

BLACK HORSE PIKE REGIONAL SCHOOL DISTRICT  
HIGHLAND   TIMBER CREEK   TRITON  
SCIENCE DEPARTMENT

**SYLLABUS**  
**Advanced Placement Biology**  
**Course Content**

Advanced Placement Biology is an introductory college level biology course. Designed with the AP Biology Curriculum Framework, focused on the major concepts in biology and their connections, it allows students to develop deep conceptual understanding and integrate science practices through inquiry-based means. Structured around four Big ideas (Evolution, Energy Processes, Information, and Interactions), encompassing the core scientific principles, theories, and processes governing living organisms and systems, at least one of the Big ideas will be incorporated in every lesson.

**September: Summer Assignments: Ecology** (5.3.12.B.1, 5.3.12.B.3, 5.3.12.C.1) **or Classification** (5.1.12.A.1, B.3, C.1, 5.3.12.E.2) – and RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.11-12.1, 2, 3, 4, 5, 9, 10)

**\*\*If Ecology \*\*** - students will explore and discuss the interconnectedness of all living things

1. Population dynamics, limiting factors
2. Ecosystem and community dynamics, species interactions
3. Biogeochemical cycles, global issues

**\*\*If Classification \*\*** - students will identify the major phyla and identify the distinguishing characteristics of each. They will use their knowledge to develop a basic understanding of the evolution of the Phyla.

**October: The Chemistry of Life** (5.2.12.A.1, 2,4,5,6, 5.1.12.B.2, 5.3.12.A.1 - and RST.11-12.1 through 10, N-R.1 through 3, N-Q.1 through 3, S-ID.1) - students will explore the interconnections between all levels of organization at the molecular level. They will expand their prior chemistry knowledge, delving into the connections between molecules, and identify the main macromolecules within organisms, and predict function based on their composition.

1. Review of atoms, molecules, bonding, pH, water
2. Organic molecules: carbohydrates, lipids, proteins, nucleic acids
3. Chemical reactions: enzymes, cofactors, rates of activity, regulation

**November: Cells** (5.1.12.C.1, 5.1.12.C.2, 5.3.12.A.3 and L.11-12. 5, 6, RI.11-12.1, 2, 3, 7, 8, 9, 10, RST.11-12.8, 9, S-ID.1, 9, WHST.11-12.8, 9, S-IC.5, 6) - students will examine the evolution of cell theory and discuss and compare prokaryotic and eukaryotic cells – at the structural and functional level.

1. Prokaryotic and eukaryotic cells; plant and animal cells
2. Structure and function of cell membranes, organelles, cytoskeleton
3. Cellular transport
4. Cell cycle and regulation, mitosis and meiosis.

**December: Cellular Energetics** (2.2.12.B.1, 8.1.12.C.1, 9.1.12.A.1, 9.1.12.B, 9.4O, L.9-10.6 or L.11-12.6, RI.9-10.2, 8 or RI.11-12.2, 8, RST.9-10.1, 9, 10 or RST.11-12.1, 9, 10, SL.9-10. 1 through 6 or SL.11-12.1 through 6, W.9-10.1, 7 or W.11-12.1, 7, WHST.9-10.1, 5, 7, 8, 9 or WHST.11-12. 1, 5, 7, 8, 9) - students will explore how living systems obtain and use energy to sustain organization, and maintain homeostasis. They will compare oxidation and reduction reactions, and relate these processes to energy transformation and compare different metabolic pathways which allow organisms to harness the energy of organic molecules.

1. ATP, energy transfer; photosynthesis
2. Cellular respiration: glycolysis, Krebs cycle; fermentation

**January: Heredity** (5.1.12 A1,2,3 5.1.12 B1,2,3 5.3.12 D.1 5.3.12 A1 5.1.12 C1,2,3 5.5.12C1, 3 5.3.12C1, D1 and S-CP.1-9, S-MD.1-7) - students will examine the relationship between probability and inheritance, and examine traits explained by the Incomplete dominance, Co-dominance, Pleiotropic, Polygenic, Epistasis, Sex-linked and Sex Influenced Traits, the Laws of Independent Assortment and Segregation.

1. Meiosis, gametogenesis
2. Mendel's Laws, probability; inheritance patterns: chromosomes, genes, alleles
3. evidence for evolution, patterns of evolution
4. Mechanisms of evolution: natural selection, speciation, adaptive radiation
5. Hardy-Weinberg principle, allele frequencies

**February: Molecular Genetics** (5.1.12 A1, 3,5.1.B1,2,4 ,5.1.12 C1,2,3,5.3.12 A1 and W.11-12.3, .7, 8 SL.11-12.4, .5) - students will identify the components and structure of the nucleic acids, DNA and RNA, and follow the process from the original DNA sequence to the final synthesized protein by specifying the sequence of amino acids in the proteins.

1. Nucleic acid structure and replication
2. Eukaryotic chromosomal structure, nucleosomes, transposable elements

3. Transcription, mRNA editing, translation; regulation of gene expression, mutations
4. Recombinant DNA technology; DNA and RNA viruses

**March: Evolutionary Biology (Science:** 5.1.12.A.1, 5.3.12.E.3, 5.4.12.B.1

**Other:** 7.1.IL.A.7, 8.1.12.A, 8.1.12.C, 8.1.12.D, 8.1.12.E, 8.1.12.F, 8.2.12.F, 9.1.12.A.1, 9.1.12.B, 9.1F, 9.4O, RST.11-12.1 through 10, N-R.1 through 3, N-Q.1 through 3, S-ID.1)

In this unit students will discover the historical evolution of life on Earth and be able to discuss the ideas of the scientists/experiments which have significant contributions to the field. Students will investigate how increased knowledge of genetics has influenced the field of evolutionary biology. They will identify the evidence supporting the theory of evolution, describe anatomical, fossil, biogeographic, genetic and human influenced evidence for evolution, and experiment with and describe using BLAST (Basic Local Alignment Search Tool) resources to show evolutionary relationships.

**April: Organisms and Populations (Science:** 5.3.12.E.1, 5.3.12.E.2, 5.3.12.E.3, 5.3.12.A.3, 5.3.12.A.5, 5.3.12.A.6

**Other:**

6.1.12.C.12, 7.1.IL.A.7, 9.1.12.A.1, 9.4.O, RI.11-12.1, RI.11-12.2, RI.11-12.3, RI.11-12.7, RI.11-12.8, RI.11-12.9, RI.11-12.10, W.11-12.8, W.11-12.9, SL.11-12.2, SL.11-12.3, L.11-12.6, WHST.11-12.7, WHST.11-12.8, WHST.11-12.9)

In this unit students will distinguish evolutionary patterns among organisms. They will be able to trace patterns in their development, functions and structures and relate them to their ability to survive in differing environments.

1. Population dynamics, limiting factors
- 2.

**May: Structure and Function of Plants and Animals (Science:** 5.3.12.A.6, 5.3.4.A.3, 5.3.E.1 **Other:** 6.1.12.C.12, 6.1.12.C.16, 6.2.12.C.5, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10., 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10)

In this unit students will explore reproduction, growth and development in both plants and animals. They will describe mechanisms of reproduction found in different organisms. Students will also identify factors that affect growth and development in different organisms.

1. Phylogeny, adaptations
2. Growth; response to stimuli: tropisms, photo-periodicity
3. Homeostasis and immune response
4. Gametogenesis, fertilization, embryogenesis, development; behavior

**June: Biology Real Life Application Topic:**

Read and evaluate The Immortal Life of Henrietta Lacks by Rebecca Skloot

### Course Expectations & Skills

1. Complete college level laboratory exercises, and identify essential findings & write College level lab reports.
2. Recognize similarities and differences both among and within the six kingdoms of living organisms.
3. Deduce the complementary nature of structure and function in all living organisms.
4. Explain homeostasis at the organ, cellular, sub-cellular and biochemical levels.
5. Describe the sub-cellular and biochemical basis of energy conversions in cells.
6. Demonstrate the principles of Mendelian genetics & describe the sub-cellular and biochemical basis for heredity.
7. Explain the advantages of division of labor and interdependence of cells in multi-cellular organisms.
8. Recognize a variety of structural adaptations in representative animal species.
9. Generalize the theory of evolution from knowledge of the development of complex land forms from similar aquatic organisms.
10. Demonstrate a high proficiency in laboratory techniques both working in groups and as individuals.

### Resources

Primary text: Biology 9<sup>th</sup> Edition, Raven and Johnson

Supplementary resources include: AP Biology Investigative Labs: An Inquiry-Based Approach by CollegeBoard, Biology Lab Manual 2001 Edition by College Board, Baron's Biology Exam Review, The Immortal Life of Henrietta Lacks by Rebecca Skloot

### Grading Scale

Grades are calculated according to the following proportions:

Daily Work: 15%  
Minor Assessments: 20%  
Major Assessments: 40%  
Labs: 25%

# Black Horse Pike Regional School District Curriculum

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21<sup>ST</sup> CENTURY GLOBAL SKILLS

## Advanced Placement Biology Curriculum

### Unit 1: Chemistry of Life

#### PART I: UNIT RATIONALE

#### WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<b>Course/Unit Title:</b> Advanced Placement Biology	<b>Unit Summary:</b> <ol style="list-style-type: none"><li>1. In this Unit students will explore from a molecular level the interconnections that exist between all levels of organization. The first topic examined will be the properties of water. Students will recognize the properties of water that make it the ideal molecule to maintain life on earth.</li><li>2. Students will expand on the knowledge that they began to foster in their previous chemistry course but delving into the connections between molecules of life. They will recognize and identify various functional groups and their roles in maintaining proper functions of living organisms. They will predict interactions between molecules based on their chemical make-up. Students will also identify the main macromolecules within organisms, and predict function based on their composition.</li><li>3. It is essential for students to track energy changes between organisms and the environment. They will use the concepts of the First and Second Laws of Thermodynamics to track energy flow through the Universe. They will be able to predict energy changes and the spontaneity of reactions based on their knowledge of these laws.</li><li>4. Enzymes are essential for life. Students will delve into the structure and functions of various enzymes. They will perform laboratory activities to examine the effects of various conditions on enzyme activity. They will use what they find in these activities to predict behavior and rate of reactions throughout the year in various biochemical pathways including but not limited to photosynthetic and respiratory rate of various organisms.</li></ol>
<b>Grade Level(s):</b> <b>11-12</b>	
<b>Essential Question(s):</b> <ol style="list-style-type: none"><li>1. Why is water essential for life?</li><li>2. How does structure relate to function in living systems from the organismal to the molecular level.</li><li>3. How do changes in molecular structure effect energy?</li><li>4. What would happen if we</li></ol>	<b>Enduring Understanding(s):</b> <ol style="list-style-type: none"><li>1. Water has five properties including high specific heat, high heat of vaporization, cohesion and adhesion, and polar solubility that make it the ideal molecule to support and maintain life on earth.</li><li>2. A hierarchy of organization exists stemming from the atomic level through the highest level of organization and any misstep in the organization will result in loss of function.</li><li>2. Different functional groups have different bonding properties which influence the behavior of molecules.</li><li>3. Changes in molecules result in changes in potential energy resulting in changes in reaction rate and spontaneity of reactions.</li></ol>

didn't have enzymes.	4. Enzymes lower activation energy speeding up reaction rate. In the absence of enzymes reactions will proceed so slowly that life will not be sustained.
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## PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

### DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

<u>Learning Target</u>	<u>NJCCCS or CCS</u>
Water	
1. Name and describe the five main properties of water and give examples of their benefits to life.	1. <b>Science:</b> 5.2.12.A.1,2,4,5,6 <b>Other:</b> 8.1.12.A, 8.1.12.C, 8.1.12.D, 8.1.12.E, 8.1.12.F, 8.2.12.F, 8.2G, 9.1.12.A.1, 9.1.12.B, , 9.1F, 9.4O, 9.4O(2), RST.11-12.1 through 10, N-R.1 through 3, N-Q.1 through 3, S-ID.1
2. Recognize substances are acids, bases or neutral and predict behavior based on their classification.	2. <b>Science:</b> 5.2.12.A.6 <b>Other:</b> 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RI.11-12, RST.11-12, WHST.11-12
Organic Molecules in Organisms	
3. Describe the electron arrangement of carbon and relate to its ability to form bonds.	3. <b>Science:</b> 5.2.12.A.1 <b>Other:</b> 6.1.12.C.12, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RI.11-12, RST.11-12, WHST.11-12
4. Name, describe and identify the main functional groups.	4. <b>Science:</b> 5.2.12.A.1 <b>Other:</b> 6.1.12.C.12, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RI.11-12, or RST.11-12, WHST.11-12
5. Identify and describe the basic structure and function of Carbohydrates, fatty acids, proteins and nucleic acids.	5. <b>Science:</b> 5.1.12.B.2, 5.3.12.A.1 <b>Other:</b> 2.2.12.B.1, 8.1.12.A, 8.1.12.C, 8.1.12.D, 8.1.12.E, 8.1.12.F, 8.2.12.F, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.11-12.1 through 10, WHST.11-12.1 through 10, N-R.1 through 3, N-Q.1 through 3, S-ID.1
Free Energy Changes	
6. Identify how chemical reactions alter bonds.	6. <b>Science:</b> 5.3.12.A.1 5.3.12.B.1,2 <b>Other:</b> 2.1.12.B.3, 6.1.12.C.12, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10; S-ID.9, S-MD.7
7. Name factors that affect reaction speed.	7. <b>Science:</b> 5.3.12.A.2 <b>Other:</b> 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B,9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10
Enzymes	
8. Identify the role of enzymes in chemical reactions.	8. <b>Science:</b> 5.3.12.A.2 <b>Other:</b> 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B,9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10
9. Identify and experiment with factors that affect enzymes and reaction rate.	9. <b>Science:</b> 5.3.12.A.2 <b>Other:</b> 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B,9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10

### **Inter-Disciplinary Connections:**

Throughout the course students are required to write lab reports on all laboratory activities performed. Within the lab reports students are expected to analyze their data and create tables and graphs. Students use their English and Math skills throughout the year within this framework.

- examples of strategies and modified strategies are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 1 Resources

### **Students will engage with the following text:**

Raven Biology 9<sup>th</sup> Edition.

Supplemental texts include

1. AP Biology Investigative Labs: An Inquiry-Based Approach by College Board
2. Biology Lab Manual 2001 Edition by College Board

- examples of strategies and modified strategies are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 1 Resources

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs.

They may include but not be limited to:

#### **Enrichment/Enhancement**

Due to the high rigor of the course students will often need additional resources. Additional reading and enrichment activities are provided on an as needed basis. There are also after school study sessions available for students who benefit from the extra individual attention. In addition students are directed to the AP Central website for additional practice essays and sample AP test questions.

### **Students will write:**

Students perform multiple inquiry based labs throughout the year. Each lab requires an in depth lab report. The following college level rubric must be followed.

Rubric

The purpose of the course is to prepare students for the AP Biology Exam. Due to this expectation students are given old AP Biology Exam questions as part of each of their tests. They are graded based on the College Board AP Biology Essay Rubrics available on the following website: <http://www.wsfcs.k12.nc.us/Page/1643>

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs.

