Winslow Township School District
Laboratory Chemistry
Unit 2

Overview: In this unit of study, students *develop and use models*, *plan and carry out investigations*, *analyze and interpret data,* and *engage in argument from evidence* to make sense of energy as a quantitative property of a system—a property that depends on the motion and interactions of matter and radiation within that system. They will also use the findings of investigations to provide a mechanistic explanation for the core idea that total change of energy in any system is always equal to the total energy transferred into or out of the system. Additionally, students develop an understanding that energy, at both the macroscopic and the atomic scales, can be accounted for as motions of particles or as energy associated with the configurations (relative positions) of particles.

Students apply their understanding of energy to explain the role that water plays in affecting weather. Students examine the ways that human activities cause feedback that create changes to other systems. Students are expected to demonstrate proficiency in *developing and using models*, *planning and carrying out investigations*, *analyzing and interpreting data, engaging in argument from evidence*, and using these practices to demonstrate understanding of core ideas.

Students also develop possible solutions for major global problems. They begin by breaking these problems into smaller problems that can be tackled with engineering methods. To evaluate potential solutions, students are expected not only to consider a wide range of criteria, but also to recognize that criteria need to be prioritized.

Overview	Standards for Science	Unit Focus	Essential Questions
Unit 2	• **HS-PS3-4** • **HS-ESS2-5** • **HS-ESS3-2** • **HS-ETS1-3**	• **Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).** • **Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.** • **Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.**	*Does thermal energy always transfer or transform in predictable ways?* *What makes water's properties essential to life on our planet?*

Unit 2:: Enduring Understandings	• When investigating or describing a system, the boundaries and initial conditions of the system need to be defined and their inputs and outputs analyzed and described using models. • Energy cannot be created or destroyed, but it can be transported from one place to another and transferred between systems. • Uncontrolled systems always move toward more stable states—that is, toward a more uniform energy distribution. Although energy cannot be destroyed, it can be converted into less useful forms—for example, to thermal energy in the surrounding environment. • The abundance of liquid water on Earth's surface and its unique combination of physical and chemical properties are central to the planet's dynamics. • The functions and properties of water and water systems can be inferred from the overall structure, the way the components are shaped and used, and the molecular substructure. These properties include water's exceptional capacity to absorb, store, and release large amounts of energy; transmit sunlight; expand upon freezing; dissolve and transport materials; and lower the viscosities and melting points of rocks.	

Winslow Township School District
Laboratory Chemistry
Unit 2

Curriculum Unit 2	Standards		Pacing	
			Days	Unit Days
Unit 2: • **Introduction to Chemistry** • **Properties of Matter** • **Scientific Measurement** • **Atomic Structure**	HS-PS1-1 HS-PS1-2 HS-PS1-3 HS-PS1-4 HS-PS1-6 HS-PS1-7 HS-PS3-1 HS-PS3-2 HS-PS3-3 HS-PS3-4	Quantum Mechanical Model	5	43
	HS-ETS11 HS-ETS12 HS-ETS13	Organizing Elements Classifying Elements Periodic Trends	15	
	HS-ETS11 HS-ETS12 HS-ETS13	Ion Formation Ionic Bonding Metallic Bonding Molecular Compounds Covalent Bonding Bonding Theories Polar Bonding	21	
	Assessment, Re-teach and Extension		2	

Winslow Township School District
Laboratory Chemistry
Unit 2

Unit 1		
Disciplinary Core Ideas	**Indicator #**	**Indicator**
PS3.B: Conservation of Energy and Energy Transfer • Energy cannot be created or destroyed, but it can be transported from one place to another and transferred between systems. • Uncontrolled systems always evolve toward more stable states—that is, toward more uniform energy distribution (e.g., water flows downhill, objects hotter than their surrounding environment cool down). PS3.D: Energy in Chemical Processes	**HS-PS3-4**	Use a model to predict the relationships between systems or between components of a system.
	HS-PS3-4	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.

Although energy cannot be destroyed, it can be converted to less useful forms—for example, to thermal energy in the surrounding environment. **ESS3.A: Natural Resources** All forms of energy production and other resource extraction have associated economic, social, environmental, and geopolitical costs and risks as well as benefits. New technologies and social regulations can change the balance of these factors. (HS-ESS3-2)	**HS-ESS3-2**	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.

Winslow Township School District
Laboratory Chemistry
Unit 2

<table>
<tr><th colspan="2">Unit 2</th></tr>
<tr><th colspan="2">• Assessment Plan</th></tr>
<tr><td>• Exploratory activities
• Warm-up activities
• Individual/Group Lab report
• Class discussions
• Student Participation
• Teacher Observations</td><td>•Quizzes
• Tests
• Authentic assessments and projects
• Exploratory activities
• Presentations</td></tr>
<tr><th>Resources</th><th>Activities</th></tr>
<tr><td>• 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/</td><td>• 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</td></tr>
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Winslow Township School District
Laboratory Chemistry
Unit 2

Instructional Best Practices and Exemplars	
1. Identifying similarities and differences 2. Summarizing and note taking 3. Reinforcing effort and providing recognition 4. Homework and practice 5. Nonlinguistic representations	6. Cooperative learning 7. Setting objectives and providing feedback 8. Generating and testing hypotheses 9. Cues, questions, and advance organizers 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.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/

Winslow Township School District
Laboratory Chemistry
Unit 2

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

Winslow Township School District
Laboratory Chemistry
Unit 2

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.

Winslow Township School District
Laboratory Chemistry
Unit 2

English Language Learners	Modifications for Gifted Students
All WIDA Can Do Descriptors can be found at this link: https://wida.wisc.edu/teach/can-do/descriptors ☐ Grades 9-12 WIDA Can Do Descriptors: ☐ Listening ☐ Speaking ☐ Reading ☐ Writing ☐ Oral Language Students will be provided with accommodations and modifications that may include: • 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	Students excelling in mastery of standards will be challenged with complex, high level challenges related to the topic. ● 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 Additional Strategies may be located at the links: ❖ Gifted Programming Standards ❖ Webb's Depth of Knowledge Levels and/or Revised Bloom's Taxonomy ❖ REVISED Bloom's Taxonomy Action Verbs

Winslow Township School District
Laboratory Chemistry
Unit 2

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 NJSLS 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. 8.1.12.DA.3: Translate between decimal numbers and binary numbers. 8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.