
*The Mission of the Chardon Local Schools is High Achievement
for All Students, Where Learning is Our Most Important Work.*

Science Course of Study:

ROBOTICS

Revised January 2022



Strand: Scientific and Engineering Practices

Learning Standards:

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information.

How Taught?

Teaching activities may include, but are not limited to:

- Building lego robots following “blueprint” plans to carry out defined functions.
- Applying mathematical principles to the programming of ev3 robots to control movement.
- Exploring and researching types and applications of robots in society and presenting their information to the class.
- Exploring and researching the potential drawbacks to the development of robot technologies in the workplace and presenting their information to the class.
- Watching instructional videos (via edpuzzle) on the topics of robotics and electronics and are embedded with questions for understanding.
- Using scratch coding to design and test programs to control the movement of the lego ev3 robots.

Materials:

- LEGO Ev3 Robotics kits
- Snap circuit electronics kits
- Edpuzzle
- GIZMO

How Assessed?

Assessments may include, but are not limited to:

- Class presentations of research.
- Participation in class debate of benefits and drawbacks of robotic technology.
- Completing video assignments with embedded questions for understanding.
- Using scratch coding to program the lego ev3 robots to perform specific tasks.
- Ability to problem-solve when robots do not follow programs or programs do not appear to work properly. (hypothesis- test- re-design)
- Ability to build simple circuits following a “blueprint” design and use a multimeter to take measurements of voltage, current, and resistance within the circuits.

How Re-Taught?

Re-teaching activities may include, but are not limited to:

- descriptive feedback on original task/assessment
- student examples of expectations
- modeling
- student self assessments
- manipulatives

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|--|---|
| | <ul style="list-style-type: none">• presenting the information again in a different way• practice activities• computer tutorials / programs• peer tutoring• breaking down concept into smaller components• games and hands-on activities• cooperative learning• Universal Design for Learning principles offering students opportunities to experience and engage material in new and different ways |
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Strand: 21st Century Skills

Learning Standards:

21st century skills are integral to the science standards and curriculum development revision documents. They are an essential part of the model curriculum component through the incorporation and integration of scientific inquiry, science skills and process and technological and engineering design. As enumerated by ORC 3301.079, these skills include: creativity and innovation; critical thinking, problem solving and communication; information, media and technological literacy; personal management, productivity, accountability, leadership and responsibility; and interdisciplinary, project-based, real-world learning opportunities.

How Taught?

Teaching activities may include, but are not limited to:

- Building lego robots following “blueprint” plans to carry out defined functions.
- Applying mathematical principles to the programming of ev3 robots to control movement.
- Exploring and researching types and applications of robots in society and presenting their information to the class.
- Exploring and researching the potential drawbacks to the development of robot technologies in the workplace and presenting their information to the class.
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Re-teaching activities may include, but are not limited to:

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Strand: Technological Design

Learning Standard:

Technological design is a problem or project-based way of applying creativity, science, engineering and mathematics to meet a human need or want. Modern science is an integrated endeavor. Technological design integrates learning by using science, technology, engineering and mathematics and fosters 21st Century Skills.

How Taught?

Teaching activities may include, but are not limited to:

- Use of various types of sensor technology (ultrasonic, color, touch, gyroscopic) to provide environmental data to their robots.
- Building lego robots following “blueprint” plans to carry out defined functions.
- Applying mathematical principles to the programming of ev3 robots to control movement.
- Exploring and researching types and applications of robots in society and presenting their information to the class.
- Exploring and researching the potential drawbacks to the development of robot technologies in the workplace and presenting their information to the class.
- Watching instructional videos (via edpuzzle) on the topics of robotics and electronics and are embedded with questions for understanding.
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How Assessed?

- Class presentations of research.
- Participation in class debate of benefits and drawbacks of robotic technology.
- Completing video assignments with embedded questions for understanding.
- Using scratch coding to program the lego ev3 robots to perform specific tasks.
- Ability to problem-solve when robots do not follow programs or programs do not appear to work properly. (hypothesis- test- re-design)
- Ability to build simple circuits following a “blueprint” design and use a multimeter to take measurements of voltage, current, and resistance within the circuits.

How Re-Taught?

Re-teaching activities may include, but are not limited to:

- descriptive feedback on original task/assessment
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Strand: Technology and Engineering

Learning Standard:

Technology modifies the natural world through innovative processes, systems, structures and devices to extend human abilities. Engineering is design under constraint that develops and applies technology to satisfy human needs and wants. Technology and engineering, coupled with the knowledge and methods derived from science and mathematics, profoundly influence the quality of life.

How Taught?

Teaching activities may include, but are not limited to:

- Use of various types of sensor technology (ultrasonic, color, touch, gyroscopic) to provide environmental data to their robots.
- Building lego robots following “blueprint” plans to carry out defined functions.
- Applying mathematical principles to the programming of ev3 robots to control movement.
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Strand: Scientific Inquiry, Practice and Applications

Learning Standard:

- Apply knowledge of science content to real-world challenges.
- Identify questions that can be answered through scientific investigations.
 - Design and conduct scientific investigations using appropriate safety techniques.
 - Use appropriate mathematics, tools and techniques to gather data and information.
 - Analyze and interpret data.
 - Develop descriptions, models, explanations and predictions.
 - Think critically and logically to connect evidence and explanations.
 - Recognize and analyze alternative explanations and predictions.
- Communicate scientific procedures and explanations.
- Design technological/engineering solutions.

How Taught?

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