A Planned Course of Study

for

Biology

AJHS Course #0491

Abington School District

Abington, Pennsylvania

September, 2016

BIOLOGY PLANNED COURSE OF STUDY

I. Objectives

Students will demonstrate a level of proficiency in each of the following areas related to Biology:

A. Organisms and Cells

1. Common Characteristics of Life
2. Energy Flow
3. Life Cycles
4. Cells Cycles
5. Form and Function
6. Organization
7. Molecular Basis of Life
8. Unifying Themes

B. Genetics

1. Heredity
2. Reproduction
3. Molecular Basis of Life
4. Biotechnology
5. Unifying Themes

C. Evolution

1. Natural Selection
2. Adaptation
3. Unifying Themes

D. Ecology

1. The Environment
2. Materials Cycles
3. Energy Flow
4. Biodiversity
5. Succession

E. Science as Inquiry

F. Reading Informational Text in Science and Technical Subjects

1. Key Ideas and Details
2. Craft and Structure
3. Integration of Knowledge and Ideas
4. Range and Level of Complex Texts

G. Writing in Science and Technical Subjects

1. Text Types and Purposes
2. Production and Distribution of Writing
3. Research to Build and Present Knowledge
4. Range of Writing

II. Major Concepts

A. Organisms and Cells

1. Common Characteristics of Life

a. Characteristics of life common to all organisms
b. Cellular structures of prokaryotic and eukaryotic organisms
c. Degrees of complexity of prokaryotic and eukaryotic organisms
d. Relationships between structure and function

2. Energy Flow

a. Chemical reactions within the cell
b. Energy changes within the cell

3. Life Cycles

a. Life cycle of organisms
b. Cell division in growth and development

4. Cell Cycles

a. Cell cycle and mitosis
b. Viral cycles

5. Form and Function

a. Structure and function of cell organelles

b. Water in cell metabolism
c. Cell membrane and protection and regulation
d. Inter- and intra-cellular transportation

6. Organization
a. Advantages of multicellularity
b. Specialization in cells, tissues, and organs

7. Molecular Basis of Life
a. Structure and function of organic molecules
b. Storage and use of information within cells

8. Unifying Themes
a. Systems influencing homeostasis
b. Repeating patterns in biological polymers
c. Unique properties of water

B. Genetics

1. Heredity
a. Inheriting genetic information
b. Expressing genetic information

2. Reproduction
a. Process, outcome, and importance of meiosis
b. Meiosis compared to and contrasted with mitosis

3. Molecular Basis of Life
a. Structure and function of DNA
b. DNA, protein synthesis, and gene expression
c. Replication, transcription, and translation

4. Biotechnology
a. Genetics in medicine, forensics, and agriculture

5. Unifying Themes
a. Patterns in biomacromolecules
b. Comparison of Mendelian and non-Mendelian patterns of inheritance
c. Observing characteristics at molecular, cellular, and organism levels

C. Evolution

1. Natural Selection

a. Mechanisms of biological evolution
b. Speciation
c. Impact on biodiversity
d. Kinship and DNA sequences

2. Adaptation

a. Role of mutations and gene recombination
b. Patterns of evolution
c. Inherited characteristics and survival
d. Environmental change and the gene pool

3. Unifying Themes

a. Interpret data from fossils, anatomy, physiology, and DNA relevant to evolution
b. DNA, protein synthesis, and gene expression
c Replication, transcription, and translation

D. Ecology

1. The Environment

a. Limiting factors, carrying capacity, and population dynamics
b. Causes of extinctions

2. Materials Cycles

a. Biogeochemical cycles within ecosystems
b. Consequences of interrupting natural cycles

3. Energy Flow

a. Efficiency of energy flow within ecosystems
b. Energy conversions throughout food webs

4. Biodiversity

a. Consequences of extinction
b. Abiotic and biotic causes of population fluctuations

5. Succession

a. Primary and secondary succession
b. Influence of humans on patterns of natural change (i.e. succession, desertification, etc.)

