CTE Standards Unpacking
Middle School Mechatronics/Robotics

Course: Middle School Mechatronics/Robotics
Course Description: Middle School Robotics/Mechatronics course allows students to develop an understanding of how robots function, their applications, and how to program them to perform specified tasks.
Career Cluster: STEM
Prerequisites: None
Program of Study Application: This course is a STEM Cluster course, which may be followed by the STEM Pathway course of Mechatronics/Robotics, followed by a Senior Capstone course.

***INDICATOR #MSMR 1:* Understand the components that make up a robot**
***SUB-INDICATOR 1.1 (Webb Level: 2 Skill/Concept):* Know the equipment used in robotics**
***SUB-INDICATOR 1.2 (Webb Level: 2 Skill/Concept):* Identify various mechanical systems used in robotics**
***SUB-INDICATOR 1.3 (Webb Level: 3 Strategic Thinking):* Demonstrate the use of programming commands**

Knowledge (Factual):	Understand (Conceptual):	Skills (Application):
Learn the concepts of robotic technology and how robots work.	Understand how the software, hardware, and mechanical components of robots are design and integrated. Understand how these components work together.	Create a report explaining the interaction between Microprocessor, Sensors, Intelligent Controls, and Motors. Write a research report indicating historical and current Robotic systems

Benchmarks
Students will be assessed on their *ability* to:
- Design a robotic plan.
- Create a robot to perform simple tasks.
- Create a report explaining the interaction between Microprocessor, Sensors, Intelligent Controls, and Motors.
- Write a research report indicating historical and current Robotic systems

Academic Connections

Knowledge (Factual):	Understand(Conceptual):	Skills (Application):
Learn the basic concepts and building blocks of a robot such as design, engineering, and software components.	Understand how a robot works. Identify human careers replaced by robotics. Research and report on a specific career of interest in the robotics field. Write a biography about a historic person in the field of robotics	Build a simple robot using available components. When given a product, research the types of robotic fields, necessary for the product to have been created. Compare and contrast career opportunities related to different fields of robotics.

Benchmarks

Students will be assessed on their *ability* to:

- Describe how the robotics field may influence the job market. Identify the uses of robots
- Demonstrate understanding of basic components of a robot Design and/or program a robot to follow a set of commands.

Academic Connections

ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):	Sample Performance Task Aligned to the Academic Standard(s):
RBT 5.1 Explore career opportunities in the robotics field. Examples: Robotic surgeries, Police and fire and rescue robotics. The uses of robotics in business and industry. Learn about	Research available resources to find how robots may be useful in helping disabled people.

ethical and social impact of using robots.

6-8-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem

INDICATOR #MSMR 2: **Investigate the impact of robotics on our society**		
SUB-INDICATOR 2.1 (Webb Level: 3 Strategic Thinking): Compare and contrast robotics labor vs. human labor		
SUB-INDICATOR 2.2 (Webb Level: 2 Skill/Concept): Explore career outlook for robotic applications		
SUB-INDICATOR 2.3 (Webb Level: 2 Skill/Concept): Explore new entrepreneurial opportunities using robotics		
Knowledge (Factual): Learn how to program a robot , debug and test your program.	**Understand (Conceptual):** RBT 4.1 Build and program a robot to perform a specified task RBT 4.2 Test the robot for any flaws in hardware or bugs in software components.	**Skills (Application):** Present your project. Communicate with teammates and others.

Benchmarks
Students will be assessed on their *ability* to:
- Document a Robotic project's Circuit Diagrams, Block Diagrams and Flowcharts as well as the Robotic project's design and implementation procedures.
- Present the final project as a team.

Academic Connections	
ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):	**Sample Performance Task Aligned to the Academic Standard(s):**
Understand the foundations of algorithm and flowcharting.	Create Robotic project's Circuit Diagrams, Block Diagrams and Flowcharts.

INDICATOR #MSMR 3: **Design a robot to solve a particular problem**		
SUB-INDICATOR 3.1 (Webb Level: 3 Strategic Thinking): Identify robotic applications		
SUB-INDICATOR 3.2 (Webb Level: 4 Extended Thinking): Propose a robotic design		
SUB-INDICATOR 3.3 (Webb Level: 4 Extended Thinking): Construct a functional robot.		
SUB-INDICATOR 3.4 (Webb Level: 4 Extended Thinking): Program a robot to perform a specific task.		
SUB-INDICATOR 3.5 (Webb Level: 4 Extended Thinking): Evaluate robot programming		
Knowledge (Factual): Know to a robot's components work together. Understand and explain the concepts of engineering, mathematics, and scientific foundations of building a robot.	**Understand (Conceptual):** Understand the mathematical and engineering foundations for building a robot. Understand how each component works. Understand how the components interact with each other.	**Skills (Application):** Perform an experiment with your robot such as finding an object or sensing an on object in their path.
Benchmarks Students will be assessed on their *ability* to: • Working as a team member to build and operate a robot using available and inexpensive components		

Academic Connections	
ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):	**Sample Performance Task Aligned to the Academic Standard(s):**
Communication skills and team work are Important in the work place.	Write the project documentation and the instructional manual for the project as a member of a team.

Additional Resources
Please list any resources (e.g., websites, teaching guides, etc.) that would help teachers as they plan to teach these new standards.

BEST Robotics: http://www.bestinc.org/
Vex Robotice: http://vexrobotics.com
FIRST Tech Challenge: http://www.usfirst.org/roboticsprograms/ftc
STEM Robotics 101: http://stemrobotics.cs.pdx.edu/node/190?root=291
Career Research: www.sdmylife.com and http://www.onetonline.org