SPRING GROVE AREA SCHOOL DISTRICT

PLANNED COURSE OVERVIEW

Course Title: General Biology	**Length of Course:** 30 cycles
Grade Level(s): 10	**Periods Per Cycle:** 9
Units of Credit: 1.5	**Length of Period:** 43 minutes
Classification: Graduation Requirement	**Total Instructional Time:** 193.5 hours

Course Description

This rigorous course is designed to prepare students for success on the Biology Keystone Exam. Course content is aligned with the Pennsylvania Department of Education Standards Aligned System Curriculum Framework for Biology. It is designed to focus on depth of understanding as it relates to the concepts of biological science. Within this course, students will receive more guided instruction than other sections of biology, with added remedial repetitions focused on the minimal acceptable standards of mastery. Themes that this course covers are: biological principles, cells, genetics and evolution, ecology, and the nature and process of science. Laboratory exercises are incorporated into the course. This is a laboratory science.

Instructional Strategies, Learning Practices, Activities, and Experiences

Bell Ringers	Laboratory Activities	Keystone Based Curriculum
Closure	Direct Instruction	Keystone Based Timeline with appropriate depth of content
Appropriately Chunked Lessons	Differentiated Instruction	

Assessments

Teacher specific assessments (quizzes, unit exams, closure, etc.)	Mid Term Exam	CDT Benchmark data
	Final Exam	Keystone Exam

Materials/Resources

Biology Textbook (Current book – *Modern Biology*; Postlethwait and Hopson. Holt Rinehart and Winston. 2006)	Teacher Provided Materials (i.e. notes, labs, remediation, enrichment materials)	Keystone Specific Review Materials (i.e. example questions, terminology, etc.)

Adopted: 11/20/91
Revised: 1995-96; 11/18/98; 11/15/01; 8/20/07; 5/19/14

I. Basic Biological Principles	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
A) Scientific Method B) Characteristics of Life C) Cellular Biology – Introduction D) Chemistry of Life	**BIO.A.1.1** Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms. **BIO.A.1.2** Compare cellular structures and their functions in prokaryotic and eukaryotic cells. Describe and interpret relationships between structure and function at various levels of biological organization. **CC.3.5.9-10D.** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics. **CC.3.5.9-10E.** Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). **CC.3.5.9-10H.** Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem

II. Chemical Basis of Life	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
A) Chemistry of Life - Specific to water - Specific to organic chemistry - Functionality of carbon - Specific to enzymatic structure and functions	**BIO.A.2.1** Describe the unique properties of water and how these properties support life on Earth (e.g., freezing point, high specific heat, cohesion). **BIO.A.2.2** 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. **BIO.A.2.3** 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. **CC.3.5.9-10D.** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics. **CC.3.5.9-10E.** Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). **CC.3.5.9-10H.** Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem **CC.3.6.9-10E** Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

III. Bioenergetics	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
A) Photosynthesis B) Cellular Respiration	**BIO.A.3.1** Describe the fundamental roles of plastids (e.g., chloroplasts) and mitochondria in energy transformations. **BIO.A.3.2** Compare the basic transformation of energy during photosynthesis and cellular respiration. Describe the role of ATP in biochemical reactions. **CC.3.5.9-10D.** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics. **CC.3.5.9-10E.** Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). **CC.3.5.9-10H.** Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem **CC.3.5.9-10F** Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. **CC.3.5.9-10G** Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

IV. Homeostasis and Transport	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
A) Cellular Membrane B) Passive Transport C) Active Transport D) Vesicle Transport E) Cellular Transport F) Homeostasis	**BIO.A.4.1** 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. **BIO.A.4.2** Explain how organisms maintain homeostasis (e.g., thermoregulation, water regulation, oxygen regulation). **CC.3.5.9-10D.** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics. **CC.3.5.9-10E.** Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). **CC.3.5.9-10H.** Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem **CC.3.5.9-10F** Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. **CC.3.5.9-10G** Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

V. Cell Growth and Reproduction	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
A) Cell Cycle B) Mitosis C) Meiosis D) DNA Structure E) DNA Replication F) RNA Structure G) Protein Synthesis H) Chromosome Structure	**BIO.B.1.1** 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. **BIO.B.1.2** 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. **CC.3.5.9-10D.** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics. **CC.3.5.9-10E.** Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). **CC.3.5.9-10H.** Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem

VI. Genetics	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
A) Genetics B) Genotypes C) Phenotypes D) Monohybrid/Dihybrid Crosses E) Single/Multiple Allele Combinations F) Chromosome Function G) Protein Synthesis H) Genetic Abnormality I) Genetic Technology J) Science and Ethics	**BIO.B.2.1** Describe and/or predict observed patterns of inheritance (i.e., dominant, recessive, co-dominance, incomplete dominance, sex-linked, polygenic, and multiple alleles). Describe processes that can alter composition or number of chromosomes (i.e., crossing-over, nondisjunction, duplication, translocation, deletion, insertion, and inversion). **BIO.B.2.2** 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. **BIO.B.2.3** Describe how genetic mutations alter the DNA sequence and may or may not affect phenotype (e.g. silent, nonsense, frame-shift). **BIO.B.2.4** 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). **CC.3.5.9-10D.** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics. **CC.3.5.9-10E.** Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). **CC.3.5.9-10H.** Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem **CC.3.6.9-10B** Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

VII. Theory of Evolution	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
A) Natural Selection B) Genetic theory C) Evolution D) Evolutionary Evidence E) Scientific Method	**BIO.B.3.1** 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. **BIO.B.3.2** Interpret evidence supporting the theory of evolution (i.e., fossil, anatomical, physiological, embryological, biochemical, and universal genetic code). **BIO.B.3.3** Distinguish between the scientific terms: hypothesis, inference, law, theory, principle, fact, and observation **CC.3.5.8-10A**. Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. **CC.3.5.9-10B.** Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. **CC.3.5.9-10C** Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. **CC.3.5.9-10D.** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics. **CC.3.5.9-10E.** Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). **CC.3.5.9-10I** Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.

VII. Theory of Evolution (continued)	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
	CC.3.5.9-10H. Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem **CC3.6.9-10A** Write arguments focused on discipline-specific content **CC.3.6.9-10F** Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

VIII. Ecology	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
A) Environmental Organization B) Biotic Factors C) Abiotic Factors D) Transfer of Energy E) Biotic Interactions F) Matter Recycling G) Population Dynamics	**BIO.B.4.1** Describe the levels of ecological organization Describe characteristic biotic and abiotic components of aquatic and terrestrial ecosystems. **BIO.B.4.2** Describe how energy flows through an ecosystem. Describe biotic interactions in an ecosystem. Describe how matter recycles through an ecosystem. Describe how ecosystems change in response to natural and human disturbances. Describe the effects of limiting factors on population dynamics and potential species extinction. **CC.3.5.9-10J** By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently. **CC3.6.9-10A** Write arguments focused on discipline-specific content **CC.3.6.9-10I** Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. **CC.3.6.9-10C** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

VIII. Ecology (continued)	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
	CC.3.6.9-10D Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. **CC.3.6.9-10G** Gather relevant information from multiple authoritative print digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. **CC.3.6.9-10H** Draw evidence from informational texts to support analysis, reflection, and research.