E. Science as Inquiry

1. Compare and contrast scientific theories
2. Identify and evaluate questions that can be answered through scientific

investigations

3. **Design and conduct a scientific investigation**
4. **Use appropriate tools and technologies to gather, analyze, and interpret data**
5. **Use mathematics in all aspects of scientific inquiry**
6. **Explain the importance of accuracy and precision in making valid measurements**
7. **Formulate and revise explanations and models using logic and evidence**

F. Reading Informational Text in Science and Technical Subjects

1. **Key Ideas and Details**
   a. Using text evidence from descriptions
   b. Determining central idea(s) or conclusion(s) of a text
   c. Following precisely multistep procedures
2. **Craft and Structure**
   a. Determining meaning of scientific symbols, terms, and phrases
   b. Structure of concepts in a technical text
   c. Ascertaining author's purpose or question being addressed
3. **Integration of Knowledge and Ideas**
   a. Translating from text to graph/chart and vice versa
   b. Link reasoning and evidence with conclusion or recommendation
   c. Compare and contrast findings from multiple texts on the same topic
4. **Range and Level of Complex Texts**
   a. Text organization
   b. Author's purpose & point of view

G. Writing in Science and Technical Subjects

1. **Text Types and Purposes**
   a. Arguments based on biology-specific content
   b. Informative and explanatory texts on scientific procedures and experiments
2. **Production and Distribution of Writing**
   a. Planning, revising, and editing
   b. Using technology to produce, publish, and update individual and shared writing
3. **Research to Build and Present Knowledge**
   a. Gathering information from multiple authoritative sources
   b. Use evidence to support analysis, reflection, and research

4. Range of Writing

a. Long-term
b. Short-term

III. Instruction

A. Course Schedule

1. 6 periods per week, for full year, 47 minutes per period

B. Pacing

1. Marking Period 1: Science of Biology and Chemistry of Life
2. Marking Period 2: Cell Structure, Function and Processes
3. Marking Period 3: Genetics and Evolution
4. Marking Period 4: Classification and Ecology

C. Methods

1. Methods suggested by the texts will be employed.
2. Hands-on labs will be incorporated when appropriate.
3. Visual aids will be used throughout the course.
4. Cooperative learning activities will be employed.
5. Guided inquiry through experimentation will be a regular feature.
5. Writing experiences will be used throughout the course.
6. Student reading from the text will be an integral part of the course.
7. Supplementary materials will be used.

D. Technology

1. Virtual labs will be incorporated when appropriate.
2. Use of computers will be incorporated into learning activities.
3. Biology.com website will be utilized as a source of e-text, virtual activities, and other online student resources connected to the course concepts.

E. Resources

1. Biology by Miller and Levine published by Pearson with a 2014 copyright.
2. Science World magazine and reference books available will be used as appropriate.

3. Pennsylvania Keystone Biology Exam assessment anchors and eligible content will be used to reinforce standards-based concepts.

IV. Assessment

A. Procedures for Evaluation

1. Formative assessments will be administered in a variety of formats
2. Summative Assessments
   a. Departmental common test at conclusion of each unit.
   b. Departmental common mid-term exam and final exam
   c. Long-term projects
3. Accommodations aligned with those permitted for the PSSA/Keystone Exams and included in IEP's will be provided for Special Education students who are enrolled in this course.

.

B. Expected Levels of Achievement

Students are expected to achieve at least a minimum level of proficiency. Proficiency and related grades are defined as follows:

A	90 - 100%
B	80 - 89%
C	70 - 79%
D	60 - 69%

A Planned Course of Study

for

Honors Biology

AJHS Course # 0490

Abington School District

Abington, Pennsylvania

September, 2016

HONORS BIOLOGY PLANNED COURSE OF STUDY

I. Objectives

Students will demonstrate a level of proficiency in each of the following areas related to Biology:

A. Organisms and Cells

1. Common Characteristics of Life
2. Energy Flow
3. Life Cycles
4. Cells Cycles
5. Form and Function
6. Organization
7. Molecular Basis of Life
8. Unifying Themes

