

TOWNSHIP OF UNION PUBLIC SCHOOLS



Grade 10th-12th / Introduction to Drone Theory & Design

Adopted September 17, 2019

Mission Statement

The mission of the Township of Union Public Schools is to build on the foundations of honesty, excellence, integrity, strong family, and community partnerships. We promote a supportive learning environment where every student is challenged, inspired, empowered, and respected as diverse learners. Through cultivation of students' intellectual curiosity, skills and knowledge, our students can achieve academically and socially, and contribute as responsible and productive citizens of our global community.

Philosophy Statement

The Township of Union Public School District, as a societal agency, reflects democratic ideals and concepts through its educational practices. It is the belief of the Board of Education that a primary function of the Township of Union Public School System is to formulate a learning climate conducive to the needs of all students in general, providing therein for individual differences. The school operates as a partner with the home and community.

Course Description

Grade Levels: 11 and 12

Pre-Requisite: CAD I and CAD II or any TWO of the following engineering courses: Intro to Engineering Design, Principles of Engineering, or AP Physics

Description

The Introduction to Drone Theory & Design course is designed for the advanced CAD/Engineering student. This advanced course will cover how to build drones and understand all of the different components that make it fly. Students will also learn specific skills needed to repair quad copters. Students will learn to apply teamwork and problem-solving techniques to the drone design process and learn about current uses, potential careers, and future needs for drone technology and engineering.

Many Technology and Engineering education programs are driven by the demands from industry. In recent years, the demand for skilled drone pilots has dramatically increased, and the need for skilled technicians and programmers has as well. With this demand from industry, technology programs need to step up the preparation of students for these opportunities. Not only do students need to learn the skills of flying, they also need to master the skills of programming and computational thinking to solve complex problems.

More than just flying for hobby or sport, drones are becoming a powerful tool. By adding a camera and other sensing technologies, drones become an invaluable asset to many industries. Some of them include news agencies, photography, movies, surveillance, transport, search and rescue, and agriculture. Where expensive helicopters were required before, these relatively inexpensive multi-rotor copters can execute the most basic to more complex tasks. A properly equipped quad copter can fly over a natural gas pipeline and detect leaks. Another could quickly take flight with infrared cameras to locate a lost hiker. The possibilities are truly endless and the jobs that will be created seem to be as well. It is projected that by 2025, over 103,776 jobs will be created related to UAVs with a projected economic impact of \$3.5 billion each year over the next ten years (AUVSI, 2017).

Upon completion of this course the student will be able to:

1. Understand the importance of drone safety. Recognize every component that makes a UAV functional. Build and code using python software.
2. Visualize how to fly using Virtual Reality goggles and line of sight.
3. Understand basic drone terminology and frequency management. Adhere to FAA rules and regulations. Explain the meaning of word parts associated with each unit.
4. Study and prep for the 107 part license exam to fly drone for commercial purposes.

Evaluation and Grading

Grade Determination

The minimum level of satisfactory performance in this course is a 'C' or better. To receive a 'C' or better, students must first complete ALL course requirements specified above, including meeting the minimum attendance expectation.

Upon successful completion of the course students will be eligible to take the part 107 drone pilot exam.

Unsatisfactory performance which may include late assignments, failing grades, and/or attendance or progress will be discussed individually on an as needed basis.

Drone Theory & Design Grading System

Weighted Average of All Requirements	Final Letter Grade
93-100	A
90-92.9	A-
87-89.9	B+
83-86.9	B
80-82.9	B-
77-79.9	C+
73-76.9	C
70-72.9	C-
67-69.9	D+
63-66.9	D
Less than 63	F

Curriculum Units/Pacing Guide

Unit # / Title	Number of Days
Unit 1: Introduction to Drones or UAV's	10
Unit 2: The Aerodynamics of Wings	25
Unit 3: Machines that Hover	20
Unit 4: Submersibles and Fluid Dynamics	15
Unit 5: Legal and Ethical Issues in Drone Use	10
Unit 6: Drone Demonstration	15
Unit 7: Coding and Communicating with Drones	20
Unit 8: Building and Flying an Unmanned Aerial Vehicle (Racing)	35
Unit 9: Building and Flying an Unmanned Aerial Vehicle (Micro)	35

Unit Standards Overview

Overview	Standards	Unit Skills Focus	Content-Specific Practices (when applicable)
<p>Unit 1 What is a Drone?</p>	<p>Career Ready Practices: CRP2. Apply appropriate academic and technical skills. CRP6. Demonstrate creativity and innovation.</p> <p>CTE Standards: 9.3.ST.2 Use technology to acquire, manipulate, analyze and report data. 9.3.ST.3 Describe and follow safety, health and environmental standards related to science, technology, engineering and mathematics (STEM) workplaces. 9.3.ST.6 Demonstrate technical skills needed in a chosen STEM field. 9.3.ST-ET.2 Display and communicate STEM information. 9.3.ST-ET.5 Apply the knowledge learned in STEM to solve problems. 9.3.ST-ET.6 Apply the knowledge learned in the study of STEM to provide solutions to human and societal problems in an ethical and legal manner. 9.3.ST-SM.3 Analyze the impact that science and mathematics has on society. 9.3.ST-SM.4 Apply critical thinking skills to review information, explain statistical analysis, and to translate, interpret and summarize research and statistical data.</p>	<ul style="list-style-type: none"> • Define the commonly used parts that make up a UAV or Drones. • Identify all of the engineering components and software that allow you to fly and communicate with Unmanned Aerial Vehicle. • Describe the steps in building a drone. • Recognize the appropriate software needed to code. • Identify voltage needed to power all electrical hardware. • State why caution is important when using hot and sharp tools around motherboards. • Analyze unfamiliar flying machines with different motors. • Compliance and airspace regulations. 	<p>Standard 9.1 21st-Century Life and Career Skills: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.</p> <p>Standard 9.3 Career Awareness, Exploration, and Preparation: All students will apply knowledge about and engage in the process of career awareness, exploration, and preparation in order to navigate the globally competitive work environment of the information age.</p> <p>Standard 9.4 Career and Technical Education: All students who complete a career and technical education program will acquire academic and technical skills for careers in emerging and established professions that lead to technical skill proficiency, credentials, certificates, licenses, and/or degrees.</p>

<p>Suggested Resources Provide links to specific resources/activities</p>	<ul style="list-style-type: none"> • “A Drone’s-Eye View of Conservation” by Lian Pin Koh. TED Talks. Video (13.31) provided and also available at http://www.ted.com/talks/lian_pin_koh_a_drone_s_eye_view_of_conservation.html • “Pictures: Drones Take on Hurricanes, Environment Work.” National Geographic. Slide Show http://news.nationalgeographic.com/news/2012/09/pictures/120921-hurricanedrones-nasa-usgs-environment-science/#/news-drones-controlstation_59342_600x450.jpg • “Amazon Testing Delivery By Drone.” USAToday. Article and video (2.12) http://www.usatoday.com/story/tech/2013/12/01/amazon-bezos-drone-delivery/3799021/ • “Netflix Mocks Amazon With Video for DVD Delivery Drone.” Wired. Video (1.12) http://www.wired.com/business/2014/02/netflix-heats-amazon-rivalry-dvd-deliverydrone-video/ • “Drone Club for Kids is Really, Really Awesome.” Popular Science. Article and videos http://www.popsci.com/technology/article/2013-09/drone-club-kids-autism-makesawesome-videos 	
<p>Unit 2 The Aerodynamics of Wings</p>	<p>Career Ready Practices: CRP2. Apply appropriate academic and technical skills. CRP6. Demonstrate creativity and innovation.</p> <p>CTE Standards: 9.3.ST.2 Use technology to acquire, manipulate, analyze and report data. 9.3.ST.3 Describe and follow safety, health and environmental standards related to science, technology, engineering and mathematics (STEM) workplaces. 9.3.ST.6 Demonstrate technical skills needed in a chosen STEM field. 9.3.ST-ET.2 Display and communicate STEM information. 9.3.ST-ET.5 Apply the knowledge learned in STEM to solve problems.</p>	<ul style="list-style-type: none"> • Recognize all different types of flying vehicles fixed and non-fixed wings/propellers. • Recognize why aviation engineers need to get the design process done correctly and accurately. • Compare and research different winged animals and how they adapted to their environment. • Analyze why the monoplane model became so dominant in the early 1900’s. • Research Boeing Company for current projects that are being worked on for the future. • Analyze all data collected.

	<p>9.3.ST-ET.6 Apply the knowledge learned in the study of STEM to provide solutions to human and societal problems in an ethical and legal manner.</p> <p>9.3.ST-SM.3 Analyze the impact that science and mathematics has on society.</p>		
<p>Suggested Resources Provide links to specific resources/activities</p>	<ul style="list-style-type: none"> • “How do Planes Fly?” Canadian Museum of Nature. Interactive gallery animation. http://www.nature.ca/discover/exb/hwdbdrsfly/index_e.cfm • “Super Pitts Stunt Biplane at Point Mugu.” Youtube video (3.11) http://youtu.be/DzhCOy5M8ck • “Photo in the News: Dino Species Flew Like a Biplane.” National Geographic News. http://news.nationalgeographic.com/news/2005/10/1018_051018_biplane_dino.html • “Dinosaur Flew ‘Like a Biplane.’” Nature News. http://www.nature.com/news/2005/051017/full/news051017-1.html • “Paleontologists in a Flap over Four-Winged Dinosaurs.” http://www.abc.net.au/science/articles/2003/01/23/767860.htm • “Wing Geometry”. NASA Kids. https://www.grc.nasa.gov/www/k-12/airplane/geom.html. 		
<p>Unit 3 Machines that Hover</p>	<p>Career Ready Practices: CRP2. Apply appropriate academic and technical skills. CRP6. Demonstrate creativity and innovation. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.</p> <p>CTE Standards: 9.3.ST.2 Use technology to acquire, manipulate, analyze and report data. 9.3.ST.3 Describe and follow safety, health and environmental standards related to science, technology, engineering and mathematics</p>	<ul style="list-style-type: none"> • Identify and describe the earliest form of a rotorcraft. • Compare and contrast fixed-wing aircraft with rotary-wing aircraft, learning how to explore and apply basic principles of aviation mechanics. • Recognize and experiment the most ideal shape and configuration of rotors. • Identify why blades are specialized to hover, fly backwards, and perform other tasks that other winged 	

