SPRING GROVE AREA SCHOOL DISTRICT

PLANNED COURSE OVERVIEW

Course Title: Launching Into Aviation	**Length of Course:** 15 cycles
Grade Level(s): 9	**Periods Per Cycle:** 6
Units of Credit: .5	**Length of Period:** 43 minutes
Classification: Elective	**Total Instructional Time:** 64.5 hours

Course Description

The ninth-grade course will provide the foundation for advanced exploration in the areas of flying, aerospace engineering, and unmanned aircraft systems. Students will learn about engineering practices, problem solving, and the innovations and technological developments that have made today's aviation and aerospace industries possible. Students will also learn about the wide variety of exciting and rewarding careers available to them. The ninth-grade course will inspire students to consider aviation and aerospace careers while laying the foundation for continued study in grades 10 through 12 and beyond.

HS-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
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.
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.
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.
HS-PS2-2 Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.
HS-ESS3-2 Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.

Instructional Strategies, Learning Practices, Activities, and Experiences

Hands-on Activities Lesson Objectives Digital Content (Videos, Slide Shows)	Formative Assessments Labs Group Projects	Online Resources Summative Assessments Engineering Projects

Assessments

Observation Discussions	Quizzes Exams	Unit Exams Projects

Materials/Resources

All materials and resources are provided digitally via the AOPA curriculum including lesson plans, activities, projects, assessments.	Various craft supplies and tools to complete hands-on activities.	

Adopted: 5/18/20
Revised:

CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
Science and Engineering Practices Asking Questions and Defining Problems Constructing Explanations and Designing Solutions	**HS-ETS1-1** Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
Disciplinary Core Ideas	**ETS1.A** Defining and Delimiting Engineering Problems
Crosscutting Concepts Systems and System Models Influence of Science, Engineering, and Technology on Society and the Natural World	
Science and Engineering Practices Constructing Explanations and Designing Solutions	**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.
Disciplinary Core Ideas	**ETS1.C** Optimizing the Design Solution
Science and Engineering Practices Constructing Explanations and Designing Solutions	**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.
Disciplinary Core Ideas	**ETS1.B** Developing Possible Solutions
Crosscutting Concepts Influence of Science, Engineering, and Technology on Society and the Natural World	

CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
Science and Engineering Practices Using Mathematics and Computational Thinking Crosscutting Concepts Systems and System Models	**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 Developing and Using Models Disciplinary Core Ideas Crosscutting Concepts Systems and System Models	**HS-LS 1-2** Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. **LS1.A** Structure and Function
Science and Engineering Practices Using Mathematics and Computational Thinking Disciplinary Core Ideas Crosscutting Concepts Systems and System Models	**HS-PS2-2** Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system. (NOTE: This standard is not explicitly used as math is not required to complete the exercise). **PS2.A** Forces and Motion **PS2.B** Types of Interactions
Common Core State Standards Mathematics	**HSG.MG.A.1** Use geometric shapes, their measures and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder). **HSN-Q.A.2** Define appropriate quantities for the purpose of descriptive modeling. **HSN-Q.A.3** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
Science and Engineering Practices Asking Questions and Defining Problems Constructing Explanations and Designing Solutions Crosscutting Concepts Systems and System Models Influence of Science, Engineering, and Technology on Society and the Natural World	**HS-ESS3-2** Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
Common Core State Standards Mathematics	**HSA-REI.B.3** Solve equations and inequalities in one variable. **HSG.MG.A.1** Use geometric shapes, their measures and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder). **HSN-Q.A.1** Reason quantitatively and use units to solve problems. **HSN.Q.A.2** Define appropriate quantities for the purpose of descriptive modeling.
Standards for Mathematical Practice	**CCSS.MATH.CONTENT.HSN.Q.A.1** Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas. **CCSS.MATH.CONTENT.HSN.Q.A.3** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. **CCSS.MATH.PRACTICE.MP4** Model with mathematics.