



Robotic Programming

Grade(s):	9-12
Discipline/Course:	Business / Robotics
Course Title:	Robotic Programming
Prerequisite(s):	Completion of Algebra I (B or better)
Course Description: <i>Program of Studies</i>	Robotics, as an organizer of content, offers students a course of study that implicitly demonstrates the application of math, science, and technology as well as introduces students to technological literacy as they develop the following work-related competencies: basic programming, project and time management, resource allocation, information accessing, systems understanding, teamwork, and problem-solving.
Course Essential Questions:	<ul style="list-style-type: none"> ● What is the value of computers/robots in today's society? ● What are the strengths and limitations of computers? ● How does software affect our lives? ● How do we break down a problem?
Course Enduring Understandings:	<ul style="list-style-type: none"> ● Programming is problem solving. ● Computer programs are a sequence of instructions. ● We apply concepts of programming in our everyday life.
Duration:	½ year; .5 credits
Course Materials/Resources:	Access to a desktop computer, RobotC Software Lego Robots Kits (currently EV3 and or Spike)
FPS Academic Expectation(s)	<u>Synthesizing and Evaluating</u> The student weighs evidence, arguments, claims and beliefs in order to critically and effectively solve problems and to justify conclusions.

	<u>Creating and Constructing</u> The student transforms existing ideas and knowledge into original ideas, products, and processes.
Year at a Glance (Units):	Unit 1: Introduction to Computer Careers (2 weeks) Unit 2: Robotic Fundamentals (3 weeks) Unit 3: Movement (7 weeks) Unit 4: Sensing (5 weeks) Unit 5: Variables (5 weeks)

Units

Unit Number and Title:	Unit 1: Introduction to computer careers
Duration:	2 weeks
Resource(s):	Online Career Databases Software: word processing, spreadsheet, presentation
Overview	To provide students with educational and career path options during and after high school.

Learning Goals

Standard(s):	<p><u>Standards</u> 21st Century Skills/International Society for Technology in Education 1. Use real-world digital and other research tools to access, evaluate and effectively apply information appropriate for authentic tasks. 2. Work independently and collaboratively to solve problems and accomplish goals. 3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes. Connecticut Career and Technical Education – Computer Information Systems Content Standard 1 – Impact on Society</p> <ul style="list-style-type: none"> ● Assess the impact of information technology in a global society. <p>Content Standard 7 - Networking, Infrastructure, and Security Develop skills for networking and security.</p> <ul style="list-style-type: none"> ● Design hardware and software network security solutions ● Distinguish among network environments (e.g., peer-to-peer, client server, thin client, n-tier, Internetworks, intranets, extranets). <p>NBEA Standards: Information Technology XI. Programming and Application Development: <ul style="list-style-type: none"> ● Achievement Standard: Design, develop, test, and implement programs X. Systems Analysis and Design</p>
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	<ul style="list-style-type: none"> ● Achievement Standard: Analyze and design information systems using appropriate development tools
Essential Question(s):	<ul style="list-style-type: none"> ● What challenges do computer professionals face in today's world? ● What will the computer industry look like in 10 years?
Enduring Understanding(s):	<ul style="list-style-type: none"> ● Define different careers associated with computers. ● Define the requirements and education necessary for these careers.
Learning Goal(s): <i>Students will be able to use their learning to:</i>	<p>Students will:</p> <ul style="list-style-type: none"> ● Use analytical skills and support conclusions with specificity. ● Access and research information using the Internet. ● Display creative thinking, problem-solving, and decision making. ● Organize and maintain files. ● Use computers to process information.