	<p>(STEM) workplaces.</p> <p>9.3.ST.6 Demonstrate technical skills needed in a chosen STEM field.</p> <p>9.3.ST-ET.2 Display and communicate STEM information.</p> <p>9.3.ST-ET.5 Apply the knowledge learned in STEM to solve problems.</p> <p>9.3.ST-ET.6 Apply the knowledge learned in the study of STEM to provide solutions to human and societal problems in an ethical and legal manner.</p> <p>9.3.ST-SM.3 Analyze the impact that science and mathematics has on society.</p>	<p>machines cannot do.</p>	
<p>Suggested Resources Provide links to specific resources/activities</p>	<ul style="list-style-type: none"> • “Dragonfly Wings in Slow Motion.” Smarter Every Day. Youtube video (5.59) http://youtu.be/oxrLYv0QXa4 • “Hummingbird Aerodynamics.” Smarter Every Day. Youtube video (5.38) http://youtu.be/1VA8v1btKdQ • “Biplanes, Triplanes, and Edwardian Era Aircraft.” Youtube video (29.32) http://youtu.be/lv8wJhbWsel (good for showing specific plane models) • Many other stunt biplane videos available on Youtube • “Dinosaur Flew Like Biplane?” Scientific American (60 second audio podcast) http://www.scientificamerican.com/podcast/episode/51192681-e7f2-99df-37e5080ce0a83a04/ 		
<p>Unit 4 Submersibles and Fluid Dynamics</p>	<p>Career Ready Practices:</p> <p>CRP2. Apply appropriate academic and technical skills.</p> <p>CRP6. Demonstrate creativity and innovation.</p> <p>CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.</p> <p>CTE Standards:</p> <p>9.3.ST.2 Use technology to acquire, manipulate, analyze and report data.</p> <p>9.3.ST.3 Describe and follow safety, health and environmental standards</p>	<ul style="list-style-type: none"> •Recognize basic engineering of submersible technologies. •Understand aerodynamics is a subfield of fluid dynamics. • Study the flow and motion of fluids in order to engineer dynamic machines. •Explore how buoyancy works by testing different shapes with a plasticine ball. •Differentiate how temperature affects life of fluid and breakdown. 	

	<p>related to science, technology, engineering and mathematics (STEM) workplaces.</p> <p>9.3.ST.6 Demonstrate technical skills needed in a chosen STEM field.</p> <p>9.3.ST-ET.2 Display and communicate STEM information.</p> <p>9.3.ST-ET.5 Apply the knowledge learned in STEM to solve problems.</p> <p>9.3.ST-ET.6 Apply the knowledge learned in the study of STEM to provide solutions to human and societal problems in an ethical and legal manner.</p> <p>9.3.ST-SM.3 Analyze the impact that science and mathematics has on society.</p>		
<p>Suggested Resources Provide links to specific resources/activities</p>		<ul style="list-style-type: none"> • “The Weird and Wonderful World of Fluids.” Wired. Article and videos http://www.wired.com/wiredscience/2011/06/weird-world-of-fluids/ • “Kid Makes His Own Submarine Out of Scrap and Stays Underwater for 30 Minutes.” Wonderful Engineering. Article and video (3.02) http://wonderfulengineering.com/kidmakes-his-own-submarine-out-of-scrap-and-stays-underwater-for-30-minutes/ • “Futuristic Unmanned Submarines Could Move Like Stingrays.” Mashable. Article and video (1.14) http://mashable.com/2013/12/03/submarine-stingray/ • “Why Do Wings Help you Fly?” TED Education. Video (2.50) http://ed.ted.com/featured/QGAvaMwM • “Fluids in Motion: Fun Science Experiments.” LiveScience. http://www.livescience.com/42579-fluids-science-experiments.html • “Sharks and Rays: Stingrays.” National Geographic. http://video.nationalgeographic.com/video/animals/fish-animals/sharks-and-rays/stingray/ 	

	<p>Career Ready Practices: CRP2. Apply appropriate academic</p>	<p>•Describe how civilian use of drones has become an unprecedented issue</p>	
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<p>Unit 5 Legal and Ethical Issues in Drone Use</p>	<p>and technical skills. CRP6. Demonstrate creativity and innovation.</p> <p>CTE Standards: 9.3.ST.2 Use technology to acquire, manipulate, analyze and report data. 9.3.ST.3 Describe and follow safety, health and environmental standards related to science, technology, engineering and mathematics (STEM) workplaces. 9.3.ST.6 Demonstrate technical skills needed in a chosen STEM field. 9.3.ST-ET.2 Display and communicate STEM information. 9.3.ST-ET.5 Apply the knowledge learned in STEM to solve problems. 9.3.ST-ET.6 Apply the knowledge learned in the study of STEM to provide solutions to human and societal problems in an ethical and legal manner. 9.3.ST-SM.3 Analyze the impact that science and mathematics has on society. 9.3.ST-SM.4 Apply critical thinking skills to review information, explain statistical analysis, and to translate, interpret and summarize research and statistical data.</p>	<p>in modern society.</p> <ul style="list-style-type: none"> •Recognize the effects on restrictions and regulations placed around the use, purchase, and manufacturing. •Recognize privacy laws and legal obligation in no fly zone and restricted airspace. •Analyze maps for live data in operating a drone in a public/private property. •Research and register with the FAA (Federal Aviation Administration) for unique tag number. 	
<p>Suggested Resources</p> <p><i>Provide links to specific resources/activities</i></p>	<ul style="list-style-type: none"> • “FAA Halts Man’s Drone Photography Business Over Regulations.” The Blaze. Article and videos at http://www.theblaze.com/stories/2013/03/15/faa-halts-mans-dronephotography-business-over-regulations/ 		

	<ul style="list-style-type: none"> • “Drones Present a Challenge to FAA.” The Buffalo News. Article http://www.buffalonews.com/business/drones-present-a-challenge-to-faa-20140211 • “Domestic Drones.” American Civil Liberties Union (ACLU). https://www.aclu.org/blog/tag/domestic-drones • “Drones at Work Worldwide, but U.S. Still Lacks Laws.” Voice of America. Article and video http://www.voanews.com/content/drones-at-work-worldwide-but-us-still-lackslaws/1859180.html • “Lawmakers May Restrict Drone Aircraft for Privacy’s Sake.” The Seattle Times. Article http://www.voanews.com/content/drones-at-work-worldwide-but-us-still-lacks-laws/1859180.html • “Surveillance Drones.” Electronic Frontier Foundation (EFF). https://www.eff.org/issues/surveillance-drones • “Privacy Issues Hover Over Police Drone Use.” The Washington Post. http://www.washingtonpost.com/wp-dyn/content/article/2011/01/22/AR2011012204026.html?sid=ST2011012300293 	
<p>Unit 6</p>	<p>Career Ready Practices: CRP2. Apply appropriate academic and technical skills. CRP6. Demonstrate creativity and innovation.</p> <p>CTE Standards: 9.3.ST.2 Use technology to acquire, manipulate, analyze and report data. 9.3.ST.3 Describe and follow safety, health and environmental standards related to science, technology,</p>	<ul style="list-style-type: none"> • Name and describe the flight check list and the importance of following procedures. • Analyze flight time and battery temperature. • Name and describe the 3 flight modes associated with NASA GPS antenna. • Explore the many uses being developed for drones in fields such as science, business, and

Drone Demonstration	<p>engineering and mathematics (STEM) workplaces.</p> <p>9.3.ST.6 Demonstrate technical skills needed in a chosen STEM field.</p> <p>9.3.ST-ET.2 Display and communicate STEM information.</p> <p>9.3.ST-ET.5 Apply the knowledge learned in STEM to solve problems.</p> <p>9.3.ST-ET.6 Apply the knowledge learned in the study of STEM to provide solutions to human and societal problems in an ethical and legal manner.</p> <p>9.3.ST-SM.3 Analyze the impact that science and mathematics has on society.</p>	<p>security.</p>	
Suggested Resources <i>Provide links to specific resources/activities</i>	<ul style="list-style-type: none"> • Coffeescript tutorial and installation instructions for game development http://www.alexandrocias.com/tutorials/coffeescript_game_dev.html and “The Game”, coded with HTML5 and Coffeescript http://splash.abc.net.au/web/zoom • “Writing Your First AR Drone Plus NodeJS Program.” Hacking Drones. http://drones.johnback.us/blog/2013/01/28/writing-your-first-ar-drone-plus-nodejs-program/ 		
	<p>Career Ready Practices:</p> <p>CRP2. Apply appropriate academic and technical skills.</p> <p>CRP6. Demonstrate creativity and innovation.</p> <p>CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.</p>	<p>Differentiate coding software for different drones.</p> <ul style="list-style-type: none"> •State the difference between A++ and coffeescript. •Differentiate among the three different coding protocols to determine proper communication.. •Analyze and manage frequency 	

<p>Unit 7 Coding and Communicating with Drones.</p>	<p>CTE Standards:</p> <p>9.3.ST.2 Use technology to acquire, manipulate, analyze and report data.</p> <p>9.3.ST.3 Describe and follow safety, health and environmental standards related to science, technology, engineering and mathematics (STEM) workplaces.</p> <p>9.3.ST.6 Demonstrate technical skills needed in a chosen STEM field.</p> <p>9.3.ST-ET.2 Display and communicate STEM information.</p> <p>9.3.ST-ET.5 Apply the knowledge learned in STEM to solve problems.</p> <p>9.3.ST-ET.6 Apply the knowledge learned in the study of STEM to provide solutions to human and societal problems in an ethical and legal manner.</p> <p>9.3.ST-SM.3 Analyze the impact that science and mathematics has on society.</p>	<p>channels for better video output.</p> <ul style="list-style-type: none"> •Test your own code on sample drone. 	
<p>Suggested Resources</p> <p><i>Provide links to specific resources/activities</i></p>	<p>Coffeescript tutorial and installation instructions for game development http://www.alexandrocias.com/tutorials/coffeescript_game_dev.html and “The Game”, coded with HTML5 and Coffeescript http://splash.abc.net.au/web/zoom</p> <ul style="list-style-type: none"> • “Writing Your First AR Drone Plus NodeJS Program.” Hacking Drones. http://drones.johnback.us/blog/2013/01/28/writing-your-first-ar-drone-plus-nodejs-program/ 		
<p>Unit 8</p>	<p>Career Ready Practices:</p> <p>CRP2. Apply appropriate academic and technical skills.</p>	<ul style="list-style-type: none"> • Describe how to successfully install racing software. • Name motherboard status of 	

