

Black Horse Pike Regional School District
Highland Timber Creek Triton
Science Department

Syllabus
Honors Biology
Course Content

Life is a complex chemical phenomenon governed by the processes in which biological molecules transform and transfer matter, energy, and information. These interactions support the hierarchical organization of life, from individual cell to multicellular organisms, to the entire biosphere. In this course, students will learn about the structures, functions, and processes related to these systems as a foundation to understanding socioscientific issues. For example, with a focus on cells and human systems, they will develop the scientific literacy to make decisions concerning nutrition and health care. Through investigations of ecology, they will be better prepared to make choices about how to use and conserve the earth's resources. Through reading, writing, discussion, and lab work, students will study the interaction of living systems and processes that drive the evolution of life on earth. Aligned with the Next Generation Science Standards, this inquiry-based course prepares students for a state-mandated summative assessment that unifies the following themes and objectives:

September: Themes of Biology ([HS-LS1-1,2,3](#))

- Develop testable hypotheses that allow us to explore natural phenomena such as homeostasis through feedback mechanisms
- Collect, analyze and evaluate evidence to build and revise models of natural phenomena
- Safely use scientific tools, instruments, and specimens
- Illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms

September/October/November: Ecology ([HS-LS2-1,2,6,7,8](#) ; [HS-LS4-6](#))

- Use mathematical representations to describe the flow of energy and matter through an ecosystem
- Describe ecosystems based on the interrelationships and interdependence of organisms, such as food webs.
- Assess the effects of human activity on natural resources and Earth's biogeochemical cycles, with a focus on climate change through carbon emissions
- Evaluate the effects of natural and human-made changes in the environment on individual species and population dynamics.
- Describe how environmental factors and human influence can affect biodiversity within an ecosystem

- Design and evaluate solutions that reduce the negative effects of human activities on the environment and biodiversity

***November/December: Biochemistry* ([HS-LS1-5,6,7](#) ; [HS-LS2-5](#))**

- Illustrate how photosynthesis transforms light energy into stored chemical energy
- Explain how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.
- Use models to explain the relationship between the structure and function of carbohydrates, lipids, proteins, and nucleic acids
- Explore the properties and functions of enzymes as a special class of proteins encoded by DNA

***December/January: Cells* ([HS-LS1-1,2,3,4](#))**

- Compare the simplicity of prokaryotic cells to the complexities that lead to differentiation of eukaryotic cells
- Describe and model the function of different types of cells and cell structures
- Discuss cellular activities including membrane transport, reproduction, and communication.
- Illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms

***January/February: Matter and Energy* ([HS-LS1-3,5,6,7](#) ; [HS-LS2-3,4,5](#))**

- Illustrate how photosynthesis transforms light energy into stored chemical energy
- Assess the impact of environmental factors on a plant's ability to photosynthesize
- Explain the net transfer of energy that results from cellular respiration in both aerobic and anaerobic conditions
- Investigate the complementary relationship between photosynthesis and respiration, to support claims for the cycling of matter and flow of energy among organisms in an ecosystem, as well as in the biosphere
- Discuss the importance of photosynthesis in light of natural resource production, energy production, and climate change mitigation
- Discuss the consequences of impaired respiration in light of diabetes and mitochondrial diseases

***March/April: Genetics* ([HS-LS1-1](#) ; [HS-LS3-1,2,3](#))**

- Analyze the role of DNA in coding the instructions for characteristic traits passed from parents to offspring.

- Use evidence to explain how the structure of DNA determines the structure of proteins
- Predict the sources and effects of mutations on cellular activity and human health
- Use Punnett squares and pedigrees to apply concepts of probability and statistics to explain the variation and distribution of expressed traits in a population
- Explore modern biomedical approaches and bioethical dilemmas involved in addressing genetic disorders

May/June: Evolution ([HS-LS4-1,2,3,4,5](#))

- Evaluate multiple lines of evidence that support biological evolution
- Describe the process of evolution via natural selection
- Apply concepts of statistics and probability to support explanations for the proliferations of organisms with an advantageous, heritable trait
- Evaluate evidence supporting claims of large scale evolutionary processes such as speciation and extinction
- Apply the theory of evolution to topics such as human origins and selective breeding

Course Expectations & Skills

1. Create and maintain a class notebook
2. Think critically and creatively to participate actively and practice problem-solving
3. Communication findings and conclusions through written assignments such as lab reports and opinion papers
4. Produce creative projects that generate public awareness about socioscientific issues
5. Work independently to keep up with individual assignments and deadlines
6. Work collaboratively on activities such as inquiry-based experiments, debates, case studies, and group presentations
7. Learn to use technological tools that enhance learning content and skills that support success in all courses

Textbook

Miller, K. and Levin, J. (2010). *Biology*. NJ: Pearson.

Grading Policy

Major Assessments 50%

Minor Assessments 15%

Labs 25%

Homework /Classwork 10%

Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS ● FOSTERING ACHIEVEMENT ● CULTIVATING 21ST CENTURY GLOBAL SKILLS

Course Name: Honors Biology

Course Number:044100

PART I: UNIT 1 RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<p>Course/Unit Title: Honors Biology/ Themes of Biology</p> <p>Grade Level(s): 9-10</p>	<p>Unit Summary: Students will learn the major themes of biology in an effort to define “life” as a system in which organisms use energy, reproduce, maintain homeostasis and evolve. Interconnectedness, organization, and the relationship of form to function will be stressed. Students begin to use scientific inquiry and experiment using equipment to investigate these properties.</p>
<p>Essential Question(s):</p> <ul style="list-style-type: none">• How can we define “life” in a way that encompasses the major characteristics of living things?• How do we distinguish between life and non-life?• What major themes are emerge from the study of life science?• How is each of the major properties of life accomplished by various organisms?	<p>Enduring Understanding(s):</p> <ul style="list-style-type: none">• Life can be defined by the qualities that organisms possess or use to carry out basic everyday functions.• Systems of specialized cells within organisms help them perform the essential functions of life.• All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells.• Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.• Feedback mechanisms maintain a living system’s internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system.

