West Cabarrus High School

STEM Academy of Aviation and Aerospace

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Disclaimer: Aviation and Aerospace electives are subject to change for us to adapt to current industry standards and certifications

STEM Academy of Aviation and Aerospace Entry Courses for ALL Tracks

	9th Grade Cohort	10th Grade Cohort
AA – Elective	**Launching Into Aviation**	**Introduction to Flight & Aircraft Systems**

Course Descriptions:

9th Grade - Launching into Aviation: 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 look at the problem-solving practices and innovative leaps that transformed space exploration from the unimaginable to the common in a single generation. Students will also gain historical perspective, starting from the earliest flying machines and leading to the wide variety of modern aircraft and the integral role they play in making today's world work.

10th Grade 1st Semester - Introduction to Flight: In the Introduction to Flight Course, students will take a closer look at the aircraft they may one day operate. Students will begin with an exploration of the types of aircraft in use today before going on to learn how aircraft are made and how they fly. Students will understand how aircraft are categorized, be able to identify their parts, and learn about aircraft construction techniques and materials. They will gain an in-depth understanding of the forces of flight—lift, weight, thrust, and drag—including how to make key calculations. They will then touch on aircraft design, looking at stability, aircraft controls, and maneuvering flight. The course will conclude with a focus on career skills related to these topics.

10th Grade 2nd Semester - Aircraft Systems: In the Aircraft Systems and Performance course, students will take an in-depth look at the systems that make manned and unmanned aircraft work as well as the instrumentation powered by those systems. Beginning with aircraft powerplants and fuel systems, students will learn about the different options available and how they affect aircraft design and performance. They will go on to explore other key aircraft systems, including electrical, pitot-static, and vacuum systems. Throughout, they will learn about the flight instruments associated with each system and how to identify and troubleshoot common problems. This unit also covers airplane flight manuals, the pilot's operating handbook, and required aircraft documents. Finally, students will learn about the factors that affect aircraft performance and how to determine critical operating data for aircraft.

	11th Grade – Aviation Track	11th Grade – Avionics Track	11th Grade – Aerospace Track
AoAA Course (CTE Elective)	**The Flying Environment & Flight Planning**	**Avionics I & Avionics II**	**Fundamentals of Aerospace Technology & Advanced Aerospace Technology**

11th Grade - Students will <u>choose one of the following</u> three tracks:

Aviation Track

11th Grade 1st Semester - The Flying Environment: 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.

11th Grade 2nd Semester - Flight Planning: The Flight Planning course will cover remaining topics necessary for students to take the Federal Aviation Administration's Private Pilot Knowledge Test. Students will learn pilot and aircraft qualifications, cross-country flight planning, weight and balance, performance and limitations, human factors, chart use, night operations, navigation systems, and aeronautical decision making. Students will be provided the opportunity to participate in multiple practice examinations. At the end of this course, a school may choose to arrange for students to be signed off to take the Federal Aviation Administration's Private Pilot written exam.

Avionics Track

11th Grade 1st Semester: Avionics I: In Avionic Systems 1, students will learn the fundamentals of aviation maintenance. Areas of focus will be technical communication including reports, electronic schematics, and test logs. Instruction will include basic aircraft wiring, DC circuits, and appropriate tools used in industry.

11th Grade 2nd Semester: Avionics II: In Avionic Systems 2, students will become proficient with aircraft drawings. Instruction will include AC circuits and components. Aircraft alternating current (AC) power will also be demonstrated. Mathematic skills will be reinforced through electronic applications.

Aerospace Track

11th Grade 1st Semester: Fundamentals of Aerospace Technology: This project-based learning course engages students who are curious about aviation and aerospace careers. This course will introduce students to an engineering design process, tools to collect and analyze data, the science of aviation, materials and structures, and safety. Students will participate in real-world experiences such as designing, building, and testing a pilot seat, kite, straw rocket, and launcher, motor-powered rocket, and a model glider.

11th Grade 2nd Semester: Advanced Aerospace Technology: This course builds on the foundation of Course 1 and engages students in applying the design process, using tools to collect and analyze data, exploring a deeper level of the science of aviation and discovering how quality control systems work in the aviation field. Students will work collaboratively in teams to design, build, and test a wing; plot a course for a plane to take off and land; design, build and test a wing attachment system; test materials under stress; and design, build and test an electric-powered plane. Students will demonstrate their newly acquired knowledge and skills by presenting their innovative ideas, techniques and solutions to business and industry partners.

	12th Grade – Aviation Track	12th Grade – Avionics Track	12th Grade – Aerospace Track
AoAA Course (CTE Elective)	**Pre-Flight Your Career & Pilot Capstone**	**Avionics III & Avionics IV**	**Aeronautics Engineering Applications & Astronautics Engineering Applications**

12th Grade - Students will continue in their chosen track:

Aviation Track

12th Grade 1st Semester – Pre-Flight Your Career: After having prepared for the Private Pilot Knowledge Test and Part 107 Remote Pilot Test in the previous year, students will examine advanced aviation topics and aviation career options. Instrument flight, commercial aviation, and advanced aircraft systems begin the semester. Looking into the future, students will then explore new horizons in the aerospace industry. What might aviation look like five, ten, or 20 years into the future? The focus then turns to business development opportunities in aviation. Finally, students will learn about and conduct different types of research in preparation for their capstone project in the second semester.

12th Grade 2nd Semester – Pilot Capstone: The capstone course is the culmination of the student learning experience. The students will work as individuals or in small groups to study and report on an approved aviation topic of their choosing. The goal of this capstone course is to allow students to demonstrate an understanding of a contemporary topic in aviation as it relates to flying. The curriculum will include presentations and activities to help guide student research and project development as well as suggestions for topics or projects that can be adapted to match available resources.

Avionics Track

12th Grade 1st Semester: Avionics III: In Avionic Systems 3, students will learn the use of semiconductor materials, transistors, and amplifiers. At this level, students will also learn to troubleshoot integrated circuits. Students will use basic electronic test equipment to measure and analyze analog circuits.

12th Grade 2nd Semester: Avionics IV: In Avionic Systems 4, students will learn advanced applications of digital circuits. Students will be able to identify arithmetic-logic circuits, encoding and decoding devices, multiplexer and demultiplexer circuits, memory circuits, and various types of digital display circuits. Instruction will include the use of fundamental microprocessors. Workplace safety guidelines and practices are reinforced.

Aerospace Track

12th Grade 1st Semester: Aeronautics Engineering Applications: This project-based learning course is for students who have successfully completed Courses 1 and 2. Students will learn about systems such as flight control, remote-control vehicles, and the virtual world. Students will learn to fly using flight simulators. They will work collaboratively to propose a shift from a VOR navigation system to a GPS system and determine the cost savings. In addition, students will develop rotor blades for helicopters and design and program an unmanned flying vehicle.

12th Grade 2nd Semester: Astronautics Engineering Applications: Students in this capstone course will focus on outer space and underwater applications. During the six projects, they will work collaboratively to design, build, and test a laser communication system; develop a plan for space survivability in hostile environments; and utilize software to create a three-dimensional model of a satellite orbit and a team remote vehicle for underwater exploration. Depending on articulation agreements or state policy, students who successfully complete the course may be able to earn dual credit.