They may include but not be limited to:

#### **Enrichment/Enhancement**

Due to the rigor of this course students are expected to research their laboratory topics and cite research within their lab reports. They are expected to use peer reviewed material and are given at least a week to complete all lab reports so that any questions or concerns about the topics can be addressed.

## **PART III: TRANSFER OF KNOWLEDGE AND SKILLS**

DESCRIBE THE LEARNING EXPERIENCE.

**How** will students uncover content and build skills.

**Students will:**

Engage in textbook and other reading materials as described above  
Actively participate in class discussions both teacher and peer initiated  
Work collaboratively with peers on various assignments, labs, and/or projects  
Design and conduct laboratory experiments (see example in assessment section)  
Construct and analyze graphs using student collected and given data  
Communicate laboratory findings through lab reports.

**Teacher will :**

Utilize SmartBoard and PowerPoint technologies to present definitions, concepts and any other pertinent materials  
Start Class with an applicable old AP Biology Test Question to stem discussion and thought on the topics being covered.  
Include media such as You Tube and other animations to connect concepts to real life applications or to further appeal to audio-visual learners.

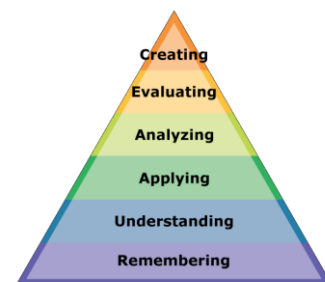
- examples of strategies and modified strategies are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 1

Resources

## PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

IDENTIFY BLOOM'S LEVELS. **Note: Letters in red correspond to learning levels indicated in pyramid on the right}**

**Formative Assessments:**

Formative assessments will be in the form of periodic quizzes, lab exercises and extemporaneous teacher evaluations during class such as various concept reinforcement worksheets.

Examples:

Chapter 1 Study Guide/ Essential Questions(R, U, Ap, An, E)

Chapter 2 Study Guide/Essential Questions (R, U, Ap, An, E)

Chapter 3 Study Guide/Essential Questions (R, U, Ap, An, E)

- examples of assessments and modified assessments are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 1 Resources

**Enrichment/Enhancement:**

Students are given the opportunity for further research and discussion on all topics covered in class. They are given access to old AP Biology Exams for examples of questions. Students are also informed and encouraged to use the Baron's AP Biology Review Guide as a further enrichment resource for all topics covered.

**Summative Assessments:**

Students will be required to take a test to demonstrate proficiency on the material presented in this unit.

Students may also submit formal lab reports.

Examples:

AP Biology Lab 2 ( Lab 13 in AP Investigation Book)- Enzyme Lab (R, U, Ap, An, E, C)

Tests consist of old AP Biology Exam Multiple Choice and Essay Questions, they can be found on the following website [www.classmarker.com](http://www.classmarker.com). (R, U, Ap, An, E, C)

- examples of assessments and modified assessments are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 1 Resources

### **Enrichment/ Enhancement:**

Due to the rigor of this course students are expected to research their laboratory topics and cite research within their lab reports. They are expected to use peer reviewed material and are given at least a week to complete all lab reports so that any questions or concerns about the topics can be addressed.

### **Performance Assessments:**

**Design and conduct laboratory experiments and present conclusions in laboratory reports.**

Examples

AP Biology Lab 2 ( Lab 13 in AP Investigation Book)- Enzyme Lab (R, U, Ap, An, E, C)

- examples of assessments and modified assessments are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 1 Resources

### **Accommodations/Modifications:**

Due to the rigor of this course students are expected to research their laboratory topics and cite research within their lab reports. They are expected to use peer reviewed material and are given at least a week to complete all lab reports so that any questions or concerns about the topics can be addressed.

# Black Horse Pike Regional School District Curriculum

## Advanced Placement Biology Curriculum

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### Unit 2: Cells

#### PART I: UNIT RATIONALE

#### WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<b>Course/Unit Title:</b> Advanced Placement Biology	<b>Unit Summary:</b> <ol style="list-style-type: none"> <li>Students will discover the historical evolution of cell theory and be able to discuss the ideas of the scientists who have significant contributions to the field. This unit will also investigate how ideals have changed as new technologies are discovered and developed. Students will investigate the similarities and differences between prokaryotic and eukaryotic cells. The structure and functional complexities will be discussed and compared. Students will also be asked to distinguish between these types of organisms by both description and visual cues.</li> <li>Students will identify the structure and function of the cell membrane and recognize its significance to the survival of the cell. Students will describe, compare and contrast the various transport mechanisms within cells. Students will experiment with and describe cell response to various types of environments. Students will explore mechanism of cellular communication.</li> <li>Students will learn to identify and discuss the basic structural organization of eukaryotic cells as well as the function of each organelle. Students will be able to explain the relationship between organelles and the why certain types of cells have or lack them. Students will also be able to distinguish between plant and animal cells.</li> <li>In order to ensure that life continues all cells must have the ability to grow and reproduce. In this particular unit students will discuss various means of asexual reproduction and compare them to the process of sexual reproduction. The cell cycle will be explored with specific emphasis on checkpoints and repercussions of incorrect cell division with particular emphasis on cancer. The process of mitosis will be compared to the stages and purpose of meiosis</li> </ol>
<b>Grade Level(s):</b> 11-12	
<b>Essential Question(s):</b> <ol style="list-style-type: none"> <li>What changes gave cells the ability to begin working as multicellular units.</li> <li>Why is it essential that cells have mechanisms to maintain homeostasis.</li> <li>How and why to plant and</li> </ol>	<b>Enduring Understanding(s):</b> <ol style="list-style-type: none"> <li>Endosymbiosis allowed for cells to gain a mechanism by which to more efficiently make their own energy, facilitating multicellularity.</li> <li>Different cells will react accordingly to changing environments. It is the goal of the cell to maintain homeostasis and if that is not achieved the cell will die.</li> <li>Plant and animal cells have organelles each with integral jobs within the cell. Some organelles are essential to plants and not animal cells and vice</li> </ol>



animal cells differ?	versa.
4. Why is it essential that they cell cycle is monitored for problems?	4. If there is a problem in the cell cycle, cells may not divide properly. If cell division is not regulated it can lead to cancer.

## PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

### DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

<u>Learning Target</u>	<u>NJCCCS or CCS</u>
Prokaryotic and Eukaryotic Cells	
1. Describe the characteristics of prokaryotic vs. eukaryotic cells.	1. <b><u>Science:</u></b> 5.1.12.C.1, 5.1.12.C.2, <b><u>Other:</u></b> 2.2.12.B.1, 9.1.12.A.1, 9.1.12.B, 9.4O, L.9-10. 5, 6 or L.11-12. 5, 6, RI.11-12.1, 2, 3, 7, 8, 9, 10, RST.11-12.8, 9, S-ID.1, 9, WHST.11-12.8, 9, S-IC.5, 6
2. Identify how multicellularity evolved.	2. <b><u>Science:</u></b> 5.3.12.A.6 <b><u>Other:</u></b> 2.1.12.D.1, 2.3.12.A.2, 9.4.H, 6.1.12.C.12, 6.1.12.C16, 6.2.12.C.5, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10
Membranes	
3. Experiment to identify the effects of putting cells in hypo/hyper/isotonic environments.	3. <b><u>Science:</u></b> 5.3.12.A.2, 5.3.12.A.3 <b><u>Other:</u></b> 2.1.12.D.1, 2.3.12.A.2, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10
4. Discuss and differentiate between active and passive transport.	4. <b><u>Science:</u></b> 5.3.12.A.2, 5.3.12.A.3 <b><u>Other:</u></b> 2.1.12.D.1, 2.3.12.A.2, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10
5. Identify the mechanisms of communication and various receptors in the cell membrane.	5. <b><u>Science:</u></b> 5.3.12.A.3 <b><u>Other:</u></b> 2.1.12.D.1, 2.3.12.A.2, 9.4.H, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10
Sub-Cellular Organization	
6. Name and describe the functions of organelles within eukaryotic cells.	6. <b><u>Science:</u></b> 5.3.12.A.1, 5.3.12.A.3 <b><u>Other:</u></b> 2.1.12.B.3, 6.1.12.C.12, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10
7. Differentiate between plant and animal cells.	7. <b><u>Science:</u></b> 5.1.12.D.3 <b><u>Other:</u></b> 2.1.12.D.1, 2.2.12.B.1, 6.1.12.D.6, 6.1.12.C.12, 16, 6.2.12.C.3, 8.1.12.A.1, 2, 9.1.12.A.1, 9.1.12.B, , 9.3.12.C.13, 9.4O, N-Q.1, N-Q.2, N-Q.3, RST.11-12.3, WHST.11-12.6
Cell Cycle and Regulation	
8. Identify importance and need of cells to divide.	8. <b><u>Science:</u></b> 5.3.12.A.4 <b><u>Other:</u></b> 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10
9. Describe the consequences of an unchecked cell cycle.	9. <b><u>Science:</u></b> 5.3.12.A.4 <b><u>Other:</u></b> 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10

### **Inter-Disciplinary Connections:**

Throughout the course students are required to write lab reports on all laboratory activities performed. Within the lab reports students are expected to analyze their data and create tables and graphs. Students use their English and Math skills throughout the year within this framework.

Student will be reading and discussing The Immortal Life of Henrietta Lacks to connect with the Cell Theory, and Cancer as well as ethical and Historical issues.

Students will be drawing and labeling the cell membrane as well as organelles relating to Art.

- examples of strategies and modified strategies are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 2 Resources Cells

### **Students will engage with the following text:**

Raven Biology 9<sup>th</sup> Edition.

Supplemental texts include

1. AP Biology Investigative Labs: An Inquiry-Based Approach by College Board
2. Biology Lab Manual 2001 Edition by College Board
3. Baron's Biology Exam Review

examples of strategies and modified strategies are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 2 Resources Cells

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs.

They may include but not be limited to:

#### **Enrichment/Enhancement**

Due to the high rigor of the course students will often need additional resources. Additional reading and enrichment activities are provided on an as needed basis. There are also after school study sessions available for students who benefit from the extra individual attention. In addition students are directed to the AP Central website for additional practice essays and sample AP test questions.

### **Students will write:**

Students perform multiple inquiry based labs throughout the year. Each lab requires an in depth lab report. The following college level rubric must be followed.

Rubric

The purpose of the course is to prepare students for the AP Biology Exam. Due to this expectation students are given old AP Biology Exam questions as part of each of their tests. They are graded based on the College Board AP Biology Essay Rubrics available on the following website: <http://www.wsfcs.k12.nc.us/Page/1643>

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs.

They may include but not be limited to:

#### **Enrichment/Enhancement**

Due to the rigor of this course students are expected to research their laboratory topics and cite research within their lab reports. They are expected to use peer reviewed material and are given at least a week to complete all lab reports so that any questions or concerns about the topics can be addressed.

### PART III: TRANSFER OF KNOWLEDGE AND SKILLS

#### DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

##### Students will:

Engage in textbook and other reading materials as described above  
Actively participate in class discussions both teacher and peer initiated  
Work collaboratively with peers on various assignments, labs, and/or projects  
Design and conduct laboratory experiments (see example in assessment section)  
Construct and analyze graphs using student collected and given data  
Communicate laboratory findings through lab reports.

##### Teacher will :

Utilize SmartBoard and PowerPoint technologies to present definitions, concepts and any other pertinent materials

Start Class with an applicable old AP Biology Test Question to stem discussion and thought on the topics being covered.

Include media such as You Tube and other animations to connect concepts to real life applications or to further appeal to audio-visual learners.

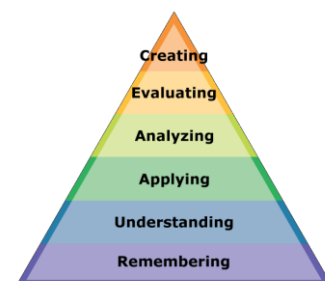
- examples of strategies and modified strategies are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 2

Resources Cells

### PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

IDENTIFY BLOOM'S LEVELS. **Note: Letters in red correspond to learning levels indicated in pyramid on the right}**



##### Formative Assessments:

Formative assessments will be in the form of periodic quizzes, lab exercises and extemporaneous teacher evaluations during class such as various concept reinforcement worksheets.

Examples:

Chapter 4 Study Guide/ Essential Questions(R, U, Ap, An, E)

Chapter 5 Study Guide/Essential Questions (R, U, Ap, An, E)

Chapter 9 Study Guide/Essential Questions (R, U, Ap, An, E)

Chapter 10 Study Guide/Essential Questions (R, U, Ap, An, E)

- examples of assessments and modified assessments are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 2 Resources Cells

##### Enrichment/Enhancement:

Students are given the opportunity for further research and discussion on all topics covered in class. They are given access to old AP Biology Exams for examples of questions. Students are also informed and encouraged to use the Baron's AP Biology Review Guide as a further enrichment resource for all topics covered.

### **Summative Assessments:**

**Students will be required to take a test to demonstrate proficiency on the material presented in this unit.**

**Students may also submit formal lab reports.**

Examples:

AP Biology Lab 1 ( Lab 4 in AP Biology Investigative Labs Book) Diffusion/Osmosis (R, U, Ap, An, E, C)

AP Biology Lab 3 ( Lab 7 in AP Biology Investigative Labs Book) Mitosis/Meiosis(R, U, Ap, An, E, C)

Tests consist of old AP Biology Exam Multiple Choice and Essay Questions, they can be found on the following website [www.classmarker.com](http://www.classmarker.com). (R, U, Ap, An, E, C)

- examples of assessments and modified assessments are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 2 Resources Cells

### **Enrichment/ Enhancement:**

Due to the rigor of this course students are expected to research their laboratory topics and cite research within their lab reports. They are expected to use peer reviewed material and are given at least a week to complete all lab reports so that any questions or concerns about the topics can be addressed.

### **Performance Assessments:**

**Design and conduct laboratory experiments and present conclusions in laboratory reports.**

Examples

AP Biology Lab 1 ( Lab 4 in AP Biology Investigative Labs Book) Diffusion/Osmosis (R, U, Ap, An, E, C)

AP Biology Lab 3 ( Lab 7 in AP Biology Investigative Labs Book) Mitosis/Meiosis(R, U, Ap, An, E, C)

- examples of assessments and modified assessments are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 2 Resources Cells

### **Accommodations/Modifications:**

Due to the rigor of this course students are expected to research their laboratory topics and cite research within their lab reports. They are expected to use peer reviewed material and are given at least a week to complete all lab reports so that any questions or concerns about the topics can be addressed.