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>NGSS</u>
<ol style="list-style-type: none">1. Describe the cellular basis of life2. Discuss how DNA codes the information responsible for creating all living systems, and can be passed on from parent to offspring3. Develop a model that can be used to identify and describe relevant parts (e.g., organ system, organs) and processes of body systems in multicellular organisms.4. Explain how organisms use feedback mechanisms to maintain internal conditions5. List, define, and discuss the characteristics common to all living things6. Analyze the relationship that exists between the characteristics of life and the maintenance of the stability of life.	<ol style="list-style-type: none">1. HS-LS1-1 - Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.2. HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.3. HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis

Inter-Disciplinary Connections:

ELA/Literacy –

RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-LS1-6),(HS-LS2-3)

WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-LS1-6),(HS-LS2-3)

WHST.9-12.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. (HS-LS1-6),(HS-LS2-3)

WHST.9-12.9 Draw evidence from informational texts to support analysis, reflection, and research. (HS-LS1-6)
SL.11-12.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings,

reasoning, and evidence and to add interest. (HS-LS1-5),(HS-LS1-7)

WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HS-LS1-3)

WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. (HS-LS1-3)

Mathematics –

MP.2 Reason abstractly and quantitatively. (HS-LS2-4)

MP.4 Model with mathematics. (HS-LS2-4)

HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-LS2-4)

HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-LS2-4)

HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-LS2-4)

Students will engage with the following text:

Biology by Miller & Levine – Chapter 1

• Directed Reading Activities as well as graphic organizers may be completed as students read text

Example: Big Ideas Organizer

Example: Sewer Lice Demo

Example: Vote with your feet: Robot Stingray Article

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:

Accommodations/Modifications

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 number and paragraph next to each blank space. Provide student with written summary.

Students will write:

Students will write a lab report based on a standard format.

- Rubric

Students may be asked to complete current events where they will write an analysis of a particular article linking various concepts learned including the problem solving process of scientific method and development of new technology to real life events.

- Current Event Outline
Scholarly Journal Reflections

Examples of strategies and modified strategies are in the District Shared/Science/CURRICULUM WRITING 2012/Biology Introduction folder

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:

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.

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
- Create various visual aids by mapping out the location of various safety equipment in the classroom
- Design and conduct laboratory experiments (see example in assessment section)
- Safely use microscopes
- Build/create wet mount slides
- Construct and analyze graphs using student collected and given data
- Complete write to learn activities

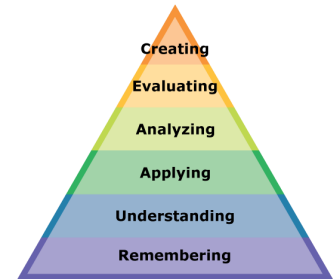
Teacher will :

- Utilize SmartBoard and PowerPoint technologies to present definitions, concepts and any other pertinent materials
- Collaborate with fellow teachers for cross curricular relationships to material
- Use leading questions to spark classroom discussion

- Include media such as YouTube and other sources of 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 District Google Drive Biology-Themes Folder

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.**



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:

- Pond Water Creatures (R, U, Ap, An, E)
- Characteristics of Life (R, U, Ap)

Examples of assessments and modified assessments are in the District Shared/Science/CURRICULUM WRITING 2012/Biology Introduction folder

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website or eBoard, adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flashcards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard, monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

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:

- Letter “e” Lab (U, Ap, E)
- Chapter One Test (R, U, Ap, An, E)

Examples of assessments and modified assessments are in the District Google Drive Biology-Themes folder

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website or eBoard, adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flashcards with term and image on inside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard, monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Performance Assessments:

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

Examples

- Experimental Design Activity (R, U, Ap, An, E, C)

Examples of assessments and modified assessments are in the District Google Drive Biology-Themes folder

Accommodations/Modifications:

Modifications: Chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website or eBoard, adjust length of assignments as needed, and modify supplemental materials for readability.

Accommodations: provide examples for projects, 1:1 assistance as needed, restate or rephrase instructions, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard.

PART I: UNIT 2 RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Honors Biology/Ecology	Unit Summary: In this unit of study, students construct explanations for the role of energy in the cycling of matter in organisms and ecosystems. They develop models to illustrate the interactions of photosynthesis and cellular respiration. Students also understand organisms' interactions with each other and their physical environment and how organisms obtain resources. Students explore how and why do organisms interact with each other (biotic factors) and their environment (abiotic factors), and what affects these interactions? Secondary ideas include the interdependent relationships in ecosystems; dynamics of ecosystems; and social interactions, including group behavior. Students use mathematical reasoning and models to make sense of carrying capacity, factors affecting biodiversity and populations. Students examine factors that have influenced the distribution and development of human society; these factors include climate, natural resource availability, and natural disasters. Students analyze how earth systems and their relationships are being modified by human activity. Students also develop an understanding of how human activities affect natural resources and of the interdependence between humans and Earth's systems, which affect the availability of natural resources. Students will apply their engineering capabilities to reduce human impacts on earth systems and improve social and environmental cost–benefit ratios. All crosscutting concepts of matter and energy; systems, and system models; cause and effect; stability and change; scale, proportion, and quantity; and the influence of engineering, technology, and science on society and the natural world are called out as organizing concepts.
Grade Level(s): 9-10	
Essential Question(s): <ul style="list-style-type: none">• How do organisms interact with, and depend on, the living and nonliving factors in their environments to obtain matter and energy?• How can change in one part of an ecosystem affect	Enduring Understanding(s): <ul style="list-style-type: none">• Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. These limits result from such factors as the availability of living and nonliving resources and from such challenges such as predation, competition, and disease. Organisms would have the capacity to produce populations of great size were it not for the fact that environments and resources are finite. This fundamental tension affects the abundance (number of individuals) of species in any given ecosystem.• A complex set of interactions within an ecosystem can keep numbers and types of organisms relatively constant over long periods of time under stable conditions. If a modest biological or physical disturbance to an ecosystem occurs, it may return to its more or less original status (i.e., the ecosystem is resilient or resistant), as opposed to becoming a very different ecosystem. Extreme fluctuations in conditions or the size

change in other parts of the ecosystem?

- How do ecosystems change over time?
- How does competition shape a community?
- What intrinsic and extrinsic factors affect population size and structure over time?
- How do humans impact the diversity and stability of ecosystems?
- How can the impacts of human activities on natural systems be reduced or mitigated to support sustainability?
- What effects do human activity have on the global climate?

of any population, however, can challenge the functioning of ecosystems in terms of resources and habitat availability.