<p>Building and Flying an Unmanned Aerial Vehicle(Racing)</p>	<p>CRP6. Demonstrate creativity and innovation.</p> <p>CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.</p> <p>CTE Standards:</p> <p>9.3.ST.2 Use technology to acquire, manipulate, analyze and report data.</p> <p>9.3.ST.3 Describe and follow safety, health and environmental standards related to science, technology, engineering and mathematics (STEM) workplaces.</p> <p>9.3.ST.6 Demonstrate technical skills needed in a chosen STEM field.</p> <p>9.3.ST-ET.2 Display and communicate STEM information.</p> <p>9.3.ST-ET.5 Apply the knowledge learned in STEM to solve problems.</p> <p>9.3.ST-ET.6 Apply the knowledge learned in the study of STEM to provide solutions to human and societal problems in an ethical and legal manner.</p> <p>9.3.ST-SM.3 Analyze the impact that science and mathematics has on society.</p>	<p>light colors and flashes.</p> <ul style="list-style-type: none"> • State the difference between GPS and ACRO. • Practice building a walkera racing version of an unmanned aerial vehicle. • Build Racing gates with pvc and led lights. 	
<p>Suggested Resources</p> <p><i>Provide links to specific resources/activities</i></p>	<p>https://www.airmap.com/rules-to-fly-recreational-drones/</p> <p>http://knowbeforeyoufly.org/learn-the-drone-laws/</p> <p>https://uavcoach.com/how-to-fly-a-quadcopter-guide/</p>		

	https://www.dji.com/flysafe		
<p>Unit 9 Building and Flying an Unmanned Aerial Vehicle (Micro)</p>	<p>Career Ready Practices:</p> <p>CRP2. Apply appropriate academic and technical skills.</p> <p>CRP6. Demonstrate creativity and innovation.</p> <p>CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.</p> <p>CTE Standards:</p> <p>9.3.ST.2 Use technology to acquire, manipulate, analyze and report data.</p> <p>9.3.ST.3 Describe and follow safety, health and environmental standards related to science, technology, engineering and mathematics (STEM) workplaces.</p> <p>9.3.ST.6 Demonstrate technical skills needed in a chosen STEM field.</p> <p>9.3.ST-ET.2 Display and communicate STEM information.</p> <p>9.3.ST-ET.5 Apply the knowledge learned in STEM to solve problems.</p> <p>9.3.ST-ET.6 Apply the knowledge learned in the study of STEM to provide solutions to human and societal problems in an ethical and legal manner.</p> <p>9.3.ST-SM.3 Analyze the impact that science and mathematics has on society.</p>	<ul style="list-style-type: none"> • Identify and describe the major functions of small motherboard. • Recognize and clean all soldering points for wires. • Identify and match all wiring with correct colors. • Bind remotes and auxiliary channels. • Differentiate manual control override. • Set Flying parameters and record data. 	
<p>Suggested Resources</p>	<ul style="list-style-type: none"> • “Barataria Bay Mapping Project.” http://publiclab.org/wiki/barataria- 		

Provide links to specific resources/activities

[bay-mapping-project](#)

- Images and maps from Balloon Mapping of BP Oil Spill.
<http://www.flickr.com/photos/tags/gulfoilmap/>
- “Map Knitter.” <http://mapknitter.org>
- “Domestic Drones.” American Civil Liberties Union (ACLU).
<https://www.aclu.org/blog/tag/domestic-drones> • “Drones at Work Worldwide, but U.S. Still Lacks Laws.” Voice of America. Article and video
<http://www.voanews.com/content/drones-at-work-worldwide-but-us-still-lackslaws/1859180.html>

Curricular Units

Unit 1: Introduction to Drones or UAV's			
Content Standards	Critical Knowledge & Skills (“Unpacked” Standards)	Content-Specific Practices (when applicable)	Standard Mastery Examples <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>
<ul style="list-style-type: none"> Define the commonly used parts that make up a UAV or Drones. Identify all of the engineering components and software that allow you to fly and communicate with Unmanned Aerial Vehicle. 	<ul style="list-style-type: none"> Describe the steps in building a drone. Recognize the appropriate software needed to code. Identify voltage needed to power all electrical hardware. State why caution is important when using hot and sharp tools around motherboards. Analyze unfamiliar flying machines with different motors. Compliance and airspace regulations. 	<ul style="list-style-type: none"> Standard 9.1 21st-Century Life and Career Skills: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures. Standard 9.4 Career and Technical Education: All students who complete a career and technical education program will acquire academic and technical skills for careers in emerging and established professions that lead to technical skill proficiency, credentials, certificates, licenses, and/or degrees 	<ul style="list-style-type: none"> Complete handwritten flashcards of drone terms Complete Learning Exercises at chapter end. Daily Quiz Video Overviews Discuss terminology words and pronunciation. Give practice in both pronunciation and understanding the words. Complete Lab assigned Provide students with handouts for in-class collaborative work: Crossword Puzzles, Word Searches and case studies pertinent to the unit and have students analyze and define Python software. Current events in Drone technology.

Unit 1 Assessment Plan	
Formative Assessment <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>	Summative Assessment <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>
<ul style="list-style-type: none"> Complete <i>handwritten</i> flashcards of Drone terms Complete Learning Exercises at chapter end. Class Participation: Completion of handouts Labeling diagrams. Discussions Contribution 	<ul style="list-style-type: none"> Terminology quizzes. Class Participation: Completion of handouts Labeling diagrams. Discussions Contribution Completion of Homework Quarterly Projects

Unit 1 Suggested Modifications/Accommodations/Extension Activities

English Language Learners (ELL) <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>	Special Education / 504 <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>	Gifted and Talented <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>
<ul style="list-style-type: none"> • Allow extra time for task completion • Organizational Accommodations • Use a consistent daily routine • Break down tasks into manageable units • Instructional Accommodations • Frequently check for understanding • Emphasize use of visual aids • Simplify task directions • Provide hands-on learning activities • Provide modeling • Assign peer buddies • Modify pace of instruction to allow additional processing time • Provide small group instruction • Demonstrate directions and provide a model or example of completed task • Emphasize multi-sensory presentation of data • Allow for repetition and/or clarification of directions, as needed • Directions repeated, clarified or reworded • Provide multi-sensory instruction • Allow wait time for processing before calling on student for response • Provide visual models of completed tasks • Seat student near front of room • Preferential seating • Monitor on-task performance • Establish and maintain eye contact when giving • oral directions • Provide short breaks when refocusing is needed • Refocusing and redirection • Prompting, cueing and redirecting student participation • Reinforcing of personal, social, behavioral and • Provide opportunities for peer interactions • Encourage student to self-advocate • Present alternatives to negative behavior • Monitor for overload, excess stimuli 	<ul style="list-style-type: none"> • Specific collaborative groupings of students per interpersonal skills and observations. • Providing vocabulary and concept resources, diagrams and videos, among other resources to assist with understanding concepts and terms. • Teacher Assistance with hands-on activities/projects and research. Teacher modeling and/or providing (more or less) guidance during the inquiry • process with specific projects. • Typing requirements are specifically scaffolded by age/grade level, ensuring appropriate balance of online/offline work. • Assist with typing tasks, and allow for many activities to be completed through a combination of “offline” and “online” work. • Provide choice of activity, presentation, and groups among appropriate projects. • Sentence starters for student write-ups, reports, research and development and other written and verbal communication tasks. • Student copies of any notes as needed, partial outlines to complete during note taking tasks. • If notes are needed, trading student’s incomplete notes for a copy of complete notes. • Scaffold the amount of work (decrease or increase) based on skill sets and time allocations, modified time allocations and other constraints. • Multiple check-in opportunities for students, particularly during hands-on activities, projects, and other independent work. • Adapt the amount of personal assistance for specific learners. • Adapt the extent to which learners are actively (hands-on or research) involved in tasks, and construction of models. 	<ul style="list-style-type: none"> • Provide choice of activity, presentation, and groups among appropriate projects. Scaffolding the amount of work (decrease or increase) based on skill sets and time allocations, modified time allocations and other constraints. • Modify the skill-level, problem type, and/or constraints to the projects allowing the learner to approach the work with a high degree of success. • Extend research by offering new and novel resources and texts, based on interest, choice, and Lexile Levels of students. • Apply/offer extensions to projects based on additional constraints or scenarios to projects. • Offer additional opportunities for collaboration, presentation, or extension. • Offer additional opportunities for synthesis - Asking questions that encourage students to create new information from existing data. • Extend Metacognition - Asking questions which prompt students to think about their own thinking process, (successes and challenges). <p>Increase connections - Asking students questions that ensure the ability to apply new learning to their lives</p>

<ul style="list-style-type: none"> • Maintain communication with home • Provide positive reinforcement • Provide consistent praise to elevate self esteem <p>Model and role play problem solving</p>		
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Unit 1 Connections	
NJSLS - Technology <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i> Refer to the NJ Technology Standards	Career Readiness Practices <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i> Refer to the NJ Career Readiness Practices
N/A	Career Ready Practices: CRP2. Apply appropriate academic and technical skills. CRP6. Demonstrate creativity and innovation.
21st Century Skills <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i> Refer to the 21st Century Life and Skills	Interdisciplinary Connections <i>When possible, provide links to specific ELA/Math/Sci/SS standards as well as samples/ documents/ assignments/etc.</i> Refer to the NJ Student Learning Standards
CTE Standards: 9.3.ST.2 Use technology to acquire, manipulate, analyze and report data. 9.3.ST.3 Describe and follow safety, health and environmental standards related to science, technology, engineering and mathematics (STEM) workplaces. 9.3.ST.6 Demonstrate technical skills needed in a chosen STEM field. 9.3.ST-ET.2 Display and communicate STEM information. 9.3.ST-ET.5 Apply the knowledge learned in STEM to solve problems.	CCCS ELA Literacy: RST.9-10.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant. RST .9-10.8 Determine if the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.

Unit 2: The Aerodynamics of Wings			
Content Standards	Critical Knowledge & Skills ("Unpacked" Standards)	Content-Specific Practices (when applicable)	Standard Mastery Examples <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>
<ul style="list-style-type: none"> Describe the functions and structures of the walkera f250 racing drone. Discuss different types of biplanes and the history of aviation. Note that the biplane was the first plane invented by the Wright Brothers. Discuss the advantages and disadvantages of biplanes. Cover important concepts like stability, velocity, drag, lift, and aerodynamics 	<ul style="list-style-type: none"> Recognize all different types of flying vehicles fixed and non-fixed wings/propellers. Recognize why aviation engineers need to get the design process done correctly and accurately. Compare and research different winged animals and how they adapted to their environment. Analyze why the monoplane model became so dominant in the early 1900's. Research Boeing Company for current projects that are being worked on for the future. Analyze all data collected. 	<ul style="list-style-type: none"> Standard 9.3 Career Awareness, Exploration, and Preparation: All students will apply knowledge about and engage in the process of career awareness, exploration, and preparation in order to navigate the globally competitive work environment of the information age. Standard 9.4 Career and Technical Education: All students who complete a career and technical education program will acquire academic and technical skills for careers in emerging and established professions that lead to technical skill proficiency, credentials, certificates, licenses, 	<ul style="list-style-type: none"> Complete handwritten flashcards of chapter terms Complete Learning Exercises at chapter end. Daily Quiz Video Overviews Discuss terminology words and pronunciation. Give practice in both pronunciation and understanding the words. Provide students with handouts for in-class collaborative work: Crossword Puzzles, Word Searches and case studies pertinent to the unit and have students analyze and define drone terms. Games and Quizzes as time permits

Unit 2 Assessment Plan	
Formative Assessment <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>	Summative Assessment <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>
<ul style="list-style-type: none"> Complete <i>handwritten</i> flashcards of chapter terms Complete Learning Exercises at chapter end. Class Participation: Completion of handouts Labeling diagrams. Discussions Contribution Completion of Homework 	<ul style="list-style-type: none"> Terminology quizzes. Class Participation: Completion of handouts Labeling diagrams. Discussions Contribution Completion of Homework Quarterly Projects Multiple choice and matching tests.