Unit Number and Title:	Unit 2: Robotic Fundamentals
Duration:	3 weeks
Resource(s):	RobotC Software Lego Robots (currently EV3 and or Spike)
Overview	To provide students with a basic understanding of robotics and the RobotiC language IDE
Learning Goals	
Standard(s):	<p><u>Standards</u></p> <p>21st Century Skills/International Society for Technology in Education</p> <ol style="list-style-type: none"> 1. Use real-world digital and other research tools to access, evaluate and effectively apply information appropriate for authentic tasks. 2. Work independently and collaboratively to solve problems and accomplish goals. 3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes. <p>Connecticut Career and Technical Education – Computer Information Systems</p> <p>Content Standard 1 – Impact on Society</p> <ul style="list-style-type: none"> ● Assess the impact of information technology in a global society. <p>Content Standard 7 - Networking, Infrastructure, and Security Develop skills for networking and security.</p> <ul style="list-style-type: none"> ● Design hardware and software network security solutions ● Distinguish among network environments (e.g., peer-to-peer, client server, thin client, n-tier, Internetworks, intranets, extranets). <p>NBEA Standards: Information Technology</p> <p>XI. Programming and Application Development:</p> <ul style="list-style-type: none"> ● Achievement Standard: Design, develop, test, and implement programs <p>X. Systems Analysis and Design</p>

	<ul style="list-style-type: none"> ● Achievement Standard: Analyze and design information systems using appropriate development tools
Essential Question(s):	<ul style="list-style-type: none"> ● What is the value of computers / robots in today's society? ● What are the strengths and limitations of computers? ● How does software affect our lives? ● How do we breakdown a problem?
Enduring Understanding(s):	<ul style="list-style-type: none"> ● Program mobile robots ● Apply measurement and geometry to calculate robot navigation Path planning using both geometry and multiple sensor feedback ● Use the experimental process ● Document and explain the results of their testing
Learning Goal(s): <i>Students will be able to use their learning to:</i>	Students will be able to: <ul style="list-style-type: none"> ● Apply information they have read on their own to the topics at hand. ● Use analytical skills and support conclusions with specificity. ● Access and research information using the Internet. ● Display creative thinking, problem solving, and decision making. ● Organize and maintain files.

Unit Number and Title:	Unit 3: Movement
Duration:	7 weeks
Resource(s):	RobotC Software Lego Robots (currently EV3 and or Spike)
Overview	To provide students how to move the robot based on time,and distance.
Learning Goals	
Standard(s):	<p><u>Standards</u> 21st Century Skills/International Society for Technology in Education 1. Use real-world digital and other research tools to access, evaluate and effectively apply information appropriate for authentic tasks. 2. Work independently and collaboratively to solve problems and accomplish goals. 3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes.</p> <p>Connecticut Career and Technical Education – Computer Information Systems Content Standard 1 – Impact on Society</p> <ul style="list-style-type: none"> ● Assess the impact of information technology in a global society. <p>Content Standard 7 - Networking, Infrastructure, and Security Develop skills for networking and security.</p> <ul style="list-style-type: none"> ● Design hardware and software network security solutions ● Distinguish among network environments (e.g., peer-to-peer, client server, thin client, n-tier, Internetworks, intranets, extranets). <p>NBEA Standards: Information Technology XI. Programming and Application Development: <ul style="list-style-type: none"> ● Achievement Standard: Design, develop, test, and implement programs X. Systems Analysis and Design</p>

	<ul style="list-style-type: none"> ● Achievement Standard: Analyze and design information systems using appropriate development tools
Essential Question(s):	<ul style="list-style-type: none"> ● What is the value of computers / robots in today's society? ● What are the strengths and limitations of computers? ● How does software affect our lives? ● How do we breakdown a problem?
Enduring Understanding(s):	<ul style="list-style-type: none"> ● Program mobile robots ● Apply measurement and geometry to calculate robot navigation Path planning using both geometry and multiple sensor feedback ● Understand systems and systems analysis ● Use the experimental process ● Document and explain the results of their testing
Learning Goal(s): <i>Students will be able to use their learning to:</i>	<p>Students will be able to:</p> <ul style="list-style-type: none"> ● Apply information they have read on their own to the topics at hand. ● Use analytical skills and support conclusions with specificity. ● Access and research information using the Internet. ● Display creative thinking, problem-solving, and decision-making. ● Organize and maintain files. ● Use computers to process information.

