

## Curriculum Framework – Gateway (2015-2016)

### Automation and Robotics – Lesson 3 Automated Systems

#### Desired Results (stage 1)

#### ESTABLISHED GOALS

*It is expected that students will...*

- G1 – Demonstrate an ability to identify, formulate, and solve engineering problems.
- G2 – Demonstrate an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- G3 – Demonstrate an ability to design and conduct experiments, as well as to analyze and interpret data.
- G4 – Demonstrate an ability to apply knowledge of mathematics, science, and engineering.

#### Transfer

**TRANSFER:** *Students will be able to independently use their learning to ...*

- T1 – Apply knowledge of mathematics, science, and engineering to design robotic systems that solve a problem.
- T2 – Use the techniques (design process), skills (mechanisms), and modern engineering tools (VEX and Programming Software) necessary for engineering practice.

#### Meaning

**UNDERSTANDINGS:** *Students will understand that ...*

- U1 – Automated systems require minimal human intervention.
- U2 – An open-loop system has no feedback path and requires human intervention, while a closed-loop system uses feedback.
- U3 – Troubleshooting is a problem-solving method used to identify the cause of a malfunction in a technological system.
- U4 – Comments do not change the way a robot behaves, but they do allow the programmer to remember the function that the code performs.
- U5 – Invention is a process of turning ideas and imagination into devices and systems.
- U6 – Some technological problems are best solved through experimentation.

**ESSENTIAL QUESTIONS:** *Students will keep considering ...*

- Q1 - How does automation enhance our daily life?
- Q2 - How can you apply troubleshooting skills that you developed in this lesson to your daily life?
- Q3 - How do comments improve a computer program?
- Q4 - Why is good communication and teamwork important when solving technological problems?

<ul style="list-style-type: none"> <li>• G5 – Demonstrate an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.</li> <li>• G6 – Pursue the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.</li> <li>• G7 – Demonstrate an understanding of professional and ethical responsibility.</li> <li>• G8 – Demonstrate an ability to function on multidisciplinary teams.</li> <li>• G9 – Demonstrate an ability to communicate effectively.</li> <li>• G10 – Gain knowledge of contemporary issues.</li> <li>• G11 – Recognize the need for, and develop an ability to engage in life-long learning.</li> </ul>	<p style="text-align: center;"><b>Acquisition</b></p> <p><b>KNOWLEDGE:</b> <i>Students will ...</i></p> <ul style="list-style-type: none"> <li>• K1 – Know the seven technological resources and how they are integrated into an open and closed loop system. U1, U2</li> <li>• K2 – Describe the purpose of pseudocode and comments within a computer program. U3</li> <li>• K3 – Know how to use ratio reasoning to solve mechanical advantage problems. U2, U3, U5, U6</li> <li>• K4 – Explain the roles and responsibilities of mechanical, electrical, and computer engineers who solve robotic problems. U2, U3, U4, U5, U6</li> </ul>	<p><b>SKILLS:</b> <i>Students will ...</i></p> <ul style="list-style-type: none"> <li>• S1 – Design, build, wire, and program both open and closed loop systems. U1, U2</li> <li>• S2 – Use motors and sensors appropriately to solve robotic problems. U1, U2, U3, U4</li> <li>• S3 - Troubleshoot a malfunctioning system using a methodical approach. U3, U5, U6</li> </ul>
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Evidence (stage 2)		
Activities (A) Projects (P) Problems(B)	Assessment FOR Learning	Assessment OF Learning
A 2.3.1 “Beef” Up Your Technological Resources Understanding	<ul style="list-style-type: none"> <li>• Student responses to presentation questions</li> <li>• Essential Questions</li> </ul>	<ul style="list-style-type: none"> <li>• Conclusion Questions</li> </ul>
A 2.3.2 Robot Behaviors and Writing Pseudocode	<ul style="list-style-type: none"> <li>• Essential Questions</li> </ul>	<ul style="list-style-type: none"> <li>• Conclusion Questions</li> </ul>
A 2.3.3 Using ROBOTC	<ul style="list-style-type: none"> <li>• Essential Questions</li> </ul>	<ul style="list-style-type: none"> <li>• Conclusion Questions</li> </ul>
P 2.3.4 Automation Through Programming	<ul style="list-style-type: none"> <li>• Essential Questions</li> </ul>	<ul style="list-style-type: none"> <li>• Conclusion Questions</li> </ul>
P 2.3.5 Simulated Factory Assembly Line	<ul style="list-style-type: none"> <li>• Essential Questions</li> </ul>	<ul style="list-style-type: none"> <li>• Conclusion Questions</li> <li>• Project Evaluation Rubric</li> </ul>

Learning Plan (stage 3)	
Activities (A) Projects (P) Problems(B)	Knowledge and Skills
A 2.3.1 “Beef” Up Your Technological Resources Understanding	K1
A 2.3.2 Robot Behaviors and Writing Pseudocode	K2
A 2.3.3 Using ROBOTC	K2, S1, S2
P 2.3.4 Automation Through Programming	K2, K3, K4, S1, S2, S3
P 2.3.5 Simulated Factory Assembly Line	K1, K2, K3, K4, S1, S2, S3