Unit 2 Suggested Modifications/Accommodations/Extension Activities

<p>English Language Learners (ELL) <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i></p>	<p>Special Education / 504 <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i></p>	<p>Gifted and Talented <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i></p>
<ul style="list-style-type: none"> • Allow extra time for task completion • Organizational Accommodations • Use a consistent daily routine • Break down tasks into manageable units • Instructional Accommodations • Frequently check for understanding • Emphasize use of visual aids • Simplify task directions • Provide hands-on learning activities • Provide modeling • Assign peer buddies • Modify pace of instruction to allow additional processing time • Provide small group instruction • Demonstrate directions and provide a model or example of completed task • Emphasize multi-sensory presentation of data • Allow for repetition and/or clarification of directions, as needed • Directions repeated, clarified or reworded • Provide multi-sensory instruction • Allow wait time for processing before calling on student for response • Provide visual models of completed tasks • Seat student near front of room • Preferential seating • Monitor on-task performance • Establish and maintain eye contact when giving • oral directions • Provide short breaks when refocusing is needed • Refocusing and redirection • Prompting, cueing and redirecting student participation • Reinforcing of personal, social, behavioral and • Provide opportunities for peer interactions • Encourage student to self-advocate 	<ul style="list-style-type: none"> • Specific collaborative groupings of students per interpersonal skills and observations. • Providing vocabulary and concept resources, diagrams and videos, among other resources to assist with understanding concepts and terms. • Teacher Assistance with hands-on activities/projects and research. Teacher modeling and/or providing (more or less) guidance during the inquiry • process with specific projects. • Typing requirements are specifically scaffolded by age/grade level, ensuring appropriate balance of online/offline work. • Assist with typing tasks, and allow for many activities to be completed through a combination of “offline” and “online” work. • Provide choice of activity, presentation, and groups among appropriate projects. • Sentence starters for student write-ups, reports, research and development and other written and verbal communication tasks. • Student copies of any notes as needed, partial outlines to complete during note taking tasks. • If notes are needed, trading student’s incomplete notes for a copy of complete notes. • Scaffolding the amount of work (decrease or increase) based on skill sets and time allocations, modified time allocations and other constraints. • Multiple check-in opportunities for students, particularly during hands-on activities, projects, and other independent work. • Adapt the amount of personal assistance for specific learners. • Adapt the extent to which learners are actively (hands-on or research) involved in tasks, and construction of models. 	<ul style="list-style-type: none"> • Provide choice of activity, presentation, and groups among appropriate projects. Scaffolding the amount of work (decrease or increase) based on skill sets and time allocations, modified time allocations and other constraints. • Modify the skill-level, problem type, and/or constraints to the projects allowing the learner to approach the work with a high degree of success. • Extend research by offering new and novel resources and texts, based on interest, choice, and Lexile Levels of students. • Apply/offer extensions to projects based on additional constraints or scenarios to projects. • Offer additional opportunities for collaboration, presentation, or extension. • Offer additional opportunities for synthesis - Asking questions that encourage students to create new information from existing data. • Extend Metacognition - Asking questions which prompt students to think about their own thinking process, (successes and challenges). • Increase connections - Asking students questions that ensure the ability to apply new learning to their lives

<ul style="list-style-type: none"> • Present alternatives to negative behavior • Monitor for overload, excess stimuli • Maintain communication with home • Provide positive reinforcement • Provide consistent praise to elevate self esteem • Model and role play problem solving 		
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Unit 2 Connections	
<p align="center">NJSLS - Technology <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i> Refer to the NJ Technology Standards</p>	<p align="center">Career Readiness Practices <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i> Refer to the NJ Career Readiness Practices</p>
<p>N/A</p>	<p>Career Ready Practices:</p> <p>CRP2. Apply appropriate academic and technical skills. CRP6. Demonstrate creativity and innovation.</p>
<p align="center">21st Century Skills <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i> Refer to the 21st Century Life and Skills</p>	<p align="center">Interdisciplinary Connections <i>When possible, provide links to specific ELA/Math/Sci/SS standards as well as samples/ documents/ assignments/etc.</i> Refer to the NJ Student Learning Standards</p>
<p>CTE Standards:</p> <p>9.3.ST-ET.2 Display and communicate STEM information. 9.3.ST-ET.5 Apply the knowledge learned in STEM to solve problems. 9.3.ST-ET.6 Apply the knowledge learned in the study of STEM to provide solutions to human and societal problems in an ethical and legal manner. 9.3.ST-SM.3 Analyze the impact that science and mathematics has on society.</p>	<p>CCC S ELA Literacy:</p> <p>RST.9-10.7. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart)and translate information expressed visually or mathematically (e.g., in an equation) into words.</p> <p>NJSLSA.W1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.</p>

Unit 3: Machines that Hover

Content Standards	Critical Knowledge & Skills ("Unpacked" Standards)	Content-Specific Practices (when applicable)	Standard Mastery Examples <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>
<ul style="list-style-type: none"> Identify and describe the earliest form of a rotorcraft. Compare and contrast fixed-wing aircraft with rotary-wing aircraft, learning how to explore and apply basic principles of aviation mechanics. Recognize and experiment the most ideal shape and configuration of rotors. Identify why blades are specialized to hover, fly backwards, and perform other tasks that other winged machines cannot do. 	<ul style="list-style-type: none"> Recognize procedures on how to turn on/off drones motors safely. Identify the direction of rotors clockwise or counter clockwise. Analyze propeller material to see which ones give you more flight time. Experiment with carbon fiber infused materials which is more rigid but light weight. 	<ul style="list-style-type: none"> Standard 9.1 21st-Century Life and Career Skills: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures. Standard 9.4 Career and Technical Education: All students who complete a career and technical education program will acquire academic and technical skills for careers in emerging and established professions that lead to technical skill proficiency, credentials, certificates, licenses, and/or degrees. 	<ul style="list-style-type: none"> Complete handwritten flashcards of chapter terms Complete Learning Exercises at chapter end. Daily Quiz Video Overviews Discuss terminology words and pronunciation. Complete Lab assigned Give practice in both pronunciation and understanding the words. Provide students with handouts for in-class collaborative work: Crossword Puzzles, Word Searches and case studies pertinent to the unit and have students analyze and define medical terms. Games and Quizzes as time permits Current events in Drones Discussion Circle

Unit 3 Assessment Plan

<p align="center">Formative Assessment <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i></p>	<p align="center">Summative Assessment <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i></p>
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<ul style="list-style-type: none"> • Complete <i>handwritten</i> flashcards of chapter terms • Complete Learning Exercises at chapter end. • Class Participation: • Completion of handouts • Labeling diagrams. • Discussions Contribution • Completion of Homework 	<ul style="list-style-type: none"> • Terminology quizzes. • Class Participation: • Completion of handouts • Labeling diagrams. • Discussions Contribution • Completion of Homework • Quarterly Projects • Multiple choice and matching tests.
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Unit 3 Suggested Modifications/Accommodations/Extension Activities

English Language Learners (ELL) <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>	Special Education / 504 <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>	Gifted and Talented <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>
<ul style="list-style-type: none"> • Allow extra time for task completion • Organizational Accommodations • Use a consistent daily routine • Break down tasks into manageable units • Instructional Accommodations • Frequently check for understanding • Emphasize use of visual aids • Simplify task directions • Provide hands-on learning activities • Provide modeling • Assign peer buddies • Modify pace of instruction to allow additional processing time • Provide small group instruction • Demonstrate directions and provide a model or example of completed task • Emphasize multi-sensory presentation of data • Allow for repetition and/or clarification of directions, as needed • Directions repeated, clarified or reworted • Provide multi-sensory instruction • Allow wait time for processing before calling on student for response • Provide visual models of completed tasks • Seat student near front of room • Preferential seating • Monitor on-task performance • Establish and maintain eye contact when giving • oral directions 	<ul style="list-style-type: none"> • Specific collaborative groupings of students per interpersonal skills and observations. • Providing vocabulary and concept resources, diagrams and videos, among other resources to assist with understanding concepts and terms. • Teacher Assistance with hands-on activities/projects and research. Teacher modeling and/or providing (more or less) guidance during the inquiry • Process with specific projects. • Typing requirements are specifically scaffold by age/grade level, ensuring appropriate balance of online/offline work. • Assist with typing tasks, and allow for many activities to be completed through a combination of “offline” and “online” work. • Provide choice of activity, presentation, and groups among appropriate projects. • Sentence starters for student write-ups, reports, research and development and other written and verbal communication tasks. • Student copies of any notes as needed, partial outlines to complete during note taking tasks. • If notes are needed, trading student’s incomplete notes for a copy of complete notes. • Scaffolding the amount of work (decrease or increase) based on skill sets and time allocations, modified time allocations and other constraints. • Multiple check-in opportunities for students, particularly during hands-on activities, projects, and other independent work. 	<ul style="list-style-type: none"> • Provide choice of activity, presentation, and groups among appropriate projects. Scaffolding the amount of work (decrease or increase) based on skill sets and time allocations, modified time allocations and other constraints. • Modify the skill-level, problem type, and/or constraints to the projects allowing the learner to approach the work with a high degree of success. • Extend research by offering new and novel resources and texts, based on interest, choice, and Lexile Levels of students. • Apply/offer extensions to projects based on additional constraints or scenarios to projects. • Offer additional opportunities for collaboration, presentation, or extension. • Offer additional opportunities for synthesis - Asking questions that encourage students to create new information from existing data. • Extend Metacognition - Asking questions which prompt students to think about their own thinking process, (successes and challenges). • Increase connections - Asking students questions that ensure the ability to apply new learning to their lives

