

WARREN COUNTY SCHOOL DISTRICT

PLANNED INSTRUCTION

COURSE DESCRIPTION

Course Title: STEM 8

Course Number: 00796

Course Prerequisites: None

Course Description: In this STEM 8 course, eight-grade students will further explore topics that are part of their Science 8 curriculum by completing a variety of hands-on STEM activities. Students will learn about the design and construction of robots and drones. They will learn about programming languages and coding principles and will use these skills to program their machines to complete various tasks. In addition to robotics and drones, students will use Vernier sensors to collect and analyze data pertaining to measuring heart rate, motion, temperature, and light. They will use some of their new knowledge to complete an environmental study at their school. By the end of the course, students will have a strong foundation in robotics, drones, and Vernier sensors. They will also have a deeper understanding of the principles of STEM and how these principles can be applied to solve real-world problems. 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 8

Length of Course: One Semester

Units of Credit: .5

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

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: 03153

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

- IQ Key
 - Geared for Speed and Power
- Tello Drone
 - Programming with DroneBlocks
- Vernier Secondary Sensing Science
 - Measuring Motion
 - Measuring Temperature
 - Measuring Heart Rates
 - Reflectivity of Light
 - Environmental Study
- VEXcode VR
 - Conquering the Wall Maze
- Vex IQ
 - Basics
 - Clawbot

Marking Period 2

- IQ Key
 - Geared for Speed and Power
- Tello Drone
 - Programming with DroneBlocks
- Vernier Secondary Sensing Science
 - Measuring Motion
 - Measuring Temperature
 - Measuring Heart Rates
 - Reflectivity of Light
 - Environmental Study
- VEXcode VR
 - Conquering the Wall Maze
- Vex IQ
 - Basics
 - Clawbot

Marking Period 3

- IQ Key
 - Geared for Speed and Power
- Tello Drone

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- Programming with DroneBlocks
- Vernier Secondary Sensing Science
 - Measuring Motion
 - Measuring Temperature
 - Measuring Heart Rates
 - Reflectivity of Light
 - Environmental Study
- VEXcode VR
 - Conquering the Wall Maze
- Vex IQ
 - Basics
 - Clawbot

Marking Period 4

- IQ Key
 - Geared for Speed and Power
- Tello Drone
 - Programming with DroneBlocks
- Vernier Secondary Sensing Science
 - Measuring Motion
 - Measuring Temperature
 - Measuring Heart Rates
 - Reflectivity of Light
 - Environmental Study
- VEXcode VR
 - Conquering the Wall Maze
- Vex IQ
 - Basics
 - Clawbot

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Standards/Eligible Content and Skills

Performance Indicator	PA Core Standard and/or Eligible Content	Marking Period Taught
Conduct an investigation to provide evidence that living things are made of cells, either one cell or many different numbers and types of cells	3.1.6-8.A	MP1, MP2, MP3, MP4
Use arguments supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.	3.1.6-8.C	MP1, MP2, MP3, MP4
Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.	3.2.6-8.G	MP1, MP2, MP3, MP4
Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.	3.2.6-8.H	MP1, MP2, MP3, MP4
Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.	3.2.6-8.J	MP1, MP2, MP3, MP4
Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.	3.2.6-8.K	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
Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.	3.2.6-8.Q	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
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
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
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 examples of technologies that have changed the way people think, interact, live, and communicate.	3.5.6-8.F	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

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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
Use tools, materials, and machines to safely diagnose, adjust, and repair systems.	3.5.6-8.J	MP1, MP2, MP3, MP4
Use devices to control technological systems.	3.5.6-8.K	MP1, MP2, MP3, MP4
Design methods to gather data about technological systems.	3.5.6-8.L	MP1, MP2, MP3, MP4
Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.	3.5.6-8.M (ETS)	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
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

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Consider historical factors that have contributed to the development of technologies and human progress.	3.5.6-8CC	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
Differentiate between inputs, processes, outputs, and feedback in technological systems.	3.5.6-8.EE	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
Compare how different technologies involve different sets of processes.	3.5.6-8.LL	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
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 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),	CC.3.6.6-8.B	MP1, MP2, MP3, MP4

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Performance Indicator	PA Core Standard and/or Eligible Content	Marking Period Taught
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.		
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
Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.	CC.3.6.6-8.F	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

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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