

## Technology Education 10-Week Matrix

Essential Questions and Content	Skills	Resources	Suggested Activities	Assessments	Performance Indicators
<p>Establish rituals and routines</p> <p>breaker for group activity What is Technology?</p> <p>Is there such a thing as measuring exactly?</p> <p><b>Mechanical Engineering and mechanical drawing</b></p>	<p>Develop ability to work well with others</p> <p>How to accurately within tolerance use a ruler in both the English standard system and the metric system</p> <p>Knowledge of measuring &amp; designing using a ruler, T-square and triangle</p>	<p>Teacher</p> <p><a href="https://thewaterlilyway.wordpress.com/2014/02/25/team-building-activity-tower-of-cups/">https://thewaterlilyway.wordpress.com/2014/02/25/team-building-activity-tower-of-cups/</a></p> <p>Fractional block display</p> <p><a href="https://www.rulergame.net/">https://www.rulergame.net/</a>  <a href="http://www.k12mathworksheets.com/subject/reading-a-ruler/">http://www.k12mathworksheets.com/subject/reading-a-ruler/</a>  <a href="https://www.education.com/activity/article/how-to-use-a-ruler/">https://www.education.com/activity/article/how-to-use-a-ruler/</a>  <a href="https://www.youtube.com/watch?v=1r7WVh2Zgc">https://www.youtube.com/watch?v=1r7WVh2Zgc</a></p> <p>Intro to Mechanical Engineering Drawing  <a href="https://www.youtube.com/watch?v=1Hm5Zyjmjac">https://www.youtube.com/watch?v=1Hm5Zyjmjac</a>  How to draw an Isometric object  <a href="https://www.youtube.com/watch?v=kYqn4QhUqe4">https://www.youtube.com/watch?v=kYqn4QhUqe4</a>  <a href="https://www.youtube.com/watch?v=kYqn4QhUqe4">https://www.youtube.com/watch?v=kYqn4QhUqe4</a>  <a href="https://www.youtube.com/watch?v=kYqn4QhUqe4">https://www.youtube.com/watch?v=kYqn4QhUqe4</a></p>	<p>Emergency procedures and evacuation procedures</p> <p>Ring of pringles Tower of cups Obstacle course challenge List three things needed to survive a catastrophe</p> <p>Measure various object using both the metric and English system</p> <p>Drawing top, side &amp; front of object. Objective is to draw Isometric drawing of a truss bridge</p>	<p>Measure various line lengths within tolerance using the Metric and the English system</p> <p>Drawn an ortho graphic drawing (front, top, and right side) to scale with accuracy</p>	<p>Engineering Design  <a href="http://www.p12.nysed.gov/cte/technology/standards/design.html">NYSED / P-12 / SO / CTE / Technology Education Standard 5 Engineering Design</a>  <a href="http://www.p12.nysed.gov/cte/technology/standards/design.html">http://www.p12.nysed.gov/cte/technology/standards/design.html</a></p>