# Black Horse Pike Regional School District Curriculum Template

## Advanced Placement Biology Curriculum

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21<sup>ST</sup> CENTURY GLOBAL SKILLS

### Unit 3: Cellular Energetics

#### PART I: UNIT RATIONALE

#### WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<b>Course/Unit Title:</b> AP Biology <b>Matter and Energy Transformations</b>	<b>Unit Summary:</b> <ol style="list-style-type: none"><li>1. Students will explore how living systems obtain and use energy to sustain organization, and maintain homeostasis. They will compare oxidation and reduction reactions, and relate these processes to energy transformation.</li><li>2. Students will apply their knowledge of biochemistry gained in a previous unit to trace the Sun's energy as it is transformed into chemical energy and stored as glucose through the process of photosynthesis.</li><li>3. Students will investigate the metabolism of glucose by the cells of all organisms through the process of cellular respiration. They will also compare different metabolic pathways which allow organisms to harness the energy of organic molecules.</li></ol>
<b>Grade Level(s):</b> <b>11-12</b> -	
<b>Essential Question(s):</b> <ol style="list-style-type: none"><li>1. How do oxidation and reduction reactions relate to energy transfer?</li><li>2. What role do catalysts play in obtaining, storing and releasing energy?</li><li>3. How do organisms obtain energy from organic molecules such as glucose?</li><li>4. What are the advantages and disadvantages of aerobic respiration and anaerobic respiration?</li><li>5. How has natural selection shaped metabolism?</li><li>6. How do plants harness sunlight for the production of organic molecules?</li><li>7. What environmental factors can influence the rate of photosynthesis?</li><li>8. How has natural</li></ol>	<b>Enduring Understanding(s):</b> <ol style="list-style-type: none"><li>1. Energy cannot be created or destroyed, but can change forms.</li><li>2. Transformation of energy and organization of matter is related to the transfer of electrons from one atom to another.</li><li>3. The Sun is the primary source of energy for all living things.</li><li>4. Whether they produce their own food or eat other organisms, all living things undergo respiration, which involves breaking down glucose to release energy, which is then transferred to ATP.</li><li>5. Biochemical pathways of respiration can be either anaerobic or aerobic pathways of respiration. Aerobic respiration, releases much more energy per molecule of glucose than anaerobic respiration.</li><li>6. The metabolism of cells has changed in response to changes in the Earth's atmosphere.</li><li>7. Photosynthesis is the biochemical pathway by which plants convert light energy to chemical energy and then store it in the chemical bonds of glucose.</li><li>8. Factors such as temperature and water availability can alter the rate of photosynthesis.</li><li>9. Some plants show adaptations to compensate for the influence of environmental factors.</li><li>10. Respiration and photosynthesis are equally important to the continuation of life on Earth.</li></ol>

<p>selection shaped photosynthesis?</p> <p>9. How are photosynthesis and respiration related?</p>	
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## PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

### DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

<u>Learning Target</u>	<u>NJCCCS or CCS</u>
<ol style="list-style-type: none"> <li>1. Compare oxidation and reduction reactions, and relate each to the transfer of energy.</li> <li>2. Define catalysts, identify biological catalysts as proteins, and relate structure to function.</li> <li>3. Identify organisms as autotrophs or heterotrophs, and as producers or consumers.</li> <li>4. Identify reactants and products of glycolysis.</li> <li>5. Identify reactants and products of the Krebs Cycle.</li> <li>6. Describe chemiosmosis and relate to ATP production via the Electron Transport Chain of the mitochondria.</li> <li>7. Describe fermentation, and identify importance.</li> <li>8. Compare lactic acid and alcohol fermentation.</li> <li>9. Compare ATP production of anaerobic respiration to aerobic respiration.</li> <li>10. Identify the most likely sequence of events in the evolution of metabolic pathways.</li> <li>11. Write the general formula for aerobic respiration and compare it to the general formula for photosynthesis.</li> <li>12. Describe the structure of the chloroplast.</li> <li>13. Identify photosynthetic pigments and describe the role they play in harvesting sunlight.</li> <li>14. Determine the most efficient wavelength and color of light for photosynthesis.</li> <li>15. Identify the reactants and products of photolysis.</li> <li>16. Identify the reactants and products of the Calvin Cycle.</li> <li>17. Explain the correlation between the light reaction and the Calvin cycle.</li> <li>18. Explain how carbon dioxide and water is consumed, and how oxygen and glucose are produced, in photosynthesis.</li> <li>19. Evaluate the effects of environmental factors on the rate of photosynthesis.</li> <li>20. Compare and contrast photosynthesis and respiration</li> </ol>	<p><b>1. Science:</b> 5.3.12.B.6, 5.3.12.C.1  <b>Other:</b>  7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.11-12.1, 2, 3, 4, 5, 9, 1</p> <p><b>2. Science:</b> 5.1.12.B.2, 5.2.12.B.3, 5.3.12.B.4  <b>Other:</b>  7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.11-12.1, 2, 3, 4, 5, 9, 10</p> <p><b>3. Science:</b> 5.1.12.D.1, 2; 5.4.12.G.2  <b>Other:</b>  2.2.12.B.1, 8.1.12.C.1, 9.1.12.A.1, 9.1.12.B, 9.4O, L.9-10.6 or L.11-12.6, RI.11-12.2, 8, RST.11-12.1, 9, 10, SL.9-10. 1 through 6 or SL.11-12.1 through 6, W.11-12.1, 7, WHST.11-12. 1, 5, 7, 8, 9</p> <p><b>4. Science:</b> 5.3.12.B.4  <b>Other:</b>  7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.11-12.1, 2, 3, 4, 5, 9, 10</p> <p><b>5. Science:</b> 5.3.12.B.4  <b>Other:</b>  7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.11-12.1, 2, 3, 4, 5, 9, 10</p> <p><b>6. Science:</b> 5.3.12.B.3,4  <b>Other:</b>  6.1A, 6.1C, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.11-12.1, 2, 3, 4, 5, 9, 10</p> <p><b>7. Science:</b> 5.3.12.B.1-4  <b>Other:</b></p>

	<p>6.1B, 6.2A, 6.2C, 9.1.12.A.1, 9.1.12.B, 9.4O, RI.11-12, RST.11-12, WHST.11-12</p> <p><b>8. Science:</b> 5.2.12.B.2, 5.2.B.3</p> <p><b>Other:</b> 6.1B, 6.2A, 6.2C, 9.1.12.A.1, 9.1.12.B, 9.4O, RI.11-12, or RST.11-12, WHST.11-12</p> <p><b>9. Science:</b> 5.3.12.B.1-4</p> <p><b>Other:</b> 2.1.12.B.1, 6.1.12.C.13, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, 9.4 O (1), 9.4O (2), RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.11-12.1, 2, 3, 4, 5, 9, 10</p> <p><b>10. Science:</b> 5.3.12.B.4, 5.3.12.C.1</p> <p><b>Other:</b> 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.1.12.F.6, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10, S-ID.1, WHST.11-12.1, 2, 3, 4, 5, 9, 10</p> <p><b>11. Science:</b> 5.3.12.B.1,2,6</p> <p><b>Other:</b> 2.1.12.B.1, 6.1.12.C.13, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, 9.4 O (1), 9.4O (2), RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.11-12.1, 2, 3, 4, 5, 9, 10</p> <p><b>12. Science:</b> 5.3.12.B.5</p> <p><b>Other:</b> 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4A (2), 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.11-12.1, 2, 3, 4, 5, 9, 10</p> <p><b>13. Science:</b> 5.3.12.B.5</p> <p><b>Other:</b> 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4A (2), 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.11-12.1, 2, 3, 4, 5, 9, 10</p> <p><b>14. Science:</b> 5.1.12.B.2, 5.2.12.B.3, 5.3.12.B.5</p> <p><b>Other:</b> 2.2.12.B.1, 8.1.12.A, 8.1.12.C, 8.1.12.D, 8.1.12.E, 8.1.12.F, 8.2.12.F, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.11-12.1 through 10, WHST.11-12.1 through 10, N-R.1 through 3, N-Q.1 through 3, S-ID.1</p> <p><b>15. Science:</b> 5.2.12.B.2, 5.3.12.B.5</p>
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	<p><b>Other:</b> 2.2.12.B.1, 8.1.12.A, 8.1.12.C, 8.1.12.D, 8.1.12.E, 8.1.12.F, 8.2.12.F, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.11-12.1 through 10, WHST.11-12.1 through 10, N-R.1 through 3, N-Q.1 through 3, S-ID.1</p> <p><b>16. Science:</b> 5.3.12.B.1-6</p> <p><b>Other:</b> 2.2.12.B.1, 8.1.12.A, 8.1.12.C, 8.1.12.D, 8.1.12.E, 8.1.12.F, 8.2.12.F, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.11-12.1 through 10, WHST.11-12.1 through 10, N-R.1 through 3, N-Q.1 through 3, S-ID.1</p> <p><b>17. Science:</b> 5.3.12.B.1-5</p> <p><b>Other:</b> 2.1.12.B.1, 6.1.12.C.13, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, 9.4 O (1), 9.4O (2), RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.11-12.1, 2, 3, 4, 5, 9, 10</p> <p><b>18. Science:</b> 5.3.12.B.1-4</p> <p><b>Other:</b> 2.1.12.B.1, 6.1.12.C.13, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, 9.4 O (1), 9.4O (2), RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.11-12.1, 2, 3, 4, 5, 9, 10</p> <p><b>19. Science:</b> 5.3.12.B.4</p> <p><b>Other:</b> 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.11-12.1, 2, 3, 4, 5, 9, 10</p> <p><b>20. Science:</b> 5.3.12.B.4</p> <p><b>Other:</b> 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.11-12.1, 2, 3, 4, 5, 9, 10</p>
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### **Inter-Disciplinary Connections:**

Material presented in this unit connect with art as photosynthesis can be applied to photography:

[http://www.accessexcellence.org/AE/AEC/AEF/1996/morishita\\_pictures.php](http://www.accessexcellence.org/AE/AEC/AEF/1996/morishita_pictures.php)

Material presented in this unit connects with health as students can discuss their nutritional choices relative to diabetes risk.

Material presented in this unit connects with social studies as students can discuss the role of photosynthesis in the development of alternative energy sources (solar, biofuels, etc.)

Literacy strategies such as Think, Pair & Share may also be used.



- examples of strategies and modified strategies are in the District Shared/Science/CURRICULUM WRITING 2013/APBiology/Matter and Energy folder

### **Students will engage with the following text:**

The textbook for this course is *Biology* (Raven and Johnson- 8<sup>th</sup> and 9<sup>th</sup> edition) Other sources of text include articles based on current research as found on scientific blogs and news websites.

The supplementary lab book is AP Biology Investigative Labs, an Inquiry Approach

- examples of strategies and modified strategies are in the District Shared/Science/CURRICULUM WRITING 2013/APBiology/ Heredity folder

### **Accommodations/Modifications**

**Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs (504 plans and/or IEP's if they apply) may include but are not limited to:**

**Make copies and highlight the required reading, allow extra time for reading, give reading materials in advance, provide daily guided questions a day ahead of time in order for the student to participate in class, if students are reading to complete guided notes, then provide page numbers for needed information. Provide student with written summary.**

### **Enrichments and Enhancements**

AP Biology Lab Manual 2001, Baron's Biology Exam Review, The Immortal Life of Henrietta Lacks, <http://education-portal.com/academy/subject/ged-and-high-school.html>, <http://apcentral.collegeboard.com>, <http://www.biologyrocks.org/Support-Materials.html>

### **Students will write:**

Students will use Cornell note-taking strategies, write responses to warm-up questions, analysis questions, conclusions in labs, and open ended questions of exams.

examples of strategies and modified strategies are in the District Shared/Science/CURRICULUM WRITING 2013/APBiology/ Heredity folder

AP Biology Lab Manual- Photosynthesis Lab

AP Biology Lab Manual- Respiration Lab

Students can write lab reports on Plant Pigment Chromatography Lab and Aerobic Exercise and Respiration Lab

Students can perform POGILs (Process-oriented Guided Inquiry Learning) exercises.

### **Accommodations/Modifications**

**Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs (504 plans and/or IEP's if they apply) which may include but not be limited to:**

**Discuss the answer to questions when completed to assess comprehension of all students, provide students with guided notes, reduce the length of writing assignments, provide extra time, and provide extra writing space for students who write with large print. Grade more heavily on content - not on spelling/ grammar/mechanics.**

### Enrichments and Enhancements

Students can research and summarize current research topics. Students can read and summarize current events from newspapers, magazines or internet articles.

## **PART III: TRANSFER OF KNOWLEDGE AND SKILLS**

### **DESCRIBE THE LEARNING EXPERIENCE.**

How will students uncover content and build skills.

Students will:

- Engage with textbook and other reading material as described above
- Actively participate in class discussions (teacher and peer initiated)
- Work collaboratively with peers on various assignments
- Construct and analyze graphs using students collected data
- Communicate lab findings via lab reports

Teachers will:

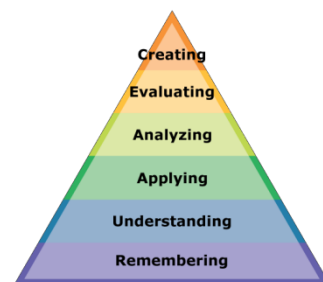
- Utilize Smart Board and Power Point technologies to present definitions, concepts and any other pertinent materials
- Begin class discussions by sharing released AP Exam questions to foster discussion and thought on the topics to be covered
- Include media such as You Tube and other animations to connect concepts to real life applications
- Utilize interactive lectures, inquiry, case study and discussion based lessons

See <http://www.biologyrocks.org/Support-Materials.html> for sample POGILs

## **PART IV: EVIDENCE OF LEARNING**

**IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.**

**IDENTIFY BLOOM'S LEVELS. (Note: Letters in red correspond to learning levels indicated in pyramid on the right)**



### Formative Assessments:

In addition to quizzes, formative assessments include lab reports. Simulated experiments include the Explorelearning.com Gizmo on photosynthesis|

see <http://www.explorelearning.com/index.cfm?method=cResource.dspDetail&ResourceID=395>)(R,U,A,A,E )

Labs include AP Biology Lab Manual- Photosynthesis Lab and AP Biology Lab Manual- Respiration Lab (R,U,A,A,E )

See District Shared/Science/CURRICULUM WRITING 2013/APBiology/Matter and Energy folder for quizzes, labs and POGILs. (R,U,A,A,E )

- examples of assessments and modified assessments are in the District Shared/Science/CURRICULUM WRITING 2013/APBiology/Matter and Energy folder

### **Enrichment/Enhancement:**

Students are given the opportunity for further research on all topics covered in class. They are given access to old AP Biology Exams for examples of questions. Students are also informed and encouraged to use the Baron's AP Biology Review Guide as further enrichment resources for all topics covered.

### **Summative Assessments:**

To demonstrate proficiency on the material presented in this unit, students will be required to take a test that includes multiple choice, matching and open-ended questions. (R,U,A,A,E )

Students will also submit formal lab reports:

AP Biology Lab Manual- Photosynthesis Lab

AP Biology Lab Manual- Respiration Lab

Examples of assessments and modified assessments are in the District Shared/Science/CURRICULUM WRITING 2013/APBiology/Matter and Energy folder

### **Enrichment/Enhancement:**

Students are given the opportunity for further research on all topics covered in class. They are given access to old AP Biology Exams for examples of questions. Students are also informed and encouraged to use the Baron's AP Biology Review Guide as further enrichment resources for all topics covered.

