

Aerospace Technologies
Fernandina Beach High School

Course Goals: These courses are hands-on STEM classes (Science, Technology, Engineering, and Mathematics), designed to involve and motivate young people in Aerospace studies. Participation and effort are recommended, expected, and required for maximum student fulfillment.

Aerospace Technologies 1 – Model Rocketry (Course Number 8600580 - 1 credit hour)

Prerequisite – none. Open to all grades:

Model rocketry teaches students basic practical aerodynamics and physics. Group projects use simple model rocket kits to teach construction techniques, and to develop safe launch and flight practices. The rocket is later modified to meet changing mission parameters. Once a foundation has been established, students are encouraged to pursue more involved and demanding projects, including designing/flying their own rocket.

Aerospace Technologies 2 – Flying Model Aircraft (Course Number 8600680 – 1 credit hour)

Prerequisite – AeroTech 1 *strongly recommended*. Open to all grades:

Remote-controlled fixed-wing model aircraft are used to explore complex aerodynamics. Student groups build and fly models from plans. During second semester they are encouraged to design and build their own airplanes. Flight operations are modelled after corporate/airline flight departments. Multi-rotor aircraft (“drones”) are also flown, and desk-top “flight simulators” allow students to compare/contrast model flying with full-scale general aviation.

(Note: The instructor can assist students who would like to work toward their FAA Drone License(s).)

Aerospace Technologies 3 – Pilot Ground School (Course Number 8601780 – 1 credit hour)

Prerequisite – AeroTech 2 (AT 1 & AT 2 *strongly recommended*). Open to Juniors/Seniors:

Earning an FAA Private Pilot License requires a written examination and a combined oral/practical exam. This rigorous course provides students with the knowledge needed to pass the oral exam and the FAA Private Pilot Knowledge Exam (the “Written”). Students will apply for and receive their Student Pilot License. In-depth lectures are supplemented with practice test questions. The students will take the FAA Private Pilot Knowledge Exam as their end-of-course test.

(Note: There is the opportunity to receive flight training at additional cost in parallel with this course.)

Aerospace Technologies 1-3 Summary

The three-year Aerospace Technologies curricula allow students to explore the aerodynamics and physics of flight. In AT1, students build and fly model rockets that can exceed 2,500’ of altitude or reach transonic speeds. Remote-controlled model aircraft and/or rotorcraft are flown in AT2, and students utilize computer-aided design (CAD) programs and basic computer flight simulators. In AT3 students will attain their FAA Student Pilot License, and learn about the atmosphere and weather, Federal Aviation Regulations, the National Airspace System, and a myriad of other subjects that make up modern aviation.

Read on for more details of each course. Thank you for your interest.

Aerospace Technologies 1

Students are introduced to foundational lessons in AT1; from basic model construction to safe flight operations, from electronics to pyrotechnics, and from simple rockets to design/technology demonstrators. Our models have flown to altitudes over 2,500', and near the speed of sound.

They will learn:

- Model rocket components/systems.
- Construction materials, methods, considerations, and precautions.
- Flight operations, and safety-of-flight considerations.
- Basic electronics and on-board technology.
- Rocket motor construction, operation, power curves, etc.
- Design requirements, trade-offs, compromises, and performance variables.
- Computer-aided design, performance projections versus flight telemetry.
- Computer-aided manufacturing and parts fabrication.
- Flight physics and aerodynamics, including extreme altitudes/speeds.



It is an amazing time to be interested in Aerospace. Never has there been so much space-based activity on such a large scale, nor has the private sector figured so prominently. Many people deeply involved with space programs got their start in model rocketry.

Today's high school students will see humans set foot on and, perhaps, start colonizing and/or terraforming, another planet. AeroTech can help spark their interest in, and wonder of, space travel.

Aerospace Technologies 2



AT2 students will build upon their rocketry foundation and deepen their knowledge of aerodynamics. Remote-controlled flying model airplanes are utilized so students may gain familiarity with:

- Airplane construction (models versus full-scale aircraft).
 - Aircraft design considerations, compromises, tradeoffs, parameters/requirements.
 - Aircraft weight-and-balance.
 - How aircraft create lift.
 - Flight control operation and effects.
 - Four forces acting on an airplane in flight.
- Electronics operations/safety considerations in the classroom.
 - Flight safety; battery use; motors/propeller safety; speed/mass/inertia of flying objects.

This course will compare-and-contrast model aircraft flight with that of full-scale airplanes and is a direct lead-in to the Private Pilot (AT3) course. Many of the lessons and practice test questions are taken from the FAA written test guide that is used extensively in AT3.

Students may simply develop a new hobby through this course, or they may lay the foundation for more advanced exploration of Aviation Sciences. Regardless, they may leave with improved self esteem and confidence, knowing they took on a challenge not all students accept.



Aerospace Technologies 3

Our signature Aerospace Technologies offering is the Private Pilot Ground School. This rigorous class is equivalent to a college course. Knowledge gained is used in the practical test/oral exam, and the written exam—two thirds of the Private Pilot license. (The practical test/flying—in the airplane with an examiner—is the third part.)



Other high schools offer similar ground instruction courses, but we have a significant advantage. Through a very generous donation we can offer flight training. Additional fees apply, but the cost is approximately half of that charged by area flight schools. (Local organizations have taken in interest in our program; limited grant opportunities may be available to qualified students.)

The course covers the following:

- Aircraft parts, systems, controls, engines, and operations.
- Aircraft performance, weight-and-balance, and instrumentation.
- Federal Aviation Regulations, and the National Airspace System.
- Weather, including weather reporting and forecasting tools.
- Aeronautical charts, navigation, flight planning, and much more.



Students will apply for/receive an FAA Student Pilot License. The end-of-course test is the actual FAA Private Pilot Knowledge Exam.