<ul style="list-style-type: none"> • Provide short breaks when refocusing is needed • Refocusing and redirection • Prompting, cueing and redirecting student participation • Reinforcing of personal, social, behavioral and • Provide opportunities for peer interactions • Encourage student to self-advocate • Present alternatives to negative behavior • Monitor for overload, excess stimuli • Maintain communication with home • Provide positive reinforcement • Provide consistent praise to elevate self esteem • Model and role play problem solving 	<ul style="list-style-type: none"> • Adapt the amount of personal assistance for specific learners. • Adapt the extent to which learners are actively (hands-on or research) involved in tasks, and construction of models. 	
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Unit 3 Connections	
<p align="center">NJSLS - Technology <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i> Refer to the NJ Technology Standards</p>	<p align="center">Career Readiness Practices <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i> Refer to the NJ Career Readiness Practices</p>
<p>N/A</p>	<p>Career Ready Practices:</p> <p>CRP2. Apply appropriate academic and technical skills. CRP6. Demonstrate creativity and innovation. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.</p>
<p align="center">21st Century Skills <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i> Refer to the 21st Century Life and Skills</p>	<p align="center">Interdisciplinary Connections <i>When possible, provide links to specific ELA/Math/Sci/SS standards as well as samples/ documents/ assignments/etc.</i> Refer to the NJ Student Learning Standards</p>
<p>CTE Standards:</p> <p>9.3.ST.2 Use technology to acquire, manipulate, analyze and report data. 9.3.ST.3 Describe and follow safety, health and environmental standards related to science, technology, engineering and mathematics (STEM) workplaces. 9.3.ST.6 Demonstrate technical skills needed in a chosen STEM field. 9.3.ST-ET.2 Display and communicate STEM information.</p>	<p>CCCS ELA Literacy:</p> <p>RST.9-10.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.</p> <p>RST.9-10.7. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.</p>

9.3.ST-ET.5 Apply the knowledge learned in STEM to solve problems.	
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Unit 4: Submersibles and Fluid Dynamics

Content Standards	Critical Knowledge & Skills ("Unpacked" Standards)	Content-Specific Practices (when applicable)	Standard Mastery Examples <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>
<ul style="list-style-type: none"> •Recognize basic engineering of submersible technologies. •Understand aerodynamics is a subfield of fluid dynamics. • Study the flow and motion of fluids in order to engineer dynamic machines. •Explore how buoyancy works by testing different shapes with a plasticine ball. 	<ul style="list-style-type: none"> •Differentiate how temperature affects life of fluid and breakdown. •Identify that air is a fluid and that aerodynamics is actually a subfield of fluid dynamics. •Describe the importance for engineers to study fluid dynamics viscosity. 	<ul style="list-style-type: none"> • Standard 9.1 21st-Century Life and Career Skills: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures. • Standard 9.3 Career Awareness, Exploration, and Preparation: All students will apply knowledge about and engage in the process of career awareness, exploration, and preparation in order to navigate the globally competitive work environment of the information age. 	<ul style="list-style-type: none"> • Complete handwritten flashcards of chapter terms • Complete Learning Exercises at chapter end. • Daily Quiz • Video Overviews • Discuss terminology words and pronunciation. • Give practice in both pronunciation and understanding the words. • Provide students with handouts for in-class collaborative work: Crossword Puzzles, Word Searches and case studies pertinent to the unit and have students analyze and define medical terms. • Games and Quizzes as time permits • Current events in Drone technology • Discussion Circle

Unit 4 Assessment Plan

Formative Assessment <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>	Summative Assessment <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>
<ul style="list-style-type: none"> • Complete <u>handwritten</u> flashcards of chapter terms • Complete Learning Exercises at chapter end. • Class Participation: • Completion of handouts • Labeling diagrams. • Discussions Contribution 	<ul style="list-style-type: none"> • Terminology quizzes. • Class Participation: • Completion of handouts • Labeling diagrams. • Discussions Contribution • Completion of Homework

<ul style="list-style-type: none"> • Completion of Homework 	<ul style="list-style-type: none"> • Quarterly Projects • Multiple choice and matching tests.
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Unit 4 Suggested Modifications/Accommodations/Extension Activities		
English Language Learners (ELL) <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>	Special Education / 504 <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>	Gifted and Talented <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>
<ul style="list-style-type: none"> • Allow extra time for task completion • Organizational Accommodations • Use a consistent daily routine • Break down tasks into manageable units • Instructional Accommodations • Frequently check for understanding • Emphasize use of visual aids • Simplify task directions • Provide hands-on learning activities • Provide modeling • Assign peer buddies • Modify pace of instruction to allow additional processing time • Provide small group instruction • Demonstrate directions and provide a model or example of completed task • Emphasize multi-sensory presentation of data • Allow for repetition and/or clarification of directions, as needed • Directions repeated, clarified or reworded • Provide multi-sensory instruction • Allow wait time for processing before calling on student for response • Provide visual models of completed tasks • Seat student near front of room • Preferential seating • Monitor on-task performance • Establish and maintain eye contact when giving oral directions • Provide short breaks when refocusing is needed • Refocusing and redirection • Prompting, cueing and redirecting student participation 	<ul style="list-style-type: none"> • Specific collaborative groupings of students per interpersonal skills and observations. • Providing vocabulary and concept resources, diagrams and videos, among other resources to assist with understanding concepts and terms. • Teacher Assistance with hands-on activities/projects and research. Teacher modeling and/or providing (more or less) guidance during the inquiry • Process with specific projects. • Typing requirements are specifically scaffold by age/grade level, ensuring appropriate balance of online/offline work. • Assist with typing tasks, and allow for many activities to be completed through a combination of “offline” and “online” work. • Provide choice of activity, presentation, and groups among appropriate projects. • Sentence starters for student write-ups, reports, research and development and other written and verbal communication tasks. • Student copies of any notes as needed, partial outlines to complete during note taking tasks. • If notes are needed, trading student’s incomplete notes for a copy of complete notes. • Scaffolding the amount of work (decrease or increase) based on skill sets and time allocations, modified time allocations and other constraints. • Multiple check-in opportunities for students, particularly during hands-on activities, projects, and other independent work. • Adapt the amount of personal assistance for specific learners. • Adapt the extent to which learners are actively (hands-on or research) involved in tasks, and construction of models. 	<ul style="list-style-type: none"> • Provide choice of activity, presentation, and groups among appropriate projects. Scaffolding the amount of work (decrease or increase) based on skill sets and time allocations, modified time allocations and other constraints. • Modify the skill-level, problem type, and/or constraints to the projects allowing the learner to approach the work with a high degree of success. • Extend research by offering new and novel resources and texts, based on interest, choice, and Lexile Levels of students. • Apply/offer extensions to projects based on additional constraints or scenarios to projects. • Offer additional opportunities for collaboration, presentation, or extension. • Offer additional opportunities for synthesis - Asking questions that encourage students to create new information from existing data. • Extend Metacognition - Asking questions which prompt students to think about their own thinking process, (successes and challenges). • Increase connections - Asking students questions that ensure the ability to apply new learning to their lives

<ul style="list-style-type: none"> • Reinforcing of personal, social, behavioral and • Provide opportunities for peer interactions • Encourage student to self-advocate • Present alternatives to negative behavior • Monitor for overload, excess stimuli • Maintain communication with home • Provide positive reinforcement • Provide consistent praise to elevate self esteem • Model and role play problem solving 		
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Unit 4 Connections	
<p align="center">NJSLS - Technology <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i> Refer to the NJ Technology Standards</p>	<p align="center">Career Readiness Practices <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i> Refer to the NJ Career Readiness Practices</p>
<p>N/A</p>	<p>Career Ready Practices: CRP2. Apply appropriate academic and technical skills. CRP6. Demonstrate creativity and innovation. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.</p>
<p align="center">21st Century Skills <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i> Refer to the 21st Century Life and Skills</p>	<p align="center">Interdisciplinary Connections <i>When possible, provide links to specific ELA/Math/Sci/SS standards as well as samples/ documents/ assignments/etc.</i> Refer to the NJ Student Learning Standards</p>
<p>CTE Standards 9.3.ST.3 Describe and follow safety, health and environmental standards related to science, technology, engineering and mathematics (STEM) workplaces. 9.3.ST.6 Demonstrate technical skills needed in a chosen STEM field. 9.3.ST-ET.2 Display and communicate STEM information. 9.3.ST-ET.5 Apply the knowledge learned in STEM to solve problems. 9.3.ST-ET.6 Apply the knowledge learned in the study of STEM to provide solutions to human and societal problems in an ethical and legal manner. 9.3.ST-SM.3 Analyze the impact that science and mathematics has on society.</p>	<p>CCCS ELA Literacy: RST.9-10.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. RST.9-10.7. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.</p>

Unit 5: Legal and Ethical Issues in Drone Use

Content Standards	Critical Knowledge & Skills ("Unpacked" Standards)	Content-Specific Practices (when applicable)	Standard Mastery Examples <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>
<ul style="list-style-type: none"> •Describe how civilian use of drones has become an unprecedented issue in modern society. •Recognize the effects on restrictions and regulations placed around the use, purchase, and manufacturing. •Recognize privacy laws and legal obligation in no fly zone and restricted airspace. •Analyze maps for live data in operating a drone in a public/private property. •Research and register with the FAA (Federal Aviation Administration) for unique tag number. 	<ul style="list-style-type: none"> •Recognize how to calibrate compass and write absolute coordinates. •Recognize and relate your coordinates to the nearest airport within 5 mile radius if flying over 400 feet. •Identify weather forecast and data before takeoff. •Identify that all components are functioning properly. 	<ul style="list-style-type: none"> • Standard 9.3 Career Awareness, Exploration, and Preparation: All students will apply knowledge about and engage in the process of career awareness, exploration, and preparation in order to navigate the globally competitive work environment of the information age. • Standard 9.4 Career and Technical Education: All students who complete a career and technical education program will acquire academic and technical skills for careers in emerging and established professions that lead to technical skill proficiency, credentials, certificates, licenses, and/or degrees. 	<ul style="list-style-type: none"> • Complete handwritten flashcards of chapter terms • Complete Learning Exercises at chapter end. • Daily Quiz • Complete Lab assigned • Video Overviews • Discuss terminology words and pronunciation. • Give practice in both pronunciation and understanding the words. • Provide students with handouts for in-class collaborative work: Crossword Puzzles, Word Searches and case studies pertinent to the unit and have students analyze and define medical terms. • Games and Quizzes as time permits • Current events in Drone technology • Discussion Circle

Unit 5 Assessment Plan

Formative Assessment <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>	Summative Assessment <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>
<ul style="list-style-type: none"> • Complete <i>handwritten</i> flashcards of chapter terms • Complete Learning Exercises at chapter end. • Class Participation: 	<ul style="list-style-type: none"> • Terminology quizzes. • Class Participation: • Completion of handouts

