

**Our Lady of the Lake Roman Catholic School**  
**Yearly Course Outline**  
**Science/PLTW**  
**Sixth Grade**  
**2024–2025**

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**Course Description**

**Design and Modeling:** Design and modeling provides students opportunities to apply the design process to creatively solve problems. Students are introduced to the unit problem in the first activity and are asked to make connections to the problems through the lessons in the unit. Students learn and utilize methods for communicating design ideas through sketches, models and mathematical models. Students work in teams to identify design requirements, research the topic, and engage stakeholders.

**Automation and Robotics:** Automation and Robotics allows students to trace the history, development, and influence of automation and robotics as they learn about mechanical systems, energy transfer, machine automation, and computer control systems. Students use the VEX Robotics platform to design, build, and program real-world objects such as traffic lights, toll booths, and robotic arms.

**Flight and Space:** The exciting world of aerospace comes alive through Flight and Space. Students explore the science behind aeronautics and use their knowledge to design, build, and test an airfoil. Custom-built simulation software allows students to experience space travel.

**Integrated Science:** The 6<sup>th</sup> grade science program also introduces students to the basic concepts of life, earth, and physical science. This program integrates a wide range of hands-on experiences, critical thinking opportunities and real-world applications.

**Instructional Materials**

PLTW Gateway Online Resources

**Methods of Assessment and Distribution**

All test, quiz, and homework grades will be posted on PowerSchool ([www.ollpowerschool.org](http://www.ollpowerschool.org)). Please check for postings frequently. Each quarter, four test- and four quiz-weighted assessments will be administered.

**1st & 2nd Quarters**  
**(Exams taken)**

50% Tests  
20% Exams  
20% Quizzes  
10% Homework

**3rd & 4th Quarters**  
**(No Exams taken)**

60% Tests  
---% Exams  
30% Quizzes  
10% Homework

**Grading Scale**

A: 100-94  
B: 93-86  
C: 85-78  
D: 77-70  
U: 69 and below

## Tentative Course Calendar

**\*\* Dates and course content are subject to change at discretion of teacher or administration. \*\***

*Aug 8 – First day of school for 4<sup>th</sup> – 7<sup>th</sup>*

Week	Standards	Objectives (The learner will . . .)	Instructional Materials	Assessments
<b>1st Quarter</b>				
<b>Week 1 Aug. 12-16</b>	6-MS-Science and Engineering Practices 1-8	<p>*Review lab safety procedures and understand the basic lab safety rules.</p> <p>*Understand and practice procedures.</p> <p>*Design and conduct investigations to demonstrate understanding of lab safety.</p>	<p><b>Technology:</b> General Lab Safety Video Amoeba Sisters Flinn Scientific Lab Safety Video</p> <p><b>Worksheet:</b> Flinn Scientific Lab Safety Procedures Handout</p>	<b>Quiz 1</b> – Flinn Scientific Lab Safety Quiz
<b>Week 2 Aug. 19-23</b>	6-MS-PSI-1 6-MS-LS1-1 6-MS-LS1-2 6-MS-Science and Engineering Practices 1-8	<p>*Participate in an instant design challenge to create an optimal solution to a given problem and apply what they learn to understand the importance of using the design process.</p> <p>*Apply an iterative process to solve a problem or create an 1. Ruler 2. <math>\frac{3}{4}</math> -cubic-inch linking cubes. 3. Basic classroom or household object 4. Isometric graph paper 5. Cartesian graph paper 1. Ruler 2. <math>\frac{3}{4}</math> -cubic-inch linking cubes. 3. Basic classroom or household object 4. Isometric graph paper 5. Cartesian graph paper opportunity that can be justified.</p> <p>*Create a physical model or prototype.</p> <p>*Collaborate effectively on a diverse and multi-disciplinary team.</p> <p>*Describe the role, connections between disciplines, and impact of engineering, biomedical</p>	<p><b>Materials:</b> 1. Ankle foot orthosis supplies 2. Instant design challenge Rubric 3. Design process reflection table 4. Gateway Notebook</p>	<b>Quiz 2:</b> Foot Orthosis Initial Sketch Test 1: Ankle Foot Orthosis Instant Design Challenge

