Winslow Township School District

Laboratory Biology Curriculum

Unit 1: Nature of Science & Cells

Overview: This unit of study will introduce key characteristics and themes of Biology. Students will understand the importance of microscopy in the study of Biology and they will utilize the scientific method to solve a variety of scientific problems. Students will be able to use their learning to interpret data in order to solve problems and make informed decisions in order to explain the physical and natural world. Students will be able to determine what makes up living things, explore the concept that the cell is the basic unit of life, and recognize how cell structures have adapted to their functions. The importance of water and macromolecules will be emphasized.

Overview	Standards for Science	Unit Focus	Essential Questions
Unit 1 **Nature of Science and Cells**	• HS-LS1-1 • HS-LS1-2 • HS-LS1-3 • HS-LS1-6 • HS-LS4-1 • HS-LS4-2 • HS-PS1-2	• Utilize the Scientific Method as a problem-solving tool – quantitatively investigate & understand the world. • Microscopy is a critical component in understanding the field of Biology. • Living things harbor characteristics that allow them to be differentiated from nonliving things. • The science of Biology and Chemistry are closely associated with each other. Major macromolecules are the building blocks of all biological matter. Water structure and functions is critical to maintaining life on Earth. • The cell is the basic unit of structure and function in life. • Cell structures are adapted to their function with emphasis on transport of materials and homeostasis.	• What role does science play in the study of life? • How do we find explanations for events in the natural world? • What is biology? • What are the basic chemical principles that affect living things? • How are cell structures adapted to their functions?

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Unit 1: Enduring Understandings	• Scientific inquiry is a process used to investigate aspects of the world and construct reasonable explanations. • Scientists use the scientific method to develop a test that answers a question. • Sometimes an experiment often not prove a hypothesis to be true. • Scientists analyze and communicate results by using charts, tables and graphs. • Organisms are made of macromolecules that drive life processes. • Water is critical to life on Earth. • The cell is the basic unit of structure and function for all life forms.	

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Curriculum Unit 1	Standards		Pacing	
			Days	Unit Days
Unit 1: **Nature of Science** **And** **Cells**	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.	6	46
	HS-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms	9	
	HS-LS1-3	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis	5	
	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.	6	
	HS-LS4-1	Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.	3	
	HS-LS4-2	Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3)	11	

		competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment		
	HS-PS1-2	Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties	6	
	Assessment, Re-teach and Extension		46	

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Unit 1 Laboratory Biology		
Disciplinary Core Ideas	**Indicator #**	**Indicator**
ETS1.A: Defining and Delimiting Engineering Problems The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions. (MS-ETS1-1) **ETS1.B: Developing Possible Solutions** A solution needs to be tested, and then modified on the basis of the test results, in order to improve it. (MS-ETS1-4) **ETS1.C: Optimizing the Design Solution** Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process—that is, some of those characteristics may be incorporated into the new design. (MS-ETS1-3)	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.
	HS-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms
	HS-LS1-3	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis
	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.
	HS-LS4-1	Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.
	HS-LS4-2	Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to

		mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment
	HS-PS1-2	Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties

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Unit 1 Laboratory Biology	
• **Assessment Plan**	
• Exploratory activities • Warm-up activities • Individual/Group Lab report • Class discussions • Student Participation • Teacher Observations	• Quizzes • Tests • Authentic assessments and projects • Exploratory activities • Presentations • Current Events

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Resources	Activities
•Chromebooks •Textbook •Videostreaming •BrainPOP •Puzzlemaker: Game Based Learning | Discovery Education **Diversity, Equity & Inclusion Educational Resources** https://www.nj.gov/education/standards/dei/	• Use various forms of expository writing-procedural writing, narrative writing, descriptive writing, labeling, as well as to create visuals, graphs, tables, diagrams and charts. • Use scientific argumentation with exercises on writing claims, using evidence to support your claim and explaining the reasoning behind their claim. • 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 • reinforcement of prefix, suffix, root words to build upon general & disciplinary vocabulary
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
9.2.12.CAP.2: Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs. 9.2.12.CAP.3: Investigate how continuing education contributes to one's career and personal growth. 9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills. 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving 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: Note: Teachers identify the modification they will use in the unit. Input via 504 and IEP plans will be implemented.

- 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 ELL students with multiple literacy strategies.
- Collaborate with after-school programs or clubs to extend learning opportunities.

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
- 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).
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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 Social Studies 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

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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.

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Integration of Computer Science and Design Thinking NJSLS 8
8.1.12.IC.1: Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices. 8.1.12.DA.1: Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.