<ul style="list-style-type: none"> • Completion of handouts • Labeling diagrams. • Discussions Contribution • Completion of Homework 	<ul style="list-style-type: none"> • Labeling diagrams. • Discussions Contribution • Completion of Homework • Quarterly Projects • Multiple choice and matching tests.
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Unit 5 Suggested Modifications/Accommodations/Extension Activities		
English Language Learners (ELL) <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>	Special Education / 504 <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>	Gifted and Talented <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>
<ul style="list-style-type: none"> • Allow extra time for task completion • Organizational Accommodations • Use a consistent daily routine • Break down tasks into manageable units • Instructional Accommodations • Frequently check for understanding • Emphasize use of visual aids • Simplify task directions • Provide hands-on learning activities • Provide modeling • Assign peer buddies • Modify pace of instruction to allow additional processing time • Provide small group instruction • Demonstrate directions and provide a model or example of completed task • Emphasize multi-sensory presentation of data • Allow for repetition and/or clarification of directions, as needed • Directions repeated, clarified or reworded • Provide multi-sensory instruction • Allow wait time for processing before calling on student for response • Provide visual models of completed tasks • Seat student near front of room • Preferential seating • Monitor on-task performance • Establish and maintain eye contact when giving oral directions • Provide short breaks when refocusing is needed 	<ul style="list-style-type: none"> • Specific collaborative groupings of students per interpersonal skills and observations. • Providing vocabulary and concept resources, diagrams and videos, among other resources to assist with understanding concepts and terms. • Teacher Assistance with hands-on activities/projects and research. Teacher modeling and/or providing (more or less) guidance during the inquiry • Process with specific projects. • Typing requirements are specifically scaffold by age/grade level, ensuring appropriate balance of online/offline work. • Assist with typing tasks, and allow for many activities to be completed through a combination of "offline" and "online" work. • Provide choice of activity, presentation, and groups among appropriate projects. • Sentence starters for student write-ups, reports, research and development and other written and verbal communication tasks. • Student copies of any notes as needed, partial outlines to complete during note taking tasks. • If notes are needed, trading student's incomplete notes for a copy of complete notes. • Scaffolding the amount of work (decrease or increase) based on skill sets and time allocations, modified time allocations and other constraints. • Multiple check-in opportunities for students, particularly during hands-on activities, projects, and other independent work. • Adapt the amount of personal assistance for specific learners. 	<ul style="list-style-type: none"> • Provide choice of activity, presentation, and groups among appropriate projects. Scaffolding the amount of work (decrease or increase) based on skill sets and time allocations, modified time allocations and other constraints. • Modify the skill-level, problem type, and/or constraints to the projects allowing the learner to approach the work with a high degree of success. • Extend research by offering new and novel resources and texts, based on interest, choice, and Lexile Levels of students. • Apply/offer extensions to projects based on additional constraints or scenarios to projects. • Offer additional opportunities for collaboration, presentation, or extension. • Offer additional opportunities for synthesis - Asking questions that encourage students to create new information from existing data. • Extend Metacognition - Asking questions which prompt students to think about their own thinking process, (successes and challenges). • Increase connections - Asking students questions that ensure the ability to apply new learning to their lives

<ul style="list-style-type: none"> • Refocusing and redirection • Prompting, cueing and redirecting student participation • Reinforcing of personal, social, behavioral and • Provide opportunities for peer interactions • Encourage student to self-advocate • Present alternatives to negative behavior • Monitor for overload, excess stimuli • Maintain communication with home • Provide positive reinforcement • Provide consistent praise to elevate self esteem • Model and role play problem solving 	<ul style="list-style-type: none"> • Adapt the extent to which learners are actively (hands-on or research) involved in tasks, and construction of models. 	
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Unit 5 Connections	
<p align="center">NJSLS - Technology</p> <p align="center"><i>When possible, provide links to specific samples/ documents/ assignments/etc.</i></p> <p align="center">Refer to the NJ Technology Standards</p>	<p align="center">Career Readiness Practices</p> <p align="center"><i>When possible, provide links to specific samples/ documents/ assignments/etc.</i></p> <p align="center">Refer to the NJ Career Readiness Practices</p>
N/A	<p>Career Ready Practices:</p> <p>CRP2. Apply appropriate academic and technical skills.</p> <p>CRP6. Demonstrate creativity and innovation.</p> <p>CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.</p>
<p align="center">21st Century Skills</p> <p align="center"><i>When possible, provide links to specific samples/ documents/ assignments/etc.</i></p> <p align="center">Refer to the 21st Century Life and Skills</p>	<p align="center">Interdisciplinary Connections</p> <p align="center"><i>When possible, provide links to specific ELA/Math/Sci/SS standards as well as samples/ documents/ assignments/etc.</i></p> <p align="center">Refer to the NJ Student Learning Standards</p>
<p>CTE Standards:</p> <p>9.3.ST.2 Use technology to acquire, manipulate, analyze and report data.</p> <p>9.3.ST.3 Describe and follow safety, health and environmental standards related to science, technology, engineering and mathematics (STEM) workplaces.</p> <p>9.3.ST.6 Demonstrate technical skills needed in a chosen STEM field.</p> <p>9.3.ST-ET.2 Display and communicate STEM information.</p> <p>9.3.ST-ET.5 Apply the knowledge learned in STEM to solve problems.</p>	<p>CCCS ELA Literacy:</p> <p>RST.9-10.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.</p> <p>RST.9-10.7. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.</p>

Unit 6: Drone Demonstration			
Content Standards	Critical Knowledge & Skills ("Unpacked" Standards)	Content-Specific Practices (when applicable)	Standard Mastery Examples <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>
<ul style="list-style-type: none"> • Research location on school property for drone demonstration. • Describe major obstacles when flying indoors compare to outdoors. • Recognize possible obstacles that the drone can hit. • Assist professional drone pilot with field of view directions. 	<ul style="list-style-type: none"> • Name and describe the flight check list and the importance of following procedures. • Analyze flight time and battery temperature. • Name and describe the 3 flight modes associated with NASA GPS antenna. • Explore the many uses being developed for drones in fields such as science, business, and security. 	<ul style="list-style-type: none"> • Standard 9.3 Career Awareness, Exploration, and Preparation: All students will apply knowledge about and engage in the process of career awareness, exploration, and preparation in order to navigate the globally competitive work environment of the information age. • Standard 9.4 Career and Technical Education: All students who complete a career and technical education program will acquire academic and technical skills for careers in emerging and established professions that lead to technical skill proficiency, credentials, certificates, licenses, and/or degrees. 	<ul style="list-style-type: none"> • Complete handwritten flashcards of chapter terms • Complete Learning Exercises at chapter end. • Daily Quiz • Video Overviews • Discuss terminology words and pronunciation. • Give practice in both pronunciation and understanding the words. • Complete Lab assigned • Provide students with handouts for in-class collaborative work: Crossword Puzzles, Word Searches and case studies pertinent to the unit and have students analyze and define medical terms. • Games and Quizzes as time permits • Current events in Drone Technology.

Unit 6 Assessment Plan	
Formative Assessment <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>	Summative Assessment <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>
<ul style="list-style-type: none"> • Complete <u>handwritten</u> flashcards of chapter terms • Complete Learning Exercises at chapter end. • Class Participation: • Completion of handouts • Labeling diagrams. 	<ul style="list-style-type: none"> • Terminology quizzes. • Class Participation: • Completion of handouts • Labeling diagrams. • Discussions Contribution

- Discussions Contribution
- Completion of Homework

- Completion of Homework
- Quarterly Projects
- Multiple choice and matching tests.

Unit 6 Suggested Modifications/Accommodations/Extension Activities

English Language Learners (ELL) <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>	Special Education / 504 <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>	Gifted and Talented <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>
<ul style="list-style-type: none"> • Allow extra time for task completion • Organizational Accommodations • Use a consistent daily routine • Break down tasks into manageable units • Instructional Accommodations • Frequently check for understanding • Emphasize use of visual aids • Simplify task directions • Provide hands-on learning activities • Provide modeling • Assign peer buddies • Modify pace of instruction to allow additional processing time • Provide small group instruction • Demonstrate directions and provide a model or example of completed task • Emphasize multi-sensory presentation of data • Allow for repetition and/or clarification of directions, as needed • Directions repeated, clarified or reworded • Provide multi-sensory instruction • Allow wait time for processing before calling on student for response • Provide visual models of completed tasks • Seat student near front of room • Preferential seating • Monitor on-task performance • Establish and maintain eye contact when giving oral directions • Provide short breaks when refocusing is needed • Refocusing and redirection • Prompting, cueing and redirecting student 	<ul style="list-style-type: none"> • Specific collaborative groupings of students per interpersonal skills and observations. • Providing vocabulary and concept resources, diagrams and videos, among other resources to assist with understanding concepts and terms. • Teacher Assistance with hands-on activities/projects and research. Teacher modeling and/or providing (more or less) guidance during the inquiry process with specific projects. • Typing requirements are specifically scaffolded by age/grade level, ensuring appropriate balance of online/offline work. • Assist with typing tasks, and allow for many activities to be completed through a combination of “offline” and “online” work. • Provide choice of activity, presentation, and groups among appropriate projects. • Sentence starters for student write-ups, reports, research and development and other written and verbal communication tasks. • Student copies of any notes as needed, partial outlines to complete during note taking tasks. • If notes are needed, trading student’s incomplete notes for a copy of complete notes. • Scaffolding the amount of work (decrease or increase) based on skill sets and time allocations, modified time allocations and other constraints. • Multiple check-in opportunities for students, particularly during hands-on activities, projects, and other independent work. • Adapt the amount of personal assistance for specific learners. • Adapt the extent to which learners are actively (hands-on or research) involved in tasks, and 	<ul style="list-style-type: none"> • Provide choice of activity, presentation, and groups among appropriate projects. Scaffolding the amount of work (decrease or increase) based on skill sets and time allocations, modified time allocations and other constraints. • Modify the skill-level, problem type, and/or constraints to the projects allowing the learner to approach the work with a high degree of success. • Extend research by offering new and novel resources and texts, based on interest, choice, and Lexile Levels of students. • Apply/offer extensions to projects based on additional constraints or scenarios to projects. • Offer additional opportunities for collaboration, presentation, or extension. • Offer additional opportunities for synthesis - Asking questions that encourage students to create new information from existing data. • Extend Metacognition - Asking questions which prompt students to think about their own thinking process, (successes and challenges). • Increase connections - Asking students questions that ensure the ability to apply new learning to their lives