		science, and computer science on society.		
<b>Week 3</b> <b>Aug. 26-30</b>	6-MS-Science and Engineering Practices 1-8	*Persistently apply an iterative process to solve a problem or create an opportunity that can be justified. *Sketch and/or interpret perspective, isometric, and multi-view drawings with adequate attention to standards and critical annotations.	<b>Resources:</b> Activity 1.2 Rubric <b>Materials:</b> 1. Ruler 2. $\frac{3}{4}$ -cubic-inch linking cubes. 3. Basic classroom or household object 4. Isometric graph paper 5. Cartesian graph paper	<b>Test 1:</b> Foot Orthosis Design Challenge
<b>Week 4</b> <b>Sept. 3-6</b> 9/2 Labor Day No School	6-MS-Science and Engineering Practices 1-8	*Differentiate between two-dimensional and three-dimensional models including the strength and weaknesses of each one. *Sketch and/or interpret perspective, isometric, and multi-view drawings with adequate attention to standards and critical annotations.	<b>Resources:</b> Activity 1.2 Rubric 1. Ruler 2. $\frac{3}{4}$ -cubic-inch linking cubes. 3. Basic classroom or household object 4. Isometric graph paper 5. Cartesian graph paper	<b>Test 2:</b> Design Process Test
<b>Week 5</b> <b>Sept. 9-13</b>	6-MS-Science and Engineering Practices 1-8	*Introduce U.S. Customary and metric systems. *Use a ruler to measure accurately. *Read dimensions on a sketch.	<b>Materials:</b> Activity 1.3 Measuring Matters Skimmer Activity Various Building Materials Ruler Engineering Notebook	<b>Quiz 3:</b> Measuring using metric/standard units
<b>Week 6</b> <b>Sept. 16-20</b>	6-MS-Science and Engineering Practices 1-8	*Identify the proper tool to use to measure and dimension with accuracy and precision. *Measure and present values appropriate to standards of accuracy and precision. *Understand why accurate dimensioning, and thorough	<b>Materials:</b> US Customary and metric ruler Engineering Design Notebook 3D Linking Cubes Dial Caliper	<b>Quiz 4:</b> Measuring with a dial caliper quiz

		documenting are necessary for both mechanical dissection and creative problem		
<b>Week 7</b> <b>Sept. 23-27</b> Spirit Week 9/27 Fun Run Kickoff		*Define and apply statistical concepts of center and spread. *Read and interpret a box and whisker graph. *Construct a box and whisker graph to visually represent data. *Consider how statistical analysis can inform the design process. and creative problem	<b>Materials:</b> US Customary and metric ruler Engineering Design Notebook 3D Linking Cubes Dial Caliper	<b>Test 3:</b> Measuring Matters Skimmer Activity with Conclusion Questions
<b>Week 8</b> <b>Sept. 30-Oct. 3</b> 10/3 Living Rosary 10/4 – No School	6-MS-Science and Engineering Practices 1-8	*Use a dial caliper to measure a 3D object. *Add dimensions to a Multiview sketch.	<b>Materials:</b> US Customary and metric ruler Engineering Design Notebook 3D Linking Cubes Dial Caliper	<b>Test 4:</b> Activity 1.5 Test
<b>Week 9</b> <b>Oct. 7-11</b> 10/11 - ½ day (Fun Run)		6 <sup>th</sup> – 7 <sup>th</sup> Grade Exams		
<b>2nd Quarter</b>				
<b>Week 10</b> <b>Oct. 14-18</b>	6-MS-Science and Engineering Practices 1-8	*Perform a mechanical dissection of an object to understand its design. *Use sketching to document an communicate designs with accuracy.	<b>Materials:</b> Activity 1.6 Project Information *PLTW Website *Foam puzzle cube *Camera *Isometric graph paper *Dial Caliper	Test 1: Project 1.6 Investigate the Inside
<b>Week 11</b> <b>Oct. 21-25</b> 10/25 Fun Run Reward Day	6-MS-Science and Engineering Practices 1-8	*Use the proper tool to measure with accuracy and precision. *Add or interpret dimensions on a sketch following the guidelines of dimensioning.	<b>Materials:</b> Activity 1.6 Project Information *PLTW Website *Foam puzzle cube *Camera *Isometric graph paper	Test 2 - Investigate the Inside Test

