SPRING GROVE AREA SCHOOL DISTRICT

PLANNED COURSE OVERVIEW

Course Title: Unmanned Aircraft System Operations	**Length of Course:** 15 cycles
Grade Level(s): 11	**Periods Per Cycle:** 6
Units of Credit: .5	**Length of Period:** 40 minutes
Classification: Elective	**Total Instructional Time:** 60 hours

Course Description

This course will cover small, unmanned aircraft performance, ethics, human factors, aeronautical decision-making and judgment, safety protocols, weight and balance, maintenance, aviation weather sources and effects of weather (micro-meteorology) on small unmanned aircraft performance, small unmanned aircraft loading and performance, emergency procedures, crew resource management, and preflight inspection procedures. Students will be provided the opportunity to participate in multiple practice examinations. Students will be prepared to complete the Federal Aviation Administration's Part 107 Remote Pilot Knowledge Test upon completion of this course.

Instructional Strategies, Learning Practices, Activities, and Experiences

Direct Instruction Field Experiences Groupwork Drone Flights	Instructional Videos Labs Practice Problems/Calculations	Reading Flight Simulations Flight Planning/ Map Reading

Assessments

Unit quizzes Unit Tests Pre-Test	Projects Presentations Post-Test	Videos Simulations

Materials/Resources

AOPA Curriculum Sectional Charts The York Airport	Plotters E6B Flight Calculators FAA Regulations FAR/AIM	Model Airplanes Drones The Pilots Handbook of Aeronautical Knowledge

Adopted: 5/23/22
Revised:

CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
Unit 1: Introduction to Drones and UAS Operations **Description:** In Unit 6, students will receive a broad overview of the world of unmanned flight, and a preview of what is to come in the course. This will include a first look at common UAS components, and an explanation of how different types of drones fly. Next, students will learn about Part 107: the types of flying it applies to, the certification process, and the regulations with which commercial drone operators must be familiar. Finally, students will look beyond Part 107 at privacy issues that have arisen with the popularity of drones, as well as best practices remote pilots should follow to be good neighbors.	**HS-ETS1-3** - Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts. Science and Engineering Practices Constructing Explanations and Designing Solutions Disciplinary Core Ideas ETS1.B: Developing Possible Solutions

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Unit 2: Operational Decision Making **Description:** In Section A of Unit 7, students will learn ways in which topics they have been introduced to before, such as weather theory and aerodynamics, relate specifically to sUAS operations. Next, in Section B, they will continue to learn how effective crew management is essential to these operations. Students will learn both regulatory requirements and best practices for preflight inspections and drone maintenance, and how crew resource management plays a vital role in UAS missions. At the close of the unit, students will look at how to handle common UAS emergencies, as well as the various human factors involved in UAS flight.	**HS-ETS1-2** - Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. Science and Engineering Practices Constructing Explanations and Designing Solutions Disciplinary Core Ideas ETS1.A: Defining and Delimiting Engineering Problems **HS-ETS1-3** - Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts. Science and Engineering Practices Constructing Explanations and Designing Solutions Disciplinary Core Ideas ETS1.B: Developing Possible Solutions

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Unit 3: Becoming a Commercial sUAS Pilot **Description:** In this unit, students will revisit topics that they learned in the first semester of 11th grade, including airspace and navigation, airport operations, radio communications, and weather theory. These are topics that don't apply to sUAS exclusively but are necessary for all pilots. For the review, students will divide into groups and research various topics, and then each group will find a creative way to teach the class the material. At the end of Unit 8, students will be prepared to take the FAA's Part 107 exam and earn their commercial sUAS certification.	**RST.11-12.2** - Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms. **RST.11-12.4** - 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 to grades 11-12 texts and topics. **RST.11-12.7** - Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. **RST.11-12.9** - Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. **WHST.11-12.2** - Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. **WHST.11-12.4** - Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. **WHST.11-12.6** - Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. **WHST.11-12.7** - Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. **WHST.11-12.8** - Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. **WHST.11-12.9** - Draw evidence from informational texts to support analysis, reflection, and research.

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Unit 4: From Theory to Practice: Planning and Executing a Mission **Description:** Unit 9, as its title suggests, will give students a chance to apply the knowledge they have learned in the course by learning to fly drones and taking part in simulated sUAS operations. The unit will begin with an in-depth look at the systems involved in UAS, including controllers, propulsion, and electrical systems. Next, students will learn about different types of drone imaging sensors. After covering important aspects of UAS safety, students will have opportunities to get hands-on experience flying a drone. In Section B, students will apply what they have learned throughout the semester to perform real-world sUAS operations as teams. Each team will work with a client (either their school or another local organization) to provide a beneficial product or service using a drone. This will give students the opportunity to plan an sUAS operation from the ground up, to fly it, and to present a valuable deliverable to a client—all of which are skills that they would use day to day as professional remote pilots.	**HS-ETS1-2 -** Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. Science and Engineering Practices Asking Questions and Defining Problems Constructing Explanations and Designing Solutions Disciplinary Core Ideas ETS1.A: Defining and Delimiting Engineering Problems **HS-ETS1-3** - Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts. Science and Engineering Practices Constructing Explanations and Designing Solutions Disciplinary Core Ideas ETS1.B: Developing Possible Solutions Crosscutting Concepts Influence of Science, Engineering, and Technology on Society and the Natural World **HS-ETS1-4** - Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem. Science and Engineering Practices Using Mathematics and Computational Thinking Disciplinary Core Ideas ETS1.B: Developing Possible Solutions