<ul style="list-style-type: none"> • participation • Reinforcing of personal, social, behavioral and • Provide opportunities for peer interactions • Encourage student to self-advocate • Present alternatives to negative behavior • Monitor for overload, excess stimuli • Maintain communication with home • Provide positive reinforcement • Provide consistent praise to elevate self esteem • Model and role play problem solving 	<p>construction of models.</p>	
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Unit 6 Connections	
<p align="center">NJSLS - Technology</p> <p align="center"><i>When possible, provide links to specific samples/ documents/ assignments/etc.</i></p> <p align="center">Refer to the NJ Technology Standards</p>	<p align="center">Career Readiness Practices</p> <p align="center"><i>When possible, provide links to specific samples/ documents/ assignments/etc.</i></p> <p align="center">Refer to the NJ Career Readiness Practices</p>
<p>N/A</p>	<p>Career Ready Practices:</p> <p>CRP2. Apply appropriate academic and technical skills.</p> <p>CRP6. Demonstrate creativity and innovation.</p>
<p align="center">21st Century Skills</p> <p align="center"><i>When possible, provide links to specific samples/ documents/ assignments/etc.</i></p> <p align="center">Refer to the 21st Century Life and Skills</p>	<p align="center">Interdisciplinary Connections</p> <p align="center"><i>When possible, provide links to specific ELA/Math/Sci/SS standards as well as samples/ documents/ assignments/etc.</i></p> <p align="center">Refer to the NJ Student Learning Standards</p>
<p>CTE Standards:</p> <p>9.3.ST.2 Use technology to acquire, manipulate, analyze and report data.</p> <p>9.3.ST.3 Describe and follow safety, health and environmental standards related to science, technology, engineering and mathematics (STEM) workplaces.</p> <p>9.3.ST-ET.2 Display and communicate STEM information.</p> <p>9.3.ST-ET.5 Apply the knowledge learned in STEM to solve problems.</p> <p>9.3.ST-ET.6 Apply the knowledge learned in the study of STEM to provide solutions to human and societal problems in an ethical and legal manner.</p>	<p>CCCS ELA Literacy:</p> <p>RI.9-10.2. Determine a central idea of a text and analyze how it is developed and refined by specific details; provide an objective summary of the text.</p> <p>RI.9-10.7. Analyze various perspectives as presented in different mediums (e.g., a person's life story in both print and multimedia), determining which details are emphasized in each account.</p>

Unit 7: Coding and Communicating with Drones

Content Standards	Critical Knowledge & Skills ("Unpacked" Standards)	Content-Specific Practices (when applicable)	Standard Mastery Examples <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>
<ul style="list-style-type: none"> •Describe the basic concepts used in computer programming. •Identify advanced computer science concepts by coding game. •Recognize language used to program drones, including javascript and C++. 	<ul style="list-style-type: none"> •Differentiate coding software for different drones. •State the difference between A++ and coffeescript. •Differentiate among the three different coding protocols to determine proper communication.. •Analyze and manage frequency channels for better video output. •Test your own code on sample drone. 	<ul style="list-style-type: none"> • Standard 9.1 21st-Century Life and Career Skills: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures. • Standard 9.3 Career Awareness, Exploration, and Preparation: All students will apply knowledge about and engage in the process of career awareness, exploration, and preparation in order to navigate the globally competitive work environment of the information age. 	<ul style="list-style-type: none"> • Complete handwritten flashcards of chapter terms • Complete Learning Exercises at chapter end. • Daily Quiz • Video Overviews • Discuss terminology words and pronunciation. • Give practice in both pronunciation and understanding the words. • Complete Lab assigned • Provide students with handouts for in-class collaborative work: Crossword Puzzles, Word Searches and case studies pertinent to the unit and have students analyze and define medical terms. • Games and Quizzes as time permits • Current events in Drone Technology: • Discussion Circle

Unit 7 Assessment Plan	
Formative Assessment <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>	Summative Assessment <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>
<ul style="list-style-type: none"> • Complete <i>handwritten</i> flashcards of chapter terms • Complete Learning Exercises at chapter end. • Class Participation: • Completion of handouts • Labeling diagrams. 	<ul style="list-style-type: none"> • Terminology quizzes. • Class Participation: • Completion of handouts • Labeling diagrams. • Discussions Contribution

<ul style="list-style-type: none"> • Discussions Contribution • Completion of Homework 	<ul style="list-style-type: none"> • Completion of Homework • Quarterly Projects • Multiple choice and matching tests.
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Unit 7 Suggested Modifications/Accommodations/Extension Activities		
English Language Learners (ELL) <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>	Special Education / 504 <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>	Gifted and Talented <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>
<ul style="list-style-type: none"> • Allow extra time for task completion • Organizational Accommodations • Use a consistent daily routine • Break down tasks into manageable units • Instructional Accommodations • Frequently check for understanding • Emphasize use of visual aids • Simplify task directions • Provide hands-on learning activities • Provide modeling • Assign peer buddies • Modify pace of instruction to allow additional processing time • Provide small group instruction • Demonstrate directions and provide a model or example of completed task • Emphasize multi-sensory presentation of data • Allow for repetition and/or clarification of directions, as needed • Directions repeated, clarified or reworded • Provide multi-sensory instruction • Allow wait time for processing before calling on student for response • Provide visual models of completed tasks • Seat student near front of room • Preferential seating • Monitor on-task performance • Establish and maintain eye contact when giving oral directions • Provide short breaks when refocusing is needed • Refocusing and redirection • Prompting, cueing and redirecting student 	<ul style="list-style-type: none"> • Specific collaborative groupings of students per interpersonal skills and observations. • Providing vocabulary and concept resources, diagrams and videos, among other resources to assist with understanding concepts and terms. • Teacher Assistance with hands-on activities/projects and research. Teacher modeling and/or providing (more or less) guidance during the inquiry process with specific projects. • Typing requirements are specifically scaffolded by age/grade level, ensuring appropriate balance of online/offline work. • Assist with typing tasks, and allow for many activities to be completed through a combination of “offline” and “online” work. • Provide choice of activity, presentation, and groups among appropriate projects. • Sentence starters for student write-ups, reports, research and development and other written and verbal communication tasks. • Student copies of any notes as needed, partial outlines to complete during note taking tasks. • If notes are needed, trading student’s incomplete notes for a copy of complete notes. • Scaffold the amount of work (decrease or increase) based on skill sets and time allocations, modified time allocations and other constraints. • Multiple check-in opportunities for students, particularly during hands-on activities, projects, and other independent work. • Adapt the amount of personal assistance for specific learners. • Adapt the extent to which learners are actively (hands-on or research) involved in tasks, and 	<ul style="list-style-type: none"> • Provide choice of activity, presentation, and groups among appropriate projects. Scaffold the amount of work (decrease or increase) based on skill sets and time allocations, modified time allocations and other constraints. • Modify the skill-level, problem type, and/or constraints to the projects allowing the learner to approach the work with a high degree of success. • Extend research by offering new and novel resources and texts, based on interest, choice, and Lexile Levels of students. • Apply/offer extensions to projects based on additional constraints or scenarios to projects. • Offer additional opportunities for collaboration, presentation, or extension. • Offer additional opportunities for synthesis - Asking questions that encourage students to create new information from existing data. • Extend Metacognition - Asking questions which prompt students to think about their own thinking process, (successes and challenges). • Increase connections - Asking students questions that ensure the ability to apply new learning to their lives

<ul style="list-style-type: none"> • participation • Reinforcing of personal, social, behavioral and • Provide opportunities for peer interactions • Encourage student to self-advocate • Present alternatives to negative behavior • Monitor for overload, excess stimuli • Maintain communication with home • Provide positive reinforcement • Provide consistent praise to elevate self esteem • Model and role play problem solving 	<p>construction of models.</p>	
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Unit 7 Connections	
<p align="center">NJSLS - Technology <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i> Refer to the NJ Technology Standards</p>	<p align="center">Career Readiness Practices <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i> Refer to the NJ Career Readiness Practices</p>
<p>N/A</p>	<p>Career Ready Practices:</p> <p>CRP2. Apply appropriate academic and technical skills. CRP6. Demonstrate creativity and innovation. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.</p>
<p align="center">21st Century Skills <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i> Refer to the 21st Century Life and Skills</p>	<p align="center">Interdisciplinary Connections <i>When possible, provide links to specific ELA/Math/Sci/SS standards as well as samples/ documents/ assignments/etc.</i> Refer to the NJ Student Learning Standards</p>
<p>CTE Standards:</p> <p>9.3.ST.2 Use technology to acquire, manipulate, analyze and report data. 9.3.ST.3 Describe and follow safety, health and environmental standards related to science, technology, engineering and mathematics (STEM) workplaces. 9.3.ST.6 Demonstrate technical skills needed in a chosen STEM field.</p>	<p>CCCS ELA Literacy:</p> <p>RST.9-10.7. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.</p> <p>NJSLSA.W1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.</p>

Unit 8: Building and Flying an Unmanned Aerial Vehicle (Racing)			
Content Standards	Critical Knowledge & Skills ("Unpacked" Standards)	Content-Specific Practices (when applicable)	Standard Mastery Examples <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>
<ul style="list-style-type: none"> Identify and build the carbon fiber frame using 3m nuts and bolts.. Recognize torquing specs for assembly. Analyze wiring diagram for inputs and outputs. Describe how to set up video transmitter and remote signal. 	<ul style="list-style-type: none"> Describe how to successfully install racing software. Name motherboard status of light colors and flashes. State the difference between GPS and ACRO. Practice building a walkera racing version of an unmanned aerial vehicle Build Racing gates with pvc and led lights. 	<ul style="list-style-type: none"> Standard 9.3 Career Awareness, Exploration, and Preparation: All students will apply knowledge about and engage in the process of career awareness, exploration, and preparation in order to navigate the globally competitive work environment of the information age. Standard 9.4 Career and Technical Education: All students who complete a career and technical education program will acquire academic and technical skills for careers in emerging and established professions that lead to technical skill proficiency, credentials, certificates, licenses, and/or degrees. 	<ul style="list-style-type: none"> Complete handwritten flashcards of chapter terms Complete Learning Exercises at chapter end. Daily Quiz Video Overviews Discuss terminology words and pronunciation. Give practice in both pronunciation and understanding the words. Complete Lab assigned Provide students with handouts for in-class collaborative work: Crossword Puzzles, Word Searches and case studies pertinent to the unit and have students analyze and define medical terms. Games and Quizzes as time permits Current events in Drone Technology. :Discussion Circle

Unit 8 Assessment Plan	
Formative Assessment <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>	Summative Assessment <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>
<ul style="list-style-type: none"> Complete <i>handwritten</i> flashcards of chapter terms Complete Learning Exercises at chapter end. Class Participation: Completion of handouts 	<ul style="list-style-type: none"> Terminology quizzes. Class Participation: Completion of handouts Labeling diagrams.