			*Dial Caliper	
<p><b>Week 12</b> <b>Oct. 28-31</b> 11/2-OLL Festival</p>	6-MS-Science and Engineering Practices 1-8	<p>*Demonstrate creativity and courage to take risks in proposing designs and describe the value of unique attributes or approaches.</p> <p>*Analyze problems or artifacts when developing solutions.</p> <p>*Create a physical model or prototype.</p> <p>*Demonstrate the ability to manage multiple resources throughout a project. (11 days)</p>	<p><b>Materials:</b> Isometric graph paper CAD Application Fabrication Materials Puzzle Cube Design Brief Project 2.4 Rubric Puzzle Cube Data Sheet</p>	Quiz 1: Activity 2.1 Project Tinkercad 3-D Printed Keychain
<p><b>Week 13</b> <b>Nov. 4-8</b> 11/6 - 11/7 Saints Alive</p>	6-MS-Science and Engineering Practices 1-8	<p>*Demonstrate creativity and courage to take risks in proposing designs and describe the value of unique attributes or approaches.</p> <p>*Analyze problems or artifacts when developing solutions.</p> <p>*Create a physical model or prototype.</p> <p>*Demonstrate the ability to manage multiple resources throughout a project. (11 days)</p>	<p><b>Materials:</b> Isometric graph paper CAD Application Fabrication Materials Puzzle Cube Design Brief Project 2.4 Rubric Puzzle Cube Data Sheet</p>	Quiz 2: Tinkercad and Solid Modeling Quiz
<p><b>Week 14</b> <b>Nov. 11-15</b></p>	6-MS-Science and Engineering Practices 1-8	<p>*Follow a design process to effectively develop a design solution.</p> <p>*Use a CAD application to create a 3D model of a design solution.</p> <p>*Create a prototype to test a solution.</p> <p>*Construct a box and whiskers graph to visually represent and analyze data.</p>	<p><b>Materials:</b> Activity 2.4 Project Information Sheets 27 plastic linking cubes Isometric graph paper Dial Caliper Stopwatch Prototype supplies</p>	Test 3: Activity 2.4: Puzzle Cube Design Challenge
<p><b>Week 15</b> <b>Nov. 18-22</b></p>	6-MS-Science and Engineering Practices 1-8	<p>*Describe the purpose of automation and robotics and its effect on society.</p> <p>*Summarize ways that robots are used in today's world and the impact of their use on society.</p> <p>*Describe positive and negative effects of automation and robotics in terms of safety and economics.</p>	<p><b>Resources:</b> *Activity 1.2 What do We Use Robotics For Lesson 1 Key Terms Crossword *Automation and Robotics Presentation Teacher Notes</p>	Quiz 3: VEX Robotics Safety Quiz Quiz 4: Types of Robots Presentation

