

INTRODUCTION TO AVIATION AERONAUTICAL SCIENCE ELECTIVE

COURSE OBJECTIVE: Upon successful completion of this course, the student will have gained a foundational understanding of all the aspects of flight presented in the modules. The student will also gain a broad knowledge of multiple aviation career pathways.

COURSE DESCRIPTION: Students will work through 10 modules covering a broad variety of aviation topics incorporating hands on math and science. Each module will conclude with a “checkpoint” to evaluate the students understanding of the material.

Students will also be introduced to career pathways in the aviation industry through interviews with individuals who specialize in those areas. At the conclusion of the course students will understand that there are a wide variety of opportunities that do not necessarily involve being a pilot.

Students will participate in two national competitions. One is the building and flying a rubber band competition model airplane. This competition will develop an in-depth understanding of the aerodynamics of flight. The second competition is an aviation science fair. Students will utilize the scientific method in an aviation related research project.

All classes will be online. The students will be able to work at their own pace and in their own time frame. Instructor contact information will be readily available as well as an interactive student blog.

COURSE GOALS: It is our goal to excite students about science, technology, engineering and math (STEM) and in so doing to introduce them to the wide world of aviation.

COURSE POLICIES: It is important that students follow the order of classes as presented in the syllabus. It should also be noted that we do not assign homework but allow class time to do the required assignments. Students will be expected to accomplish all assignments as presented in the course materials.

Parents and schools are responsible to utilize the grading tools available to assign their student a grade. It is the responsibility of the school or parent to keep all grade records. However, Av-STEM Alaska needs to be notified of successful completion of this course since it is a pre-requisite of all other courses.

INSTRUCTORS: Grant Funk and Barney Funk can both be reached via email at takeoff@av-stem.com. We will also arrange a phone call if needed through email correspondence. Grant is a Certified Flight Instructor and Barney is a pilot as well as a certified Airframe and Power Plant Mechanic with an FAA Inspector Authorization. Grant and Barney are co-developers of this course.

PROVIDED SUPPLIES: Flight simulator software, aviation plotter, E6B flight computer (similar to a slide rule for flight calculations), aviation charts, and a competition kit plane. Please note: We do not provide the computer or the joystick to run the flight simulator.

ATTENDANCE: Since this is an online course students are expected to take every class in the course as well as the class assignments.

CLASSES: Classes will be approximately 55 minutes in length which includes 5 minutes to gather supplies and 5 minutes to put supplies away. All assignments should be accomplished during class time.

ASSIGNMENTS: All assignments will be given and explained in class. There will be class time allotted to complete the assignments.

GRADING: Parents and schools will make the decision how the student grades will be recorded to best reflect their personal requirements.

COURSE OUTLINE AND DESCRIPTION OF THE TEN MODULES. (Note: Some modules by necessity will overlap to best accomplish student proficiencies.)

1. **INTRODUCTION:** Introductions are the starting line for the beginning of a course. It is at that point that students begin to get to know the instructors as well as the opportunities that are before them. We include, as a part of the introduction, sessions on what makes a dream live or die. Over the years we have seen students pursue their dreams as well as get side tracked. The end results are radically different. As a part of the introduction we will have the students make posters as reminders of this concept. It is our hope that this visual aid will give students the perseverance to follow the path they were created for.
2. **AVIATION HISTORY:** The flying we enjoy today did not happen overnight. We will trace several significant contributions throughout history that have brought us into the space age. This will not be a comprehensive study. That would be a course in itself. However, we enjoy the privilege of standing on the shoulders of many innovative people from the past. Having an understanding of where we have come from will give students a good foundation to build on as we move forward. At the conclusion of this module students will develop an aviation time line from their notes and personal study.
3. **AERODYNAMICS:** In this unit we explore the questions of flight. We will look at the theories of lift and discuss the different opinions experts have on what causes lift. Surprisingly, this is still being debated. We will have in-flight footage of a wing when it quits flying (stalls) as well as hands on activities to explore Bernoulli's principle and Newton's Laws.
4. **INTRO TO FLIGHT SIMULATOR:** We provide software for a flight simulator program that will be used throughout the course. In this module we teach the students the basics of the simulator they will be using with the emphasis that this will be a tool, not a toy. Students will learn the basics of flight as we take them through simulated flight lessons. By the end of this unit they will be proficient at using the flight simulator. They will also have gone through several flight lessons giving them a good understanding of basics of flight training. From this point on flight simulator will be used extensively as a hands on tool to understand how instruments work, how to navigate and much more.
5. **AIRPLANE INSTRUMENTS:** Students will understand the variety of instrument systems in general aviation airplanes, how they work, what they do, and how to interpret

the information they are communicating. Students will be using flight simulator to understand and apply airplane instruments.

6. **AVIATION CHARTS:** This is a comprehensive charts unit. Students will understand how to read a chart, how to use the chart legend, how to understand the symbols on a chart, how to explain the longitude and latitude system, and much more. Students will also learn the difference between a Sectional Chart and a World Aeronautical Chart.
7. **NAVIGATION:** Airplane instruments and Charts will now be combined to understand how to navigate using the various systems that are available in airplanes. Students will be introduced to a variety of navigation tools. Flight simulator will be a great “hands on” learning tool for navigation.
8. **FLIGHT CALCULATIONS:** How far is my flight? How long will it take if I am going at a known speed? How much fuel do I need? How will the wind affect my flight? Students will not only learn how to do these calculations, they will get to test their answers in the flight simulator.
9. **WEATHER:** Students will understand how to read basic aviation weather charts. They will understand the interaction of high pressure and low pressure systems as well as how to identify and interpret cloud activity. Students will begin to practice weather forecasting.
10. **WEIGHT AND BALANCE:** We will teach the importance of a balanced airplane. Students will learn how to do the calculations to balance the airplane prior to a flight.
11. **PREDICTING AIRPLANE PERFORMANCE:** Students will use the flight simulator to understand airplane performance. They will understand how glide speed affects glide distance and how density altitude and wing area affect take-off performance.

CAREER PATHWAYS: A part of our education philosophy is that each student is uniquely created with special interests and abilities. Not all are “wired” to be pilots. For this reason we introduce students to a wide variety of career pathways for them to explore. We accomplish this through interviews with individuals engaged in jobs and hobbies that may ignite a spark of interest in your students, leading to a career they were created for.

AVIATION COMPETITIONS: These are designed to stretch the student in the area of aerodynamics. In so doing, the student will develop an in depth understanding of aerodynamic forces and their applications. Competitions will be judged using the online resources available. The competitions and judging will be explained during class. Students are not required to compete but are required to do the projects.

PERSONAL COMMITMENT: We are committed to being as available to our students as possible. We will respond promptly to all communications.