<ul style="list-style-type: none"> • Labeling diagrams. • Discussions Contribution • Completion of Homework 	<ul style="list-style-type: none"> • Discussions Contribution • Completion of Homework • Quarterly Projects • Multiple choice and matching tests.
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Unit 8 Suggested Modifications/Accommodations/Extension Activities		
English Language Learners (ELL) <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>	Special Education / 504 <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>	Gifted and Talented <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>
<ul style="list-style-type: none"> • Allow extra time for task completion • Organizational Accommodations • Use a consistent daily routine • Break down tasks into manageable units • Instructional Accommodations • Frequently check for understanding • Emphasize use of visual aids • Simplify task directions • Provide hands-on learning activities • Provide modeling • Assign peer buddies • Modify pace of instruction to allow additional processing time • Provide small group instruction • Demonstrate directions and provide a model or example of completed task • Emphasize multi-sensory presentation of data • Allow for repetition and/or clarification of directions, as needed • Directions repeated, clarified or reworded • Provide multi-sensory instruction • Allow wait time for processing before calling on student for response • Provide visual models of completed tasks • Seat student near front of room • Preferential seating • Monitor on-task performance • Establish and maintain eye contact when giving oral directions • Provide short breaks when refocusing is needed • Refocusing and redirection 	<ul style="list-style-type: none"> • Specific collaborative groupings of students per interpersonal skills and observations. • Providing vocabulary and concept resources, diagrams and videos, among other resources to assist with understanding concepts and terms. • Teacher Assistance with hands-on activities/projects and research. Teacher modeling and/or providing (more or less) guidance during the inquiry process with specific projects. • Typing requirements are specifically scaffolded by age/grade level, ensuring appropriate balance of online/offline work. • Assist with typing tasks, and allow for many activities to be completed through a combination of “offline” and “online” work. • Provide choice of activity, presentation, and groups among appropriate projects. • Sentence starters for student write-ups, reports, research and development and other written and verbal communication tasks. • Student copies of any notes as needed, partial outlines to complete during note taking tasks. • If notes are needed, trading student’s incomplete notes for a copy of complete notes. • Scaffolding the amount of work (decrease or increase) based on skill sets and time allocations, modified time allocations and other constraints. • Multiple check-in opportunities for students, particularly during hands-on activities, projects, and other independent work. • Adapt the amount of personal assistance for specific learners. • Adapt the extent to which learners are actively 	<ul style="list-style-type: none"> • Provide choice of activity, presentation, and groups among appropriate projects. Scaffolding the amount of work (decrease or increase) based on skill sets and time allocations, modified time allocations and other constraints. • Modify the skill-level, problem type, and/or constraints to the projects allowing the learner to approach the work with a high degree of success. • Extend research by offering new and novel resources and texts, based on interest, choice, and Lexile Levels of students. • Apply/offer extensions to projects based on additional constraints or scenarios to projects. • Offer additional opportunities for collaboration, presentation, or extension. • Offer additional opportunities for synthesis - Asking questions that encourage students to create new information from existing data. • Extend Metacognition - Asking questions which prompt students to think about their own thinking process, (successes and challenges). • Increase connections - Asking students questions that ensure the ability to apply new learning to their lives

<ul style="list-style-type: none"> • Reinforcing of personal, social, behavioral and • Provide opportunities for peer interactions • Encourage student to self-advocate • Present alternatives to negative behavior • Monitor for overload, excess stimuli • Maintain communication with home • Provide positive reinforcement • Provide consistent praise to elevate self esteem • Model and role play problem solving 	<p>(hands-on or research) involved in tasks, and construction of models.</p>	
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Unit 8 Connections	
<p align="center">NJSLS - Technology <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i> Refer to the NJ Technology Standards</p>	<p align="center">Career Readiness Practices <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i> Refer to the NJ Career Readiness Practices</p>
<p>N/A</p>	<p>Career Ready Practices:</p> <p>CRP2. Apply appropriate academic and technical skills. CRP6. Demonstrate creativity and innovation. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.</p>
<p align="center">21st Century Skills <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i> Refer to the 21st Century Life and Skills</p>	<p align="center">Interdisciplinary Connections <i>When possible, provide links to specific ELA/Math/Sci/SS standards as well as samples/ documents/ assignments/etc.</i> Refer to the NJ Student Learning Standards</p>
<p>CTE Standards:</p> <p>9.3.ST.2 Use technology to acquire, manipulate, analyze and report data. 9.3.ST.3 Describe and follow safety, health and environmental standards related to science, technology, engineering and mathematics (STEM) workplaces. 9.3.ST.6 Demonstrate technical skills needed in a chosen STEM field. 9.3.ST-ET.2 Display and communicate STEM information.</p>	<p>CCCS ELA Literacy:</p> <p>RST.9-10.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant. RST .9-10.8 Determine if the reasoning and evidence in a text support the author’s claim or a recommendation for solving a scientific or technical problem.</p>

Unit 9: Building and Flying an Unmanned Aerial Vehicle (Micro)

Content Standards	Critical Knowledge & Skills (“Unpacked” Standards)	Content-Specific Practices (when applicable)	Standard Mastery Examples <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>
<ul style="list-style-type: none"> Identify and describe the major functions of small motherboard. Recognize and clean all soldering points for wires. Identify and match all wiring with correct colors. Bind remotes and auxiliary channels. 	<ul style="list-style-type: none"> Differentiate manual control override. Set Flying parameters and record data. Recognize direction of travel for tuning. Analyze line diagram for racing channels. 	<ul style="list-style-type: none"> Standard 9.1 21st-Century Life and Career Skills: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures. Standard 9.3 Career Awareness, Exploration, and Preparation: All students will apply knowledge about and engage in the process of career awareness, exploration, and preparation in order to navigate the globally competitive work environment of the information age. 	<ul style="list-style-type: none"> Complete handwritten flashcards of chapter terms Complete Learning Exercises at chapter end. Daily Quiz Video Overviews Discuss terminology words and pronunciation. Give practice in both pronunciation and understanding the words. Provide students with handouts for in-class collaborative work: Crossword Puzzles, Word Searches and case studies pertinent to the unit and have students analyze and define medical terms. Games and Quizzes as time permits. Current events in Drone Technology.

Formative Assessment <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>	Summative Assessment <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>
<ul style="list-style-type: none"> • Complete <i>handwritten</i> flashcards of chapter terms • Complete Learning Exercises at chapter end. • Class Participation: • Completion of handouts • Labeling diagrams. • Discussions Contribution • Completion of Homework 	<ul style="list-style-type: none"> • Terminology quizzes. • Class Participation: • Completion of handouts • Labeling diagrams. • Discussions Contribution • Completion of Homework • Quarterly Projects • Multiple choice and matching tests.

Unit 9 Suggested Modifications/Accommodations/Extension Activities

English Language Learners (ELL) <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>	Special Education / 504 <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>	Gifted and Talented <i>When possible, provide links to specific samples/ documents/ assignments/etc.</i>
<ul style="list-style-type: none"> • Allow extra time for task completion • Organizational Accommodations • Use a consistent daily routine • Break down tasks into manageable units • Instructional Accommodations • Frequently check for understanding • Emphasize use of visual aids • Simplify task directions • Provide hands-on learning activities • Provide modeling • Assign peer buddies • Modify pace of instruction to allow additional processing time • Provide small group instruction • Demonstrate directions and provide a model or example of completed task • Emphasize multi-sensory presentation of data • Allow for repetition and/or clarification of directions, as needed • Directions repeated, clarified or reworded • Provide multi-sensory instruction • Allow wait time for processing before calling on student for response • Provide visual models of completed tasks • Seat student near front of room • Preferential seating 	<ul style="list-style-type: none"> • Specific collaborative groupings of students per interpersonal skills and observations. • Providing vocabulary and concept resources, diagrams and videos, among other resources to assist with understanding concepts and terms. • Teacher Assistance with hands-on activities/projects and research. Teacher modeling and/or providing (more or less) guidance during the inquiry • Process with specific projects. • Typing requirements are specifically scaffolded by age/grade level, ensuring appropriate balance of online/offline work. • Assist with typing tasks, and allow for many activities to be completed through a combination of "offline" and "online" work. • Provide choice of activity, presentation, and groups among appropriate projects. • Sentence starters for student write-ups, reports, research and development and other written and verbal communication tasks. • Student copies of any notes as needed, partial outlines to complete during note taking tasks. • If notes are needed, trading student's incomplete notes for a copy of complete notes. • Scaffolding the amount of work (decrease or increase) based on skill sets and time allocations, modified time allocations and other 	<ul style="list-style-type: none"> • Provide choice of activity, presentation, and groups among appropriate projects. Scaffolding the amount of work (decrease or increase) based on skill sets and time allocations, modified time allocations and other constraints. • Modify the skill-level, problem type, and/or constraints to the projects allowing the learner to approach the work with a high degree of success. • Extend research by offering new and novel resources and texts, based on interest, choice, and Lexile Levels of students. • Apply/offer extensions to projects based on additional constraints or scenarios to projects. • Offer additional opportunities for collaboration, presentation, or extension. • Offer additional opportunities for synthesis - Asking questions that encourage students to create new information from existing data. • Extend Metacognition - Asking questions which prompt students to think about their own thinking process, (successes and challenges). • Increase connections - Asking students questions that ensure the ability to apply new learning to their lives

<ul style="list-style-type: none"> • Monitor on-task performance • Establish and maintain eye contact when giving oral directions • Provide short breaks when refocusing is needed • Refocusing and redirection • Prompting, cueing and redirecting student participation • Reinforcing of personal, social, behavioral and • Provide opportunities for peer interactions • Encourage student to self-advocate • Present alternatives to negative behavior • Monitor for overload, excess stimuli • Maintain communication with home • Provide positive reinforcement • Provide consistent praise to elevate self esteem • Model and role play problem solving 	<p>constraints.</p> <ul style="list-style-type: none"> • Multiple check-in opportunities for students, particularly during hands-on activities, projects, and other independent work. • Adapt the amount of personal assistance for specific learners. • Adapt the extent to which learners are actively (hands-on or research) involved in tasks, and construction of models. 	
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Unit 9 Connections	
<p align="center">NJSLS - Technology</p> <p align="center"><i>When possible, provide links to specific samples/ documents/ assignments/etc.</i></p> <p align="center">Refer to the NJ Technology Standards</p>	<p align="center">Career Readiness Practices</p> <p align="center"><i>When possible, provide links to specific samples/ documents/ assignments/etc.</i></p> <p align="center">Refer to the NJ Career Readiness Practices</p>
<p>N/A</p>	<p>Career Ready Practices:</p> <p>CRP2. Apply appropriate academic and technical skills.</p> <p>CRP6. Demonstrate creativity and innovation.</p> <p>CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.</p>
<p align="center">21st Century Skills</p> <p align="center"><i>When possible, provide links to specific samples/ documents/ assignments/etc.</i></p> <p align="center">Refer to the 21st Century Life and Skills</p>	<p align="center">Interdisciplinary Connections</p> <p align="center"><i>When possible, provide links to specific ELA/Math/Sci/SS standards as well as samples/ documents/ assignments/etc.</i></p> <p align="center">Refer to the NJ Student Learning Standards</p>
<p>CTE Standards:</p> <p>9.3.ST.2 Use technology to acquire, manipulate, analyze and report data.</p> <p>9.3.ST.3 Describe and follow safety, health and environmental standards related to science, technology, engineering and mathematics (STEM) workplaces.</p>	<p>CCCS ELA Literacy:</p> <p>RST.9-10.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant.</p>

9.3.ST.6 Demonstrate technical skills needed in a chosen STEM field.

9.3.ST-ET.2 Display and communicate STEM information.

RST .9-10.8 Determine if the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.