		*Provide examples of STEM careers and the need for those professionals in our society.	*Vex structure and motion pieces *Storage Bags	
<b>Thanksgiving Holidays</b> <b>Nov. 25-29</b>				
<b>Week 16</b> <b>Dec. 2-6</b>	6-MS-PS2-3 6-MS-PS 2-5 6-MS-PS3-1 6-MS-Science and Engineering Practices 1-8	*Calculate gear ratios, *Explain the relationship between torque and speed in a gear train. *Analyze the speed, torque, and movement through a gear train. *Identify the four types of movement in mechanisms.	<b>Materials:</b> Activity 2.1 Study Guide Nearpod Mechanisms Toy Box Presentation	
<b>Week 17</b> <b>Dec. 9-13</b>	6-MS-PS2-3 6-MS-PS3-1 6-MS-Science and Engineering Practices 1-8	*Build and test models of mechanisms. *Describe the function of different mechanisms. *Identify real-word examples of the use of mechanisms.	<b>Resources:</b> Activity 2.2 Project Pages VEX kits	Test 4: Activity 2.1 Test
<b>Week 18</b> <b>Dec. 16-20</b> 12/20 - ½ day		6 <sup>th</sup> – 7 <sup>th</sup> Grade Exams		
<b>Christmas Holidays</b> <b>Dec. 21 – Jan. 5</b>				
<b>3rd Quarter</b>				
<b>Week 19</b> <b>Jan. 6-10</b>	6-MS-PS2-3 6-MS-PS3-1 6-MS-Science and Engineering Practices 1-8	*Build and test models of mechanisms. *Describe the function of different mechanisms. *Identify real-word examples of the use of mechanisms.	<b>Resources:</b> Activity 2.2 Project Pages VEX kits	Quiz 1: Activity 2.2 Mechanical Build Questions
<b>Week 20</b> <b>Jan. 13-17</b>	6-MS-PS2-3 6-MS-PS3-1 6-MS-Science and Engineering Practices 1-8	*Build and test models of mechanisms. *Describe the function of different mechanisms. *Identify real-word examples of the use of mechanisms.	<b>Resources:</b> Activity 2.2 Project Pages VEX kits	Test 1: Activity 2.2: Types of Mechanisms Test
<b>Week 21</b> <b>Jan. 21-24</b> 1/20 - No School	6-MS-PS4-1 6-MS-PS4-2 6-MS-ESS3-4 6-MS-Science and Engineering Practices 1-8	*Apply knowledge of gear ratios and mechanisms to design, build, and test design solutions. *Use sketching to communicate ideas. *Collaborate within a team.	<b>Resources:</b> Project 2.3: Wind Turbine Construction Project Resources VEX Kits	Quiz 2: Wind Turbine Project Build
<b>Week 22</b> <b>Jan. 27-31</b> Catholic Schools Week	6-MS-Science and Engineering Practices 1-8	*Use the characteristics for a specific mechanism to evaluate its purpose and applications.	<b>Resources:</b> Project 2.4 pull Toy	Test 2: Project 2.4 Pull Toy/Survival Challenge

1/31 - Pep Rally		*Apply knowledge of mechanisms to solve a unique problem for speed, torque, force, or type of motion. (12 Day Activity)	Construction Grading Rubric Various Vex Parts	
<b>Week 23</b> <b>Feb. 3-7</b>	6-MS-Science and Engineering Practices 1-8	*Use the characteristics for a specific mechanism to evaluate its purpose and applications. *Apply knowledge of mechanisms to solve a unique problem for speed, torque, force, or type of motion. (12 Day Activity)	<b>Resources:</b> Project 2.4 pull Toy Construction Grading Rubric Various Vex Parts	Quiz 3: Testbed Coding Quiz
<b>Week 24</b> <b>Feb. 10-14</b>	6-MS-PS2-3 6-MS-PS3-1 6-MS-Science and Engineering Practices 1-8	*Design, build, wire, and program both open-and closed-loop systems. *Use motors and sensors appropriately to solve robotic problems. (12 day activity)	<b>Resources:</b> *Vex Parts *Computer with ROBOTC program installed. *Computer with a CAD software installed *Problem Sheets *Activity 3.4 Programming Lab Sheets *Activity 3.4 Automation Task Check Off	Quiz 4: Sensors and Motors Quiz
<b>Week 25</b> <b>Feb. 17-21</b> 2/21 - Eve Parade	6-MS-PS2-3 6-MS-PS3-1 6-MS-Science and Engineering Practices 1-8	*Design, build, wire, and program both open-and closed-loop systems. *Use motors and sensors appropriately to solve robotic problems. (12 day activity)	<b>Resources:</b> *Vex Parts *Computer with ROBOTC program installed. *Computer with a CAD software installed *Problem Sheets *Activity 3.4 Programming Lab Sheets *Activity 3.4 Automation Task Check Off	Test 3: Activity 3.3 Automation Through Programming Project

