

Robotics

Career Cluster	STEM
Course Code	21009
Prerequisite(s)	None
Credit	.5
Program of Study and Sequence	Foundational Courses, Cluster Courses, Pathway Courses, Capstone Experience
Student Organization	None
Coordinating Work-Based Learning	industry tours of local businesses utilizing robotic systems
Industry Certifications	None
Dual Credit or Dual Enrollment	TBD
Teacher Certification	Information Technology Cluster Endorsement; Programming & Software Development Pathway Endorsement; STEM Cluster Endorsement; Engineering & Robotics Pathway Endorsement; Manufacturing Cluster Endorsement; Welding & Precision Machining Pathway Endorsement; 7-12 Technology Education Endorsement; K-12 Educational Technology Endorsement; K-12 Classroom Technology Endorsement
Resources	BEST Robotics: http://www.bestinc.org/ 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

Course Description:

This robotics course emphasizes the design, building, operation, application, and documentation of robotic systems. Students follow the engineering design process, apply basic programming skills, and explore how robots and automated systems are used in industry.

Students will have an understanding of the historical and current uses of robots and automated systems; programmable circuits, interfacing both inputs and outputs; proficient ethical standards for engineering and technology professions; and testing of robots.

Program of Study Application

This is a STEM Pathway Course for the Robotics Pathway, preceded by a Foundational Course(s) and a Cluster Course(s).

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Course Standards

Indicator # RBT 1 Identify components of a robotic system.

<i>Webb Level</i>	<i>Sub-indicator</i>	<i>Integrated Content</i>
One Recall	RBT 1.1 Describe the parts necessary to make a robot. <i>Examples:</i> • Create a report explaining the interaction between Microprocessor, Sensors, Intelligent Controls, and Motors. • Write a research report indicating historical and current Robotic systems.	
Two Skill/ Concept	RBT 1.2 Examine the relationships among the subsystems. <i>Examples:</i> • Explain the purposes of the mechanical, electrical, and software subsystems. • Describe how these subsystems work together within the whole robotic system.	

Notes:

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Indicator # RBT 2: Understand safety procedures and ethical issues inherent to robotics.

<i>Webb Level</i>	<i>Sub-indicator</i>	<i>Integrated Content</i>
Two Skill/ Concept	RBT 2.1. Demonstrate proper safety procedures <i>Examples:</i> • Operate and use proper personal protective equipment	
Two Skill/ Concept	RBT 2.2. Determine how to apply OSHA Compliant Lockout – Tag-out procedures <i>Examples:</i> • Examine process • List hazard areas	
Two Skill/ Concept	RBT 2.3. Examine current ethical issues. <i>Examples:</i> • Review the ethical standards for engineering and technology professions. • Discuss intellectual property.	IEEE Code of Ethics: http://www.ieee.org/about/corporate/governance/p7-8.html

Notes:

Indicator # RBT 3 Construct, analyze and troubleshoot circuits.

<i>Webb Level</i>	<i>Sub-indicator</i>	<i>Integrated Content</i>
Three Strategic thinking	RBT 3.1. Build circuit according to schematic diagram <i>Examples:</i> • Chose proper electronic components to construct a circuit • Assemble circuit in accordance with schematic diagram	
Three Strategic thinking	RBT 3.2. Calculate circuit parameters <i>Examples:</i> • Employ correct formula or law to solve for unknown parameters • Record calculated parameters using proper measurement parameters	
Three Strategic thinking	RBT 3.3. Measure circuits parameters <i>Examples:</i> • Select and use proper test equipment to measure required parameters • Record calculated parameters using proper measurement parameters	
Three Strategic thinking	RBT 3.4. Compare calculated and measured solutions to analyze circuit operation <i>Examples:</i> • Graph calculated and measured parameters • Compare parameters to determine if they are within circuit parameters • Inspect circuit operation	

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Indicator # RBT 4: Design, build and analyze a robotic system.

<i>Webb Level</i>	<i>Sub-indicator</i>	<i>Integrated Content</i>
Three Strategic thinking	RBT 4.1 Build and program a robot to perform a specified task. <i>Example:</i> • Use mechanical tools, such as motors, gears, and gear trains in the construction of a robotic system and program • Use VEX, NXT, or other kits to create robotic system	
Three Strategic thinking	RBT 4.2 Test the robot for any flaws in hardware or bugs in software components. <i>Examples:</i> • Test individual subsystems and the system as an entire unit	
Three Strategic thinking	RBT 4.3 Write a technical report evaluating the system performance. <i>Examples:</i> • 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.	Soft Skill: Presentation, communication, teamwork

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Indicator # RBT 5 Research career opportunities and industry applications

<i>Webb Level</i>	<i>Sub-indicator</i>	<i>Integrated Content</i>
One Recall	RBT 5.1 Explore career opportunities in the robotics field <i>Examples:</i> • 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	Soft Skills: written communication, presentation
Three Strategic Thinking	RBT 5.2 Investigate commercial application of robotic systems <i>Examples:</i> • Create a report demonstrating the progression of use and acceptance in the medical field • Take a field trip to a local industry that utilizes robotic systems	Career Development

Notes: