



Sparta Area School District

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Course Outcome Summary

Course Information: **We are Living in a Material World (Year C)**

Description: Students investigate the periodic table, atoms, and crystalline structures of materials in order to identify materials that we use in daily life. Students evaluate the properties and performance of materials to understand why they are used.

Instruction Level: Grades 6-8

Course Standards: Science, Technology, Engineering, Math, ELA, Social Studies

Units

1. Periodic Table of Elements
2. Atoms
3. Physical and Chemical Reactions
4. Crystal Structures
5. Metals
6. Polymers
7. Nanoscale
8. Challenge Based Learning Project

Unit Outlines

1. Periodic Table of Elements

Essential Question:

Students will be able to answer the question(s):

- What are the building blocks of life?
- What are the elements that make up different materials?

Essential Knowledge:

What are the key concepts/vocabulary/ideas that students will have mastery of by the completion of the unit?

- Students explore the periodic table, learning its layout and the meaning of the various components.

2. Atoms

Essential Question:

Students will be able to answer the question(s):

- What are the building blocks of life?

Essential Knowledge:

What are the key concepts/vocabulary/ideas that students will have mastery of by the completion of the unit?

- Students learn about the atom structure and the particle movement in solids, liquids, and gases.

3. Physical and Chemical Reactions

Essential Question:

Students will be able to answer the question(s):

- What are the properties of various materials and how do they react to each other?

Essential Knowledge:

What are the key concepts/vocabulary/ideas that students will have mastery of by the completion of the unit?

- Students learn about the property characteristics and energy transfer during physical and chemical changes. They explore endothermic and exothermic reactions.

4. Crystal Structures

Essential Question:

Students will be able to answer the question(s):

- How are crystals formed at the atomic level?

Essential Knowledge:

What are the key concepts/vocabulary/ideas that students will have mastery of by the completion of the unit?

- Students understand the principles of crystals.

5. Metals

Essential Question:

Students will be able to answer the question(s):

- What are the properties of various metals?

Essential Knowledge:

What are the key concepts/vocabulary/ideas that students will have mastery of by the completion of the unit?

- Students learn the properties of metals.

6. Polymers**Essential Question:**

- What are the properties of various polymers?

Essential Knowledge:

What are the key concepts/vocabulary/ideas that students will have mastery of by the completion of the unit?

- Students learn about the various types of plastics and the manufacturing process.

7. Nanoscale**Essential Question:**

- What are the properties of various materials and how can we investigate each property?

Essential Knowledge:

What are the key concepts/vocabulary/ideas that students will have mastery of by the completion of the unit?

- Students explore the qualities of nanoscale materials and the properties that make nanoscale possible.

8. Challenge-Based Learning Project**Essential Question:**

- What innovative materials exist and how are they used in the development of products?
- How does the manufacturing of these materials impact our daily lives and environment?

Essential Knowledge:

What are the key concepts/vocabulary/ideas that students will have mastery of by the completion of the unit?

- Students research a material, its applications, and composition.

Science Standards:

- Interpretation of Data
 - Select one piece of data from a simple data presentation (e.g. a simple food web diagram)
 - Identify basic features of a table, graph, or diagram (e.g. units of measurement)

- Find basic information in text that describes a simple data presentation
- Determine how the values of variables change as the value of another variable changes in a simple data presentation
- Scientific Investigation
 - Find basic information in text that describes a simple experiment
 - Understand the tools and functions of tools used in a simple experiment
- Evaluation of Models, Inferences, and Experimental Results
 - Find basic information in a model (conceptual)
 - Identify implications in a model
 - Determine which models present certain basic information

Technology Standards:

- Students use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways.
- Students evaluate the accuracy, perspective, credibility and relevance of information, media, data or other resources.
- Students curate information from digital resources using a variety of tools and methods to create collections of artifacts that demonstrate meaningful connections or conclusions.
- Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.
- Students break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.
- Students understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions. (Sphero)
- Students choose the appropriate platforms and tools for meeting the desired objectives of their creation or communication.
- Students publish or present content that customizes the message and medium for their intended audiences.
- Students explore local and global issues and use collaborative technologies to work with others to investigate solutions.

Engineering Standards:

- Use tools to observe, measure, make things, and transfer information.
- Follow a set of instructions to produce a product using appropriate tools and materials.
- Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
- Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- After testing, determine similarities and differences among several solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
- Build a model that will be used for testing, and make modification so design outcomes can be achieved.

Math Standards:

- Substitute whole numbers for unknown quantities to evaluate expressions
 - Describe the changes visible in a graph
- Compute the perimeter of polygons when all side lengths are given
- Compute the area of rectangles
- Perform common conversions of money and of length, weight, mass, and time within a measurement system
- Read basic tables and charts
- Compute using rates and ratios
- Solve multistep ratio and percent problems
- Solve problems involving surface area and volume
- Know the formulas for area and volume of various geometric shapes
- Solve problems using Order of Operation

ELA Standards:

- English
 - Determine whether a simple essay has met a straightforward goal
 - Determine the most logical place for a sentence in a paragraph
 - Delete obviously redundant and wordy material
 - Revise expressions that deviate markedly from the style and tone of the essay
 - Recognize and correct marked disturbances in sentence structure
 - Recognize and correct inappropriate shifts in verb tense and voice when the meaning of the entire sentence must be considered
 - Ensure straightforward pronoun-antecedent agreement
 - Use the appropriate word in frequently confused pairs
 - Use appropriate punctuation in straightforward situations
- Writing
 - Generate reasons for a position that are vague or simplistic; show a little recognition of the complexity of the issue in the prompt by briefly noting implications and/or complications of the text.
 - Present a thesis that establishes focus on the topic issue, and/or briefly or unclearly responding to counterarguments to the writer's position.
 - Provide adequate development in support of ideas; clarify ideas by using some specific reasons, details, and examples
 - Use some appropriate transitional words and phrases
 - Present a somewhat developed introduction and conclusion
 - Show adequate use of language to communicate by correctly employing many of the conventions of standard English grammar, usage, and mechanics, but with some distracting errors that may occasionally impede understanding, choosing words that are appropriate, and using some varied kinds of sentence structures to vary pace.
- Reading
 - Identify a clear central idea or theme in somewhat challenging passages or their paragraphs

- Summarize key supporting ideas and details in somewhat challenging passages
- Recognize a clear intent of an author or narrator in somewhat challenging passages
- Locate simple details at the sentence and paragraph level in somewhat challenging passages
- Draw simple logical conclusions in somewhat challenging passages
- Draw a logical conclusions using information from two informational texts
- Identify simple cause-effect relationships within a single paragraph in somewhat challenging and literary narratives
- Analyze how one or more sentences in complex passages offer reasons for or support a claim

Social Studies Standards:

- Chronological Reasoning
- Sequencing - Design one's own sequential pattern of events and explain why they occurred in this manner
- Historical Connections
- Comparison - Categorize the traits of two items by placing them into "like" topics (grouping a list of traits)
- Analyzing Historical Sources
- Evidence - Describe details/ evidence that support a main idea/ argument statement

