

WARREN COUNTY SCHOOL DISTRICT

PLANNED INSTRUCTION

COURSE DESCRIPTION

Course Title: STEM 7

Course Number: 00795

Course Prerequisites: None

Course Description: In this STEM 7 course, seventh-grade students will further explore topics that are part of their Science 7 curriculum by completing a variety of hands-on STEM activities. The course will explore the various physical, biological, and environmental aspects of green energy systems, including the components, design, and installation. They will investigate both hydrogen fuel cell cars and solar cars. In addition, students will learn about the benefits and challenges of tiny houses, including their affordability, sustainability, and energy efficiency. By the end of the course, students will have gained an appreciation for the importance of sustainable living and the potential of eco-friendly housing and transportation solutions. Standards are incorporated from all three branches of science and all areas of the STEELS standards to ensure a well-rounded science experience in accordance with the three-dimensional design of these new standards.

Suggested Grade Level: Grade 7

Length of Course: One Nine-Week Marking Period

Units of Credit: .25

PDE Certification and Staffing Policies and Guidelines (CSPG) Required Teacher Certifications:

CSPG 32 Biology, CSPG 34 Chemistry, CSPG 40 Earth and Space Science, CSPG 45 Environmental Science, CSPG 46 General Science, CSPG 54 Middle Level Science, CSPG 56 Physics, CSPG 65 Technology Education, CSPG 70 Grades 4 – 8 (3100-05), CSPG 71 Computer Science 7 - 12

To find the CSPG information, go to [CSPG](#)

Certification verified by the WCSD Human Resources Department: ☒ Yes ☐ No

WCSD STUDENT DATA SYSTEM INFORMATION

Course Level: Academic

Mark Types: Check all that apply.

☒ F – Final Average ☒ MP – Marking Period ☐ EXM – Final Exam

GPA Type: ☐ GPAEL-GPA Elementary ☒ GPAML-GPA for Middle Level ☐ NHS-National Honor Society
☐ UGPA-Non-Weighted Grade Point Average ☐ GPA-Weighted Grade Point Average

State Course Code: 03012

To find the State Course Code, go to [State Course Code](#), download the Excel file for SCED, click on SCED 6.0 tab, and choose the correct code that corresponds with the course.

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TEXTBOOKS AND SUPPLEMENTAL MATERIALS

Board Approved Textbooks, Software, and Materials:

Title: Middle School SmartLab Learning Hub
Publisher: Creative Learning Systems
ISBN #: [Click or tap here to enter text.](#)
Copyright Date: 2023
WCSD Board Approval Date: 01/09/2023

Supplemental Materials: [Click or tap here to enter text.](#)

Curriculum Document

WCSD Board Approval:

Date Finalized: 6/26/2023
Date Approved: 6/26/2023
Implementation Year: 2023 - 2024

SPECIAL EDUCATION, 504, and GIFTED REQUIREMENTS

The teacher shall make appropriate modifications to instruction and assessment based on a student's Individual Education Plan (IEP), Chapter 15 Section 504 Plan (504), and/or Gifted Individual Education Plan (GIEP).

SCOPE AND SEQUENCE OF CONTENT AND CONCEPTS

Marking Period 1

- Arckit
 - Build Your Own House
 - Modernize a Classic
 - Tiny Houses
- Fishertechnik Green Energy
 - Alternative Energy
 - Hydrogen Fuel Cell Car
 - Power a Tiny House
- Secondary Energy Efficiency
 - Energy Consumption: Watt Meter
 - Heat Creation and Dissipation: Infrared Camera
 - Home Energy Audit
- Solar Energy
 - Passive Solar Home Design
 - Solar Race Car Challenge
 - Solar Cooking

Marking Period 2

- Arckit
 - Build Your Own House
 - Modernize a Classic
 - Tiny Houses
- Fishertechnik Green Energy
 - Alternative Energy
 - Hydrogen Fuel Cell Car
 - Power a Tiny House
- Secondary Energy Efficiency
 - Energy Consumption: Watt Meter
 - Heat Creation and Dissipation: Infrared Camera
 - Home Energy Audit
- Solar Energy
 - Passive Solar Home Design
 - Solar Race Car Challenge
 - Solar Cooking

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Marking Period 3

- Arckit
 - Build Your Own House
 - Modernize a Classic
 - Tiny Houses
- Fishertechnik Green Energy
 - Alternative Energy
 - Hydrogen Fuel Cell Car
 - Power a Tiny House
- Secondary Energy Efficiency
 - Energy Consumption: Watt Meter
 - Heat Creation and Dissipation: Infrared Camera
 - Home Energy Audit
- Solar Energy
 - Passive Solar Home Design
 - Solar Race Car Challenge
 - Solar Cooking