<p><b>3D Printing &amp; Design</b> Module 1: 3D printing 101</p> <p>Module 2/3: from layers to beginning designs</p> <p>Module 4/5: printing with purpose</p>	<p><b>3D Printing &amp; Design</b> <b>Module 1</b></p> <ul style="list-style-type: none"> <li>Exercise research skills as they build an understanding of 3D printing</li> <li>Get an introduction to the class 3D printer</li> <li>Gain an understanding of the history, current possibilities, and future potential of 3D printing</li> <li>Develop an appreciation for how 3D printing can benefit life</li> <li>Build vocabulary and workflow awareness of 3D printing</li> </ul> <p><b>Module 2/3</b></p> <ul style="list-style-type: none"> <li>Develop an understanding of additive manufacturing</li> <li>Design and build a class 3D model</li> <li>Explore the basics of creating a 3D file through a design challenge</li> <li>Begin brainstorming a future 3D print project</li> </ul> <p><b>Module 4/5</b></p> <ul style="list-style-type: none"> <li>Gain an understanding of the Design Thinking Process</li> <li>Work together to create a math</li> </ul>	<p><b>3D Printing &amp; Design</b> WOZU Education - Teacher Resources: "3D printing: pathway to purposeful engagement" Teacher's Guide</p> <p>3D printers Class padlet</p> <p>Explore - Design Challenge to apply the design thinking model for a real purpose.</p> <p>Explain – Use the 3D printing app of their choice to build the design for their section</p>	<p><b>3D Printing &amp; Design</b></p>	<p>Design and print object per rubric <a href="file:///C:/Users/vtrotella/Downloads/3D%20Printing%20Module%20Rubric.pdf">file:///C:/Users/vtrotella/Downloads/3D%20Printing%20Module%20Rubric.pdf</a></p>	<p><b>3D Printing &amp; Design</b> <b>NGSS</b> MS-ETS1-1 <a href="https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/MS-ETS1-1%20Evidence%20Statements%20June%202015%20asterisks.pdf">https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/MS-ETS1-1%20Evidence%20Statements%20June%202015%20asterisks.pdf</a></p> <p>MS-ETS1-3 <a href="https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/MS-ETS1-3%20Evidence%20Statements%20June%202015%20asterisks.pdf">https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/MS-ETS1-3%20Evidence%20Statements%20June%202015%20asterisks.pdf</a></p> <p>MS-ETS1-4 <a href="https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/MS-ETS1-4%20Evidence%20Statements%20June%202015%20asterisks.pdf">https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/MS-ETS1-4%20Evidence%20Statements%20June%202015%20asterisks.pdf</a></p> <p><b>NYS MST</b> Standard 1 – Analysis, Inquiry, and Design – Engineering design – Intermediate level <a href="http://www.p12.nysed.gov/cte/technology">http://www.p12.nysed.gov/cte/technology</a></p>
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<p>Module 6/7: imagining the future</p> <p>Module 8/9: what will you print?</p>	<p>manipulatives kit for a younger grade level</p> <ul style="list-style-type: none"> <li>Utilize a 3D modeling software to create objects for print</li> <li>Continue brainstorming a future 3D print object</li> </ul> <p><b>Module 6/7</b></p> <ul style="list-style-type: none"> <li>Recognize the purpose of modeling in the ideation and problem-solving process in science</li> <li>Revisit the Designing Thinking Model in a hands-on design challenge</li> <li>Work collaboratively to imagine, design, and build a 3D model of future space travel</li> </ul> <p><b>Model 8/9</b> Utilize the Design Thinking Model to bring their own ideas to print</p>	<p>Evaluate – Self evaluate design using rubric.</p>			<p><a href="http://www.p12.nysed.gov/documents/techsta1_2.pdf">gy/documents/techsta1_2.pdf</a></p> <p>Standard 5 – Engineering design – Intermediate level <a href="http://www.p12.nysed.gov/cte/technology/standards/design.html">http://www.p12.nysed.gov/cte/technology/standards/design.html</a></p> <p><b>CDOS</b> Standard 1 – Career Development – Intermediate</p> <p>Standard 3a - Universal Foundation skills – Intermediate</p> <p><a href="http://www.p12.nysed.gov/cte/cdlearn/documents/cdoslea.pdf">http://www.p12.nysed.gov/cte/cdlearn/documents/cdoslea.pdf</a></p>

## Technology Education 20-Week Matrix

Essential Questions and Content	Skills	Resources	Suggested Activities	Assessments	Performance Indicators
<p><b>Balsa Bridges</b> (end of)</p> <p>Series of 3-4 projects students work through</p> <p><b>Balsa Bridges</b></p> <p>Tech Wars Jan 8th-12<sup>th</sup>: some students will attend competition at NCCC Tech Wars.</p> <p>What types of structures can withstand the greatest forces?</p> <p>How to develop mechanical drawing blueprints into actual architecture (scaling factors)?</p> <p>What types of careers are associated with this STEM project?</p>	<p>Activities are designed to improve 21<sup>st</sup> century student skills in communication, collaboration, critical thinking and creativity.</p> <p>Develop spatial relationships cognitively, then in mechanical blueprints and in the actual structures.</p>	<p>Popsicle sticks, structural glue and structural stress analyzer.</p> <p>Mechanical drawing paper.</p> <p>1/8 x 1/8 Balsa wood, timber cutters and structural glue.</p>	<p>Construct truss configurations with various bracing techniques.</p> <p>Test with structural stress analyzer.</p> <p>Design and build a balsa bridge using parameters given.</p> <p>Qualify for Tech Wars with the same structural stress analyzer.</p>	<p>Structural stress analyzer to determine force structures can withstand.</p> <p>Hint: apply the structural efficiency formula.</p> <p>Efficiency=Force/Mass</p> <p>in a group setting, test their solution against design specifications, present and evaluate results, describe how the solution might have been modified for different or better results, and discuss tradeoffs that might have to be made</p>	<p>Standard 5 – Engineering design – Intermediate level</p> <p><a href="http://www.p12.nysed.gov/cite/technology/standards/design.html">http://www.p12.nysed.gov/cite/technology/standards/design.html</a></p>