### **Performance Assessments:**

Students can be presented with the case study "The Mystery of the Seven Deaths"

([http://sciencecases.lib.buffalo.edu/cs/collection/detail.asp?case\\_id=431&id=431](http://sciencecases.lib.buffalo.edu/cs/collection/detail.asp?case_id=431&id=431))

Students can prepare PowerPoint presentations on diabetes and other metabolic disorders, including mitochondrial diseases (R,U,A,A,E )

AP Biology Lab Manual- Photosynthesis Lab

AP Biology Lab Manual- Respiration Lab

- examples of assessments and modified assessments are in the District Shared/Science/CURRICULUM WRITING 2013/APBiology/Matter and Energy folder

### **Accommodations/Modifications:**

Due to the rigor of this course, students are expected to research their laboratory topics and cite research within their lab reports. They are expected to use peer reviewed material and are given at least a week to complete all lab reports so that any questions or concerns about the topics can be addressed.

# Black Horse Pike Regional School District Curriculum Template

## AP Biology Curriculum

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21<sup>ST</sup> CENTURY GLOBAL SKILLS

### Unit 4: Heredity

#### PART I: UNIT RATIONALE

##### WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<p><b>Course/Unit Title:</b> AP Biology, Genetics</p> <p><b>Grade Level(s):</b> 11-12</p>	<p><b>Unit Summary:</b></p> <ol style="list-style-type: none"> <li>Students will be introduced to the experiments of Gregor Mendel. By outlining the garden pea plant experiment, Mendel's approach allowed him to reach his conclusions. This will allow students to relate Mendel's discoveries to the current theories of inheritance.</li> <li>Investigating patterns of inheritance, they will conduct monohybrid and dihybrid crosses using the Law of Dominance. They will distinguish between genotype and phenotype and give examples of each. Using Punnett squares, they can recognize the relationship between probability and inheritance. The students will be exposed to a variety of traits in organisms that will be explained by the Law of Incomplete dominance, Co-dominance, Pleiotropic, Polygenic, Epistasis, Sex-linked and Sex Influenced Traits. They will also investigate environmental factors can alter gene expression.</li> <li>The Laws of Independent Assortment and Segregation will be studied to show how genetic information is encoded and transmitted in genes. They will show how alleles segregate when more than one gene is involved. The fact that sorting and recombination of genes in sexual reproduction will result in a variety of offspring will be examined. Finally, the students will identify the gene as a set of instructions for the cells and ultimately for the organism.</li> <li>With knowledge of genetics, a pedigree can be used to predict the genotype of the ancestors by observing the phenotype of the offspring. The students will have an opportunity to create a pedigree of their family to describe how the genetic information was passed through their family.</li> <li>A mutation in a gene can cause disorders and diseases in all organisms. The students will examine how genetic material can be altered by natural and artificial means, and cause mutations, whether they are beneficial or harmful. Genetic disorders that are caused by non-disjunction will be discussed.</li> </ol>
<p><b>Essential Question(s):</b></p> <p>Based on his observations of his pea plant experiments, how was Gregor Mendel able to contribute to our understanding of genetics? How is genetic information</p>	<p><b>Enduring Understanding(s):</b></p> <p>Organisms get their traits from genetic material that is held in the DNA of the genes. This can be passed to future generations in a systematic manner. Organisms contain genetic information that influences their traits, and they pass this on to their offspring during reproduction. There are predictable patterns of inheritance that can be determined by using Punnett squares. The DNA is the universal code for life, and it enables an organism to transmit its hereditary material to future</p>

<p>passed through the generations?</p> <p>How do alleles segregate when more than one gene is involved?</p> <p>How do inheritance patterns differ when the Law of Dominance is not followed.</p> <p>How can the information learned from pedigrees determine the nature of genes and alleles associated with inherited human traits?</p> <p>Does the environment determine traits?</p>	<p>generations.</p> <p>Independent assortment helps account for the many genetic variations observed in plants, animals and other organisms, even when they have the same parents.</p> <p>Some traits are passed to offspring via inheritance patterns that vary from Dominant/Recessive patterns</p> <p>The pedigree will help trace the inheritance pattern by looking at the known phenotype of a single trait. With pedigree analysis, it is possible to apply the principles of Mendelian genetics to some human traits.</p> <p>There are potential impacts on the organism due to a change in the DNA that is caused by mutations due to environmental conditions. The value and potential application of the Genome project will open up opportunities to find cures/treatments for genetic disorders.</p>
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## PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

### DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

<u>Learning Target</u>	<u>NJCCCS or CCS</u>
<ol style="list-style-type: none"> <li>Using the traits of dominant and recessive, explain how Mendel's experiment contributed to the Laws of Heredity. Using the results of Mendel's experiment on garden peas, describe how his data could be explained by scientific knowledge of genes and chromosomes.</li> <li>Identify genes as a set of instructions, coded in the DNA sequence of each organism.</li> <li>Explain how probability is used to predict the results of monohybrid and dihybrid crosses. Define and distinguish between complete dominance, incomplete dominance and co-dominance.</li> <li>Explain how a testcross is used to show the genotype of an individual whose phenotype is dominant.</li> <li>Explain the role of sex chromosomes in sex determination.</li> <li>Explain the effect of crossing-over on the inheritance of genes in linkage groups.</li> <li>Show how pedigree analysis can be used to illustrate the inheritance of traits.</li> <li>Give examples of traits or disorders transmitted by</li> </ol>	<p><b>1. Science:</b> 5.1.12 A1, A2, A3 5.2.12 A1, B1, B2 5.3.12 A1</p> <p><b>Other:</b> 8.1.12.A, 8.1.12.C, 8.1.12.D, 8.1.12.E, 8.1.12.F, 8.2.12.F, 8.2G, 9.1.12.A.1, 9.1.12.B, , 9.1F, 9.4O, 9.4O(2), RST.11-12.1 through 10, N-R.1 through 3, N-Q.1 through 3, S-ID.1</p> <p><b>2-4. Science:</b> 5.1.12 A1,2,3 5.1.12 B1,2,3 5.3.12 D.1 5.3.12 A1 5.1.12 C1,2,3 5.5.12C1, 3 5.3.12C1, D1</p> <p><b>Other:</b> 2.1.12.B.3, 6.1.12.C.12, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10</p> <p><b>5. Science:</b> 5.1.12 A1,2,3 5.1.12 B1,2,3 5.3.12 D.1 5.3.12 A1</p> <p><b>Other:</b> 2.1.12.B.3, 6.1.12.C.12, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10</p> <p><b>6-7. Science:</b> 5.1.12 A1,2,3 5.1.12 B1,2,3 5.3.12 D.1 5.3.12 A1 5.1.12 C1,2,3 5.5.12C1, 3 5.3.12C1, D1</p>

<p>autosomal dominant, autosomal recessive, polygenic, sex-linked, pleiotropic, epistatic, and sex-influenced inheritance.</p> <p><b>9.</b> Explain how non-disjunction can cause genetic disorders.</p> <p><b>10.</b> Explain the value and potential applications of genome projects.</p>	<p><b>Other:</b> 2.2.12.B.1, 8.1.12.A, 8.1.12.C, 8.1.12.D, 8.1.12.E, 8.1.12.F, 8.2.12.F, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.11-12.1 through 10, WHST.11-12.1 through 10, N-R.1 through 3, N-Q.1 through 3, S-ID.1</p> <p><b>8-9. Science:</b> 5.1.12 A3 5.1.12 B1, 2, 3,4, 5.1.12 C1,2,3</p> <p><b>Other:</b> 2.2.12.B.1, 8.1.12.A, 8.1.12.C, 8.1.12.D, 8.1.12.E, 8.1.12.F, 8.2.12.F, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.11-12.1 through 10, WHST.11-12.1 through 10, N-R.1 through 3, N-Q.1 through 3, S-ID.1</p> <p><b>10. Science:</b> 5.3.12 D1, 2,3 5.3.12 C2 5.3.12A5</p> <p><b>Other:</b> 2.1.12.A.2, 6.1.12.C.12, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10, S-ID.2, 9, S-IC.6,, S-MD.2, 5, 7, WHST.11-12.1, 2, 3, 4, 5, 9, 10</p>
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### **Inter-Disciplinary Connections:**

Material presented in this section will connect content from history as students are exposed to various scientists and their contributions to the genetic theories.

Concepts from technology will be covered as students conduct research using the LMC on disorders and diseases due to mutations in the genes. To meet their requirement on technology, they will be putting this report in their electronic portfolio.

Using their knowledge of genetics, they will design, and draw, an organism that can live in a particular environment and write about the characteristics that enabled it to live there. They will include how the organism might have gotten these characteristics and how the future generation might be affected.

- examples of strategies and modified strategies are in the District Shared/Science/CURRICULUM WRITING 2013/APBiology/ Heredity folder

### **Students will engage with the following text:**

The textbook for this course is *Biology* (Raven and Johnson- 9<sup>th</sup> edition) Other sources of text include articles based on current research as found on scientific blogs and news websites.

The supplementary lab book is AP Lab Manual printed by the College Board.

- examples of strategies and modified strategies are in the District Shared/Science/CURRICULUM WRITING 2013/APBiology/ Heredity folder

### **Accommodations/Modifications**

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs (504 plans and/or IEP's if they apply) may include but are not limited to:

Make copies and highlight the required reading, allow extra time for reading, give reading materials in advance, provide daily guided questions a day ahead of time in order for the student to participate in class, if students are reading to complete guided notes, then provide page numbers for needed information. Provide student with written summary.

### **Enrichments and Enhancements**

AP Biology Lab Manual 2001, Baron's Biology Exam Review, The Immortal Life of Henrietta Lacks, <http://education-portal.com/academy/subject/ged-and-high-school.html>, <http://apcentral.collegeboard.com>, <http://www.biologyrocks.org/Support-Materials.html>

### **Students will write:**

Students will use Cornell note-taking strategies, write responses to warm-up questions, analysis questions, and conclusions in labs.

Investigation I: Artificial Selection

Investigation II: Mathematical Modeling: Hardy-Weinberg

examples of strategies and modified strategies are in the District Shared/Science/CURRICULUM WRITING 2013/APBiology/ Heredity folder

They will write a story analysis based on principles of genetics. For example, they will design a plant farm that will produce the most # of desired traits that will be economically successful.

They will design an interview with Gregor Mendel to discuss his findings from his pea plant experiments.

Write a fictional story defending or supporting the paternity of a child based on the phenotype of the paternal line of ancestors.

After researching biological careers in the field of genetics, they will write about careers such as forensics, plant breeders, population geneticists and etc.

### **Accommodations/Modifications**

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs (504 plans and/or IEP's if they apply) which may include but not be limited to:

Discuss the answer to questions when completed to assess comprehension of all students, provide students with guided notes, reduce the length of writing assignments, provide extra time, and provide extra writing space for students who write with large print. Grade more heavily on content - not on spelling/grammar/mechanics.

### **Enrichments and Enhancements**

Students can research and summarize current research topics. Students can read and summarize current events from newspapers, magazines or internet articles.

### PART III: TRANSFER OF KNOWLEDGE AND SKILLS

#### DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

Students will:

Engage with textbook and other reading material as described above

Use Cornell note-taking strategies during direct instruction facilitated by Power Point, Prezi and other technology based visual aids.

They will provide written responses to warm-up questions and exit ticket closures.

Use Gizmos, Qwizdom

They will actively participate in class discussions; work collaboratively with peers to complete labs.

They will work with their family while they are researching family traits.

The students will provide written responses to questions on labs and homework assignments, and write conclusions.

Teachers will:

Utilize Smart Board and Power Point technologies to present definitions, concepts and any other pertinent materials

Begin class discussions by sharing released AP Exam questions to foster discussion and thought on the topics to be covered

Include media such as You Tube and other animations to connect concepts to real life applications

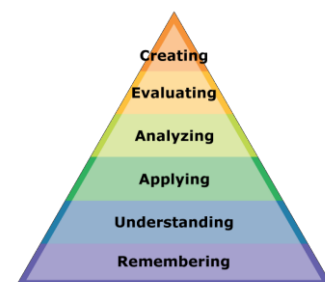
Utilize interactive lectures, inquiry, case study and discussion based lessons

See <http://www.biologyrocks.org/Support-Materials.html> for sample POGILs

### PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

IDENTIFY BLOOM'S LEVELS. (Note: Letters in red correspond to learning levels indicated in pyramid on the right)



#### Formative Assessments:

In addition to quizzes, formative assessments include modeling activities, lab reports and marked homework.

See <http://www.explorelearning.com/index.cfm?method=cResource.dspDetail&ResourceID=395> (R,U,A,A,E)

Students may demonstrate knowledge of genetics by completing Punnett squares. (R,U,A,A)

The Pedigree poster that shows their family's trait passed down. (R,U,A,A,E,C)



The Genetic Disorder Report. (R, U, A, C)

Mini-Symposium on Genetic Disorders (R, U, A)

- examples of assessments and modified assessments are in the District Shared/Science/CURRICULUM WRITING 2013/APBiology/ Heredity folder

### **Enrichment/Enhancement:**

Students are given the opportunity for further research on all topics covered in class. They are given access to old AP Biology Exams for examples of questions. Students are also informed and encouraged to use the Baron's AP Biology Review Guide as further enrichment resources for all topics covered.

### **Summative Assessments:**

To demonstrate proficiency on the material presented in this unit, students will be required to take a test that includes multiple choice, matching and open-ended questions. (R,U,A,A,E )

Students will also submit formal lab reports:

Investigation I: Artificial Selection

Investigation II: Mathematical Modeling: Hardy-Weinberg

examples of assessments and modified assessments are in the District Shared/Science/CURRICULUM WRITING 2013/APBiology/ Heredity folder

### **Enrichment/Enhancement:**

Students are given the opportunity for further research on all topics covered in class. They are given access to old AP Biology Exams for examples of questions. Students are also informed and encouraged to use the Baron's AP Biology Review Guide as further enrichment resources for all topics covered.

### **Performance Assessments:**

Conduct lab experiments and present conclusions.

Heads Up cross to show dominant /recessive traits (R, U)

The Principles of Genetics to show dihybrid cross (R, U, Ap, An)

Constructing a Human Pedigree (R, U, Ap, E)

Investigation I: Artificial Selection

Investigation II: Mathematical Modeling: Hardy-Weinberg

- examples of assessments and modified assessments are in the District Shared/Science/CURRICULUM WRITING 2013/APBiology/ Heredity folder

**Accommodations/Modifications:**

Due to the rigor of this course, students are expected to research their laboratory topics and cite research within their lab reports. They are expected to use peer reviewed material and are given at least a week to complete all lab reports so that any questions or concerns about the topics can be addressed.