- Moreover, anthropogenic changes (induced by human activity) in the environment—including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change—can disrupt an ecosystem and threaten the survival of some species.
- Group behavior has evolved because membership can increase the chances of survival for individuals and their genetic relatives.
- Changes in the physical environment, whether naturally occurring or human induced, have thus contributed to the expansion of some species, the emergence of new distinct species as populations diverge under different conditions, and the decline—and sometimes the extinction—of some species.
- Migration and extinction, in addition to speciation, leads to changes in biodiversity, with resulting changes in community structure and eventually ecosystem structure
- Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value.
- When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts.
- Both physical models and computers can be used in various ways to aid in the engineering design process. Computers are useful for a variety of purposes, such as running simulations to test different ways of solving a problem or to see which one is most efficient or economical; and in making a persuasive presentation to a client about how a given design will meet his or her needs.

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>NGSS</u>
<ol style="list-style-type: none">1. Illustrate how interactions among living systems and with their environment result in the movement of matter and energy.2. Graph real or simulated population data and analyze the trends to understand consumption patterns and resource availability, and make predictions as to what will happen to the population in the future.3. Provide evidence that the growth of populations are limited by access to resources, and how selective pressures may reduce the number of organisms or eliminate whole populations of organisms.4. Develop a working definition of ecology which includes the components of an ecosystem5. Identify and describe biotic and abiotic factors of an environment6. Explain how consumers obtain and use nutrients.7. Classify and explain different trophic levels within an ecosystem8. Describe how nitrogen and water are recycled within ecosystems9. Explain the niche of an organism10. Develop a timeline that can be used to describe the sequence of ecological succession initiated by natural or man-made events11. Discuss and explain the ways in which humans disrupt ecosystems12. List the major sources of environmental pollution and evaluate methods to alleviate their effects on biodiversity and ecosystem stability13. Compare and contrast renewable and nonrenewable resources14. Design a solution that involves reducing the negative effects of human activities on the environment and biodiversity	<p>HS-LS2-1 -Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.</p> <p>HS-LS2-2 - Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.</p> <p>HS-LS2-6 - Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.</p> <p>HS-LS2-7 - Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.*</p>

	<p>HS-LS2-8 - Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.</p> <p>HS-LS4-6 - Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.</p>
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Inter-Disciplinary Connections:

ELA/Literacy –

RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-LS1-6),(HS-LS2-3)

WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-LS1-6),(HS-LS2-3)

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HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-LS2-4)

Students will engage with the following text:

Biology by Miller & Levine – Chapter 1

- **Directed Reading Activities as well as graphic organizers may be completed as students read text**
- **Food web analyses**

- **Carbon cycle station lab**

- **Carbon cycle dice game**
 - **Rainforest card game (Biodiversity)**

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:

Accommodations/Modifications

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- **Rubric**

Students may be asked to complete current events where they will write an analysis of a particular article linking various concepts learned including the problem solving process of scientific method and development of new technology to real life events.

- **Current Event Outline**
Scholarly Journal Reflections

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PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

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- Actively participate in class discussions both teacher and peer initiated
- Work collaboratively with peers on various assignments, labs, and/or projects
- Create various visual aids by mapping out the location of various safety equipment in the classroom
- Design and conduct laboratory experiments (see example in assessment section)
- Safely use microscopes
- Build/create wet mount slides
- Construct and analyze graphs using student collected and given data
- Complete write to learn activities

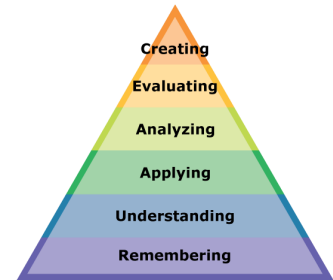
Teacher will :

- Utilize SmartBoard and PowerPoint technologies to present definitions, concepts and any other pertinent materials
 - Collaborate with fellow teachers for cross curricular relation to material
 - Use leading questions to spark classroom discussion
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- examples of strategies and modified strategies are in the District Google Drive Biology-Themes Folder

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.



Formative Assessments:

Formative assessments will be in the form of periodic quizzes, lab exercises and extemporaneous teacher evaluations during class including concept reinforcement worksheets and reading comprehension checks.

Examples:

- Pond Ecosystem Gizmo Lab (R, U, Ap, An, E)
- Section Assessment Questions (R, U, Ap)
- Salt Marsh Food Web worksheet (R, Ap)
- [Surviving Winter in the Dust Bowl \(Food Chains and Trophic Levels\)](#): The lesson engages students in an argumentation cycle based on an engaging scenario in which their group is a farm family trying to survive a dust bowl winter with limited food and water resources. The family has a bull, a cow, and limited amounts of water and wheat. Students are presented with four options that include various combinations of eating or keeping the animals alive and eating the wheat. Within this scenario, the lesson provides data on nutritional requirements of cows and humans, along with nutritional contents of wheat, milk, and beef. Students then use this data to construct an argument for the best strategy to allow their family to survive. As they construct this argument, students build and apply knowledge of food chains, trophic levels, interdependence among organisms, and energy transfers within ecosystems.
- [Of Microbes and Men](#): Students will develop a model to show the relationships among nitrogen and the ecosystem including parts that are not observable but predict observable phenomena. They will then construct an explanation of the effects of the environmental and human factors on this cycle.
- [Bunny Population Growth Activity](#): Students collect data during a simulation and use it to support their explanation of natural selection in a rabbit population and how populations change over time when biotic or abiotic factors change.
- [African Lions Activity](#): Students using the data presented to make a prediction regarding the zebra population during the periods of increase rainfall. Students will create a representation of the data that illustrates both the lion population and zebra population during the same time period
- [Animal Behavior](#): Students will make detailed observations of an organism's behavior and then design and execute a controlled experiment to test a hypothesis about a specific case of animal behavior. Students will record observations, make sketches, collect and analyze data, make conclusions, and prepare a formal report.
- [Biodiversity](#): Students use this lab to represent how biodiversity stops a disease from spreading.
- [One For All: A Natural Resources Game](#): Identify a strategy that would produce a sustainable use of resources in a simulation game. Draw parallels between the chips used in the game and renewable resources upon which people depend. Draw parallels between the actions of participants in the game and the actions of people or governments in real-world situations

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website or eBoard, adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flash cards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard, monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Summative Assessments:

Students will be required to take tests, quizzes, and perform laboratory activities to demonstrate proficiency on the material presented in this unit.

Examples:

- Ecology Quiz (R, U, Ap, An, E)
- Owl Pellet Lab (R, U, Ap, An, E)

- examples of assessments and modified assessments are in the District Google Drive Biology - Ecology folder

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website or eBoard, adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flash cards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard, monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Performance Assessments:

Design and conduct laboratory experiments and present conclusions in laboratory reports. Develop arguments supported by research and participate in debates, peer presentations, etc.