## Technology Education 30-Week Matrix

Essential Questions and Content	Skills	Resources	Suggested Activities	Assessments	Performance Indicators
<b>Coding</b> Module 1: Hello, Mini!  Module 2: Communicate with Geometry and Color  Module 3: Communicate with Text Coding  Module 4: Communicate Forces and Motion with Reference	<ul style="list-style-type: none"> <li>Compare coding to other forms of communication.</li> <li>Understand the process of digitized signals with Bluetooth robotics.</li> <li>Utilize basic coding skills with Mini robot.</li> <li>Work with geometric shapes within nautical flags.</li> <li>Explore block coding with Sphero Edu and Mini.</li> <li>Develop block code that Mini can carry out for representing nautical flags.</li> <li>Explore the difference between block and text coding in the Sphero Edu App.</li> <li>Work to communicate coordinate movements for Mini.</li> <li>Extend and practice their use of text coding in the Sphero Edu app.</li> </ul>		Nautical Shape Activity <u>Engage:</u> communication and Mini using color and geometry, create larger representations of the nautical flag.  <u>Explore &amp; Explain:</u> Write their plans and ideas in their journals, using the Sphero Edu app and block coding to create code that simulates the flag  <u>Evaluate:</u> Students may discuss the programming or nautical flag building	Flipgrid presentation	NGSS 3-5-ETS1-1 & NGSS 3-5-ETS1-2 <a href="https://www.nextgenscience.org/dci-arrangement/3-5-ets1-engineering-design">https://www.nextgenscience.org/dci-arrangement/3-5-ets1-engineering-design</a>  NGSS 4-PS4-3 <a href="https://www.nextgenscience.org/pe/4-ps4-3-waves-and-their-applications-technologies-information-transfer">https://www.nextgenscience.org/pe/4-ps4-3-waves-and-their-applications-technologies-information-transfer</a>

Module 5/6: Communicate, Code, and Challenge Mini	<ul style="list-style-type: none"> <li>• Share the motion (speed and direction) of Mini using reference points with arrows.</li> <li>• Use their understanding of coding to share a newly developed communication system with Mini.</li> <li>• Design and build a communication mat game board that Mini can roll on for communication.</li> <li>• Share the newly-created communication system in a 3 minute presentation.</li> </ul>				
<b>Drone Build</b> Module 1: Becoming a Drone Builder and Pilot	<ul style="list-style-type: none"> <li>• Explore the Federal Aviation Administration's classifications and requirements for public use of drone technology, and take notes for sharing in their drone teams.</li> <li>• Research, identify, and share online current event articles regarding drone use in the public sector, and take notes for sharing in their drone teams.</li> <li>• Discover how to assemble, connect, and lift/land their drones.</li> <li>• Complete a checklist rubric of "I Can" statements to apply for pilot status with the drone.</li> </ul>	<b>Drone Build</b> WOZU Education - Teacher Resources: Deploy Drone: Build Your Drone Teacher's Guide	<b>Drone Build</b> Module 1: Becoming a Drone Builder and Pilot		<b>Drone Build</b> <b>NGSS</b> MS-ETS1-1 <a href="https://www.nextgenscience.org/dc-i-arrangement/ms-ets1-engineering-design">https://www.nextgenscience.org/dc-i-arrangement/ms-ets1-engineering-design</a>  <b>NYS MST</b> <a href="http://www.nysed.gov/common/nysed/files/programs/curriculum-instruction/p-12-science-learning-standardsms9-18.pdf">http://www.nysed.gov/common/nysed/files/programs/curriculum-instruction/p-12-science-learning-standardsms9-18.pdf</a>  Standard 1 – Analysis, Inquiry, and Design – Engineering design – Intermediate level <a href="http://www.p12.nysed.gov/cte/technolo">http://www.p12.nysed.gov/cte/technolo</a>