# Black Horse Pike Regional School District Curriculum Template

## Biology Curriculum

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21<sup>ST</sup> CENTURY GLOBAL SKILLS

### Unit 5: Molecular Genetics

#### PART I: UNIT RATIONALE

#### WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<p><b>Course/Unit Title:</b> Advanced Placement Biology/ Unit 5: Molecular Genetics</p> <p><b>Grade Level(s):</b> 11-12</p>	<p><b>Unit Summary:</b></p> <ol style="list-style-type: none"> <li>1. The components that make up the structure of the nucleic acids, DNA and RNA, will be examined. They will learn about the experiments that helped reveal the structure and function of DNA as well as how DNA replicates. The students will be looking at the community of the scientists such as Watson, Crick, Franklin and Chargaff who contributed to the breakthroughs in our understanding of the natural world.</li> <li>2. The processes of DNA replication, transcription and translation in protein synthesis will be explained using the base-pairing rule. Transcription and translation will connect the process of protein synthesis, and the students will follow this process from the original DNA sequence to the final synthesized protein by specifying the sequence of amino acids in the proteins. This will be the link that carries them to the study of genetics which show the characteristics of that organism.</li> <li>3. A mutation in the code of the DNA can cause genetic disorders. These disorders will be researched and examined to find the affected chromosome, cause and sometimes preventative measures.</li> <li>4. Mutations will provide for the diversity and changing of life forms over many generations by passing those traits to their offspring. This leads to the differences of the same kind of organism which may provide advantages for surviving and reproducing.</li> <li>5. Advances in Modern Genetics have opened opportunities to manipulate DNA in many ways. Applications of DNA modification range from agriculture to medicine.</li> </ol>
<p><b>Essential Question(s):</b></p> <ol style="list-style-type: none"> <li>1. What is the structure of DNA, and how does it function in genetic inheritance?</li> <li>2. How was the structure of DNA / RNA discovered?</li> <li>3. How does DNA replicate? What role does DNA polymerase play in copying DNA?</li> <li>4. How does information flow from DNA to RNA to direct</li> </ol>	<p><b>Enduring Understanding(s):</b></p> <ol style="list-style-type: none"> <li>1. DNA is the universal code for life that enables an organism to transmit hereditary information. The genes act as a set of instructions, encoded in the DNA sequence of nucleotides of each organism. This will specify the sequence of amino acids in proteins which will form the traits of an organism. It has the ability to store, copy and transmit the genetic information.</li> <li>2. Scientists build on the work of others to discover the structure of DNA. Watson and Crick built on the work of Franklin, Wilkins, Avery, Meselson, Hershey and Chase. As technology developed and advanced, so did the ability to further explore the cell at the molecular level.</li> <li>3. The function of DNA polymerase uses the base-pairing rule. The double-</li> </ol>

<p>the synthesis of proteins?</p> <p>5. How can DNA be manipulated, and what are the current and potential applications of this technology?</p>	<p>helix model explains Chargaff's rule of base pairing and how the two strands of DNA are held together.</p> <p>4. DNA carries information for specifying the traits of the organism. The cell uses the sequence of the bases in DNA as a template for making mRNA. The codons of mRNA specify the sequence of amino acids in proteins. Proteins, in turn, play a key role in producing an organism's traits.</p> <p>5. DNA sequences can be moved from one organism into another. These sequences can be used to create recombinant organisms which have desired characteristics. It can also be used to correct DNA mutations, and treat genetic disorders and diseases.</p>
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## PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

### DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

<u>Learning Target</u>	<u>NJCCCS or CCS</u>
<ol style="list-style-type: none"> <li>Discuss the experiments leading to the identification of DNA as the molecule that carries the genetic code.</li> <li>Identify the chemical components of DNA.</li> <li>Summarize the events of DNA replication.</li> <li>Compare DNA replication in prokaryotes with that of eukaryotes.</li> <li>Contrast RNA with DNA.</li> <li>Explain the process of transcription.</li> <li>Identify the genetic code and explain how it is read.</li> <li>Summarize the process of translation.</li> <li>Define mutations and describe different types of mutations.</li> <li>Describe the effects mutations can have on genes.</li> <li>Relate mutations to genetic diversity.</li> <li>Describe the role of Restriction Enzymes and vectors in creating transgenic organisms.</li> <li>Describe medical and agricultural applications of Recombinant DNA.</li> <li>Describe procedure and applications of RFLP analysis.</li> </ol>	<p><b>1,2. Science:</b> 5.1.12 A1, 3,5.1.B1,2,4,5.1.12 C1,2,3,5.3.12 A1</p> <p><b>Other:</b> 2.1.12.A.2, 6.1.12.C.12, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10, S-ID.2, 9, S-IC.6., S-MD.2, 5, 7, WHST.11-12.1, 2, 3, 4, 5, 9, 10</p> <p><b>3-8. Science:</b> 5.3.12 C1, C2</p> <p><b>Other:</b> 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.1.12.F.6, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10, S-ID.1, WHST.11-12.1, 2, 3, 4, 5, 9, 10</p> <p><b>9-11. Science:</b> 5.3.12 E1, E2</p> <p><b>Other:</b> 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10, S-CP.1, 3, 5, 8, S-MD.2, 5, WHST.11-12.1, 2, 3, 4, 5, 9, 10</p> <p><b>12-14. Science:</b> 5.3.12 C1,2</p> <p><b>Other:</b> 2.2.12.B.1, 6.1.12.B.6, 6.1.12.C.12, 6.1.12.C.13, 6.1.12.B.16, 6.1.12.C.16, 6.2.12.C.3, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.1.12.F.6, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10, S-ID.1, WHST.11-12.1, 2, 3, 4, 5, 9, 10</p>

### **Inter-Disciplinary Connections:**

Material presented in this section will connect with material in Math, History, Language Arts and 21<sup>st</sup> Century Life and Careers.

BLAST lab- AP Biology Lab Manual investigation 3

Bacterial Transformation lab- AP Lab Manual investigation 8

Restriction Enzyme Analysis lab- AP Lab Manual investigation 9

- examples of strategies and modified strategies are in the District Shared/Science/CURRICULUM WRITING 2013/APBiology/molecular genetics folder

### **Students will engage with the following text:**

The textbook for this course is *Biology* (Raven and Johnson- 9<sup>th</sup> edition) Other sources of text include articles based on current research as found on scientific blogs and news websites.

The supplementary lab book is AP Biology Investigative Labs, an Inquiry Approach

- examples of strategies and modified strategies are in the District Shared/Science/CURRICULUM WRITING 2013/APBiology/ molecular genetics folder

#### **Accommodations/Modifications**

**Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs (504 plans and/or IEP's if they apply) may include but are not limited to:**

**Make copies and highlight the required reading, allow extra time for reading, give reading materials in advance, provide daily guided questions a day ahead of time in order for the student to participate in class, if students are reading to complete guided notes, then provide page numbers for needed information. Provide student with written summary.**

#### **Enrichments and Enhancements**

AP Biology Lab Manual 2001, Baron's Biology Exam Review, The Immortal Life of Henrietta Lacks, <http://education-portal.com/academy/subject/ged-and-high-school.html>, <http://apcentral.collegeboard.com>, <http://www.biologyrocks.org/Support-Materials.html>

### **Students will write:**

Students will use Cornell note-taking strategies, write responses to warm-up questions, analysis questions, and conclusions in labs.

BLAST lab- AP Biology Lab Manual investigation 3

Bacterial Transformation lab- AP Lab Manual investigation 8

Restriction Enzyme Analysis lab- AP Lab Manual investigation 9

- examples of strategies and modified strategies are in the District Shared/Science/CURRICULUM WRITING 2013/APBiology/molecular genetics folder

#### **Accommodations/Modifications**

**Accommodations and/or modifications will be made on a case by case basis in accordance with individual**

student needs (504 plans and/or IEP's if they apply) which may include but not be limited to:

Discuss the answer to questions when completed to assess comprehension of all students, provide students with guided notes, reduce the length of writing assignments, provide extra time, and provide extra writing space for students who write with large print. Grade more heavily on content - not on spelling/grammar/mechanics.

#### Enrichments and Enhancements

Students can research and summarize current research topics. Students can read and summarize current events from newspapers, magazines or internet articles.

### **PART III: TRANSFER OF KNOWLEDGE AND SKILLS**

**DESCRIBE THE LEARNING EXPERIENCE.**

**How will students uncover content and build skills.**

Students will:

- Engage with textbook and other reading material as described above
- Actively participate in class discussions (teacher and peer initiated)
- Work collaboratively with peers on various assignments
- Construct and analyze graphs using students collected data
- Communicate lab findings via lab reports

Teachers will:

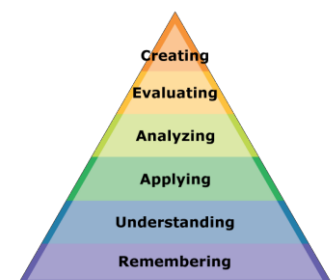
- Utilize SmartBoard and Power Point technologies to present definitions, concepts and any other pertinent materials
- Begin class discussions by sharing released AP Exam questions to foster discussion and thought on the topics to be covered
- Include media such as You Tube and other animations to connect concepts to real life applications
- Utilize interactive lectures, inquiry, case study and discussion based lessons

See <http://www.biologyrocks.org/Support-Materials.html> for sample POGILs

### **PART IV: EVIDENCE OF LEARNING**

**IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.**

**IDENTIFY BLOOM'S LEVELS. (Note: Letters in red correspond to learning levels indicated in pyramid on the right)**



### **Formative Assessments:**

In addition to quizzes, formative assessments include modeling activities and lab reports.

Labs include:

BLAST lab- AP Biology Lab Manual investigation 3

Bacterial Transformation lab- AP Lab Manual investigation 8

Restriction Enzyme Analysis lab- AP Lab Manual investigation 9

Students will demonstrate knowledge of DNA and protein synthesis by completing charts using the base pairing rule to go from DNA, to m-RNA, to t-RNA, to amino acid, and finally to the correct protein.

The DNA model that they build will show the correct base pairing rule. (R,U,A,E)

By acting as the m-RNA and acting out transcription and translation to come up with a sensible sentence in the lab Protein Synthesis \*\* (R, U, A, An ,E,C)

By completing lab activity #26 that links the genetic disorder to the incorrect transfer of bases. \*\* (R, U, A, An, E)

- examples of assessments and modified assessments are in the District Shared/Science/CURRICULUM WRITING 2013/APBiology/molecular genetics folder

### **Enrichment/Enhancement:**

Students are given the opportunity for further research on all topics covered in class. They are given access to old AP Biology Exams for examples of questions. Students are also informed and encouraged to use the Baron's AP Biology Review Guide as further enrichment resources for all topics covered.

### **Summative Assessments:**

To demonstrate proficiency on the material presented in this unit, students will be required to take a test that includes multiple choice, matching and open-ended questions. (R,U,A,A,E )

Students will also submit formal lab reports:

BLAST lab- AP Biology Lab Manual investigation 3

Bacterial Transformation lab- AP Lab Manual investigation 8

Restriction Enzyme Analysis lab- AP Lab Manual investigation 9

Examples of assessments and modified assessments are in the District Shared/Science/CURRICULUM WRITING 2013/APBiology/molecular genetics folder

### **Performance Assessments:**

Conduct lab experiments and present conclusions.

BLAST lab- AP Biology Lab Manual investigation 3

Bacterial Transformation lab- AP Lab Manual investigation 8

Restriction Enzyme Analysis lab- AP Lab Manual investigation 9

Build a model of DNA using the base pairing rule and indicate which amino acids will be formed

together. (R, U, An, A, E, C)

- examples of assessments and modified assessments are in the District Shared/Science/CURRICULUM WRITING 2013/APBiology/molecular genetics folder |

**Accommodations/Modifications:**

**Due to the rigor of this course, students are expected to research their laboratory topics and cite research within their lab reports. They are expected to use peer reviewed material and are given at least a week to complete all lab reports so that any questions or concerns about the topics can be addressed. |**



# Black Horse Pike Regional School District Curriculum

## Advanced Placement Biology Curriculum

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21<sup>ST</sup> CENTURY GLOBAL SKILLS

### Unit 6: Evolutionary Biology

#### PART I: UNIT RATIONALE

#### WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<p><b>Course/Unit Title:</b> Advanced Placement Biology</p> <p><b>Grade Level(s):</b> 11-12</p>	<p><b>Unit Summary:</b></p> <ol style="list-style-type: none"> <li>1. Students will discover the historical evolution of life on Earth and be able to discuss the ideas of the scientists/experiments which have significant contributions to the field. This unit will also investigate how ideas have changed as new evidence was discovered. Students will investigate how increased knowledge of genetics has influenced the field of evolutionary biology.</li> <li>2. Students will identify the evidence supporting the theory of evolution. Students will describe anatomical, fossil, biogeographic, genetic and human influenced evidence for evolution. Students will experiment with and describe using BLAST resources to show evolutionary relationships.</li> <li>3. Students will be able to explain the mechanisms of evolutionary change. Students will describe artificial and natural selection through experiments and case studies. Students will investigate the requirements for speciation and the different paces of evolution.</li> </ol>
<p><b>Essential Question(s):</b></p> <ol style="list-style-type: none"> <li>1. How has life changed on Earth?</li> <li>2. How was the theory of evolution developed?</li> <li>3. How can we provide evidence for the theory of evolution?</li> <li>4. How can we visually see evolution in action?</li> <li>5. How do organisms evolve and create new species?</li> </ol>	<p><b>Enduring Understanding(s):</b></p> <ol style="list-style-type: none"> <li>1. There are several hypotheses about the natural origin of life on Earth, each with supporting scientific evidence. There is no “perfect” organism, the interactions of the environment and phenotype determines the fitness of the individual and can direct change.</li> <li>2. Building on the work of other geologists and biologists, Charles Darwin developed the theory of evolution by natural selection by collecting and analyzing data from the fossil record, anatomy, biogeography, and other sources to initiate a framework of life’s history from simple prokaryotic cells to the amazing diversity found in life’s six kingdoms.</li> <li>3. Biological evolution is supported by scientific evidence from many disciplines: geographical, geological, physical, chemical, mathematical. Molecular, morphological and genetic information of existing and extinct organisms add to our understanding of evolution.</li> <li>4. Professionals in fields ranging from food production, pharmaceuticals and medicines apply the principles of natural selection in order to solve problems in medicine, agriculture and many other human endeavors. Environments change and act as selective mechanisms on the evolution of populations such as the Peppered moth.</li> <li>5. Natural selection acts on phenotypic variations in populations.</li> </ol>

Evolutionary change can also be driven by random processes. When these mechanisms lead to populations of a species becoming reproductively isolated, speciation may occur.

## PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

### DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

<u>Learning Target</u>	<u>NJCCCS or CCS</u>
Origins	<p><b>1. Science:</b> 5.3.12.E.3</p> <p><b>Other:</b> 2.1.12.B.1, 6.1.12.C.13, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10</p>
<ol style="list-style-type: none"> <li>Evaluate hypotheses about the origin of life on earth, citing evidence where possible.</li> <li>Describe the probable conditions of the early earth.</li> <li>Interpret the Miller-Urey experiment.</li> <li>Sequence important events in the history of life on Earth</li> </ol>	<p><b>2. Science:</b> 5.3.12.E.3, 5.4.12.B.1</p> <p><b>Other:</b> 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10</p>
Evolutionary Theory	<p><b>3. Science:</b> 5.1.12.A.1, 5.3.12.E.3, 5.4.12.B.1</p> <p><b>Other:</b> 7.1.IL.A.7, 8.1.12.A, 8.1.12.C, 8.1.12.D, 8.1.12.E, 8.1.12.F, 8.2.12.F, 9.1.12.A.1, 9.1.12.B, 9.1F, 9.4O, RST.11-12.1 through 10, N-R.1 through 3, N-Q.1 through 3, S-ID.1</p>
<ol style="list-style-type: none"> <li>Identify important insights and discoveries towards the development of the theory of evolution.</li> <li>Cite evidence for evolution by natural selection</li> </ol>	<p><b>4. Science:</b> 5.3.12.E.2</p> <p><b>Other:</b> 6.1.12.C.12, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.1.12.F.6, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.11-12.1, 2, 3, 4, 5, 9, 10</p>
Evolutionary Mechanisms	<p><b>5. Science:</b> 5.1.12.A.1, B.3, C.1, 5.3.12.E.2</p> <p><b>Other:</b> 6.1.12.C.12, 7.1.IL.A.7, 8.1.12.A, 8.1.12.C, 8.1.12.D, 8.1.12.E, 8.1.12.F, 8.2.12.F, 8.2G 9.1.12.A.1, 9.1.12.B, 9.1.12.F.6, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.11-12.1, 2, 3, 4, 5, 9, 10</p>
<ol style="list-style-type: none"> <li>Explain the process of natural selection including specific examples.</li> <li>Explain how the processes of artificial selection, genetic drift, gene flow and genetic mutation influence evolution including specific examples.</li> </ol>	<p><b>6. Science:</b> 5.3.12.E.2</p> <p><b>Other:</b> 6.1.12.C.12, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.1.12.F.6, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.11-12.1, 2, 3, 4, 5, 9, 10</p>
Speciation	<p><b>7. Science:</b> 5.3.12.E.2</p> <p><b>Other:</b> 6.1.12.C.12, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.1.12.F.6, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.11-12.1, 2, 3, 4, 5, 9, 10</p>
<ol style="list-style-type: none"> <li>Explain the process of speciation through reproductive isolation.</li> <li>Describe the mechanisms that can lead to reproductive isolation.</li> </ol>	<p><b>7. Science:</b> 5.3.12.E.2</p> <p><b>Other:</b> 6.1.12.C.12, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.1.12.F.6, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.11-12.1, 2, 3, 4, 5, 9, 10</p>

	<p><b>8. Science:</b> 5.3.12.E.2</p> <p><b>Other:</b> 6.1.12.C.12, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.1.12.F.6, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.11-12.1, 2, 3, 4, 5, 9, 10, 8.1.12.E.1, A-CED.4, A-REI.1,2</p> <p><b>9. Science:</b> 5.3.12.E.2</p> <p><b>Other:</b> 6.1.12.C.12, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.1.12.F.6, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.11-12.1, 2, 3, 4, 5, 9, 10</p> <p><b>10. Science:</b> 5.3.12.E.2</p> <p><b>Other:</b> 6.1.12.C.12, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.1.12.F.6, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.11-12.1, 2, 3, 4, 5, 9, 10</p>
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### **Inter-Disciplinary Connections:**

Throughout the course students are required to write lab reports on all laboratory activities performed. Within the lab reports students are expected to analyze their data and create tables and graphs. Students use their English and Math skills throughout the year within this framework.

Student will be investigating major scientific discoveries/ideas and their relationship to the time in which the discoveries were made as well as their impact on societal thought of the era, which relates to History.

Students will be using the Hardy-Weinberg equation to investigate evolution which relates to Math.

Students will be using computers to investigate BLAST to find evolutionary relationships which relates to Technology  
- examples of strategies and modified strategies are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 6 Evolution

### **Students will engage with the following text:**

Raven Biology 9<sup>th</sup> Edition.

Supplemental texts include

1. AP Biology Investigative Labs: An Inquiry-Based Approach by College Board
2. Biology Lab Manual 2001 Edition by College Board
3. Baron's Biology Exam Review

examples of strategies and modified strategies are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 6 Evolution

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs (504 plans or IEP's if they apply). They may include but not be limited to:

**Enrichment/Enhancement**

Due to the high rigor of the course students will often need additional resources. Additional reading and enrichment activities are provided on an as needed basis. There are also after school study sessions available for students who benefit from the extra individual attention. In addition students are directed to the AP Central website for additional practice essays and sample AP test questions.

**Students will write:**

Students perform multiple inquiry based labs throughout the year. Each lab requires an in depth lab report. The following college level rubric must be followed.

Rubric

The purpose of the course is to prepare students for the AP Biology Exam. Due to this expectation students are given old AP Biology Exam questions as part of each of their tests. They are graded based on the College Board AP Biology Essay Rubrics available on the following website: <http://www.wsfcs.k12.nc.us/Page/1643>

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs (504 plans or IEP's if they apply). They may include but not be limited to:

**Enrichment/Enhancement**

Due to the rigor of this course students are expected to research their laboratory topics and cite research within their lab reports. They are expected to use peer reviewed material and are given at least a week to complete all lab reports so that any questions or concerns about the topics can be addressed.

## **PART III: TRANSFER OF KNOWLEDGE AND SKILLS**

**DESCRIBE THE LEARNING EXPERIENCE.**

**How will students uncover content and build skills.**

**Students will:**

- Engage with textbook and other reading materials as described above
- Actively participate in class discussions both teacher and peer initiated
- Work collaboratively with peers on various assignments, labs, and/or projects
- Design and conduct laboratory experiments (see example in assessment section)
- Construct and analyze graphs using student collected and instructor provided data
- Communicate laboratory findings through lab reports.

**Teacher will :**

- Utilize SmartBoard and PowerPoint technologies to present definitions, concepts and any other pertinent materials
- Start Class with an applicable old AP Biology Test Question to stem discussion and thought on the topics being covered.
- Include media such as You Tube and other animations to connect concepts to real life applications or to further appeal to audio-visual learners.

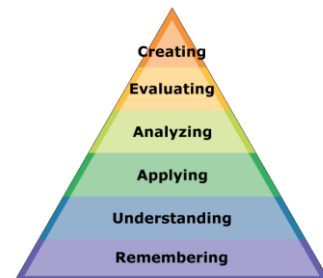
- examples of strategies and modified strategies are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 6 Evolution

- supplemental materials for the instructor can also be found on the AP Central website where a focus on evolution led to the development of a special focus on evolution and change

## PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

IDENTIFY BLOOM'S LEVELS. **Note: Letters in red correspond to learning levels indicated in pyramid on the right}**



### Formative Assessments:

Formative assessments will be in the form of periodic quizzes, lab exercises and extemporaneous teacher evaluations during class such as various concept reinforcement worksheets.

Examples:

Chapter 20 Study Guide/ Essential Questions (R, U, Ap, An, E)

Chapter 21 Study Guide/Essential Questions (R, U, Ap, An, E)

Chapter 22 Study Guide/Essential Questions (R, U, Ap, An, E)

- examples of assessments and modified assessments are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 6 Evolution

### Enrichment/Enhancement:

Students are given the opportunity for further research and discussion on all topics covered in class. They are given access to old AP Biology Exams for examples of questions. Students are also informed and encouraged to use the Baron's AP Biology Review Guide as a further enrichment resource for all topics covered.

### Summative Assessments:

Students will be required to take a test to demonstrate proficiency on the material presented in this unit.

Students may also submit formal lab reports.

Examples:

AP Biology Lab 8 ( Lab 2 in AP Biology Investigative Labs Book) Population Genetics and Evolution (R, U, Ap, An, E, C)

AP Biology Investigative Lab 1 Artificial Selection (R, U, Ap, An, E, C)

AP Biology Investigative Lab 3 Comparing DNA Sequences to Understand Evolutionary Relationships with BLAST (R, U, Ap, An, E, C)

Tests consist of old AP Biology Exam Multiple Choice and Essay Questions, they can be found on the following website [www.classmarker.com](http://www.classmarker.com). (R, U, Ap, An, E, C)

- examples of assessments and modified assessments are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 6 Evolution

### Enrichment/ Enhancement:

Due to the rigor of this course students are expected to research their laboratory topics and cite research within their lab reports. They are expected to use peer reviewed material and are given at least a week to complete all lab reports so that any questions or concerns about the topics can be addressed.

### **Performance Assessments:**

**Design and conduct laboratory experiments and present conclusions in laboratory reports.**

Examples

AP Biology Lab 8 ( Lab 2 in AP Biology Investigative Labs Book) Population Genetics and Evolution (R, U, Ap, An, E, C)

AP Biology Investigative Lab 1 Artificial Selection (R, U, Ap, An, E, C)

AP Biology Investigative Lab 3 Comparing DNA Sequences to Understand Evolutionary Relationships with BLAST (R, U, Ap, An, E, C)

- examples of assessments and modified assessments are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 6 Evolution

### **Accommodations/Modifications:**

Due to the rigor of this course students are expected to research their laboratory topics and cite research within their lab reports. They are expected to use peer reviewed material and are given at least a week to complete all lab reports so that any questions or concerns about the topics can be addressed.

# Black Horse Pike Regional School District Curriculum

## Advanced Placement Biology Curriculum

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21<sup>ST</sup> CENTURY GLOBAL SKILLS

### Unit 7: Diversity of Organisms

#### PART I: UNIT RATIONALE

##### WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<b>Course/Unit Title:</b> Advanced Placement Biology	<b>Unit Summary:</b> <ol style="list-style-type: none"> <li>Students will distinguish evolutionary patterns among organisms. They will be able to trace patterns in their development, functions and structures and relate them to their ability to survive in differing environments.</li> <li>Students will identify the characteristics of Domains, Kingdoms, and selected Phyla of organisms. Students will describe how these organisms relate to each other and how their diversity arose.</li> <li>Students will be able to explain the mechanisms of phylogenetic classification. Students will be able to construct a phylogenetic tree to explain evolutionary relationships in organisms.</li> </ol>
<b>Grade Level(s):</b> 11-12	
<b>Essential Question(s):</b> <ol style="list-style-type: none"> <li>What are the biological trends that can be seen in the evolution of organisms?</li> <li>What are the distinguishing characteristics of the 3 Domains, 6 Kingdoms, and select phyla of organisms?</li> <li>How can phylogeny be used to develop a classification system to organize organisms?</li> </ol>	<b>Enduring Understanding(s):</b> <ol style="list-style-type: none"> <li>Organisms share many conserved core processes and features that evolved and are widely distributed among organisms, both extant and extinct.</li> <li>The process of evolution explains the diversity and unity of life. The diversity of life can be classified into groups with common characteristics. There are 3 Domains with specific features: Archaea, Eukarya and Bacteria. There are 6 kingdoms with specific features: Archaeobacteria, Eubacteria, Protists, Fungi, Plants and Animals.</li> <li>Phylogenetic trees and cladograms are graphical representations of evolutionary history. Phylogenetic trees can be constructed from morphological similarities of living or fossil species, and from DNA and protein sequence similarities.</li> </ol>

#### PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

##### DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

<b><u>Learning Target</u></b> Trends in Evolution & Diversity of Life	<b><u>NJCCCS or CCS</u></b> <b><u>1. Science:</u></b> 5.3.12.E.1, 5.3.12.E.2 , 5.3.12.E.3  <b><u>Other:</u></b> 6.1.12.C.12, 7.1.12.A.7, 9.1.12.A.1, 9.4.O, RI.11-12.1, RI.11-12.2, RI.11-12.3, RI.11-12.7, RI.11-12.8, RI.11-12.9, RI.11-12.10, W.11-12.8, W.11-12.9, SL.11-12.2, SL.11-12.3, L11-12.6,
1. Describe endosymbiosis.	

<p>2. Describe the adaptations that allowed plants to move from water to land and the reproductive adaptations of angiosperms.</p> <p>3. Describe the environmental roles of fungi.</p> <p>4. Discuss animal body plans.</p> <p>5. Describe the progressively complex derived characters in animal groups.</p> <p>Classification</p> <p>6. Develop and analyze cladograms to understand evolutionary relationships.</p>	<p>WHST.11-12.7, WHST.11-12.8, WHST.11-12.9</p> <p><b>2. Science:</b> 5.3.12.E.1, 5.3.12.E.2, 5.3.12.E.3, 5.3.12.A.3, 5.3.12.A.5, 5.3.12.A.6</p> <p><b>Other:</b> 6.1.12.C.12, 7.1.IL.A.7, 9.1.12.A.1, 9.4.O, RI.11-12.1, RI.11-12.2, RI.11-12.3, or RI.11-12.7, RI.11-12.8, RI.11-12.9, RI.11-12.10, W.11-12.8, W.11-12.9, SL.11-12.2, SL.11-12.3, L11-12.6, WHST.11-12.7, WHST.11-12.8, WHST.11-12.9</p> <p><b>3. Science:</b> 5.3.12.E.1, 5.3.12.E.2, 5.3.12.E.3, 5.3.12.A.3, 5.3.12.A.5, 5.3.12.A.6</p> <p><b>Other:</b> 6.1.12.C.12, 7.1.IL.A.7, 9.1.12.A.1, 9.4.O, RI.11-12.1 RI.11-12.2, RI.11-12.3, RI.11-12.7, RI.11-12.8, RI.11-12.9, RI.11-12.10, W.11-12.8, W.11-12.9, SL.11-12.2, SL.11-12.3, L11-12.6, WHST.11-12.7, WHST.11-12.8, WHST.11-12.9</p> <p><b>4. Science:</b> 5.3.12.E.1, 5.3.12.E.2, 5.3.12.E.3, 5.3.12.A.3, 5.3.12.A.5, 5.3.12.A.6</p> <p><b>Other:</b> 6.1.12.C.12, 7.1.IL.A.7, 9.1.12.A.1, 9.4.O, RI.11-12.1, RI.11-12.2, RI.11-12.3, RI.11-12.7, RI.11-12.8, RI.11-12.9, RI.11-12.10, W.11-12.8, W.11-12.9, SL.11-12.2, SL.11-12.3, L11-12.6, WHST.11-12.7, WHST.11-12.8, WHST.11-12.9</p> <p><b>5. Science:</b> 5.3.12.E.1, 5.3.12.E.2, 5.3.12.E.3, 5.3.12.A.3, 5.3.12.A.5, 5.3.12.A.6</p> <p><b>Other:</b> 6.1.12.C.12, 7.1.IL.A.7, 9.1.12.A.1, 9.4.O, RI.11-12.1 RI.11-12.2, RI.11-12.3, RI.11-12.7, RI.11-12.8, RI.11-12.9, RI.11-12.10, W.11-12.8, W.11-12.9, SL.11-12.2, SL.11-12.3, L11-12.6, WHST.11-12.7, WHST.11-12.8, WHST.11-12.9</p> <p><b>6. Science:</b> 5.3.12.E.1, 5.3.12.E.2, 5.3.12.E.3, 5.1.12.A.1, 5.1.12.A.2, 5.1.12.A.3, 5.1.12.B.1, 5.1.12.B.2, 5.1.12.B.3</p> <p><b>Other:</b> 6.1.12.C.12, 7.1.IL.A.7, 9.1.12.A.1, 9.4.O, RI.11-12.1, RI.11-12.2, RI.11-12.3, RI.11-12.7, RI.11-12.8, RI.11-12.9, RI.11-12.10, W.11-12.8, W.11-12.9, SL.11-12.2, SL.11-12.3, L11-12.6, WHST.11-12.7, WHST.11-12.8, WHST.11-12.9,</p>
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Student will be investigating major scientific discoveries/ideas and their relationship to the time in which the discoveries were made which relates to History. They will also be visualizing how the concept of diversity of life has changed over time as new species and new classification systems were developed.