<p><b>Week 26</b> <b>Feb. 24-28</b> 2/28 – ½ Day Grandparents Day</p>	<p>6-MS-PS2-3 6-MS-PS3-1 6-MS-Science and Engineering Practices 1-8</p>	<p>*Design, build, wire, and program both open-and closed-loop systems. *Use motors and sensors appropriately to solve robotic problems. (12 day activity)</p>	<p><b>Resources:</b> *Vex Parts *Computer with ROBOTC program installed. *Computer with a CAD software installed *Problem Sheets *Activity 3.4 Programming Lab Sheets *Activity 3.4 Automation Task Check Off</p>	
<p><b>Mardi Gras Holiday</b> <b>March 3-7</b></p>				
<p><b>Week 27</b> <b>March 10-14</b> 3/14 – ½ Day</p>	<p>6-MS-PS2-3 6-MS-PS3-1 6-MS-Science and Engineering Practices 1-8</p>	<p>*Design, build, wire, and program both open-and closed-loop systems. *Use motors and sensors appropriately to solve robotic problems. (12 day activity)</p>	<p><b>Resources:</b> *Vex Parts *Computer with ROBOTC program installed. *Computer with a CAD software installed *Problem Sheets *Activity 3.4 Programming Lab Sheets *Activity 3.4 Automation Task Check Off</p>	<p>Test 4: Robot C Review Test</p>
<p><b>4th Quarter</b></p>				
<p><b>Week 28</b> <b>March 17-21</b></p>	<p>6-MS-LS2-1</p>	<p>*Gather and synthesize information to identify skills scientists use to learn about the world. *Construct an explanation based on evidence for why scientists use a standard measurement system. *Use mathematical representations to identify the SI units of measure for length, mass, volume, density, time, and temperature.</p>	<p><b>Resources:</b> Notes, supplemental readings, worksheets, diagrams, labs/lab reports, selected websites, Interactive Science Notebook</p>	<p>Quiz 1: Metric Unit Conversion Activity</p>

<p><b>Week 29</b> <b>March 24-28</b></p>	<p>6-MS-LS2-1 6-MS-LS2-2 6-MS-LS2-3</p>	<p>*Apply scientific ideas to describe the math skills scientists use in collecting data and making measurements. *Gather and synthesize information to describe what math skills scientists use to analyze their data. *Construct a scientific explanation based on evidence for how adaptations help an organism survive. *Apply scientific ideas to describe competition and predation. *Gather and synthesize information to identify the three types of symbiosis.</p>	<p><b>Resources:</b> Notes, supplemental readings, worksheets, diagrams, labs/lab reports, selected websites, Interactive Science Notebook</p>	<p>Test 1: Tools of Science Test</p>
<p><b>Week 30</b> <b>March 31 - Apr 4</b></p>	<p>6-MS-Science and Engineering Practices 1-8</p>	<p>*Explore the history of flight and space travel. *Investigate what is currently happening in space and flight travel.</p>	<p><b>Resources:</b> Explorers of the Universe Trivia Game Tracking Sheet</p>	<p>Quiz 2 – History of Space Flight Research Project Test 2: History of Flight and Space</p>
<p><b>Week 31</b> <b>April 7-11</b></p>	<p>6-MS-Science and Engineering Practices 1-8 6-MS-PS2-1 6-MS-PS2-2 6-MS-PS3-1 6-MS-PS3-2</p>	<p>*Explore how flight is possible. *Investigate Newton’s three laws of motion. *Examine the four forces of flight.</p>	<p><b>Resources:</b> Activity 1.2 Study Guide Paper Glider Nearpod I-Movie</p>	<p>Quiz 3: Calculating force, mass, and acceleration</p>
<p><b>Week 32</b> <b>April 14-17</b> 4/17 Passion Play 4/18 Good Friday</p>	<p>6-MS-Science and Engineering Practices 1-8 6-MS-PS2-1 6-MS-PS2-2 6-MS-PS3-1 6-MS-PS3-2</p>	<p>*Explore how flight is possible. *Investigate Newton’s three laws of motion. *Examine the four forces of flight.</p>	<p><b>Resources:</b> Activity 1.2 Study Guide Paper Glider Nearpod I-Movie</p>	<p>Quiz 4: Newton’s Law’s Presentation</p>
<p><b>Easter Holiday</b> <b>April 21-25</b></p>				
<p><b>Week 33</b> <b>April 28-May 2</b> 5/2 - Field Day ½ Day</p>	<p>6-MS-ESS1-1 6-MS-ESS1-2 6-MS-ESS1-3 6-MS-ESS3-4 6-MS-PS1-1 6-MS-PS2-1 6-MS-PS2-2 6-MS-PS2-3 6-MS-PS2-4</p>	<p>*Explore lift-off. *Investigate propulsion systems. *Determine how the amount of fuel a rocket uses impacts its travel distance.</p>	<p><b>Resources:</b> Activity 2.1 3-2-1 Liftoff Optional Extension Activity: Fuel Mass</p>	<p>Test 3: Forces of Flight Test</p>

	6-MS-PS2-5 6-MS-PS3-1 6-MS-PS3-2 6-MS-Science and Engineering Practices	*Compare how different types of fuel affect the distance a spacecraft travels.		
<b>Week 34</b> <b>May 5-9</b> 5/6 May Crowning	6-MS-ESS1-1 6-MS-ESS1-2 6-MS-ESS1-3 6-MS-ESS3-4 6-MS-PS1-1 6-MS-PS2-1 6-MS-PS2-2 6-MS-PS2-3 6-MS-PS2-4 6-MS-PS2-5 6-MS-PS3-1 6-MS-PS3-2 6-MS-Science and Engineering Practices	*Explore lift-off. *Investigate propulsion systems. *Determine how the amount of fuel a rocket uses impacts its travel distance. *Compare how different types of fuel affect the distance a spacecraft travels.	<b>Resources:</b> Activity 2.1 3-2-1 Liftoff Optional Extension Activity: Fuel Mass	
<b>Week 35</b> <b>May 12-16</b>	6-MS-ESS1-1 6-MS-ESS1-2 6-MS-ESS1-3 6-MS-ESS3-4 6-MS-PS1-1 6-MS-PS2-1 6-MS-PS2-2 6-MS-PS2-3 6-MS-PS2-4 6-MS-PS2-5 6-MS-PS3-1 6-MS-PS3-2 6-MS-Science and Engineering Practices	*Explore lift-off. *Investigate propulsion systems. *Determine how the amount of fuel a rocket uses impacts its travel distance. *Compare how different types of fuel affect the distance a spacecraft travels.	<b>Resources:</b> Activity 2.1 3-2-1 Liftoff Optional Extension Activity: Fuel Mass	Test 4: Rocket Propulsion Project
<b>Week 36</b> <b>May 19-22</b> 5/22 ½ day	6-MS-ESS1-1 6-MS-ESS1-2 6-MS-ESS1-3 6-MS-ESS3-4 6-MS-PS2-1 6-MS-PS2-2 6-MS-PS2-3 6-MS-PS2-4 6-MS-PS2-5 6-MS-PS3-1 6-MS-PS3-2 6-MS-PS4-1 6-MS-PS4-2 6-MS-Science and Engineering Practices 1-8	*Examine the balance of forces needed for an aircraft to orbit a body and escape space. *Examine the layers of Earth's atmosphere, including where human-made satellites orbit. *Explore the phases of the Apollo 11 mission. *Describe the techniques for landing a spacecraft.	<b>Resources:</b> Activity 2.3 All Systems Go Mapping Orbits Worksheet Optional Extension Activities: Clocking a Trip Getting a Boost	