Examples:

- Eco-Issues Project (Ap, An, E, C)
- Population Dice Game (Ap, An, E, C)
- [Land and People: Finding a Balance](#): This environmental study project allows a group of students to consider real environmental dilemmas concerning water use and provide solutions to these dilemmas.

Examples of assessments and modified assessments are in the District Google Drive Biology - Ecology folder

Accommodations/Modifications:

Modifications: Chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website or eBoard, adjust length of assignments as needed, and modify supplemental materials for readability.

Accommodations: provide examples for projects, 1:1 assistance as needed, restate or rephrase instructions, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard.

PART I: UNIT 3 RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Honors Biology/Biochem	Unit Summary: This unit explores the biochemical properties of cells. Cells are made of complex molecules that consist mainly of a few key elements. Due to unique chemical properties, water comprises much of the cell and is essential for life. The four classes of organic macromolecules have unique structures and function that contribute to vital processes including homeostasis, metabolism, and reproduction. Students can study the chemistry of life in order to make connections to both human and environmental health. This unit leads into the study of cell structure and function. Crosscutting concepts of systems and system models, energy and matter are used as organizing concepts.
Grade Level(s): 9-10	
Essential Question(s): <ul style="list-style-type: none">● What are the basic chemical principles that affect life?● What elements make up the majority of living systems?● Why is water essential for life to exist?● What are the roles of the major organic macromolecules?● How does pH affect the function of living systems?	Enduring Understanding(s): <ul style="list-style-type: none">● The process of photosynthesis converts light energy to stored chemical energy by converting carbon dioxide plus water into sugars plus released oxygen.● The sugar molecules thus formed contain carbon, hydrogen, and oxygen: their hydrocarbon backbones are used to make amino acids and other carbon-based molecules that can be assembled into larger molecules (such as proteins or DNA), used for example to form new cells.● As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products.● As a result of these chemical reactions, energy is transferred from one system of interacting molecules to another. Cellular respiration is a chemical process in which the bonds of food molecules and oxygen molecules are broken and new compounds are formed that can transport energy to muscles. Cellular respiration also releases the energy needed to maintain body temperature despite ongoing energy transfer to the surrounding environment.

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>NGSS</u>
<ol style="list-style-type: none">1. Explain the relationships among atoms, molecules, elements, and compounds.2. Explain the connection between the sequence and the subcomponents of a biomolecule and its properties3. Describe how amino acids and other complex carbon-based molecules are composed largely of carbon, oxygen, and hydrogen atoms.4. Recognize that all organisms take in matter and rearrange the atoms in chemical reactions.5. Classify solutions as acids or bases by using the pH scale.6. Define the important characteristics of water that make life possible7. Depict the structures and describe the functions of the four classes of organic macromolecules, including their monomers.8. Explain how enzymes catalyze chemical reactions.9. Use chemical indicators to identify organic compounds	<ol style="list-style-type: none">1. HS-LS1-5 - Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.2. HS-LS1-6. Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.3. HS-LS1-7. Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.4. HS-LS2-3. Construct and revise an

explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.

5. HS-LS2-4. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.

6. HS-LS2-5. Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.

Inter-Disciplinary Connections:

ELA/Literacy –

RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-LS1-6),(HS-LS2-3)

WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-LS1-6),(HS-LS2-3)

WHST.9-12.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. (HS-LS1-6),(HS-LS2-3)

WHST.9-12.9 Draw evidence from informational texts to support analysis, reflection, and research. (HS-LS1-6)

SL.11-12.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. (HS-LS1-5),(HS-LS1-7)

WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HS-LS1-3)

WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. (HS-LS1-3)

Mathematics –

MP.2 Reason abstractly and quantitatively. (HS-LS2-4)

MP.4 Model with mathematics. (HS-LS2-4)

HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-LS2-4)

HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-LS2-4)

HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-LS2-4)

Students will engage with the following text:

Biology by Miller & Levine- Unit 1, Chapter 2

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:

Accommodations/Modifications

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 number and paragraph next to each blank space. Provide student with written summary.

Students will write:

Students will write a lab report based on a standard format.

- Rubric

Students may be asked to complete current events where they will write an analysis of a particular article linking various concepts learned including the problem solving process of scientific method and development of new technology to real life events.

- Current Event Outline

Scholarly Journal Reflections

Examples of strategies and modified strategies are in the District Shared/Science/CURRICULUM WRITING 2012/Biology Introduction folder

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:

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.

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
- Create various visual aids by mapping out the location of various safety equipment in the classroom
- Design and conduct laboratory experiments (see example in assessment section)
- Safely use microscopes
- Build/create wet mount slides
- Construct and analyze graphs using student collected and given data
- Complete write to learn activities

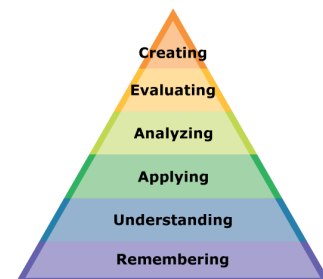
Teacher will :

- Utilize SmartBoard and PowerPoint technologies to present definitions, concepts and any other pertinent materials
- Collaborate with fellow teachers for cross curricular relation to material
- Use leading questions to spark classroom discussion

- Include media such as YouTube and other sources of 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 District Google Drive Biology-Themes Folder

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.**



Formative Assessments:

In addition to quizzes, formative assessments include modeling activities (which include online and physical models) and lab investigations. Students can present posters about macromolecules to the class (Remembering through Applying)

Example: "Why is Patrick Paralyzed?" Case study

Examples of assessments and modified assessments are in the District Shared Google Drive Biochemistry folder

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website or eBoard, adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flash cards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard, monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Summative Assessments:

To demonstrate proficiency on the material presented in this unit, students will be required to take a test that includes multiple choice, true-false, matching and open-ended questions. (Remembering through Analyzing)

Examples of assessments and modified assessments are in the District Shared Google Drive Biochemistry folder

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website or eBoard, adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flash cards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard, monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Performance Assessments:

Students may be presented with a case study such as “Who Took Jerrel’s iPod” (Remembering through Evaluating) (<http://serendip.brynmawr.edu/exchange/waldron/organic>). They may create and maintain a food diary in which they analyze the macromolecules in their own diets. (Remembering through Creating)

Examples of assessments and modified assessments are in the District Shared Google Drive Biochemistry folder

Accommodations/Modifications:

Modifications: Chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website or eBoard, adjust length of assignments as needed, and modify supplemental materials for readability.