Marking Period 4

- Arckit
 - Build Your Own House
 - Modernize a Classic
 - Tiny Houses
- Fishertechnik Green Energy
 - Alternative Energy
 - Hydrogen Fuel Cell Car
 - Power a Tiny House
- Secondary Energy Efficiency
 - Energy Consumption: Watt Meter
 - Heat Creation and Dissipation: Infrared Camera
 - Home Energy Audit
- Solar Energy
 - Passive Solar Home Design
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PLANNED INSTRUCTION

Standards/Eligible Content and Skills

| Performance Indicator | PA Core Standard and/or Eligible Content | Marking Period Taught |
|--|---|------------------------------|
| Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. | 3.1.6-8.I | MP1, MP2, MP3, MP4 |
| Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. | 3.1.6-8.L | MP1, MP2, MP3, MP4 |
| Evaluate competing design solutions for maintaining biodiversity and ecosystem services. | 3.1.6-8.U | MP1, MP2, MP3, MP4 |
| Develop a model that predicts and describes changes in the particle motion, temperature, and state of a pure substance when thermal energy is added or removed. | 3.2.6-8.B | MP1, MP2, MP3, MP4 |
| Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass and speed of an object. | 3.2.6-8.L | MP1, MP2, MP3, MP4 |
| Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer | 3.2.6-8.M | MP1, MP2, MP3, MP4 |
| Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample. | 3.2.6-8.N | MP1, MP2, MP3, MP4 |
| Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century. | 3.3.6-8.O | MP1, MP2, MP3, MP4 |
| Apply scientific principles to design a method for monitoring and minimizing human impact on the environment. | 3.3.6-8.M | MP1, MP2, MP3, MP4 |
| Construct an argument supported by evidence for how increases in human population and per capita consumption of natural resources impact Earth's systems. | 3.3.6-8.N | MP1, MP2, MP3, MP4 |
| Analyze and interpret data about how different societies (economic and social systems) and cultures use and manage natural resources differently. | 3.4.6-8.B | MP1, MP2, MP3, MP4 |
| Collect, analyze, and interpret environmental data to describe a local environment. | 3.4.6-8.E | MP1, MP2, MP3, MP4 |
| Obtain and communicate information to describe how best resource management practices and environmental laws are designed to achieve environmental sustainability. | 3.4.6-8.G | MP1, MP2, MP3, MP4 |
| Design a solution to an environmental issue in which individuals and societies can engage as stewards of the environment. | 3.4.6-8.H | MP1, MP2, MP3, MP4 |
| Construct an explanation that describes regional environmental conditions and their implications on environmental justice and social equity. | 3.4.6-8.I | MP1, MP2, MP3, MP4 |

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|---|---|------------------------------|
| Research information from various sources to use and maintain technological products or systems. | 3.5.6-8.A | MP1, MP2, MP3, MP4 |
| Use instruments to gather data on the performance of everyday products. | 3.5.6-8.B | MP1, MP2, MP3, MP4 |
| Hypothesize what alternative outcomes (individual, cultural, and/or environmental) might have resulted had a different technological solution been selected. | 3.5.6-8.C | MP1, MP2, MP3, MP4 |
| Analyze how the creation and use of technologies consumes renewable, nonrenewable, and inexhaustible resources; creates waste; and may contribute to environmental challenges. | 3.5.6-8.D | MP1, MP2, MP3, MP4 |
| Consider the impacts of a proposed or existing technology and devise strategies for reducing, reusing, and recycling waste caused by its creation. | 3.5.6-8.E | MP1, MP2, MP3, MP4 |
| Analyze examples of technologies that have changed the way people think, interact, live, and communicate. | 3.5.6-8.F | MP1, MP2, MP3, MP4 |
| Analyze how an invention or innovation was influenced by the context and circumstances in which it is developed. | 3.5.6-8.G | MP1, MP2, MP3, MP4 |
| Evaluate trade-offs based on various perspectives as part of a decision process that recognizes the need for careful compromises among competing factors. | 3.5.6-8.H | MP1, MP2, MP3, MP4 |
| Examine the ways that technology can have both positive and negative effects at the same time. | 3.5.6-8.I | MP1, MP2, MP3, MP4 |
| Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. | 3.5.6-8.N (ETS) | MP1, MP2, MP3, MP4 |
| Interpret the accuracy of information collected. | 3.5.6-8.O | MP1, MP2, MP3, MP4 |
| Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. | 3.5.6-8.P (ETS) | MP1, MP2, MP3, MP4 |
| Apply a technology and engineering design thinking process. | 3.5.6-8.Q | MP1, MP2, MP3, MP4 |
| Develop innovative products and systems that solve problems and extend capabilities based on individual or collective needs and wants. | 3.5.6-8.R | MP1, MP2, MP3, MP4 |
| Illustrate the benefits and opportunities associated with different approaches to design. | 3.5.6-8.S | MP1, MP2, MP3, MP4 |
| Create solutions to problems by identifying and applying human factors in design. | 3.5.6-8.T | MP1, MP2, MP3, MP4 |
| Evaluate and assess the strengths and weaknesses of various design solutions given established principles and elements of design. | 3.5.6-8.U | MP1, MP2, MP3, MP4 |
| Refine design solutions to address criteria and constraints. | 3.5.6-8.V | MP1, MP2, MP3, MP4 |

