ELEVENTH GRADE CURRICULUM

THE FLYING ENVIRONMENT

SEMESTER ONE

This course is foundational for both manned and unmanned aviation, and will prepare students to take either of two Federal Aviation Administration tests: the Private Pilot Knowledge Test or the Part 107 Remote Pilot Knowledge Test. Topics include: pre-flight procedures, airspace, radio communications, aviation phraseology, regulations, airport operations, aviation safety, weather, cockpit management, and emergency procedures.

Unit 1: Aviation Weather Theory

What makes weather, and why does it matter to pilots? In this unit, students will examine the building blocks of weather. Early lessons will cover broad concepts, such as heat exchange, the role of atmospheric water, and the movement of air masses. Later lessons will focus on understanding specific weather phenomena, including clouds and fog, thunderstorms, and wind shear.

PROPRIETARY

		No. of Sessions Per Lesson	Day of Semester
Pre-Course Exam		1	1
Section A – Why Weather Matters			
Lesson 1	Introduction to Aviation Weather	1	2
Section B – Understanding Atmosphere			
Lesson 1	Makeup of the Atmosphere	3	5
Lesson 2	Atmospheric Circulation and Winds	3	8
Lesson 3	Clouds and Precipitation	4	12
Lesson 4	Air Masses and Fronts	4	16
Lesson 5	Thunderstorms	4	20
Unit 1 Exam		1	21

Total Sessions Unit 1 **21**
Semester Total **21**

Unit 2: Aviation Weather Services

To fly safely, pilots must have good insight into the weather around them. Weather observations, forecasts, and charts are vital to a pilot's understanding of the weather both before takeoff and as a flight progresses. In this unit, students will learn about the sources of weather observations, including radiosondes, radar, satellites, and more. They'll also learn about various weather products and services available to pilots and how to interpret these essential tools to make good decisions about the viability of a proposed flight.

		No. of Sessions Per Lesson	Day of Semester
Section A – Weather Observations and Forecasts			
Lesson 1	Introduction to Aviation Weather Services	1	22
Lesson 2	Aviation Weather Observation & Reporting	4	26
Lesson 3	Aviation Forecasts and Weather Charts	4	30
Section B – Getting Weather Information			
Lesson 1	Preflight Weather Planning	3	33
Lesson 2	In-flight Weather and Tactical Weather Decision Making	3	36
Unit 2 Exam		1	37
Total Sessions Unit 2		**16**	
Semester Total		**37**	

PROPRIETARY

Unit 3: Airport Operations

Every flight begins and ends at an airport. To keep airports running smoothly and safely, pilots need to understand the "rules of the road." Signs and pavement markings help pilots navigate the complex and sometimes busy world of the airport. Specialized lighting makes it easier to find your way at night. In this unit, students will learn the meaning and function of the many signs and markings used at airports.

		No. of Sessions Per Lesson	Day of Semester
Section A – Understanding Airports			
Lesson 1	Introduction to Airports and Airport Data	2	39
Lesson 2	Airport Markings and Signs	4	43
Lesson 3	Airport Lighting	2	45
Lesson 4	Traffic Patterns	2	47
Lesson 5	Communications	4	51
Lesson 6	ATC	2	53
Lesson 7	Pilot Communications in the Airport Environment	3	56
Lesson 8	Airport Safety and Pilot Considerations	2	58
Unit 3 Exam		1	59

Total Sessions Unit 3 22
Semester Total 59

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Unit 4: Introduction to Aeronautical Charts and Airspace

A good flight starts with a good plan, and the first thing a pilot may turn to is a map. In aviation, the maps are known as aeronautical charts, and they provide a wealth of information for pilots. Knowing how to read the charts is critical for any pilot, and this unit provides an introduction to the main features of the charts as well as an introduction to the National Airspace System which governs where and under what circumstances drone and manned pilots may fly their aircraft.

		No. of Sessions Per Lesson	Day of Semester
Section A – Introducing Aeronautical Charts and Airspace			
Lesson 1	Introduction to Aeronautical Charts	4	63
Lesson 2	Introduction to the National Airspace System	4	67
Unit 4 Exam		1	68

Total Sessions Unit 4 **9**
Semester Total **68**

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Unit 5: Post-Course Exam Review

After a semester full of weather, airport operations, and navigation, it's time to review for the Post-Course Exam. In this unit, students become the teachers as they select topics to review from weather theory to types of airspace, plan review activities, and present their lessons or activities to their classmates.

		No. of Sessions Per Lesson	Day of Semester
Section A – Post-Course Exam Review			
Lesson 1	Review or Project: Student/Teacher Choice	1	69
Post-Course Exam		1	70

Total Sessions Unit 5 **2**
Semester Total **70**

PROPRIETARY

ELEVENTH GRADE CURRICULUM: UAS

UAS OPERATIONS

SEMESTER TWO

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.

Unit 6: Introduction to Drones and UAS Operations

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.

PROPRIETARY

		No. of Sessions Per Lesson	Day of Semester
Pre-Course Exam		1	1
Section A – Drones and their Components			
Lesson 1	Introduction to UAS	2	3
Lesson 2	How Drones Fly	3	6
Section B - Part 107 and Beyond			
Lesson 1	Part 107: An Introduction	2	8
Lesson 2	Part 107: Operating Rules and Waivers	3	11
Lesson 3	Beyond 107: Best Practices and Being a Good Neighbor	2	13
Unit 6 Exam		1	14

Total Sessions Unit 6 14
Semester Total 14

Unit 7: Operational Decision Making

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.

		No. of Sessions Per Lesson	Day of Semester
<u>Section A – Weather and Performance</u>			
Lesson 1	Practical Weather for UAS Pilots	3	17
Lesson 2	Small UAS Loading	2	19
Lesson 3	UAS Aerodynamics and Performance	3	22
<u>Section B – UAS Crew Management</u>			
Lesson 1	Preflight and Maintenance	3	25
Lesson 2	UAS Crew Resource Management and Communications	3	28
Lesson 3	Handling Emergencies	3	31
Lesson 4	Human Factors and ADM	4	35
<u>Unit 7 Exam</u>		1	36

Total Sessions Unit 7 22
Semester Total 36

PROPRIETARY

Unit 8: Becoming a Commercial sUAS Pilot

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 the 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.

		No. of Sessions Per Lesson	Day of Semester
<u>Section A – Part 107 Exam Preparation</u>			
Lesson 1	Group Project: Your Turn to Teach Regulations Airspace and Requirements Weather Loading and Performance Operations	10	46
Lesson 2	UAS Jeopardy!	1	47
<u>Unit 8 Practice Exam (Optional)</u>		0	47

Total Sessions Unit 8 **11**
Semester Total **47**

PROPRIETARY

Unit 9: From Theory to Practice: Planning and Executing a Mission

Unit 9, as its title suggests, will give students a chance to apply the knowledge they've 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.

		No. of Sessions Per Lesson	Day of Semester
<u>Section A – Flight School</u>			
Lesson 1	The Right Drone for the Job	2	49
Lesson 2	Expert Mode	4	53
Lesson 3	Learning to Fly: Fundamentals of Control	4	57
<u>Section B – Drones in Action</u>			
Lesson 1	Real-World Experience: UAS Team Operations	12	69
<u>Post-Course Exam</u>		1	70
Total Sessions Unit 9	**23**		
Semester Total	**70**		

PROPRIETARY