

**Government and Public Administration Cluster
Aerospace Science: Science of Flight 200
Course Number 28.01910**

Course Description:

Aerospace Science: Flight Science Standards

The Science Georgia Standards of Excellence are designed to provide foundational knowledge and skills for all students to develop proficiency in science. The Project 2061’s Benchmarks for Science Literacy and the follow up work, A Framework for K-12 Science Education were used as the core of the standards to determine appropriate content and process skills for students. The Science Georgia Standards of Excellence focus on a limited number of core disciplinary ideas and crosscutting concepts which build from Kindergarten to high school. The standards are written with the core knowledge to be mastered integrated with the science and engineering practices needed to engage in scientific inquiry and engineering design. Crosscutting concepts are used to make connections across different science disciplines.

The Science Georgia Standards of Excellence drive instruction. Hands-on, student-centered, and inquiry-based approaches should be the emphasis of instruction. The standards are a required minimum set of expectations that show proficiency in science. However, instruction can extend beyond these minimum expectations to meet student needs.

Science consists of a way of thinking and investigating, as well a growing body of knowledge about the natural world. To become literate in science, students need to possess sufficient understanding of fundamental science content knowledge, the ability to engage in the science and engineering practices, and to use scientific and technological information correctly. Technology should be infused into the curriculum and the safety of the student should always be foremost in instruction.

The Aerospace Science: Flight Science

Georgia Standards of Excellence are designed to continue the student investigations of the sciences that began in grades K-8 and provide students the necessary skills to be proficient in Aerospace Science. These standards include more abstract concepts such as principles and physics of flight, aircraft motion and control, flight propulsion, meteorology, weather elements affecting atmospheric flight, aviation weather forecasting, human flight physiology, navigation elements, navigation planning, flight instrumentation and navigation technology. Students investigate aerospace science concepts through experiences in laboratories and field work using the science and engineering practices of asking questions and defining problems, developing and using models, planning and carrying out investigations, analyzing and interpreting data, using mathematics and computational thinking, constructing explanations and designing solutions, engaging in argument from evidence, and obtaining, evaluating, and communicating information.

Course Standard 1

GPA-AFSF2-1

The following standard is included in all CTAE courses adopted for the Career Cluster/Pathways. Teachers should incorporate the elements of this standard into lesson plans during the course. The topics listed for each element of the standard may be addressed in differentiated instruction matching the content of each course. These elements may also be addressed with specific lessons from a variety of resources. This content is not to be treated as a unit or separate body of knowledge but rather integrated into class activities as applications of the concept.

Standard: Demonstrate employability skills required by business and industry.

The following elements should be integrated throughout the content of this course.

1.1 Communicate effectively through writing, speaking, listening, reading, and interpersonal abilities.

Person-to-Person Etiquette	Telephone and Email Etiquette	Cell Phone and Internet Etiquette	Communicating At Work	Listening
Interacting with Your Boss	Telephone Conversations	Using Blogs	Improving Communication Skills	Reasons, Benefits, and Barriers
Interacting with Subordinates	Barriers to Phone conversations	Using Social Media	Effective Oral Communication	Listening Strategies

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Interacting with Co-workers	Making and Returning Calls		Effective Written Communication	Ways We Filter What We Hear
Interacting with Suppliers	Making Cold Calls		Effective Nonverbal Skills	Developing a Listening Attitude
	Handling Conference Calls		Effective Word Use	Show You Are Listening
	Handling Unsolicited Calls		Giving and Receiving Feedback	Asking Questions
				Obtaining Feedback
				Getting Others to Listen

Nonverbal Communication	Written Communication	Speaking	Applications and Effective Résumés
Communicating Nonverbally	Writing Documents	Using Language Carefully	Completing a Job Application
Reading Body Language and Mixed Messages	Constructive Criticism in Writing	One-on-One Conversations	Writing a Cover Letter
Matching Verbal and Nonverbal communication		Small Group Communication	Things to Include in a Résumé
Improving Nonverbal Indicators		Large Group Communication	Selling Yourself in a Résumé
Nonverbal Feedback		Making Speeches	Terms to Use in a Résumé
Showing Confidence Nonverbally		Involving the Audience	Describing Your Job Strengths
Showing Assertiveness		Answering Questions	Organizing Your Résumé
		Visual and Media Aids	Writing an Electronic Résumé
		Errors in Presentation	Dressing Up Your Résumé

1.2 Demonstrate creativity by asking challenging questions and applying innovative procedures and methods.

Teamwork and Problem Solving	Meeting Etiquette
Thinking Creatively	Preparation and Participation in Meetings
Taking Risks	Conducting Two-Person or Large Group Meetings
Building Team Communication	Inviting and Introducing Speakers
	Facilitating Discussions and Closing
	Preparing Visual Aids
	Virtual Meetings

1.3 Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.