Unit Number and Title:	Unit 4: Sensing
Duration:	5 weeks
Resource(s):	RobotC Software Lego Robots (currently EV3 and or Spike)
Overview	To provide students how to use the sensor(s) reading and determine an action for the gather data
Learning Goals	
Standard(s):	<p><u>Standards</u></p> <p>21st Century Skills/International Society for Technology in Education</p> <ol style="list-style-type: none"> 1. Use real-world digital and other research tools to access, evaluate and effectively apply information appropriate for authentic tasks. 2. Work independently and collaboratively to solve problems and accomplish goals. 3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes. <p>Connecticut Career and Technical Education – Computer Information Systems</p> <p>Content Standard 1 – Impact on Society</p> <ul style="list-style-type: none"> ● Assess the impact of information technology in a global society. <p>Content Standard 7 - Networking, Infrastructure, and Security Develop skills for networking and security.</p> <ul style="list-style-type: none"> ● Design hardware and software network security solutions ● Distinguish among network environments (e.g., peer-to-peer, client server, thin client, n-tier, Internetworks, intranets, extranets). <p>NBEA Standards: Information Technology</p> <p>XI. Programming and Application Development:</p> <ul style="list-style-type: none"> ● Achievement Standard: Design, develop, test, and implement programs <p>X. Systems Analysis and Design</p>

	<ul style="list-style-type: none"> ● Achievement Standard: Analyze and design information systems using appropriate development tools
Essential Question(s):	<ul style="list-style-type: none"> ● What is the value of computers / robots in today's society? ● What are the strengths and limitations of computers? ● How does software affect our lives? ● How do we break down a problem?
Enduring Understanding(s):	<ul style="list-style-type: none"> ● Program mobile robots ● Apply measurement from sensor data received ● Understand systems and systems analysis ● Use the experimental process ● Document and explain the results of their testing
Learning Goal(s): <i>Students will be able to use their learning to:</i>	Students will be able to: <ul style="list-style-type: none"> ● Apply information they have read on their own to the topics at hand. ● Use analytical skills and support conclusions with specificity. ● Access and research information using the Internet. ● Display creative thinking, problem-solving, and decision-making. ● Organize and maintain files. ● Use computers to process information.

Unit Number and Title:	Unit 5: Variables
Duration:	5 weeks
Resource(s):	RobotC Software Lego Robots (currently EV3 and or Spike)
Overview	To provide students how to use the variables in this code and determine an action for the manipulated from the data
Learning Goals	
Standard(s):	<p><u>Standards</u> 21st Century Skills/International Society for Technology in Education 1. Use real-world digital and other research tools to access, evaluate and effectively apply information appropriate for authentic tasks. 2. Work independently and collaboratively to solve problems and accomplish goals. 3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes.</p> <p>Connecticut Career and Technical Education – Computer Information Systems Content Standard 1 – Impact on Society</p> <ul style="list-style-type: none"> ● Assess the impact of information technology in a global society. <p>Content Standard 7 - Networking, Infrastructure, and Security Develop skills for networking and security.</p> <ul style="list-style-type: none"> ● Design hardware and software network security solutions ● Distinguish among network environments (e.g., peer-to-peer, client server, thin client, n-tier, Internetworks, intranets, extranets). <p>NBEA Standards: Information Technology XI. Programming and Application Development: <ul style="list-style-type: none"> ● Achievement Standard: Design, develop, test, and implement programs X. Systems Analysis and Design</p>

	<ul style="list-style-type: none"> ● Achievement Standard: Analyze and design information systems using appropriate development tools
Essential Question(s):	<ul style="list-style-type: none"> ● What is the value of computers / robots in today's society? ● What are the strengths and limitations of computers? ● How does software affect our lives? ● How do we break down a problem?
Enduring Understanding(s):	<ul style="list-style-type: none"> ● Program mobile robots ● Apply numeric information to the decision process to calculate robot navigation Path planning using both geometry and multiple sensor feedback ● Understand systems and systems analysis ● Use the experimental process ● Document and explain the results of their testing
Learning Goal(s): <i>Students will be able to use their learning to:</i>	<p>Students will be able to:</p> <ul style="list-style-type: none"> ● Apply information they have read on their own to the topics at hand. ● Use analytical skills and support conclusions with specificity. ● Access and research information using the Internet. ● Display creative thinking, problem-solving, and decision-making. ● Organize and maintain files. ● Use computers to process information.