Accommodations: provide examples for projects, 1:1 assistance as needed, restate or rephrase instructions, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard.

PART I: UNIT 4 RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<p>Course/Unit Title: Honors Biology/Cells</p> <p>Grade Level(s): 9-10</p>	<p>Unit Summary:</p> <p>Students will investigate the similarities and differences between prokaryotic and eukaryotic cells. The structure and functional complexities will be discussed and compared. Students will learn to identify and discuss the basic structural organization of eukaryotic cells as well as the function of each major organelle. Students will be able to explain the relationship between organelles and the why certain types of cells have or lack certain organelles. Specific emphasis will be placed on the cell membrane, as its role is pivotal a cell’s survival. Students will also be able to distinguish between plant and animal cells.</p> <p>Transport (osmosis, diffusion, active transport) – 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 methods cells use to move materials into or out of cell.</p> <p>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 process of mitosis will be compared to the stages and purpose of meiosis. Crosscutting concepts of structure and function, systems and system models, and stability and changes will be used as organizing concepts</p>
<p>Essential Question(s):</p> <ul style="list-style-type: none">• How do prokaryotic and eukaryotic cells compare?• How does structure relate to function in living systems from the organismal to the cellular level?• What do you mean they say that people are made of a system of systems?• How do feedback mechanisms maintain homeostasis?• What role does the cell cycle play in the life of organisms?	<p>Enduring Understanding(s):</p> <ul style="list-style-type: none">• Life can be defined by a series of qualities that organisms possess or utilize to carry out basic everyday functions.• Systems of specialized cells within organisms help them perform the essential functions of life.• All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells.• Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.• Feedback mechanisms maintain a living system’s internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system.

- How are cancer cells different from regular cells and why do they occur in organisms?
- How can we study stem cells ethically and responsibly?

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>NGSS</u>
<ol style="list-style-type: none"> 1. Compare and contrast the differences between prokaryotic and eukaryotic cells 2. Compare and contrast plant and animal cells 3. List and describe organelles and their functions 4. Construct models that explain the movement of molecules across membranes with membrane structure and function 5. Provide examples and explain how organisms use feedback systems to maintain their internal environments 6. Identify the cell membrane as selectively permeable and describe the movement of molecules across a membrane when placed in various solutions 7. Define, discuss, compare and contrast osmosis and diffusion 8. Differentiate between active and passive transport 9. Distinguish between, compare and contrast sexual vs. asexual reproduction, 10. Compare the process of cell division in prokaryotic and eukaryotic cells. 11. Summarize the cell cycle and discuss how it is controlled. 12. Sequence and describe the events of mitosis 13. Compare and contrast mitosis and meiosis 14. Explain cancer and tumor formation 	<p>HS-LS1-1 - Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.</p> <p>HS-LS1-2 - Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.</p> <p>HS-LS1-3 - Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.</p>

	<p>HS-LS1-4 - Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.</p>
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Inter-Disciplinary Connections:

ELA/Literacy –

RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-LS1-6),(HS-LS2-3)

WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-LS1-6),(HS-LS2-3)

WHST.9-12.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. (HS-LS1-6),(HS-LS2-3)

WHST.9-12.9 Draw evidence from informational texts to support analysis, reflection, and research. (HS-LS1-6)

SL.11-12.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. (HS-LS1-5),(HS-LS1-7)

WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HS-LS1-3)

WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. (HS-LS1-3)

Mathematics –

MP.2 Reason abstractly and quantitatively. (HS-LS2-4)

MP.4 Model with mathematics. (HS-LS2-4)

HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-LS2-4)

HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-LS2-4)

HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-LS2-4)

Students will engage with the following text:

Biology by Miller & Levine Chapters 7, 10, 11.4

Supplemental texts include EOC Books, Blue lab books by Holt, Biozone, Modern Biology, Minute Reading Activities. Various accredited academic internet websites as well as Journals or Magazines such as “Popular Science”

- **History of Cell Theory – nature cell biology Journal**

Examples of strategies and modified strategies are in the District Shared Google Drive Biology-Cells folder

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:

Accommodations/Modifications

Students will write:

Students will write a lab report based on a standard format.

- **Rubric**

Students may be asked to complete current events where they will write an analysis of a particular article linking various concepts learned including the problem solving process of scientific method and development of new technology to real life events.

- **Current Event Outline**

Scholarly Journal Reflections

In addition to normal day to day writing activities, students may be asked to research a particular scientist and write an essay discussing the importance of their discovery to the scientific world.

Lab reports in a standard format or conclusion essays may be required for certain lab activities.

Students may be asked to complete current events where they will write an analysis of a particular article linking various concepts learned including the problem solving process of scientific method and development of new technology to real life events.

Make strategic use of digital media in presentations to enhance understanding of the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

Make strategic use of digital media in presentations to enhance understanding of the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

Conduct short as well as more sustained research to determine how feedback mechanisms maintain homeostasis. Synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation

Examples of strategies and modified strategies are in the District Shared/Science/CURRICULUM WRITING 2012/Biology Introduction folder

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:

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.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

Students will:

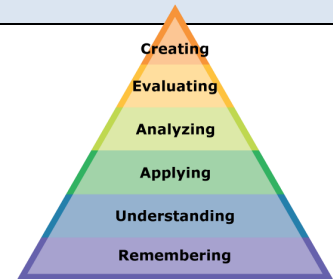
- Engage in textbook and other reading materials as described above
- Actively participate in class discussions both teacher and peer initiated
- Work collaboratively with peers on various assignments, labs, and/or projects
- Create various visual aids by mapping out the location of various safety equipment in the classroom
- Design and conduct laboratory experiments (see example in assessment section)
- Safely use microscopes
- Build/create wet mount slides
- Construct and analyze graphs using student collected and given data
- Complete write to learn activities

Teacher will :

- Utilize SmartBoard and PowerPoint technologies to present definitions, concepts and any other pertinent materials
 - Collaborate with fellow teachers for cross curricular relation to material
 - Use leading questions to spark classroom discussion
 - 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 District Google Drive Biology-Themes Folder

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.



Formative Assessments:

Formative assessments will be in the form of periodic quizzes, lab exercises and extemporaneous teacher evaluations during class.

