KCKPS CTE CURRICULUM PACING GUIDE

ROBOTICS

KSDE Course Code	21009G0.501215GGF	KSDE Course Name	Engineering Design
CIP Code	14.0101	KSDE Pathway	Engineering & Applied Mathematics
Infinite Campus Course Numbers	13105012S 13105012Y		
Prerequisites	Engineering Design (IED)		
Courses That Follow	Engineering Design and Developoment		
Buildings Offered	Harmon, Schlagle, Wyandotte		

KCKPS Course Description

Students develop skills and knowledge to design and develop robotic devices. Topics may include mechanics, electrical and motor controls, pneumatics, computer basics, and programmable logic controllers.

Kansas Department of Education Course Competencies

Link to Career Cluster on KSDE

This course utilizes the approved competencies provided on the KSDE website. The competencies identified by KSDE provide the foundation for what students should know and/or be able to do by the end of the course.

Common District Summative Assessment

Precision Exam: Robotics 1

Description: The first in a sequence of courses that prepares individuals with a lab-based, hands-on curriculum combining electrical, mechanical and engineering principles. Students will learn to design, build, program, and control robotic devices. A rigorous study and application of electrical concepts will include: sources of energy, electrical safety, use and identification of basic electronic components, sensors and actuators. Engineering concepts will include: mechanical design, prototype development, design testing, programming, and proper engineer documentation.

Standards: https://www.precisionexams.com/kansas/files/standards-pdfs/ks_611.pdf

PACING GUIDE AT A GLANCE

Unit	Unit Name	Length
1	Introduction to the design process and equipment	6 weeks
2	Simple build	6 weeks
3	Simple game	6 weeks
4	Autonomous game	6 weeks
5	Sensors game	6 weeks
6	Ultimate game	6 weeks

KSDE COURSE COMPETENCIES

Competency	Unit Taught
1. Build, Align, fit, or assemble robotic devices or component parts using hand tools, power tools, fixtures, templates, or microscopes.	1,2,3
2. Troubleshoot robotic systems using knowledge of microprocessors, programmable controllers, electronics, circuit analysis, mechanics, sensor or feedback systems, hydraulics and or pneumatics.	3,4,5,6
3. Train robots using appropriate software (multiple software platforms, if possible) to perform simple or complex tasks such as designing and carrying out a series of tests.	3,4,5
4. Install, program, and repair programmable controllers, robot controllers, end-of-arm tools, or conveyors.	3,4,5,6
5. Read blueprints, schematics, diagrams, or technical orders to determine methods and sequences of assembly	2,3,4
6. Record numerical and graphical test results and analyze them to prepare for written testing and documentation.	4,5,6
7. Explain complex mathematical information used in robotic operations.	4,5,6
8. Demonstrate knowledge of careers in robotics and applications of robotics in research, commercial and industrial settings.	1,2,3

9. Read and utilize blueprints, production layouts, and technical drawings relating to robotics.	2,3,4
10. Troubleshoot mechanical failures or unexpected problems including debugging programming.	3,4,5,6
11. Integrate robotics with peripherals, sensors or other equipment.	4,5,6
12. Demonstrate knowledge of how automated robotic systems increase production volume and precision in a variety of high-throughput operations.	2,3,4
13. Resolve engineering or science problems using robots.	2,3
14. Analyze test results in relation to design or rated specifications and test objectives, and modify or adjust equipment to meet specifications.	4,5,6
15. Verify dimensions and tolerances of parts in conformance with specifications in conjunction with robotic maintenance including assembly and disassembly of kit parts and or fabricated parts.	1,2,3

UNIT 1

Introduction to the Design Process and Equipment 6 weeks

Unit Overview

Students will learn the design process. Students will also explore careers in robotics.

Unit Competencies

- Build, Align, fit, or assemble robotic devices or component parts using hand tools, power tools, fixtures, templates, or microscopes.
- Demonstrate knowledge of careers in robotics and applications of robotics in research, commercial and industrial settings.
- Verify dimensions and tolerances of parts in conformance with specifications in conjunction with robotic maintenance including assembly and disassembly of kit parts and or fabricated parts.

Unit Resources

Primary Resources	Supplemental Resources
● Vex IQ Super Kit ● Vex IQ Snapcad ● Vex Code IQ Blocks Software	● First Robotics ● Youtube ● Internet ● Laptop

Unit Vocabulary

Build, Align, Fit, Component, Hand Tools, Power Tools, teamplates, Tolerances

UNIT 2

Simple Build 6 weeks

Unit Overview

Students will use the design process to construct and drive a simple robot drivetrain.

Unit Competencies

- Build, Align, fit, or assemble robotic devices or component parts using hand tools, power tools, fixtures, templates, or microscopes.
- Read blueprints, schematics, diagrams, or technical orders to determine methods and sequences of assembly
- Demonstrate knowledge of careers in robotics and applications of robotics in research, commercial and industrial settings.
- Read and utilize blueprints, production layouts, and technical drawings relating to robotics.
- Demonstrate knowledge of how automated robotic systems increase production volume and precision in a variety of high-throughput operations.
- Resolve engineering or science problems using robots.
- Verify dimensions and tolerances of parts in conformance with specifications in conjunction with robotic maintenance including assembly and disassembly of kit parts and or fabricated parts.

Unit Resources

Primary Resources	Supplemental Resources
• Vex IQ Super Kit • Vex IQ Snapcad • Vex Code IQ Blocks Software	• First Robotics • Youtube • Internet • Laptop

Unit Vocabulary

Build, Align, Fit, Component, Hand Tools, Power Tools, teamplates, Tolerances, Blueprints, schematics, diagrams, Sequences of assembly, Production Layouts, Automated, Dimensions

UNIT 3

Simple Game 6 weeks

Unit Overview

Students will use the design process to create a robot to compete in a simple driving game.

Unit Competencies

- Build, Align, fit, or assemble robotic devices or component parts using hand tools, power tools, fixtures, templates, or microscopes.
- Troubleshoot robotic systems using knowledge of microprocessors, programmable controllers, electronics, circuit analysis, mechanics, sensor or feedback systems, hydraulics and or pneumatics.
- Train robots using appropriate software (multiple software platforms, if possible) to perform simple or complex tasks such as designing and carrying out a series of tests.
- Install, program, and repair programmable controllers, robot controllers, end-of-arm tools, or conveyors.
- Read blueprints, schematics, diagrams, or technical orders to determine methods and sequences of assembly.
- Demonstrate knowledge of careers in robotics and applications of robotics in research, commercial and industrial settings.
- Read and utilize blueprints, production layouts, and technical drawings relating to robotics.
- Demonstrate knowledge of how automated robotic systems increase production volume and precision in a variety of high-throughput operations.
- Resolve engineering or science problems using robots.
- Verify dimensions and tolerances of parts in conformance with specifications in conjunction with robotic maintenance including assembly and disassembly of kit parts and or fabricated parts.

Unit Resources

Primary Resources	Supplemental Resources
• Vex IQ Super Kit • Vex IQ Snapcad • Vex Code IQ Blocks Software	• First Robotics • Youtube • Internet • Laptop

Unit Vocabulary

Feedback systems, hydraulics, pneumatics, Robotic maintenance

UNIT 4

Autonomous Game 6 weeks

Unit Overview

Students will use the design process to create a robot to create an autonomous game.

Unit Competencies

- Troubleshoot robotic systems using knowledge of microprocessors, programmable controllers, electronics, circuit analysis, mechanics, sensor or feedback systems, hydraulics and or pneumatics.
- Train robots using appropriate software (multiple software platforms, if possible) to perform simple or complex tasks such as designing and carrying out a series of tests.
- Install, program, and repair programmable controllers, robot controllers, end-of-arm tools, or conveyors.
- Read blueprints, schematics, diagrams, or technical orders to determine methods and sequences of assembly
- Record numerical and graphical test results and analyze them to prepare for written testing and documentation.
- Explain complex mathematical information used in robotic operations.
- Read and utilize blueprints, production layouts, and technical drawings relating to robotics.
- Troubleshoot mechanical failures or unexpected problems including debugging programming.
- Integrate robotics with peripherals, sensors or other equipment.
- Demonstrate knowledge of how automated robotic systems increase production volume and precision in a variety of high-throughput operations.
- Analyze test results in relation to design or rated specifications and test objectives, and modify or adjust equipment to meet specifications.

Unit Resources

Primary Resources	Supplemental Resources
• Vex IQ Super Kit • Vex IQ Snapcad • Vex Code IQ Blocks Software	• First Robotics • Youtube • Internet • Laptop

Unit Vocabulary

UNIT 5

Sensors Game 6 weeks

Unit Overview

Students will use the design process to create a sensors game.

Unit Competencies

- Troubleshoot robotic systems using knowledge of microprocessors, programmable controllers, electronics, circuit analysis, mechanics, sensor or feedback systems, hydraulics and or pneumatics.
- Train robots using appropriate software (multiple software platforms, if possible) to perform simple or complex tasks such as designing and carrying out a series of tests.
- Install, program, and repair programmable controllers, robot controllers, end-of-arm tools, or conveyors.
- Record numerical and graphical test results and analyze them to prepare for written testing and documentation.
- Explain complex mathematical information used in robotic operations.
- Troubleshoot mechanical failures or unexpected problems including debugging programming.
- Integrate robotics with peripherals, sensors or other equipment.
- Analyze test results in relation to design or rated specifications and test objectives, and modify or adjust equipment to meet specifications.

Unit Resources

Primary Resources	Supplemental Resources
• Vex IQ Super Kit • Vex IQ Snapcad • Vex Code IQ Blocks Software	• First Robotics • Youtube • Internet • Laptop

Unit Vocabulary

UNIT 6	
Ultimate Game	6 weeks

Unit Overview

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Unit Competencies

- Troubleshoot robotic systems using knowledge of microprocessors, programmable controllers, electronics, circuit analysis, mechanics, sensor or feedback systems, hydraulics and or pneumatics.
- Install, program, and repair programmable controllers, robot controllers, end-of-arm tools, or conveyors.
- Record numerical and graphical test results and analyze them to prepare for written testing and documentation.
- Explain complex mathematical information used in robotic operations.
- Troubleshoot mechanical failures or unexpected problems including debugging programming.
- Integrate robotics with peripherals, sensors or other equipment.
- Analyze test results in relation to design or rated specifications and test objectives, and modify or adjust equipment to meet specifications.

Unit Resources

Primary Resources	Supplemental Resources
● Vex IQ Super Kit ● Vex IQ Snapcad ● Vex Code IQ Blocks Software	● First Robotics ● Youtube ● Internet ● Laptop

Unit Vocabulary