Students will be using computers to investigate BLAST (Basic Local Alignment Search Tool) to find evolutionary relationships and develop cladograms which relates to Technology.

Students will be developing, drawing and labeling cladograms relating to Art and Critical Thinking.

- examples of strategies and modified strategies are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 7 Resources Diversity

**Students will engage with the following text:**

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**Supplemental texts include**

1. AP Biology Investigative Labs: An Inquiry-Based Approach by College Board
2. Biology Lab Manual 2001 Edition by College Board
3. Baron's Biology Exam Review
4. "Henrietta Lacks" or "The Double Helix" or other titles as deemed to enhance curriculum, current trends and student interest

examples of strategies and modified strategies are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 7 Resources Diversity

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**Enrichment/Enhancement**

Due to the high rigor of the course students will often need additional resources. Additional reading and enrichment activities are provided on an as needed basis. There are also after school study sessions available for students who benefit from the extra individual attention. In addition students are directed to the AP Central website for additional practice essays and sample AP test questions.

**Students will write:**

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### PART III: TRANSFER OF KNOWLEDGE AND SKILLS

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Students will:

- Engage in textbook and other reading materials as described above
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- Design and conduct laboratory experiments (see example in assessment section)
- Construct and analyze graphs using student collected and given data
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Teacher will :

- Utilize SmartBoard and PowerPoint technologies to present definitions, concepts and any other pertinent materials
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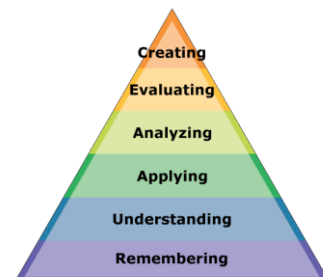
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Resources Diversity

### PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

IDENTIFY BLOOM'S LEVELS. **Note: Letters in red correspond to learning levels indicated in pyramid on the right}**



Formative Assessments:

Formative assessments will be in the form of periodic quizzes, lab exercises and extemporaneous teacher evaluations during class such as various concept reinforcement worksheets.

Examples:

Chapter 23 Study Guide/Essential Questions (R, U, Ap, An, E)

Chapter 26 Study Guide/ Essential Questions (R, U, Ap, An, E)

Chapter 27 Study Guide/Essential Questions (R, U, Ap, An, E)

Chapter 28 Study Guide/Essential Questions (R, U, Ap, An, E)

Chapter 29 Study Guide/Essential Questions (R, U, Ap, An, E)

Chapter 31 Study Guide/Essential Questions (R, U, Ap, An, E)

- examples of assessments and modified assessments are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 7 Resources Diversity

### **Enrichment/Enhancement:**

Students are given the opportunity for further research and discussion on all topics covered in class. They are given access to old AP Biology Exams for examples of questions. Students are also informed and encouraged to use the Baron's AP Biology Review Guide as a further enrichment resource for all topics covered.

### **Summative Assessments:**

**Students will be required to take a test to demonstrate proficiency on the material presented in this unit.**

**Students may also submit formal lab reports.**

Examples:

AP Biology Investigative Lab 3 Comparing DNA Sequences to Understand Evolutionary Relationships with BLAST (R, U, Ap, An, E, C)

Tests consist of old AP Biology Exam Multiple Choice and Essay Questions, they can be found on the following website [www.classmarker.com](http://www.classmarker.com). (R, U, Ap, An, E, C)

- examples of assessments and modified assessments are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 7 Resources Diversity

### **Enrichment/ Enhancement:**

Due to the rigor of this course students are expected to research their laboratory topics and cite research within their lab reports. They are expected to use peer reviewed material and are given at least a week to complete all lab reports so that any questions or concerns about the topics can be addressed.

### **Performance Assessments:**

**Design and conduct laboratory experiments and present conclusions in laboratory reports.**

Examples

AP Biology Investigative Lab 3 Comparing DNA Sequences to Understand Evolutionary Relationships with BLAST (R, U, Ap, An, E, C)

- examples of assessments and modified assessments are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 7 Resources Diversity

### **Accommodations/Modifications:**

Due to the rigor of this course students are expected to research their laboratory topics and cite research within their lab reports. They are expected to use peer reviewed material and are given at least a week to complete all lab reports so that any questions or concerns about the topics can be addressed.

# Black Horse Pike Regional School District Curriculum

## Advanced Placement Biology Curriculum

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21<sup>ST</sup> CENTURY GLOBAL SKILLS

### Unit 8: Structure and Function of Plants and Animals

#### PART I: UNIT RATIONALE

#### WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<b>Course/Unit Title:</b> Advanced Placement Biology	<b>Unit Summary:</b> <ol style="list-style-type: none"> <li>1. In this unit students will explore reproduction, growth and development in both plants and animals. They will describe mechanisms of reproduction found in different organisms. Students will also identify factors that affect growth and development in different organisms.</li> <li>2. Students will expand on their knowledge of evolution and mechanisms of evolution by further exploring structural, physiological and behavioral adaptations that exist in different species. They will use what they have learned about cladistics to infer relation between species based on these adaptations. Students will also look at the interactions that different organisms have with their environments, and how these interactions can lead to evolution.</li> </ol>
<b>Grade Level(s):</b> 11-12	
<b>Essential Question(s):</b> <ol style="list-style-type: none"> <li>1. How do plants reproduce?</li> <li>2. Where did the plants that we see today come from?</li> <li>3. How do water and nutrients move through plants?</li> <li>4. Where did heterotrophic life start?</li> <li>5. How do humans develop from a single cell into a multicelled human being?</li> <li>6. How do all of the systems within the human body interact?</li> <li>7. Are we born with our behaviors or are they learned?</li> <li>8. How can the environment affect the organisms that live</li> </ol>	<b>Enduring Understanding(s):</b> <ol style="list-style-type: none"> <li>1. Each phylum of plants has different reproductive cycles, and sometimes spends more time in the gametophyte stage and sometimes spends more time in the sporophyte stage.</li> <li>2. All plants originated from green algae and different adaptations led them to become more suited to live on the land.</li> <li>3. Plants have xylem and phloem that help to move water and nutrients through plants. Plants use the cohesive and adhesive properties of water to move water from the roots up to the leaves of the plants via transpiration.</li> <li>4. All life started from a single celled organism and small adaptations through generations eventually led to all of the phyla that exist today.</li> <li>5. Multiple cell divisions and the activation and deactivation of different enzymes and proteins at different stages of development give rise to different types of tissue.</li> <li>6. Within the human body there are many body systems working in unison with the ultimate goal of maintaining homeostasis. If any one system begins to fail then it puts the entire human body at risk.</li> <li>7. There is a lot of interaction between both nature and nurture with determining and predicting behavior. Animals, including humans, can be trained to respond in predictable manners to given stimuli.</li> </ol>

within them?	8. Organisms adapt and respond to their environments. These adaptations can eventually lead to evolution.
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## PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

### DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

<u>Learning Target</u>	<u>NJCCCS or CCS</u>
Reproduction, Growth and Development	
1. Draw and describe in detail the mechanisms of reproduction in both plants and animals.	1. <b>Science:</b> 5.3.2.A.1, <b>Other:</b> 2.1.12.B.3, 6.1.12.C.12, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10
2. Identify factors that affect growth and development in both plants and animals	2. <b>Science:</b> 5.3.2.A.1, <b>Other:</b> 2.1.12.B.3, 6.1.12.C.12, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10
Structural, physiological, and behavioral adaptations	
3. Relate adaptations in both plants and animals to their evolution.	3. <b>Science:</b> 5.3.2.E.1 <b>Other:</b> 67.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, S-CP.1, 3, 5, 8, S-MD.2, 5, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10
4. Draw and interpret a phylogenetic tree identifying the main differences that arose between each of the Phyla	4. <b>Science:</b> 5.3.2.E.1 <b>Other:</b> 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, S-CP.1, 3, 5, 8, S-MD.2, 5, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10
5. Draw and interpret a cladogram describing the evolution of plants.	5. <b>Science:</b> 5.3.2.E.1 <b>Other:</b> 27.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, S-CP.1, 3, 5, 8, S-MD.2, 5, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10
6. Describe in detail the different body systems present within humans, and identify how they interact to achieve homeostasis.	6. <b>Science:</b> 5.3.12.A.6, 5.3.4.A.3, <b>Other:</b> 6.1.12.C.12, 6.1.12.C16, 6.2.12.C.5, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10., 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10
Response to the environment	
7. Identify ways in which the environment can affect both structure and function in plants and animals	7. <b>Science:</b> 5.3.6.E.1 <b>Other:</b> 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, S-CP.1, 3, 5, 8, S-MD.2, 5, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10
8. Identify and describe different tropisms in plants	8. <b>Science:</b> 5.3.4.A.1 <b>Other:</b> 2.1.12.B.3, 6.1.12.C.12, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1,

### **Inter-Disciplinary Connections:**

Throughout the course students are required to write lab reports on all laboratory activities performed. Within the lab reports students are expected to analyze their data and create tables and graphs. Students use their English and Math skills throughout the year within this framework.

- examples of strategies and modified strategies are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 1 Resources
- Lab Report Rubric

### **Students will engage with the following text:**

Raven Biology 9<sup>th</sup> Edition.

Supplemental texts include

1. AP Biology Investigative Labs: An Inquiry-Based Approach by College Board
2. Biology Lab Manual 2001 Edition by College Board
3. Baron's Biology Exam Review
4. The Immortal Life of Henrietta Lacks by Rebecca Skloot

- examples of strategies and modified strategies are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 1 Resources
- AP Lab 9- Transpiration
- AP Lab 10- Circulatory System and Animal Physiology

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. (504 plans or IEP's if they apply) They may include but not be limited to:

#### **Enrichment/Enhancement**

Due to the high rigor of the course students will often need additional resources. Additional reading and enrichment activities are provided on an as needed basis. There are also after school study sessions available for students who benefit from the extra individual attention. In addition students are directed to the AP Central website for additional practice essays and sample AP test questions.

### **Students will write:**

Students perform multiple inquiry based labs throughout the year. Each lab requires an in depth lab report. The following college level rubric must be followed.

Rubric (link does not open)

The purpose of the course is to prepare students for the AP Biology Exam. Due to this expectation students are given old AP Biology Exam questions as part of each of their tests. They are graded based on the College Board AP Biology Essay Rubrics available on the following website: <http://www.wsfcs.k12.nc.us/Page/1643>

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. They may include but not be limited to:

### Enrichment/Enhancement

Due to the rigor of this course students are expected to research their laboratory topics and cite research within their lab reports. They are expected to use peer reviewed material and are given at least a week to complete all lab reports so that any questions or concerns about the topics can be addressed.

## **PART III: TRANSFER OF KNOWLEDGE AND SKILLS**

**DESCRIBE THE LEARNING EXPERIENCE.**

**How will students uncover content and build skills.**

**Students will:**

- Engage with textbook and other reading materials as described above
- Actively participate in class discussions both teacher and peer initiated
- Work collaboratively with peers on various assignments, labs, and/or projects
- Design and conduct laboratory experiments (see example in assessment section)
- Construct and analyze graphs using student- collected and teacher-provided data
- Communicate laboratory findings through lab reports.

**Teacher will :**

- Utilize SmartBoard and PowerPoint technologies to present definitions, concepts and any other pertinent materials
- Start Class with an applicable old AP Biology Test Question to stem discussion and thought on the topics being covered.
- Include media such as You Tube and other animations to connect concepts to real life applications or to further appeal to audio-visual learners.

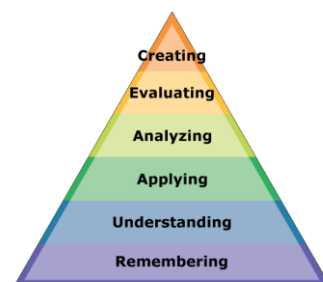
- examples of strategies and modified strategies are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 1

Resources

## **PART IV: EVIDENCE OF LEARNING**

**IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.**

**IDENTIFY BLOOM'S LEVELS. Note: Letters in red correspond to learning levels indicated in pyramid on the right**



### **Formative Assessments:**

Formative assessments will be in the form of periodic quizzes, lab exercises and extemporaneous teacher evaluations during class such as various concept reinforcement worksheets.

Examples:

Chapter 43 Study Guide/ Essential Questions (R, U, Ap, An, E)

Chapter 44 Study Guide/Essential Questions (R, U, Ap, An, E)

Chapter 45 Study Guide/Essential Questions (R, U, Ap, An, E)

- examples of assessments and modified assessments are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 8 Resources

### **Enrichment/Enhancement:**

Students are given the opportunity for further research and discussion on all topics covered in class. They are given access to old AP Biology Exams for examples of questions. Students are also informed and encouraged to use the Baron's AP Biology Review Guide as a further enrichment resource for all topics covered.

### **Summative Assessments:**

**Students will be required to take a test to demonstrate proficiency on the material presented in this unit.**

**Students may also submit formal lab reports.**

Examples:

AP Biology Lab 9 ( Lab 11 in AP Investigation Book)- Transpiration Lab (R, U, Ap, An, E, C)

Tests consist of old AP Biology Exam Multiple Choice and Essay Questions, they can be found on the following website [www.classmarker.com](http://www.classmarker.com). (R, U, Ap, An, E, C)

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### **Enrichment/ Enhancement:**

Due to the rigor of this course students are expected to research their laboratory topics and cite research within their lab reports. They are expected to use peer reviewed material and are given at least a week to complete all lab reports so that any questions or concerns about the topics can be addressed.

### **Performance Assessments:**

**Design and conduct laboratory experiments and present conclusions in laboratory reports.**

Examples

AP Biology Lab 9 ( Lab 11 in AP Investigation Book)- Transpiration Lab (R, U, Ap, An, E, C)

- examples of assessments and modified assessments are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 8 Resources

### **Accommodations/Modifications:**

Due to the rigor of this course students are expected to research their laboratory topics and cite research within their lab reports. They are expected to use peer reviewed material and are given at least a week to complete all lab reports so that any questions or concerns about the topics can be addressed.