B. Genetics

1. Heredity
2. Reproduction
3. Molecular Basis of Life
4. Biotechnology
5. Unifying Themes

C. Evolution

1. Natural Selection
2. Adaptation
3. Unifying Themes

D. Ecology

1. The Environment
2. Materials Cycles
3. Energy Flow
4. Biodiversity
5. Succession

E. Science as Inquiry

F. Reading Informational Text in Science and Technical Subjects

1. Key Ideas and Details
2. Craft and Structure
3. Integration of Knowledge and Ideas
4. Range and Level of Complex Texts

G. Writing in Science and Technical Subjects

1. Text Types and Purposes
2. Production and Distribution of Writing
3. Research to Build and Present Knowledge
4. Range of Writing

II. Major Concepts

A. Organisms and Cells

1. Common Characteristics of Life

a. Characteristics of life common to all organisms
b. Cellular structures of prokaryotic and eukaryotic organisms
c. Degrees of complexity of prokaryotic and eukaryotic organisms
d. Relationships between structure and function
e. Analysis of structural and functional similarities and differences between prokaryotes and eukaryotes.

2. Energy Flow

a. Chemical reactions within the cell
b. Energy changes within the cell
c. Analysis of cell structures and processes that transform energy in living systems.

3. Life Cycles

a. Life cycle of organisms
b. Cell division in growth and development

4. Cell Cycles

a. Cell cycle and mitosis
b. Viral cycles

c. Analysis of the three stages and results of the cell cycle

5. Form and Function

a. Structure and function of cell organelles
b. Water in cell metabolism
c. Cell membrane and protection and regulation
d. Inter- and intra-cellular transportation
e. Analysis of the unique properties of water and explanation of how they support life on Earth
f. Analysis and prediction of the role of cell structures involved in the transport of materials into, out of, and within a cell
g. Analysis of the relationship between feedback and response mechanisms in the maintenance of homeostasis

6. Organization

a. Advantages of multicellularity
b. Specialization in cells, tissues, and organs
c. Evaluation of relationships between structures and functions at various levels of biological organization

7. Molecular Basis of Life

a. Structure and function of organic molecules
b. Storage and use of information within cells
c. Evaluation of relationships between structure and function at various levels of biochemical organization
d. Analysis of role of enzymatic regulation in biochemical reactions within a cell

8. Unifying Themes

a. Systems influencing homeostasis
b. Repeating patterns in biological polymers
c. Unique properties of water

B. Genetics

1. Heredity

a. Inheriting genetic information
b. Expressing genetic information
c. Prediction of outcomes based on the inheriting, altering and expression of genetic information

2. Reproduction

a. Process, outcome, and importance of meiosis
b. Meiosis compared to and contrasted with mitosis

3. **Molecular Basis of Life**
   a. Structure and function of DNA
   b. DNA, protein synthesis, and gene expression
   c. Replication, transcription, and translation
   d. Analysis of the processes of protein synthesis
4. **Biotechnology**
   a. Genetics in medicine, forensics, and agriculture
   b. Application of scientific reasoning, inventions, tools and new technologies in the study of biology
   c. Evaluation of the impact of genetic engineering on medicine, forensics, and agriculture
5. **Unifying Themes**
   a. Patterns in biomacromolecules
   b. Comparison of Mendelian and non-Mendelian patterns of inheritance
   c. Observing characteristics at molecular, cellular, and organism levels

C. Evolution

1. **Natural Selection**
   a. Mechanisms of biological evolution
   b. Speciation
   c. Impact on biodiversity
   d. Kinship and DNA sequences
2. **Adaptation**
   a. Role of mutations and gene recombination
   b. Patterns of evolution
   c. Inherited characteristics and survival
   d. Environmental change and the gene pool
3. **Unifying Themes**
   a. Interpretation of data from fossils, anatomy, physiology, and DNA relevant to evolution
   b. DNA, protein synthesis, and gene expression
   c. Replication, transcription, and translation
   d. Evaluation of the mechanisms and sources of evidence related to the theory of evolution

D. Ecology

1. **The Environment**
   a. Limiting factors, carrying capacity, and population dynamics

b. Causes of extinctions
c. Analysis of interactions and relationships in an ecosystem as they relate to limiting factors

2. Materials Cycles
a. Biogeochemical cycles within ecosystems
b. Consequences of interrupting natural cycles
c. Analysis of interactions and relationships in an ecosystem as they relate to biogeochemical cycles

