Curriculum Area: Engineering	**Course Title:** Automation and Robotics; Trimester
Grade: 8th	**Date Last Approved:** April 2015; Reviewed: August 2021

Stage 1: Desired Results

Course Description and Purpose:
This course introduces and explores robotics, and how they are integrated into almost all areas of modern life. This course is "activity oriented" to further develop student knowledge of engineering and the design process to solve everyday problems. Students use the VEX robotics systems to design, create, improve, deploy and run their robotic projects. This course will prepare students for future high school engineering courses.

Enduring Understanding(s):
1. Develop an understanding of engineering design.
2. Develop the abilities to apply the design process.
3. Develop an understanding of the attributes of design.

4. Develop the abilities to use and maintain technological products and systems.

5. Develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.

Essential Question(s):
1. What skills prepare you for diverse career opportunities?
2. How can failure produce positive outcomes?
3. What does it take to effectively develop a solution to a problem or need?
4. What does effective teamwork look like?
5. What is the purpose of modeling?
6. Why are teams of people more successful than an individual when solving problems?
7. How do you express yourself and your creativity through engineering?

Learning Targets:
1. Students can apply the design process to create design solutions to solve a problem.
2. Students can apply the design process to analyze solutions using data and communicate their findings.

Stage 2: Learning Plan

I. Mechanical Systems

   A. Simple Gear Train
   B. Simple Gear Train with Idler
   C. Bevel Gear Assembly
   D. Worm and Wheel
   E. Leadscrew
   F. Rack and Pinion
   G. Universal Joint
   H. Chain Drive
   I. Belt Drive
   J. Crank and Slider
   K. Cam and Follower

Standards Referenced: NGSS.P1

Learning Targets Addressed: 1 & 2

Key Unit Resources: MyPLTW, Teacher Created Resources

Assessment Map:

Type	Level	Assessment Detail
Practice	Knowledge	In class activities
Formative	Skills/ Reasoning	Creation of mechanism sub assemblies
Summative	Product	Construction of Mechanisms

II. Windmill / Pull Toy Construction
 	
A. Design Process
   1. Define a problem
   2. Generate concepts
   3. Design a solution
   4. Build and test solution
   5. Evaluate solution
   6. Present solution

Standards: NGSS.MS-ETS1-2, NGSS.MS-ETS1-4, NGSS.P1, NGSS.P2, NGSS.P3, NGSS.P4, NGSS.P6

Learning Targets Addressed: 1 & 2

Key Unit Resources: MyPLTW, Teacher Created Resources

Assessment Map:

Type	Level	Assessment Detail
Practice	Knowledge	In class activities
Formative	Skills/ Reasoning	Creation of windmill/pull toy components
Summative	Product	Creation of working windmill/pull toy

III. Test Bed A. Testbed Build B. Motors and LEDs C. Digital Sensors D. Analog Sensors

Standards: NGSS.P1

Learning Targets Addressed: 1&2

Key Unit Resources: MyPLTW, Teacher Created Resources

Assessment Map:

Type	Level	Assessment Detail
Practice	Knowledge	In class activities
Formative	Skills/ Reasoning	Creation of sub assemblies
Summative	Product	Creation of working test bed with working programing

IV. Automation Through Programing
 	
A. Design Process
   1. Define a problem
   2. Generate concepts
   3. Design a solution
   4. Build and test solution
   5. Evaluate solution
   6. Present solution

Standards: NGSS.MS-ETS1-2, NGSS.P2, NGSS.P3, NGSS.P6

Learning Targets Addressed: 1 & 2

Key Unit Resources: MyPLTW, Teacher Created Resources

Assessment Map:

Type	Level	Assessment Detail
Practice	Knowledge	In class activities
Formative	Skills/ Reasoning	Creation of project components
Summative	Product	Creation of working project