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|--|---|------------------------------|
| 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. | 3.5.6-8.W (ETS) | MP1, MP2, MP3, MP4 |
| Defend decisions related to a design problem. | 3.5.6-8.X | MP1, MP2, MP3, MP4 |
| Compare, contrast, and identify overlap between the contributions of science, technology, engineering, and mathematics in the development of technological systems. | 3.5.6-8.Y | MP1, MP2, MP3, MP4 |
| Analyze how different technological systems often interact with economic, environmental, and social systems. | 3.5.6-8.Z | MP1, MP2, MP3, MP4 |
| Adapt and apply an existing product, system, or process to solve a problem in a different setting. | 3.5.6-8.AA | MP1, MP2, MP3, MP4 |
| Demonstrate how knowledge gained from other content areas affects the development of technological products and systems. | 3.5.6-8.BB | MP1, MP2, MP3, MP4 |
| Consider historical factors that have contributed to the development of technologies and human progress. | 3.5.6-8.CC | MP1, MP2, MP3, MP4 |
| Engage in a research and development process to simulate how inventions and innovations have evolved through systematic tests and refinements. | 3.5.6-8.DD | MP1, MP2, MP3, MP4 |
| Demonstrate how systems thinking involves considering relationships between every part, as well as how the systems interact with the environment in which it is used. | 3.5.6-8.FF | MP1, MP2, MP3, MP4 |
| Create an open-loop system that has no feedback path and requires human intervention. | 3.5.6-8.GG | MP1, MP2, MP3, MP4 |
| Create a closed-loop system that has a feedback path and requires no human intervention. | 3.5.6-8.HH | MP1, MP2, MP3, MP4 |
| Predict outcomes of a future product or system at the beginning of the design process. | 3.5.6-8.II | MP1, MP2, MP3, MP4 |
| Apply informed problem-solving strategies to the improvement of existing devices or processes or the development of new approaches. | 3.5.6-8.JJ | MP1, MP2, MP3, MP4 |
| Explain how technology and engineering are closely linked to creativity, which can result in both intended and unintended innovations. | 3.5.6-8.KK | MP1, MP2, MP3, MP4 |
| Cite specific textual evidence to support analysis of science and technical texts. | CC.3.5.6-8.A | MP1, MP2, MP3, MP4 |
| Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. | CC.3.5.6-8.C | MP1, MP2, MP3, MP4 |
| Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics. | CC.3.5.6-8.D | MP1, MP2, MP3, MP4 |

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| 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). | CC.3.5.6-8.G | MP1, MP2, MP3, MP4 |
| Distinguish among facts, reasoned judgment based on research findings, and speculation in a text. | CC.3.5.6-8.H | MP1, MP2, MP3, MP4 |
| Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. | CC.3.5.6-8.I | MP1, MP2, MP3, MP4 |
| Write arguments focused on discipline-specific content. • Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically. • Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources. • Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence. • Establish and maintain a formal style. • Provide a concluding statement or section that follows from and supports the argument presented. | CC.3.6.6-8.A | MP1, MP2, MP3, MP4 |
| Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. • Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension. • Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples. • Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts. • Use precise language and domain-specific vocabulary to inform about or explain the topic. • Establish and maintain a formal style and objective tone. • Provide a concluding statement or section that follows from and supports the information or explanation presented. Note: Students' narrative skills continue to grow in these grades. The Standards require that students be able to incorporate narrative elements effectively into arguments and informative/explanatory texts. In history/social studies, students must be able to incorporate narrative accounts into their analyses of individuals or events of historical import. In science and technical subjects, students must be able to write precise enough descriptions of the step-by-step procedures they use in their investigations or technical work that others can replicate them and (possibly) reach the same results. | CC.3.6.6-8.B | MP1, MP2, MP3, MP4 |

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|---|--|-----------------------|
| Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. | CC.3.6.6-8.C | MP1, MP2, MP3, MP4 |
| Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently. | CC.3.6.6-8.E | MP1, MP2, MP3, MP4 |
| Draw evidence from informational texts to support analysis reflection, and research. | CC.3.6.6-8.H | MP1, MP2, MP3, MP4 |

ASSESSMENTS

PDE Academic Standards, Assessment Anchors, and Eligible Content: The teacher must be knowledgeable of the PDE Academic Standards, Assessment Anchors, and Eligible Content and incorporate them regularly into planned instruction.

Formative Assessments: The teacher will utilize a variety of assessment methods to conduct in-process evaluations of student learning.

Effective formative assessments for this course include: Bell ringers, exit tickets, worksheets, quizzes, lab assignments, practice tests, writing prompts, teacher questioning, class discussions, individual and team based projects

Summative Assessments: The teacher will utilize a variety of assessment methods to evaluate student learning at the end of an instructional task, lesson, and/or unit.

Effective summative assessments for this course include: Projects, performance tasks, tests