/osmosis lab, egg lab, water properties lab

Extensions: Cell parts video, magazine articles

Remediation: Review worksheets, flashcards, tutors

Instructional Methods: lecture, group work, individual work/research

Materials & Resources: textbook, worksheets, computers, lab materials

Assessments: section quizzes, project/poster rubric, lab report, unit exam

Curriculum Scope & Sequence

Planned Course: Applied Biology

Unit: Cellular Processes (Cellular Respiration and Photosynthesis)

Time Frame: 17 days

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

Anchor(s) or adopted anchor: S11.B.1.1.3, S11.B.2.1.4, S11.B.2.2.1, S11.B.2.2.2, S11.B.2.2.3

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

- Compare and contrast how autotrophs and heterotrophs obtain food
- Explain how cellular respiration harvests the energy of food to create chemical energy in the form of ATP
- Identify the reactants and products of photosynthesis
- Summarize the overall process of photosynthesis

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

- class notes, lecture, inquiry worksheets, and cellular diagrams

Extensions: Photosynthesis lab

Remediation: Review worksheets, flashcards

Instructional Methods: Lecture, group work, individual work/research

Materials & Resources: Textbook, worksheets, computers

Assessments: Section quizzes, lab report, unit exam

Curriculum Scope & Sequence

Planned Course: Applied Biology

Unit: DNA and RNA

Time Frame: 20 days

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

Anchor(s) or adopted anchor: S11.B.1.1.3, S11.B.1.1.1, S11.B.2.2.1, S11.B.2.1.2, S11.C.2.1.2

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

- Identify the building blocks of DNA, and describe DNA's structure in regards to the base-pairing rule
- Summarize the overall process of DNA replication and describe the functions of accessory enzymes
- Explain the role of RNA in protein synthesis, and summarize the events of both transcription and translation
- Describe how mutations alter a gene's genetic information, resulting in a changed protein

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

- class notes, lecture, inquiry worksheets, replication activity, DNA cheek cell lab, protein synthesis activity.

Extensions: Video, DNA construction activity, magazine articles

Remediation: Review worksheets, flashcards, tutor

Instructional Methods: lecture, group work, individual work/research

Materials & Resources: textbook, worksheets, computers, lab materials

Assessments: section quizzes, project rubric, lab report, unit exam

Curriculum Scope & Sequence

Planned Course: Applied Biology

Unit: Mitosis/Meiosis

Time Frame: 15 days

State Standards: 3.3.10.A, 3.3.10.B, 3.3.10.C, 4.6.10.A, 4.7.10.B

Anchor(s) or adopted anchor: S11.B.1.1.3, S11.B.2.1.4, S11.B.2.2.1, S11.B.2.2.2, S11.B.2.2.3

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

- Describe how cell reproduction leads to repair and growth, and what factors cause the division of cells.
- Describe the structure and function of a chromosome
- Name and summarize the stages of the cell cycle, especially the events of mitosis
- Explain the process of cytokinesis in both plant and animal cells
- Compare and contrast mitosis and meiosis, and explain how meiosis leads to genetically unique cells
- Describe how meiosis increases genetic variation among offspring

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

- Class notes, lecture, inquiry worksheets, cellular diagrams, onion lab, mitosis/meiosis pipe-cleaner activity

Extensions: Video on cellular growth, mitosis CD, mitosis project

Remediation: Review worksheets, flashcards

Instructional Methods: Lecture, group work, individual work/research

Materials & Resources: Textbook, worksheets, computers, lab materials

Assessments: Section quizzes, project rubric, lab report, unit exam

Curriculum Scope & Sequence

Planned Course: Applied Biology

Unit: Genetics

Time Frame: 15 days

State Standards: 3.3.10.C, 3.3.10.D, 3.4.10.D, 4.7.10.C

Anchor(s) or adopted anchor: S11.B.2.1.4, S11.B.2.2.1, S11.B.2.2.2, S11.B.2.2.3

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

- Explain how genes interact and express themselves (including dominant, recessive, codominance, incomplete dominance, sex-linked, and multiple alleles)
- Create Punnet squares as a tool to predict the probability of an offspring's genotype and phenotype

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

- Class notes, lecture, inquiry worksheets, practice problems sets, and coin toss lab