Module 2: Science of Flight	<ul style="list-style-type: none"> <li>• Learn basic vocabulary associated with drone flight.</li> <li>• Practice movements that connect to the vocabulary learned.</li> <li>• Develop piloting skills that allow them to safely pilot a drone within a defined area in a controlled manner.</li> </ul>	WOZU Education - Teacher Resources: Deploy Drone: Build Your Drone Teacher's Guide	<p>Module 2: Engage – Drone Vocabulary Word Cloud.</p> <p>Explore – Research devices with the ability to scan QR codes.</p> <p>Explain – Use remote controls to solidify movements</p> <p>Evaluate – Students will demonstrate their ability to lift and land the drone in a single spot; life, move vertical to one corner, rotate and fly to each corner making a square flight back to the pilot; and perform yaw, pitch and roll.</p>		<a href="http://www.p12.nysed.gov/documents/techsta1_2.pdf">gy/documents/techsta1_2.pdf</a>  Standard 5 – Engineering design – Intermediate level <a href="http://www.p12.nysed.gov/cte/technology/standards/design.html">http://www.p12.nysed.gov/cte/technology/standards/design.html</a>  <b>CDOS</b> Standard 1 – Career Development – Intermediate  Standard 3a - Universal Foundation skills – Intermediate  <a href="http://www.p12.nysed.gov/cte/cdlearn/documents/cdoslea_pd">http://www.p12.nysed.gov/cte/cdlearn/documents/cdoslea_pd</a>
Module 3: Stability and Control Training	<ul style="list-style-type: none"> <li>• Practice piloting.</li> <li>• Support teammates with safety and directions.</li> <li>• Continue to build confidence with terminology regarding drone flight.</li> </ul>		Module 3: Stability and Control Training		

## Technology Education 40-Week Matrix

Essential Questions and Content	Skills	Resources	Suggested Activities	Assessments	Performance Indicators
<b>Dones – Build</b> Module 4: Speed Test and Variables	<ul style="list-style-type: none"> <li>• Make predictions regarding the speed of the DIY drone.</li> <li>• Design and conduct an investigation in which they use the formula for speed to calculate the drone's speed.</li> <li>• Compare their results to the company's estimation of the speed of the drone.</li> <li>• Assess what variables could make the drone's speed vary.</li> </ul>	<b>Dones – Build</b> WOZU Education - Teacher Resources - Deploy Drone: Build Your Drone Teacher's Guide	<b>Dones – Build</b> Module 4: Speed Test and Variables		
Module 5: Team Challenge	<ul style="list-style-type: none"> <li>• Demonstrate control and maneuverability in piloting a drone.</li> <li>• Work together in a team to accomplish a goal.</li> <li>• Share understanding of drone terminology.</li> </ul>	WOZU Education - Teacher Resources: Deploy Drone: Build Your Drone Teacher's Guide	Module 5: Team Challenge		