Problem Solving	Customer Service	The Application Process	Interviewing Skills	Finding the Right Job
Transferable Job Skills	Gaining Trust and Interacting with Customers	Providing Information, Accuracy and Double Checking	Preparing for an Interview	Locating Jobs and Networking
Becoming a Problem Solver	Learning and Giving Customers What They Want	Online Application Process	Questions to Ask in an Interview	Job Shopping Online
Identifying a Problem	Keeping Customers Coming Back	Following Up After Submitting an Application	Things to Include in a Career Portfolio	Job Search Websites
Becoming a Critical Thinker	Seeing the Customer's Point	Effective Résumés:	Traits Employers are Seeking	Participation in Job Fairs
Managing	Selling Yourself and the Company	Matching Your Talents to a Job	Considerations Before Taking a Job	Searching the Classified Ads

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	Handling Customer Complaints	When a Résumé Should be Used		Using Employment Agencies
	Strategies for Customer Service			Landing an Internship
				Staying Motivated to Search

1.4 Model work readiness traits required for success in the workplace including integrity, honesty, accountability, punctuality, time management, and respect for diversity.

Workplace Ethics	Personal Characteristics	Employer Expectations	Business Etiquette	Communicating at Work
Demonstrating Good Work Ethic	Demonstrating a Good Attitude	Behaviors Employers Expect	Language and Behavior	Handling Anger
Behaving Appropriately	Gaining and Showing Respect	Objectionable Behaviors	Keeping Information Confidential	Dealing with Difficult Coworkers
Maintaining Honesty	Demonstrating Responsibility	Establishing Credibility	Avoiding Gossip	Dealing with a Difficult Boss
Playing Fair	Showing Dependability	Demonstrating Your Skills	Appropriate Work Email	Dealing with Difficult Customers
Using Ethical Language	Being Courteous	Building Work Relationships	Cell Phone Etiquette	Dealing with Conflict
Showing Responsibility	Gaining Coworkers' Trust		Appropriate Work Texting	
Reducing Harassment	Persevering		Understanding Copyright	
Respecting Diversity	Handling Criticism		Social Networking	
Making Truthfulness a Habit	Showing Professionalism			
Leaving a Job Ethically				

1.5 Apply the appropriate skill sets to be productive in a changing, technological, diverse workplace to be able to work independently and apply team work skills.

Expected Work Traits	Teamwork	Time Management
Demonstrating Responsibility	Teamwork Skills	Managing Time
Dealing with Information Overload	Reasons Companies Use Teams	Putting First Things First
Transferable Job Skills	Decisions Teams Make	Juggling Many Priorities
Managing Change	Team Responsibilities	Overcoming Procrastination
Adopting a New Technology	Problems That Affect Teams	Organizing Workspace and Tasks
	Expressing Yourself on a Team	Staying Organized
	Giving and Receiving Constructive Criticism	Finding More Time
		Managing Projects
		Prioritizing Personal and Work Life

1.6 Present a professional image through appearance, behavior and language.

On-the-Job Etiquette	Person-to-Person Etiquette	Communication Etiquette	Presenting Yourself
Using Professional Manners	Meeting Business Acquaintances	Creating a Good Impression	Looking Professional
Introducing People	Meeting People for the First Time	Keeping Phone Calls Professional	Dressing for Success
Appropriate Dress	Showing Politeness	Proper Use of Work Email	Showing a Professional Attitude
Business Meal Functions		Proper Use of Cell Phone	Using Good Posture
Behavior at Work Parties		Proper Use in Texting	Presenting Yourself to Associates
Behavior at Conventions			Accepting Criticism

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International Etiquette			Demonstrating Leadership
Cross-Cultural Etiquette			
Working in a Cubicle			

Support of CTAE Foundation Course Standards and Georgia Standards of Excellence L9-10RST 1-10 and L9-10WHST 1-10

Georgia Standards of Excellence ELA/Literacy standards have been written specifically for technical subjects and have been adopted as part of the official standards for all CTAE courses.

Course Standard 2

GPA-AFSF2-2

Obtain, evaluate, and communicate information about the relationship between the forces of flight.

