

Engineering Technology
Scope and Sequence
ROBOTICS

Mr. Buonomo

ROBOTICS (1274)

Year – Credit 1

Prerequisite: Design and Drawing for Production

Recommended: Computer Aided Design

This course will introduce students to electro-mechanical control systems and programming through the design of robots. Students will design and test robotic systems with specific requirements that will introduce them to design issues related to mechanics, sensors and control of a mobile robot. Primary learning topics for this course include: understanding robotic principles, computer programming, movement systems (electro-mechanical, hydraulic, and pneumatic), open and closed feedback sensing systems, and the many uses of robots. Students will learn to use the tools and techniques necessary for the design, mechanical and electronic construction of their robot. This course is recommended for all students interested in a Technology sequence in the STEM Academy or learning about robotics.

UNIT #	Length (weeks)	Week #	Topic Sequence	Scope
1	1	1	Introduction	● Introduction ● Research Presentation ● News article procedure and resources
2	1	2	History of Robotics	● Impacts of Robotics on Society Introduction ● Robots in Movies ● First round of news articles begin
3	3	3-5	Spark Fun Inventor's Kit	● Arduino IDE ● Blink ● Input / Output ○ light ○ sound ○ push button ○ temperature ● Serial Monitor / Serial Plotter ● Servos
4	3	6-8	Animatronics	● Research ● Design ● Present Design, elicit input ● Design Reflection, finalize design ● Model Design -Paper / Cardboard ● Build Design - Laser Cut Cardboard ● Test Design ● Demonstrate ● Evaluate successes and failures
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5	1	9	Motors - Spark Fun Robot	● DC motors (brush and brushless) ● servo motors ● stepper motors ○ Calculated and Measure output ● programming motor outputs
6	1	10	Machine Shop Intro	● Shop Tour ● Shop Safety ● Machine Tool Safety
6	2	11-12	CNC	● CNC ● G-Code

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				• cncviewer
7	4	13-16	Intro to Vex Kit	• Vex Controller • Vex Remote • Vex Sensors • Vex Motors • Vex mechanical parts • Programming Vex Platform
8	2	17-18	Vex Challenge 1	• Build 2 motor drive base • program tank and arcade drive • program autonomous routine
9	1	19	Rotary Motion	• Gear Ratios • Torque • Power Transmission • measuring rotary motion
10	1	20	Drive Systems	• 2WD • 4WD • Holonomic (mecanum wheels) • Walking (Bipedal and Hex bot) • Programming Drive Systems • Group Building Drive systems
11	1	21	Pneumatic Systems	• Compressed air storage and plumbing • pistons and solenoids • electrical control system • program a pneumatic system
12	3	22-24	Grippers	• Research gripper types • Design gripper • Present Gripper Design, elicit input • Design Reflection, finalize design • Model Design • Build Design • Test Design • Demonstrate • Evaluate successes and failures
14	3	25-27	Industrial Control	• Research industrial manufacturing lines • Design an industrial control system to sort different materials (colored balls, different sized cubes, coins) • Present Design, elicit input • Design Reflection, finalize design • Model Design • Build Design • Test Design • Demonstrate • Evaluate successes and failures
15	4	27-30	Robotic System Design Challenge	• Design Challenge • Brainstorm Solutions • Design Solution • Present Design, elicit input • Design Reflection, finalize design

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				• Model Design • Build Design • Test Design • Demonstrate • Evaluate successes and failures
16	6	31-36	Robotic Arm Work Cells	• Research Commercial Robotic Arm systems • Design a Robotic Arm to pick and place an item in an industrial control environment. Locate an object (colored ball, colored cube), decide where to place, place object in proper location. • Brainstorm Solutions • Design Solution • Present Design, elicit input • Design Reflection, finalize design • Model Design • Build Design • Test Design • Demonstrate • Evaluate successes and failures
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