Extensions: Problem sets, videos, genetic disorder project

Remediation: Review worksheets, flashcards, tutor

Instructional Methods: Lecture, group work, individual work/research

Materials & Resources: Textbook, worksheets, computers

Assessments: Section quizzes, project rubric, lab reports, unit exam

Curriculum Scope & Sequence

Planned Course: Applied Biology

Unit: Evolution

Time Frame: 12 days

State Standards: 3.3.10.C, 3.3.10.D, 3.4.10.D, 4.7.10.C,

Anchor(s) or adopted anchor: S11.B.2.1.1, S11.B.2.1.2, S11.B.2.1.3, S11.B.2.1.4, S11.B.2.2.3

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

- Define and describe natural selection with examples
- Relate genetic mutation to speciation either in a natural setting or a man-made setting
- Defend the idea of a common ancestor in organisms using anatomical, genetic, and behavioral traits
- Expand on the idea of artificial selection and biotechnology using real-world examples

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

- Class notes, lecture, inquiry worksheets, Teddy graham lab

Extensions: Peppered moth lab, primate lab, Darwin video

Remediation: Review worksheets, flashcards, tutor

Instructional Methods: Lecture, group work, individual work/research

Materials & Resources: Textbook, worksheets, computers, lab materials

Assessments: Section quizzes, lab report, unit exam

Curriculum Scope & Sequence

Planned Course: Applied Biology

Unit: Classification

Time Frame: 8 days

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

Anchor(s) or adopted anchor: S11.A.3.1.2, S11.A.3.3.2, S11.B.1.1.1, S11.B.1.1.2, S11.B.1.1.3

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

- Describe binomial nomenclature and Linnaean classification
- Explain the need for a system of classification among living organisms
- Name the six kingdoms and three domains
- Describe scientists use of evolutionary characteristics and DNA to classify

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

- class notes, lecture, inquiry worksheets, articles, diagrams

Extensions: Video, diagrams, What am I? lab

Remediation: Review worksheets, flashcards, tutor

Instructional Methods: Lecture, group work, individual work/research

Materials & Resources: Textbook, worksheets, computers, lab materials

Assessments: Section quizzes, lab reports

Curriculum Scope & Sequence

Planned Course: Applied Biology

Unit: Viruses and Bacteria

Time Frame: 8 days

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

Anchor(s) or adopted anchor: S11.A.3.1.2, S11.A.3.3.2, S11.B.1.1.1, S11.B.1.1.2, S11.B.1.1.3

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

- Identify types of prokaryotes
- Describe the structure and function of several types of bacteria
- Explain the ecological roles that bacteria play in the environment
- Describe how bacteria can be harmful and beneficial to humans
- Identify the structures of a virus and their roles in viral infection
- Explain how viruses multiply

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

- Class notes, lecture, inquiry worksheets, articles, diagrams

Extensions: Video, diagrams, bacterial lab

Remediation: Review worksheets, flashcards, tutor

Instructional Methods: Lecture, group work, individual work/research

Materials & Resources: Textbook, worksheets, computers, lab materials

Assessments: Section quizzes, lab reports

Curriculum Scope & Sequence

Planned Course: Applied Biology

Unit: Zoology

Time Frame: 15 days

State Standards: 3.3.10.A, 3.3.10.B, 4.6.10.A, 4.7.10.B

Anchor(s) or adopted anchor: S11.B.1.1.1, S11.B.1.1.2

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

- Explain how a multicellular organism subdivides specialized groups of cells for life functions
- List the levels of organization from cell to organ system
- Relate the idea of structure and function for all biological levels of organization with examples

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

- Class notes, lecture, inquiry worksheets, teacher demonstrations, animal dissections

Extensions: Hydra lab, planaria lab, videos, computer-generated dissection labs

Remediation: Review worksheets, flashcards, tutor

Instructional Methods: Lecture, group work, individual work/research

Materials & Resources: Textbook, worksheets, computers

Assessments: Section quizzes, unit exam

Curriculum Scope & Sequence

Planned Course: Applied Biology

Unit: Botany

Time Frame: 15 days

State Standards: 3.3.10.A, 3.3.10.B, 4.6.10.A, 4.7.10.B

Anchor(s) or adopted anchor: S11.B.1.1.1, S11.B.1.1.2

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

- Identify and explain the structure/function relationship of major plant tissues
- Describe how the separate parts of a plant work together
- Compare and contrast monocots and dicots
- Summarize plant reproduction and identify the structures used in the reproduction process

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

- Class notes, lecture, inquiry worksheets, plant dissection

Extensions: Video, plant diagrams, plant specimen identification

Remediation: Review worksheets, flashcards, tutor

Instructional Methods: Lecture, group work, individual work/research

Materials & Resources: Textbook, worksheets, computers, lab materials

Assessments: Section quizzes, lab reports