<p><b>Dones – Flight</b> Module 1: Introduction to Drones</p>	<ul style="list-style-type: none"> <li>Explore the concept of an Unmanned Aerial Vehicle (UAV)</li> <li>View and explain basic used for UAVs and drones</li> <li>Articulate basic vocabulary relating to parts of drones, flight, and safety.</li> </ul>	<p><b>Dones – Flight</b> WOZU Education – Teacher Resources – Drones: Ready for Flight Teacher’s Guide</p>	<p><b>Dones – Flight</b> Module 1: Introduction to Drones</p>	<p><b>Dones – Flight</b> <b>NGSS</b> MS-ETS1-1 <a href="https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/MS-ETS1-1%20Evidence%20Statements%20June%202015%20asterisks.pdf">https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/MS-ETS1-1%20Evidence%20Statements%20June%202015%20asterisks.pdf</a></p>
<p>Module 2: Introduction to Flight</p>	<ul style="list-style-type: none"> <li>Perform preflight checklist steps to assess weather quality, battery charging level (state of charge – SOC), propeller conditions, and more.</li> <li>Visually inspect the aircraft and flight area to determine flight safety.</li> <li>Perform a flight challenge involving three maneuvers.</li> <li>Master the power-up and power-down sequence controls.</li> </ul>	<p><b>Dones – Flight</b></p>	<p>Module 2: Introduction to Flight</p> <p>Engage - Review parts of the aircraft with students, discuss the three mission sequences, review vocabulary, review cardinal directions, review the drone controller buttons and debrief pre-flight checklist.</p> <p>Explore – Distribute handouts to teams, explain the activity using teacher notes, instruct students to use the Mission Preflight Checklist to verify that all the proper conditions are met for flight, use each inspection to monitor for good habits for piloting drones, students execute their mission, students perform three Mission #1 flights, and instruct students teams to log their</p>	<p>MS-ETS1-4 <a href="https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/MS-ETS1-4%20Evidence%20Statements%20June%202015%20asterisks.pdf">https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/MS-ETS1-4%20Evidence%20Statements%20June%202015%20asterisks.pdf</a></p> <p><b>NYS MST</b> Standard 1 – Analysis, Inquiry, and Design – Engineering design – Intermediate level <a href="http://www.p12.nysed.gov/cte/technology/">http://www.p12.nysed.gov/cte/technology/</a></p>

Module 3: Basic Maneuvers	<ul style="list-style-type: none"> <li>• Complete a proper preflight checklist.</li> <li>• Form a flight plan that matches the mission objectives.</li> <li>• Perform their assigned role of pilot, observer, or recorder.</li> <li>• Perform a series of basic maneuvers to take off from the starting position, move several directions, and then land on a finishing target.</li> <li>• Communicate directions during the mission to properly orient the aircraft and move it toward the landing target.</li> <li>• Record mission details, communication challenges, and any other successes or failures experienced.</li> </ul>		<p>flight(s) in their Team Flight Log.</p> <p>Module 3: Basic Maneuvers</p>	<p><a href="#">documents/techsta1_2.pdf</a></p> <p>Standard 5 – Engineering design – Intermediate level  <a href="http://www.p12.nysed.gov/cte/technology/standards/design.html">http://www.p12.nysed.gov/cte/technology/standards/design.html</a></p> <p><b>CDOS</b>  Standard 1 – Career Development – Intermediate</p> <p>Standard 3a - Universal Foundation skills – Intermediate  <a href="http://www.p12.nysed.gov/cte/cdlearn/documents/cdolea.pdf">http://www.p12.nysed.gov/cte/cdlearn/documents/cdolea.pdf</a></p>
Module 4: Advanced Maneuvers	<ul style="list-style-type: none"> <li>• Analyze objects to be moved.</li> <li>• Design how the drone will pick up and carry objects.</li> </ul>		Module 4: Advanced Maneuvers	

Module 5: Making Moves	<ul style="list-style-type: none"> <li>• Build a mechanism by which the drone will pick up and deliver objects.</li> <li>• Calculate weights and determine what objects can be safely transported by the drone</li> </ul>		Module 5: Making Moves		
Module 6: Blind-Pilot Adventure	<ul style="list-style-type: none"> <li>• Work together to set up a challenging drone obstacle course.</li> <li>• Communicate effectively to navigate the drone obstacle course.</li> <li>• Demonstrate mission planning, communication, and proper use of vocabulary/action words to effectively complete a challenge.</li> <li>• Design a flight plan that has a clear path.</li> <li>• Identify best role for each of team member to assign correct skill sets to unique challenges of each role.</li> <li>• Safely pilot the mission from start to finish avoiding obstacles and working together to</li> </ul>		Module 6: Blind-Pilot Adventure		

	articulate directions, elevation changes, and power- up/power-down sequences.				
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