For example:

- Students may demonstrate knowledge of the cell cycle simply by using two different pairs of cards (or other) to model the steps mitosis quickly and effectively. (R, U, Ap)
- Diffusion Worksheet (R, U, Ap)
- Mitosis Coloring Activity (U, Ap, An, E)
- Cell Transport – Diffusion Lab (U, Ap, An, E)
- Mitosis and Cancer Web Quest (R, U, Ap, An)

Membrane Channels Simulation: Students begin by asking questions that arise from demonstrations with aromatic sprays and they will articulate the movement of particles from areas of high concentrations to lower concentrations. The students will then ask questions that arise from careful observation of phenomena, or unexpected results, to clarify and/or seek additional information. Students will develop, revise, and /or use a model based on evidence to illustrate and/or predict the relationship between systems or between components of a system using a computer simulation. Students will then communicate scientific and/or technical information or ideas in multiple formats (including orally, graphically, and textually).

Membrane Diffusion: Collaboratively, students will analyze data using tools, technologies, and/or models in order to make valid and reliable scientific claims or determine an optimal design solution. Students can then work either collaboratively or independently to use mathematical, computational, and/or algorithmic representations of phenomena or design solutions to describe and/or support claims and/or explanations.

Examples of strategies and modified strategies are in the District Shared Google Drive Biology-Cells folder

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website or eBoard, adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flash cards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide

alternate access to any material or media via on-course website or eBoard, monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Summative Assessments:

Students will be required to take tests to demonstrate proficiency on the material presented in this unit. For Example:

- Cell Structure and Function Test (R, U, Ap, An, E)
- Cell Transport Quiz (R, U, Ap, An, E)
- Mitosis Lab: Onion Root Tips (U, Ap, An, E)

Examples of strategies and modified strategies are in the District Shared Google Drive Biology-Cells folder

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website or eBoard, adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flash cards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard, monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Performance Assessments:

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

- Cheek/ Elodea Cell Lab (U, Ap, An, E)

Creation of poster projects

- Organelle wanted poster (U, Ap, C)
- Stages of Mitosis (Ap, E, C)

Examples of strategies and modified strategies are in the District Shared Google Drive Biology-Cells folder

Accommodations/Modifications:

Modifications: Chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website or eBoard, adjust length of assignments as needed, and modify supplemental materials for readability.

Accommodations: provide examples for projects, 1:1 assistance as needed, restate or rephrase instructions, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard.

PART I: UNIT 5 RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Honors Biology/Matter and Energy	Unit Summary: In this unit of study, students construct explanations for the role of energy in the cycling of matter in organisms and ecosystems. They apply mathematical concepts to develop evidence to support the interactions of photosynthesis and cellular respiration, and they will develop models to communicate these explanations. Students also understand organisms' interactions with each other and their physical environment, including how organisms obtain resources. Students utilize the crosscutting concepts of matter and energy and systems, and system models to make sense of ecosystem dynamics that they learned in the earlier unit on ecology.
Grade Level(s): 9-10	
Essential Question(s): <ul style="list-style-type: none">● How does the process of photosynthesis relate to us?● How do plants make their own food?● How do organisms obtain energy?● How do matter and energy cycle through ecosystems?● How can the process of photosynthesis and respiration in a cell impact ALL of Earth's systems?● How does respiration relate to nutrition?	Enduring Understanding(s): <ul style="list-style-type: none">● The process of photosynthesis converts light energy to stored chemical energy by converting carbon dioxide plus water into sugars plus released oxygen.● The sugar molecules thus formed contain carbon, hydrogen, and oxygen: their hydrocarbon backbones are used to make amino acids and other carbon-based molecules that can be assembled into larger molecules (such as proteins or DNA), used for example to form new cells.● As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products.● As a result of these chemical reactions, energy is transferred from one system of interacting molecules to another. Cellular respiration is a chemical process in which the bonds of food molecules and oxygen molecules are broken and new compounds are formed that can transport energy to muscles. Cellular respiration also releases the energy needed to maintain body temperature despite ongoing energy transfer to the surrounding environment.● Photosynthesis and cellular respiration (including anaerobic processes) provide most of the energy for life processes.● Plants or algae form the initial level of the food web. At each link upward in a food web, only a small fraction of the matter consumed at the lower level is transferred upward, to produce growth and release energy in cellular respiration at the higher level. Given this inefficiency, there are generally fewer organisms at higher levels of a food web. Some matter reacts to release energy for life functions, some matter is stored in newly made structures, and much is discarded. The chemical elements that make up the molecules of organisms pass through food webs and into and out of the atmosphere and soil, and they are combined and recombined in different ways. At each link in an ecosystem, matter and energy are conserved.● Photosynthesis and cellular respiration are important components of the carbon cycle, in which carbon is exchanged among the biosphere,

	<p>atmosphere, oceans, and geosphere through chemical, physical, geological, and biological processes.</p> <ul style="list-style-type: none"> The main way that solar energy is captured and stored on Earth is through the complex chemical process known as photosynthesis
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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>NGSS</u>
<ol style="list-style-type: none"> Identify organisms as autotrophs or heterotrophs (producers/consumers). Recite and analyze the equation of photosynthesis Discuss the importance of plants to human civilization. Identify plant structures that are essential for photosynthesis Describe the structure of the chloroplast Determine the most efficient wavelength and color of light for photosynthesis Describe the function of photosynthetic pigments. Explain how carbon dioxide and water is consumed, and how oxygen and glucose are produced, in photosynthesis Evaluate the effects of environmental factors on the rate of photosynthesis. Relate the processes of cellular respiration to metabolism. Compare ATP production of anaerobic respiration to aerobic respiration Write the general formula for aerobic respiration and compare it to the general formula for photosynthesis Compare and contrast photosynthesis and respiration Evaluate the efficiency of the carbon cycle in energy production 	<p>HS-LS1-3 - Plan and conduct an investigation to provide evidence that, feedback mechanisms maintain homeostasis.</p> <p>HS-LS1-5 - Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.</p> <p>HS-LS1-6. Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.</p> <p>HS-LS1-7. Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are</p>

formed resulting in a net transfer of energy.

HS-LS2-3. Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.

HS-LS2-4. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.

HS-LS2-5. Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.

