

Winslow Township School District
Laboratory Chemistry
Unit 4

Overview: In this unit of study, students construct explanations for the role of energy in the cycling of matter in organisms. They apply mathematical concepts to develop evidence to support explanations of the interactions of photosynthesis and cellular respiration and develop models to communicate these explanations. The crosscutting concept of *matter and energy* provides students with insights into the structures and processes of organisms. Students are expected to *develop and use models, plan and conduct investigations, use mathematical thinking, and construct explanations and design solutions* as they demonstrate proficiency with the disciplinary core ideas.

Overview	Standards for Science	Unit Focus	Essential Questions
Unit 4	<ul style="list-style-type: none"> • HS-LS1-5 • HS-LS1-7 • HS-LS1-7 	<ul style="list-style-type: none"> • Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. • 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. • 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><i>How does photosynthesis transform light energy into stored chemical energy?</i></p> <p><i>How does cellular respiration result in a net transfer of energy?</i></p> <p><i>How do elements combine with other elements and what molecules or formula units are formed?</i></p>

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***Unit 4:
Enduring
Understandings***

- The process of photosynthesis converts light energy to stored energy by converting carbon dioxide plus water into sugars plus released oxygen.

Changes of energy and matter in a system can be described in terms of energy and matter flows into, out of, and within a system.

- 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.
- Chemical processes in which the bonds are broken and new compounds are formed that can transport energy to muscles.
- Chemical processes in which the bonds are broken also releases the energy needed to maintain body temperature despite ongoing energy transfer to the surrounding environment.

Energy cannot be created or destroyed—it only moves between one place and another place, between objects and/or fields, or between systems.

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Curriculum Unit 4	Standards		Pacing	
			Days	Unit Days
Unit 4: •	HS-PS3-3 HS-PS3-4 HS-ESS1-1 HS-ESS1-2 HS-ESS1-3 HS-ESS1-6	Liquids Solids Changes of State Properties of Solutions Concentration of Solutions Colligative Properties	23	39
	HS-ESS1-1 HS-ESS1-2 HS-ESS1-3 HS-ESS1-6	Acid-Base Theories Hydrogen Ions Strengths of Acids + Bases Neutralization	13	
	Assessment, Re-teach and Extension		3	

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Unit 1		
Disciplinary Core Ideas	Indicator #	Indicator
<p>LS1.A: Structure and Function</p> <ul style="list-style-type: none"> 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. <p>LS1.C: Organization for Matter and Energy Flow in Organisms</p> <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. <p>As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products.</p> <ul style="list-style-type: none"> 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. 	<p>HS-LS1-4 HS-LS1-5 HS-LS1-6 HS-LS1-7</p>	<p>Use a model to predict the relationships between systems or between components of a system.</p> <p>Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.</p> <p>Use mathematical representations of phenomena to support claims.</p> <p>Apply scientific principles and evidence to provide an explanation of phenomena and solve design problems, taking into account possible unanticipated effects. Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.</p>

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Unit 4	
• Assessment Plan	
<ul style="list-style-type: none"> • Exploratory activities • Warm-up activities • Individual/Group Lab report • Class discussions • Student Participation • Teacher Observations 	<ul style="list-style-type: none"> • Quizzes • Tests • Authentic assessments and projects • Exploratory activities • Presentations
Resources	Activities
<ul style="list-style-type: none"> • Chromebooks • Textbook • Reading Essentials Workbook • Web Quests • Virtual Field Trips • Video Streaming • BrainPOP • Puzzlemaker: Game Based Learning Discovery Education • Diversity, Equity & Inclusion Educational Resources https://www.nj.gov/education/standards/dei/ 	<ul style="list-style-type: none"> • Use physical models to examine the phases of the moon using a light source and a moon model to view the various shapes of the moon as it orbits the earth and keep a lunar calendar for one month and analyze the results by looking for differences and patterns. • Measure the acceleration of the objects as they fall from various heights and determine that the objects speed up as they fall, therefore proving that a force is acting on them. • mini-lessons • independent reading • films • website exploration • discussions, dialogues • debates • partner or small group work • student presentations, reports, journals, reflections, • in-class assessments, • written reports, essays, research, and homework

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Instructional Best Practices and Exemplars

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|---|--|
| 1. Identifying similarities and differences | 6. Cooperative learning |
| 2. Summarizing and note taking | 7. Setting objectives and providing feedback |
| 3. Reinforcing effort and providing recognition | 8. Generating and testing hypotheses |
| 4. Homework and practice | 9. Cues, questions, and advance organizers |
| 5. Nonlinguistic representations | 10. Manage response rates |

9.1 Personal Financial Literacy, 9.2 Career Awareness, Exploration, Preparation and Training & 9.4 Life Literacies and Key Skills

- 9.4.12.IML.7: Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change.
- 9.4.12.IML.8: Evaluate media sources for point of view, bias, and motivations.
- 9.4.12.IML.9: Analyze the decisions creators make to reveal explicit and implicit messages within information and media.
- 9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task.
- 9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.
- 9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments.
- 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.