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## Advanced Placement Biology Curriculum

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### Unit 9: Ecology

#### PART I: UNIT RATIONALE

#### WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<b>Course/Unit Title:</b> Advanced Placement Biology	<b>Unit Summary:</b> <ol style="list-style-type: none"> <li>1. In this unit, students will be able to discuss the interconnectedness of all living things, from a cellular level all the way up to the magnitude of an ecosystem. As part of this organisms must be able to obtain and use both energy and matter in various forms. Specific emphasis will be placed on the cycling of energy through the various trophic levels of an environment, requiring students to identify energy transformations that occur through the trophic levels. Emphasis will also be placed on describing continuous cycling of matter such as water, carbon, and nitrogen.</li> <li>2. Students will explore the various types of major ecosystems, or biomes, of the Earth. They will be able to discuss population growth, limiting factors, and investigate human impact on this natural world.</li> </ol>
<b>Grade Level(s):</b> 11-12	
<b>Essential Question(s):</b> <ol style="list-style-type: none"> <li>1. What is ecology?</li> <li>2. What are biotic and abiotic factors and how do they compare?</li> <li>3. How are matter and energy transferred and transformed in a living system?</li> <li>4. How does competition shape a community?</li> <li>5. How can change in one part of an ecosystem affect change in other parts of the ecosystem?</li> <li>6. How do ecosystems change over time?</li> <li>7. What is a biome and how is it classified?</li> <li>8. What factors affect populations?</li> <li>9. How can we study and</li> </ol>	<b>Enduring Understanding(s):</b> <ol style="list-style-type: none"> <li>1. Organisms and their physical environment affect each other and impact the balance of the overall environment.</li> <li>2. There are multiple components of a community that are both living and non living.</li> <li>3. All organisms must transfer matter and convert energy from one form to another in order to maintain stability and ensure survival of both an organism and its environment.</li> <li>4. Biological communities in ecosystems are based on stable interrelationships and interdependence of organisms.</li> <li>5. Changes in one part of the system will affect other parts of the system, and stability can be disrupted by natural or human interactions.</li> <li>6. Succession in communities may be impacted by natural or human events resulting in changes, both temporary and permanent, depending on the severity.</li> <li>7. ALSO IN #4 – (Biological communities in ecosystems are based on stable interrelationships and interdependence of organisms), as well as a multitude of abiotic factors such as climate or soil.</li> <li>8. Growth of a population varies based on the limiting factors of an ecosystem</li> <li>9. Previous events or evidence as well as systematic observations may be used to predict the outcome of future generations of a population.</li> </ol>

compare the growth of various populations?	10. Humans can alter the living and non-living factors within an ecosystem, thereby creating changes in the overall system.
10. How do humans impact the diversity and stability of ecosystems?	

## PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

### DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

<u>Learning Target</u>	<u>NJCCCS or CCS</u>
1. Define the following terms and describe how they relate to each other: population, community, ecosystem, and biosphere.	1. <b><u>Science:</u></b> 5.3.12.B.1, 5.3.12.B.3, 5.3.12.C.1 <b><u>Other:</u></b> 6.1.12.B.1, 6.1.12.B.9, 6.1.12.C.16, 6.2.12.C.3, 6.1.12.B.16
2. Draw an exponential growth curve, write the equation for this curve and define all terms in this equation.	2. <b><u>Science:</u></b> 5.3.12.C.1 <b><u>Other:</u></b> 7.1.1L.A.7, 9.1.12.A.1, 9.1.12.B, 9.1.12.F.6, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10, S-ID.1, WHST.11-12.1, 2, 3, 4, 5, 9, 10
3. Draw a logistic growth curve and label the following: carrying capacity, inflection point, accelerating growth rate, and decelerating growth rate.	3. <b><u>Science:</u></b> 5.3.12.C.1 <b><u>Other:</u></b> 7.1.1L.A.7, 9.1.12.A.1, 9.1.12.B, 9.1.12.F.6, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10, S-ID.1, WHST.11-12.1, 2, 3, 4, 5, 9, 10
4. Identify and compare density-dependent and density-independent limitations on population growth.	4. <b><u>Science:</u></b> 5.3.12.C.1 <b><u>Other:</u></b> 7.1.1L.A.7, 9.1.12.A.1, 9.1.12.B, 9.1.12.F.6, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10, S-ID.1, WHST.11-12.1, 2, 3, 4, 5, 9, 10
5. Identify and compare type I, type II and type III survivorship curves.	5. <b><u>Science:</u></b> 5.3.12.C.1 <b><u>Other:</u></b> 7.1.1L.A.7, 9.1.12.A.1, 9.1.12.B, 9.1.12.F.6, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10, S-ID.1, WHST.11-12.1, 2, 3, 4, 5, 9, 10
6. Compare r-selected species with K-selected species.	6. <b><u>Science:</u></b> 5.3.12.C.1 <b><u>Other:</u></b> 6.1.12.B.1, 6.1.12.B.9, 6.1.12.C.16, 6.2.12.C.3, 6.1.12.B.16, WHST.9-10.2, WHST.9-10.4
7. Define symbiosis and explain the following types: parasitism, commensalism and mutualism.	7. <b><u>Science:</u></b> 5.3.8.C.1, <b><u>Other:</u></b> 7.1.1L.A.7, 9.1.12.A.1, 9.1.12.B, 9.1.12.F.6, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10, S-ID.1, WHST.11-12.1, 2, 3, 4, 5, 9, 10
8. Describe the predator/prey relationship and effects of upsetting the balance of this relationship.	8. <b><u>Science:</u></b> 5.3.8.C.1, <b><u>Other:</u></b> 7.1.1L.A.7, 9.1.12.A.1, 9.1.12.B, 9.1.12.F.6, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10, S-ID.1, WHST.11-12.1, 2, 3, 4, 5, 9, 10
9. Define ecological niche and compare realized and potential niches.	9. <b><u>Science:</u></b> 5.3.12.C.1 <b><u>Other:</u></b> 6.1.12.B.1, 6.1.12.B.9, 6.1.12.C.16, 6.2.12.C.3, 6.1.12.B.16, WHST.9-10.2, WHST.9-10.4
10. Describe the relationship between species diversity and community stability.	
11. Define keystone species.	10. <b><u>Science:</u></b> 5.3.12.C.1 <b><u>Other:</u></b> 6.1.12.B.1, 6.1.12.B.9, 6.1.12.C.16, 6.2.12.C.3, 6.1.12.B.16, WHST.9-10.2, WHST.9-10.4
12. Define ecological succession, and compare and illustrate primary and secondary succession.	
13. Diagram and track the flow of energy through an ecosystem using a food chain and a food web.	11. <b><u>Science:</u></b> 5.3.12.C.1 <b><u>Other:</u></b> 6.1.12.B.1, 6.1.12.B.9, 6.1.12.C.16, 6.2.12.C.3, 6.1.12.B.16, WHST.9-10.2, WHST.9-10.4
14. Distinguish between gross primary productivity and net primary productivity.	12. <b><u>Science:</u></b> 5.3.12.C.1 <b><u>Other:</u></b> 7.1.1L.A.7, 9.1.12.A.1, 9.1.12.B, 9.1.12.F.6, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10, S-ID.1, WHST.11-12.1, 2, 3, 4, 5, 9, 10
15. Define biomass and explain its significance.	

<p>16. List the major biomes and describe each, especially in terms of climate (precipitation and temperature).</p> <p>17. Diagram and explain the water cycle, carbon cycle, nitrogen cycle and phosphorus cycle.</p> <p>18. Identify human impacts on ecosystems and discuss possible ?</p>	<p>13. <b><u>Science:</u></b> 5.3.12.B.1, 5.3.12.B.2, 5.3.12.B.3, 5.3.12.B.4, 5.3.12.B.5, 5.1.12.C.1 <b><u>Other:</u></b> 6.1.12.B.1, 6.1.12.B.9, 6.1.12.C.16, 6.2.12.C.3, 6.1.12.B.16, WHST.9-10.2, WHST.9-10.4</p> <p>14. <b><u>Science:</u></b> 5.3.12.B.1, 5.3.12.B.2, 5.3.12.B.3, 5.3.12.B.4, 5.3.12.B.5, 5.1.12.C.1 <b><u>Other:</u></b> 6.1.12.B.1, 6.1.12.B.9, 6.1.12.C.16, 6.2.12.C.3, 6.1.12.B.16, WHST.9-10.2, WHST.9-10.4</p> <p>15. <b><u>Science:</u></b>5.3.12.B.1, 5.3.12.B.3, 5.3.12.C.1 <b><u>Other:</u></b> 2.1.12.B.1, 6.1.12.C.13, 7.1.1L.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, 9.4 O (1), 9.4O (2), RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.11-12.1, 2, 3, 4, 5, 9, 10</p> <p>16. <b><u>Science:</u></b> 5.3.12.C.1 <b><u>Other:</u></b> 7.1.1L.A.7, 9.1.12.A.1, 9.1.12.B, 9.1.12.F.6, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10, S-ID.1, WHST.11-12.1, 2, 3, 4, 5, 9, 1</p> <p>17. <b><u>Science:</u></b> 5.4.12.G.7 <b><u>Other:</u></b> 2.1.12.B.3, 6.1.12.C.12, 6.1.12.C16, 6.2.12.C.5, 7.1.1L.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10</p> <p>18. <b><u>Science:</u></b> 5.4.12.G.4, 5.4.12.G.5, 5.4.12.G.6 <b><u>Other:</u></b> 2.1.12.B.3, 6.1.12.C.12, 6.1.12.C16, 6.2.12.C.5, 7.1.1L.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.11-12.1, 2, 3, 4, 5, 9, 10</p>
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### **Inter-Disciplinary Connections:**

Throughout the course students are required to write lab reports on all laboratory activities performed. Within the lab reports students are expected to analyze their data and create tables and graphs. Students use their English and Math skills throughout the year within this framework.

- examples of strategies and modified strategies are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 1 Resources  
Lab Report Rubric

### **Students will engage with the following text:**

Raven Biology 9<sup>th</sup> Edition.

#### **Supplemental texts include**

1. AP Biology Investigative Labs: An Inquiry-Based Approach by College Board
2. Biology Lab Manual 2001 Edition by College Board
3. Baron's Biology Exam Review
4. The Immortal Life of Henrietta Lacks by Rebecca Skloot

- examples of strategies and modified strategies are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 1 Resources
- AP Lab 11 Animal Behavior
- AP Lab 12 Dissolved Primary Productivity

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. (504 plans or IEP's if they apply) They may include but not be limited to:

### **Enrichment/Enhancement**

Due to the high rigor of the course students will often need additional resources. Additional reading and enrichment activities are provided on an as needed basis. There are also after school study sessions available for students who benefit from the extra individual attention. In addition students are directed to the AP Central website for additional practice essays and sample AP test questions.

### **Students will write:**

Students perform multiple inquiry based labs throughout the year. Each lab requires an in depth lab report. The following college level rubric must be followed.

Rubric (link does not open)

The purpose of the course is to prepare students for the AP Biology Exam. Due to this expectation students are given old AP Biology Exam questions as part of each of their tests. They are graded based on the CollegeBoard AP Biology Essay Rubrics available on the following website: <http://www.wsfcs.k12.nc.us/Page/1643>

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. They may include but not be limited to:

### **Enrichment/Enhancement**

Due to the rigor of this course students are expected to research their laboratory topics and cite research within their lab reports. They are expected to use peer reviewed material and are given at least a week to complete all lab reports so that any questions or concerns about the topics can be addressed.

## **PART III: TRANSFER OF KNOWLEDGE AND SKILLS**

### **DESCRIBE THE LEARNING EXPERIENCE.**

**How will students uncover content and build skills.**

#### **Students will:**

- Engage with the textbook and other reading materials as described above
- Actively participate in class discussions both teacher and peer-initiated
- Work collaboratively with peers on various assignments, labs, and/or projects
- Design and conduct laboratory experiments (see example in assessment section)
- Construct and analyze graphs using student collected and given data
- Communicate laboratory findings through lab reports.

#### **Teacher will :**

- Utilize SmartBoard and PowerPoint technologies to present definitions, concepts and any other pertinent materials
- Start Class with an applicable old AP Biology Test Question to stem discussion and thought on the topics being covered.
- Include media such as You Tube and other animations to connect concepts to real life applications or to further appeal to audio-visual learners.
- Utilize interactive lecture, inquiry, PBL, case study and discussion-based lessons

- examples of strategies and modified strategies are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 1

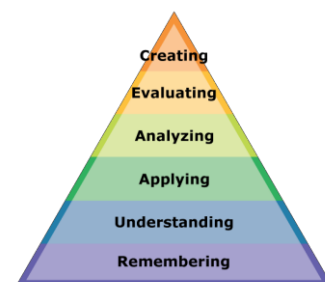
Resources AP Lab 11 Animal Behavior

AP Lab 12 Dissolved Oxygen and Primary Productivity

## PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

IDENTIFY BLOOM'S LEVELS. **Note: Letters in red correspond to learning levels indicated in pyramid on the right}**



### Formative Assessments:

Formative assessments will be in the form of periodic quizzes, lab exercises and extemporaneous teacher evaluations during class such as various concept reinforcement worksheets.

Examples:

Chapter 54 Study Guide/ Essential Questions (R, U, Ap, An, E)

Chapter 55 Study Guide/Essential Questions (R, U, Ap, An, E)

Chapter 56 Study Guide/Essential Questions (R, U, Ap, An, E)

- other examples of assessments and modified assessments are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 9 Resources

### Enrichment/Enhancement:

Students are given the opportunity for further research and discussion on all topics covered in class. They are given access to old AP Biology Exams for examples of questions. Students are also informed and encouraged to use the Baron's AP Biology Review Guide as a further enrichment resource for all topics covered.

### Summative Assessments:

Students will be required to take a test to demonstrate proficiency on the material presented in this unit.

Students may also submit formal lab reports.

Examples:

AP Biology Lab 10 Energy Dynamics (R, U, Ap, An, E, C)

Tests consist of old AP Biology Exam Multiple Choice and Essay Questions, they can be found on the following website [www.classmarker.com](http://www.classmarker.com). (R, U, Ap, An, E, C)

- examples of assessments and modified assessments are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 9 Resources

### Enrichment/ Enhancement:

Due to the rigor of this course students are expected to research their laboratory topics and cite research within their lab reports. They are expected to use peer reviewed material and are given at least a week to complete all lab reports so that any questions or concerns about the topics can be addressed.

### Performance Assessments:

Design and conduct laboratory experiments and present conclusions in laboratory reports.

Examples

AP Biology Lab 10 Energy Dynamics (R, U, Ap, An, E, C)

- examples of assessments and modified assessments are in the S:\Staff\Science\Ap Biology 2012 Curriculum\Unit 9 Resources

**Accommodations/Modifications:**

Due to the rigor of this course students are expected to research their laboratory topics and cite research within their lab reports. They are expected to use peer reviewed material and are given at least a week to complete all lab reports so that any questions or concerns about the topics can be addressed.