Inter-Disciplinary Connections:

ELA/Literacy –

RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-LS1-6),(HS-LS2-3)

WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-LS1-6),(HS-LS2-3)

WHST.9-12.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant

for a specific purpose and audience. (HS-LS1-6),(HS-LS2-3)

WHST.9-12.9 Draw evidence from informational texts to support analysis, reflection, and research. (HS-LS1-6)

SL.11-12.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings,

reasoning, and evidence and to add interest. (HS-LS1-5),(HS-LS1-7)

WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HS-LS1-3)

WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. (HS-LS1-3)

Mathematics –

MP.2 Reason abstractly and quantitatively. (HS-LS2-4)

MP.4 Model with mathematics. (HS-LS2-4)

HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-LS2-4)

HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-LS2-4)

HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-LS2-4)

Students will engage with the following text:

Miller & Levine's Biology Chapters 8&9

Examples: Cornell notes of sections in each relevant chapter, writing summaries of biochemical pathways

Examples of strategies and modified strategies are in the District Shared Google Drive Biology-Matter and Energy folder

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:

Accommodations/Modifications

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 number and paragraph next to each blank space. Provide student with written summary.

Students will write:

Students will write a lab report based on a standard format.

- **Rubric**

Students may be asked to complete current events where they will write an analysis of a particular article linking various concepts learned including the problem solving process of scientific method and development of new technology to real life events.

- **Current Event Outline**

Scholarly Journal Reflections

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.

Examples of strategies and modified strategies are in the District Shared Google Drive Biology-Matter and Energy folder

In addition to normal day to day writing activities, students may be asked to research a particular scientist and write an essay discussing the importance of their discovery to the scientific world.

Lab reports in a standard format or conclusion essays may be required for certain lab activities.

Students may be asked to complete current events where they will write an analysis of a particular article linking various concepts learned including the problem solving process of scientific method and development of new technology to real life events.

Make strategic use of digital media in presentations to enhance understanding of the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

Make strategic use of digital media in presentations to enhance understanding of the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

Conduct short as well as more sustained research to determine how feedback mechanisms maintain homeostasis. Synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation

Examples of strategies and modified strategies are in the District Shared/Science/CURRICULUM WRITING 2012/Biology Introduction folder

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:

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.

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
- Create various visual aids by mapping out the location of various safety equipment in the classroom
- Design and conduct laboratory experiments (see example in assessment section)
- Safely use microscopes
- Build/create wet mount slides
- Construct and analyze graphs using student collected and given data
- Complete write to learn activities

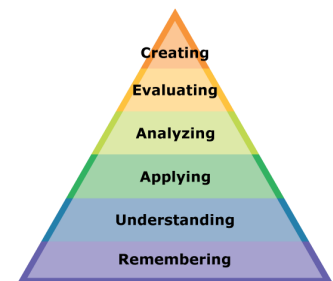
Teacher will :

- Utilize SmartBoard and PowerPoint technologies to present definitions, concepts and any other pertinent materials
 - Collaborate with fellow teachers for cross curricular relation to material
 - Use leading questions to spark classroom discussion
 - 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 District Google Drive Biology-Themes Folder

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.



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>) (Remembering through Evaluating)

Labs include Plant Pigment Chromatography Lab and Aerobic Exercise and Respiration Lab (Remembering through Analyzing)

Examples of strategies and modified strategies are in the District Shared Google Drive Biology-Matter and Energy folder

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website or eBoard, adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flash cards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard, monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Summative Assessments:

To demonstrate proficiency on the material presented in this unit, students will be required to take a test that includes multiple choice, true-false, matching and open-ended questions.

Students can also prepare presentations on mitochondrial diseases and diabetes.

Examples of strategies and modified strategies are in the District Shared Google Drive Biology-Matter and Energy folder

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website or eBoard, adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flash cards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard, monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

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

Students can prepare PowerPoint presentations on diabetes and other metabolic disorders, including mitochondrial diseases (Remembering through Creating)

Examples of strategies and modified strategies are in the District Shared Google Drive Biology-Matter and Energy folder

Accommodations/Modifications:

Modifications: Chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website or eBoard, adjust length of assignments as needed, and modify supplemental materials for readability.

Accommodations: provide examples for projects, 1:1 assistance as needed, restate or rephrase instructions, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard.

PART I: UNIT 6 RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Honors Biology/Genetics	Unit Summary: Students analyze data develop models to make sense of the relationship between DNA and chromosomes in the process of cellular division, which passes traits from one generation to the next. Students determine why individuals of the same species vary in how they look, function, and behave. Students develop conceptual models of the role of DNA in the unity of life on Earth and use statistical models to explain the importance of variation within populations for the survival and evolution of species. Ethical issues related to genetic modification of organisms and the nature of science are described. Students explain the mechanisms of genetic inheritance and describe the environmental and genetic causes of gene mutation and the alteration of gene expressions. The crosscutting concepts of structure and function, patterns, and cause and effect are used as organizing concepts.
Grade Level(s): 9-10	

Essential Question(s):

- What is the structure of DNA, and how does it function in genetic inheritance?
- How does information flow from DNA to RNA to direct the synthesis of proteins?
- 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 passed through the generations?
- How do alleles segregate when more than one gene is involved?
- How can the information learned from pedigrees determine the nature of genes and alleles associated with inherited human traits?
- How are characteristics from one generation related to the previous generation?
- Can a biologist predict the distribution of expressed traits in a population?

Enduring Understanding(s):

- All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins.
- Each chromosome consists of a single very long DNA molecule, and each gene on the chromosome is a particular segment of that DNA. The instructions for forming species' characteristics are carried in DNA. All cells in an organism have the same genetic content, but the genes used (expressed) by the cell may be regulated in different ways. Not all DNA codes for a protein; some segments of DNA are involved in regulatory or structural functions, and some have no as-yet known function.
- In sexual reproduction, chromosomes can sometimes swap sections during the process of meiosis (cell division), thereby creating new genetic combinations and thus more genetic variation. Although DNA replication is tightly regulated and remarkably accurate, errors do occur and result in mutations, which are also a source of genetic variation. Environmental factors can also cause mutations in genes, and viable mutations are inherited.
- Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus the variation and distribution of traits observed depends on both genetic and environmental factors.