The implementation of the 21st Century skills and standards for students of the Winslow Township District is infused in an interdisciplinary format in a variety of curriculum areas that include, English language Arts, Mathematics, School Guidance, Social Studies, Technology, Visual and Performing Arts, Science, Physical Education and Health, and World Language.

Additional opportunities to address 9.1, 9.2 & 9.4:

Philadelphia Mint

<https://www.usmint.gov/learn/kids/resources/educational-standards>

Different ways to teach Financial Literacy.

<https://www.makeuseof.com/tag/10-interactive-financial-websites-teach-kids-money-management-skills/>

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Modifications for Special Education/504

Students with special needs: The students' needs will be addressed on an individual and grade level using a variety of modalities. Accommodations will be made for those students who need extra time to complete assignment. Support staff will be available to aid students related to IEP specifications. 504 accommodations will also be attended to by all instructional leaders. Physical expectations and modifications, alternative assessments, and scaffolding strategies will be used to support this learning. The use of Universal Design for Learning (UDL) will be considered for all students as teaching strategies are considered.

- Small group instruction
- Audio books/ Text-to-speech platforms
- Leveled texts/Vocabulary Readers
- Leveled informational texts via online
- Modeling and guided practice
- Read directions aloud
- Repeat, rephrase and clarify directions
- Extended time as needed
- Break down assignments into smaller units
- Provide shortened assignments
- Modify testing format
- Repeat directions as needed
- Graphic organizers
- Study Guides, Study Aids and Re teaching as needed

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Modifications for At-Risk Students

Formative and summative data will be used to monitor student success. At first signs of failure, student work will be reviewed to determine support. This may include parent consultation, basic skills review and differentiation strategies. With considerations to UDL, time may be a factor in overcoming developmental considerations

- Restructure lessons using Universal Design for Learning (UDL) principals (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA)
- Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.
- Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).
- Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies).
- Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences).
- Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings.
- Use project-based science learning to connect science with observable phenomena.
- Structure the learning around explaining or solving a social or community-based issue.
- Provide English Language Learners students with multiple literacy strategies.

Collaborate with after-school programs or clubs to extend learning opportunities.

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English Language Learners	Modifications for Gifted Students
<p>All WIDA Can Do Descriptors can be found at this link: https://wida.wisc.edu/teach/can-do/descriptors</p> <p><input type="checkbox"/> Grades 9-12 WIDA Can Do Descriptors:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Listening <input type="checkbox"/> Speaking <input type="checkbox"/> Reading <input type="checkbox"/> Writing <input type="checkbox"/> Oral Language <p>Students will be provided with accommodations and modifications that may include:</p> <ul style="list-style-type: none"> • Relate to and identify commonalities in science studies in student’s home country • Assist with organization • Use of computer • Emphasize/highlight key concepts • Teacher Modeling • Peer Modeling • Label Classroom Materials - Word Walls 	<p>Students excelling in mastery of standards will be challenged with complex, high level challenges related to the topic.</p> <ul style="list-style-type: none"> • Raise levels of intellectual demands • Require higher order thinking, communication, and leadership skills • Differentiate content, process, or product according to student’s readiness, interests, and/or learning styles • Provide higher level texts • Expand use of open-ended, abstract questions • Critical and creative thinking activities that provide an emphasis on research and in-depth study • Enrichment Activities/Project-Based Learning/ Independent Study • Variety of Repertoire: 3- 5 extra song selections • above and beyond expectation for non- auditioned class., high school level selection <p>Additional Strategies may be located at the links:</p> <ul style="list-style-type: none"> ❖ Gifted Programming Standards ❖ Webb’s Depth of Knowledge Levels and/or Revised Bloom’s Taxonomy ❖ REVISED Bloom’s Taxonomy Action Verbs

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Interdisciplinary Connections

ELA:

RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts.

RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.

Math:

MP.2 Reason abstractly and quantitatively.

MP.4 Model with mathematics.

6.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.

7.RP.A.2 Recognize and represent proportional relationships between quantities.

6.EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

7.EE.B.6 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
their context.

Integration of Computer Science and Design Thinking NJSL 8

8.1.12.IC.3: Predict the potential impacts and implications of emerging technologies on larger social, economic, and political structures, using evidence from credible sources.

8.1.12.DA.1: Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.

8.2.12.ED.4: Design a product or system that addresses a global problem and document decisions made based on research, constraints, trade-offs, and aesthetic and ethical considerations and share this information with an appropriate audience.

8.2.12.ITH.1: Analyze a product to determine the impact that economic, political, social, and/or cultural factors have had on its design, including its design constraints.

8.2.12.NT.1: Explain how different groups can contribute to the overall design of a product. • 8.2.12.NT.2: Redesign an existing product to improve form or function.