- 2.1 Construct an explanation based on evidence using Newton's Laws of how forces affect the acceleration of a body in flight.
- 2.2 Explain and predict the motion of a body at rest and in flight in the absence of a force and when forces are applied using Newton's 1st Law (principle of inertia).
- 2.3 Calculate the acceleration for an object using Newton's 2nd Law, including situations where multiple forces act together.
- 2.4 Identify the pair of equal and opposite forces between two interacting bodies as they relate to aircraft propulsion and relate their magnitudes and directions using Newton's 3rd Law.
- 2.5 Develop and use a model of a Free Body Diagram to represent the forces acting on an object in all phases of flight.
- 2.6 Use mathematical representations to calculate magnitudes and vector components for typical flight forces including gravitational force, thrust forces, drag forces, and lift forces, in level unaccelerated flight, turning flight, climbing, and descending flight.
- 2.7 Plan and carry out an investigation to gather evidence to identify total energy and the exchanges of potential versus kinetic energy of an object throughout all phases of flight.
- 2.8 Develop and use a model to describe the mathematical relationship between total, parasite, and induced drag.
- 2.9 Develop and use models to determine the effects of various flight controls surfaces to include elevators, ailerons, rudders, flaps, elevons, slats and spoilers.

Course Standard 3

GPA-AFSF2-3

Obtain, evaluate, and communicate information about how the atmosphere affects objects in flight.

- 3.1 Construct an explanation based on evidence of the role and behavior of water and particulate matter in the atmosphere.
- 3.2 Construct an explanation based on evidence of the causes and impacts of atmospheric motion.
- 3.3 Construct an argument to compare and contrast the impact of atmospheric layers on flight.
- 3.4 Plan and carry out an investigation to gather evidence to identify the impacts of air masses, fronts and high- and low-pressure systems on objects in flight.
- 3.5 Develop and use models to describe the relationship between different topographical features and associated weather phenomena.
- 3.6 Construct an explanation based on evidence of the causes of atmospheric instability, turbulence and wind shear and their effects on objects in flight.
- 3.7 Plan and carry out an investigation demonstrating impacts of airframe and wing icing on aircraft performance.
- 3.8 Construct elements used in weather stations such as thermometers, barometers, and anemometers, and utilize them in weather reporting and forecasting.
- 3.9 Plan and carry out an investigation to gather evidence on the hazards of convective systems, atmospheric volcanic ash, and wake turbulence on flight.

Course Standard 4

GPA-AFSF2-4

Obtain, evaluate, and communicate information about the effects of human physiology on manned flight.

- 4.1 Construct an explanation based on evidence of the application of Boyle's Law, Dalton's Law and Henry's Law as they relate to aerospace physiology.
- 4.2 Plan and carry out an investigation demonstrating Boyle's, Dalton's and Henry's laws and their application to human training in hypobaric chambers.
- 4.3 Construct an argument supported by evidence of the effects of atmospheric changes on the human cardiovascular and respiratory systems.
- 4.4 Develop symptom and treatment flowcharts for altitude-induced physical effects such as hypoxia, hyperventilation, trapped gas, ear/sinus blocks, and altitude-induced decompression sickness.
- 4.5 Construct an explanation based on evidence of the effects of high g-force environments on the circulatory system.
- 4.6 Construct an explanation based on evidence of the causes and effects of spatial disorientation.
- 4.7 Plan and carry out an investigation to the efficacy of methods to counter the effects of the aerospace environment on the human body, to include aircraft pressurization, oxygen delivery, pressure suits, G-suits, flight simulation, Barany chairs, and centrifuge systems.

Course Standard 5

GPA-AFSF2-5

Obtain, evaluate, and communicate information about navigational elements and methods, planning and navigation technology.

- 5.1 Utilize navigational maps to determine locations, true and magnetic courses, and distances based on longitude and latitude coordinates.
- 5.2 Plan and carry out investigations to determine different methods of cartographic projections.
- 5.3 Plan and carry out investigations to describe differences in navigational methods, to include celestial, pilotage, dead-reckoning and electronic.
- 5.4 Plan and carry out investigations to determine how aircraft parameters affect flight planning.
- 5.5 Perform calculations related to fuel load and burn rates.
- 5.6 Perform calculations related to weight and center of gravity balance.
- 5.7 Construct an explanation based on evidence of the effects of wind and altitude selection on flight planning.
- 5.8 Construct an explanation based on the use of wind triangles and their application to air navigation.
- 5.9 Plan and carry out investigations to describe operation of inertial navigation systems.
- 5.10 Plan and carry out investigations to describe operation of radio navigation systems.
- 5.11 Plan and carry out investigations to describe operation of the global positioning systems.
- 5.12 Construct an explanation based on evidence on the principles of gyroscopic systems in aircraft instrumentation.
- 5.13 Construct an explanation on the function of pressure altimeters, airspeed, and attitude indicators.

This course has been approved as a 4th science toward GA high school graduation requirements as well as by USG Regent's approval for admissions.