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>NGSS</u>
<ol style="list-style-type: none">1. Explain how the process of meiosis results in the passage of traits from parent to offspring, and how that results in increased genetic diversity necessary for evolution.2. Contrast RNA with DNA.3. Summarize the processes of transcription and translation4. Define mutations and describe different types of mutations.5. Create a visual representation to illustrate how changes in a DNA nucleotide sequence can result in a change in the polypeptide produced.6. 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.7. Identify genes as a set of instructions, coded in the DNA sequence of each organism.8. 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.9. Explain the role of sex chromosomes in sex determination.10. Explain the effect of crossing-over on the inheritance of genes in linkage groups.11. Show how pedigree analysis can be used to illustrate the inheritance of traits.12. Give examples of traits or disorders transmitted by autosomal dominant, autosomal recessive, polygenic and X-linked recessive inheritance.13. Explain how non-disjunction can cause genetic disorders. Explain the value and potential applications of genome projects.	<p>HS-LS1-1 - Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.</p> <p>HS-LS3-1 - Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.</p> <p>HS-LS3-2 - Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.</p> <p>HS-LS3-3 - Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.</p>

Inter-Disciplinary Connections:

ELA/Literacy –

RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-LS1-1)

WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-LS1-1), (HS-LS3-1),(HS-LS3-2)

WHST.9-12.9 Draw evidence from informational texts to support analysis, reflection, and research. (HS-LS1-1)

RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. (HS-LS3-1)

WHST.9-12.1 Write arguments focused on discipline-specific content. (HS-LS3-2)

Mathematics –

MP.2 Reason abstractly and quantitatively. (HS-LS3-2),(HS-LS3-3)

Students will engage with the following text:

Biology by Miller and Levine chapters 11-15

Other sources of text include articles based on current research as found on scientific blogs and news sites.

They will also use:

- Preparing for the New Jersey EOC for test preparation
- Biozone

They will read articles such as:

- “Jumping Genes, a Historical Perspective Towards Modern Biology,”
- “War on Cancer,” and complete summaries on current science articles using the newspaper and internet. -

Examples of strategies and modified strategies are in the District Shared Google Drive Biology-Genetics folder

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:

Accommodations/Modifications

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 number and paragraph next to each blank space. Provide student with written summary.

Students will write:

Students will write a lab report based on a standard format.

- **Rubric**

Students may be asked to complete current events where they will write an analysis of a particular article linking various concepts learned including the problem solving process of scientific method and development of new technology to real life events.

- **Current Event Outline**

Scholarly Journal Reflections

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

- Write arguments, based on evidence, that inheritable genetic variations may result from new genetic combinations through meiosis, viable errors occurring during replication, and/or mutations caused by environmental factors

Examples of strategies and modified strategies are in the District Shared Google Drive Biology-Genetics folder

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:

Accommodations/Modifications

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.

In addition to normal day to day writing activities, students may be asked to research a particular scientist and write an essay discussing the importance of their discovery to the scientific world.

Lab reports in a standard format or conclusion essays may be required for certain lab activities.

Students may be asked to complete current events where they will write an analysis of a particular article linking various concepts learned including the problem solving process of scientific method and development of new technology to real life events.

Make strategic use of digital media in presentations to enhance understanding of the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

Make strategic use of digital media in presentations to enhance understanding of the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

Conduct short as well as more sustained research to determine how feedback mechanisms maintain homeostasis.

Synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation

Examples of strategies and modified strategies are in the District Shared/Science/CURRICULUM WRITING 2012/Biology Introduction folder

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:

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.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

Students will:

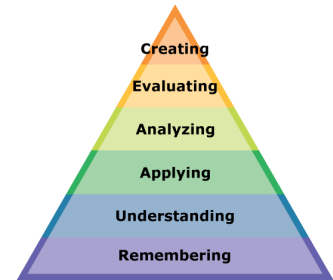
- Engage in textbook and other reading materials as described above
- Actively participate in class discussions both teacher and peer initiated
- Work collaboratively with peers on various assignments, labs, and/or projects
- Create various visual aids by mapping out the location of various safety equipment in the classroom
- Design and conduct laboratory experiments (see example in assessment section)
- Safely use microscopes
- Build/create wet mount slides
- Construct and analyze graphs using student collected and given data
- Complete write to learn activities

Teacher will :

- Utilize SmartBoard and PowerPoint technologies to present definitions, concepts and any other pertinent materials
- Collaborate with fellow teachers for cross curricular relation to material
- Use leading questions to spark classroom discussion
- 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 District Shared Google Drive Biology-Genetics folder

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.



Formative Assessments:

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

- 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 modeling transcription to translation in the lab activity CHNOPS ** (R,U,A,C)
- 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)
- 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)

DNA Transcription and Translation Simulation: Ask questions that arise from examining models or a theory, to clarify and/or seek additional information and relationships.

Growth and Development: Apply scientific reasoning, theory, and/or models to link evidence to the claims to assess the extent to which the reasoning and data support the explanation or conclusion.

Mitosis: Develop and/or use a model to generate data to support explanations, predict phenomena, analyze systems, and/or problems.

Inheritance and Variation: Genetic Variation: Design, evaluate, and/or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and trade-off considerations.

Genetics: Manipulate variables and collect data about a complex model of a proposed process or system to identify failure points or improve performance relative to criteria for success or other variables.

Examples of strategies and modified strategies are in the District Shared Google Drive Biology-Genetics folder

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website or eBoard, adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flash cards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard, monitor assignment book, assist in binder/notebook organization, preferential seating, allow student

to use notebook on assessments.

Summative Assessments:

Students will be required to take tests that include multiple choice, true- false, as well as completing Punnett squares and open ended questions to demonstrate proficiency on the material in this unit of genetics (R,U,A,A,E).

- They will be required to explain DNA replication by diagram. (R, U, An, A)
- Using a chart of amino acids, they will be expected to complete a chart using a strip of DNA and find the codon, anticodon, proper amino acid and finally the correct protein. (R, U, An, A)
- They will be expected to create and interpret a pedigree and explain how they came up with the correct genotype. (R,U,A,A,E,C)

Examples of strategies and modified strategies are in the District Shared Google Drive Biology-Genetics folder

Accommodations/Modifications:

Modifications: Extra space for responses, fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website or eBoard, adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, provide flash cards with term and image on onside and definition on the other, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard, monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Performance Assessments:

Conduct lab experiments and present conclusions.

- Build a model of DNA using the base pairing rule and indicate coded amino acids. (R, U, An, A, E, C)
- Lab activity #24, Structure of DNA and DNA Replication ** (R, U, An, A, E, C)
- Lab activity #25 RNA Structure** (R, U, C)
- Lab activity #26 Protein Synthesis ** (R, U, An, A, E, C)
- 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)

- Investigating Inherited Human Traits (R, U, Ap, C)
- Creation of their family pedigree (R,U,An,C)
- Genetic Disorder report (U, An, E, C)

Examples of strategies and modified strategies are in the District Shared Google Drive Biology-Genetics folder

Accommodations/Modifications:

Modifications: Chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website or eBoard, adjust length of assignments as needed, and modify supplemental materials for readability.

Accommodations: provide examples for projects, 1:1 assistance as needed, restate or rephrase instructions, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard.