06 Introduction to programming robotic hardware

Content Area: **Technology**
Course(s):
Time Period: **Full Year**
Length: **3 Weeks**
Status: **Published**

General Overview, Course Description or Course Philosophy

This full year honors course continues to emphasize the application of integrated STEM (Science, Technology, Engineering and Mathematics) principles and the design method to invent solutions to real world problems through robotic applications. Students will identify problems, research, design and fabricate solutions. Problem solving, critical thinking and design skills are taught through a variety of activities. Hands-on themes include structural and robotic systems, as well as system control technology. This course provides all students with valuable skills such as: problem solving, design, creative thinking, systems thinking, team work, documentation, programming and computer applications.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

All robotics systems consist of components that provide either input, processing or output. In order for these components to communicate and operate properly the hardware must be programmed to interact with its environment, receive commands and send information to motors. Students will be responsible for setting up the hardware of the robotics system, as well as programming it so that it may perform user contolled tasks.

CONTENT AREA STANDARDS

TECH.8.1.12.B	Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
TECH.8.2.12.C	Design: The design process is a systematic approach to solving problems.
TECH.8.2.12.C.4	Explain and identify interdependent systems and their functions.

RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
LA.RH.11-12.8	Evaluate an author's claims, reasoning, and evidence by corroborating or challenging them with other sources.

LA.RH.11-12.9	Integrate information from diverse sources, both primary and secondary, into a coherent understanding of an idea or event, noting discrepancies among sources.
MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.
LA.WHST.11-12.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP12	Work productively in teams while using cultural global competence.

STUDENT LEARNING TARGETS

Declarative Knowledge
Students will understand that:

- All componenets of a robotics system work together and include input, processing and output elements.
- Proper set up and care of the robotics hardware componenets is important for the effectiveness and longevity of the system.
- Hardware must be updated regularly in order to perform optimally.
- Hardware must be secured properly and safely to a robot for the safety and longevity of the system.
- They must properly input sensors and motors into their program prior to writing code in order for the processor to communicate with the sensors/motors.
- They may use any available coding software to program their robot, and an API is available to learn commands for a variety of these programs.
- Controller settings and motor actions will be utilized together in order to perform basic robot movements.

Procedural Knowledge
Students will be able to:

- Demonstrate creative thinking.
- Construct knowledge.
- Develop innovative products and process using technology.
- The design process is a systematic approach to solving problems.
- Explain and identify interdependent systems and their functions.
- Work productively in teams while using cultural global competence.
- Communicate clearly and effectively and with reason.
- Utilize critical thinking to make sense of problems and persevere in solving them.
- Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text.

- Verify data when possible.
- Corroborate or challenge conclusions with other sources of information.
- Synthesize information from a range of sources
- Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.Make sense of problems.
- Persevere in solving problems.
- Construct viable arguments.
- Critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for structure.
- Make use of structure.
- Look for regularity in repeated reasoning.
- Express regularity in repeated reasoning.

EVIDENCE OF LEARNING

Formative Assessments

Observation, weekly engineering logs, programming and hardware quiz.

Summative Assessments

Written programming test, robot skills test, robot programming test.

RESOURCES (Instructional, Supplemental, Intervention Materials)

VEX Coding Studio Software

https://help.vexcodingstudio.com/ - VEX Coding Studio Software API

Robot Mesh Studio Programming and Modeling Software

www.VEXForum.com

Teacher made handouts and tutorials available through Google Classroom/Suite

INTERDISCIPLINARY CONNECTIONS

Mathematics and ELA as listed in related standards.

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.