3. Energy Flow
a. Efficiency of energy flow within ecosystems
b. Energy conversions throughout food webs
c. Analysis of interactions and relationships in an ecosystem as they relate to energy flow

4. Biodiversity
a. Consequences of extinction
b. Abiotic and biotic causes of population fluctuations
c. Comparison of ecological levels of organization in the biosphere
d. Analysis of interactions and relationships in an ecosystem as they relate to energy flow

5. Succession
a. Primary and secondary succession
b. Influence of humans on patterns of natural change (i.e. succession, desertification, etc.)
c. Prediction of changes in an ecosystem in response to natural and human disturbances

E. Science as Inquiry
1**. Compare and contrast scientific theories**
2. Identify and evaluate questions that can be answered through scientific investigations
3. Design and conduct a scientific investigation
4. Use appropriate tools and technologies to gather, analyze, and interpret data
5. Use mathematics in all aspects of scientific inquiry
6. Explain the importance of accuracy and precision in making valid measurements
7. Formulate and revise explanations and models using logic and evidence

F. Reading Informational Text in Science and Technical Subjects

1. Key Ideas and Details
a. Using text evidence from descriptions
b. Determining central idea(s) or conclusion(s) of a text
c. Following precisely multistep procedures

2. Craft and Structure
a. Determining meaning of scientific symbols, terms, and phrases
b. Structure of concepts in a technical text
c. Ascertaining author's purpose or question being addressed

3. Integration of Knowledge and Ideas
a. Translating from text to graph/chart and vice versa
b. Linking reasoning and evidence with conclusion or recommendation
c. Comparing and contrasting findings from multiple texts on the same topic

4. Range and Level of Complex Texts
a. Text organization
b. Author's purpose & point of view

G. Writing in Science and Technical Subjects

1. Text Types and Purposes
a. Arguments based on biology-specific content
b. Informative and explanatory texts on scientific procedures and experiments

2. Production and Distribution of Writing
a. Planning, revising, and editing
b. Using technology to produce, publish, and update individual and shared writing

3. Research to Build and Present Knowledge
a. Gathering information from multiple authoritative sources
b. Using evidence to support analysis, reflection, and research

4. Range of Writing
a. Long-term
b. Short-term

III. Instruction

A. Course Schedule

1. 6 periods per week, for full year, 47 minutes per period

B. Pacing

1. Marking Period 1: Scientific Method and The Chemistry of Life
2. Marking Period 2: Cell Structure, Function, and Processes
3. Marking Period 3: Genetics; Mechanisms of Evolution

4. Marking Period 4: Ecology; Diversity of Life

C. Methods

1. Methods suggested by the texts will be employed.
2. Hands-on labs featuring inquiry methodology will be incorporated when appropriate.
3. Visual aids will be used throughout the course.
4. Cooperative learning activities will be employed.
5. Writing experiences will be used throughout the course.
6. Student reading from the text will be an integral part of the course.
7. Supplementary materials will be used.

D. Technology

1. Virtual labs will be incorporated when appropriate.
2. Use of computers will be incorporated into learning activities.
3. Biology.com website will be utilized as a source of e-text, virtual activities, and other online student resources connected to the course concepts.

E. Resources

1. Biology Concepts & Connections by Campbell published by Pearson with a 2012 copyright.
2. Reference books and materials will be used as appropriate.
3. Supplementary materials such as worksheets, quizzes, computer activities, and enrichment activities will be used.

IV. Assessment

A. Procedures for Evaluation

1. Summative Assessments
   a. Departmental common test at conclusion of each unit.
   b. Departmental common mid-term exam and final exam
   c. Long-term projects
2. Formative assessments will be administered in a variety of formats
3. Accommodations aligned with those permitted for the PSSA/Keystone Exams and included in IEP's will be provided for Special Education students who are enrolled in this course.

B. Expected Levels of Achievement

Students are expected to achieve at least a minimum level of proficiency. Proficiency and related grades are defined as follows:

A	90 - 100%
B	80 - 89%
C	70 - 79%
D	60 - 69%