

PROGRAM CONCENTRATION: Architecture, Construction, Communications & Transportation
COURSE TITLE: Foundations of Aerospace, Ground and Maritime Transportation – Seventh Grade

COURSE DESCRIPTION:

The Seventh Grade Foundations of Aerospace, Ground and Maritime Transportation Program is the intermediate transportation course for the middle school Architecture, Construction, Communications and Transportation program. The course helps students continue to build on a strong knowledge base and develop skills in the transportation sector. Tasks to be taught include knowledge of local and federal safety issues, service publications, fasteners, math and measurements, mechanical systems, oral and written communication and related physical and meteorological science principles. Mastery of these standards will help prepare students to have a competitive edge for the transportation industry.

CRITICAL COMPONENTS:

MSACCT- AST7-1: Students will demonstrate their knowledge of service publications by selecting the correct source and locating information found in each source.

- a. Identify aerospace, ground and maritime transportation service publications such as; owner's manuals, manufacturer's manuals and electronic service publications and Federal Aviation Regulations.
- b. Explain how to read a service publication in order to retrieve desired information.
- c. Describe the basic types of troubleshooting charts found in service manuals.

ACADEMIC STANDARDS:

ELA7W3: The student uses research and technology to support writing.

NATIONAL ACADEMIC STANDARDS (NATEF):

LA283: The technician uses computerized and other databases to obtain system information.

SC042: The technician uses the information in service manual charts, tables, or graphs to determine the manufacturer's specifications for system(s) operation(s) and the appropriate repair/replacement procedure and/or part.

SAMPLE TASKS:

- Students will survey shops or libraries and report the types of aerospace/transportation service information found.
- Demonstrate the use of the different types of transportation service publications by writing a short summary on a given transportation issue of interests.
- Assign students specific repairs to be made on several aerospace/transportation vehicles and require them to find the service information in various repair manuals.

MSACCT- AST7-2: Students will demonstrate their knowledge of math computations used in the aerospace, ground and maritime transportation industry.

- a. Demonstrate common math computations used in the aerospace, ground and maritime transportation industry.

- b. Identify formulas that are needed in the aerospace, ground and maritime transportation industry.
- c. Apply mathematical formulas used for distribution of consumer goods by air, ground and water.

ACADEMIC STANDARDS:

M7P1: Students will solve problems (using appropriate technology).

NATIONAL ACADEMIC STANDARDS (NATEF):

MA228: The technician can analyze and solve problems requiring the use of fractions, decimals, ratios, or percentages by a direct or indirect variation of the numerical elements of the problem.

SC349: The technician can demonstrate an understanding of the process of a vehicle's acceleration and deceleration as a function of weight and available power.

SAMPLE TASKS:

- Provide students with worksheet covering math calculations.
- Supply parts for students to measure, using both conventional and metric measure; check their measurements for accuracy.
- Use an outside micrometer to measure the diameter of familiar objects. Suggestions: a strand of hair, paper clip, lead pencil, feeler gauge, and a piece of sheet metal.
- Calculate the area of a polygon and a circle.
- Calculate the volume of a sphere, a cube and a cylinder as they relate to shipping and distribution of goods.
- Use mathematics and flight planning tools to solve flight problems such as time, distance, speed, fuel consumption and wind correction angles.
- Use weight and balance charts to determine safe operating parameters of different types of aircraft, ground, and cargo vessels.
- Solve weight and balance problems using real world examples.

MSACCT- AST7-3: Students will identify and measure fasteners used in the aerospace, ground and maritime transportation industry.

- a. Introduce the different fasteners such as; screws, bolts, washers, nuts, rivets, etc. that are used in the aerospace, ground and maritime transportation industry.
- b. Explain the functions and applications of various fasteners.
- d. Demonstrate how to measure fasteners.
- e. Identify the proper hand tools and safe uses when working with fasteners used in the aerospace, ground, and maritime transportation industry.

ACADEMIC STANDARDS:

M7P4: Students will make connections among mathematical ideas and to other disciplines.

NATIONAL ACADEMIC STANDARDS (NATEF):

SC042: The technician uses the information in service manual charts, tables, or graphs to determine the manufacturer's specifications for system(s) operation(s) and the appropriate repair/replacement procedure and/or part.

SAMPLE TASKS:

- Assign different threaded fasteners to students and require them to identify and measure each for the type of thread, size, pitch, length, and property class.
- Have students examine an aerospace/transportation vehicle to determine the types of fasteners that are commonly used.

MSACCT- AST7-4: Students will identify and measure components of an engine used in the aerospace, ground and maritime transportation industry.

- a. Introduce and explain the major components of an aerospace/transportation engine.
- b. Demonstrate how to properly measure each component.
- c. Explain the different instruments used for engine measurements.
- d. Discuss various propulsion systems for maritime vessels.

ACADEMIC STANDARDS:

M7P5: Students will use standard safety practices for all classroom laboratory and field investigations.

NATIONAL ACADEMIC STANDARDS (NATEF):

LA038: The technician collects and organizes oral and written based on discussions, notes, observations, personal experiences, and data collection that will assist in the problem analysis and solution process.

MA228: The technician can analyze and solve problems requiring the use of fractions, decimals, ratios, or percentages by a direct or indirect variation or the numerical elements of the problem.

SAMPLE TASKS:

- Show video or display overheads of the four-stroke cycle and have students identify the cycles.
- Assign different engine components to students and require them to identify and measure each for diameter, taper or out of round using a micrometer and other measuring instruments.
- Compare and contrast different types of engines used in aircraft or other transportation vehicles.

MSACCT- AST7-5: Students will demonstrate knowledge of safety, OSHA, EPA issues and procedures.

- a. Describe the typical layout and sections of an aerospace, ground and maritime transportation lab.
- b. List the types of accidents that can occur in an aerospace, ground and maritime transportation lab.
- c. Explain how to prevent aerospace, ground and maritime transportation lab accidents.

- d. Describe the general rules for the aerospace, ground and maritime transportation lab.
- e. Explain federal, state, and local rules and regulations regarding environmental issues related to the work of the aerospace, ground and maritime transportation industry.

ACADEMIC STANDARDS:

S7CS2: Students will use standard safety practices for all classroom laboratory and field investigations.

NATIONAL ACADEMIC STANDARDS (NATEF):

LA038: The technician collects and organizes oral and written information based on discussions, notes, observations, personal experiences, and data collection that will assist in the problem analysis and solution process.

SC207: The technician develops and maintains an understanding of all federal, state, and local rules and regulations regarding environmental issues related to the work of the automobile technician. The technician uses such things as government impact statements, media information, and general knowledge of pollution and waste management to correctly use and dispose of products that result from the performance of a repair task.

SAMPLE TASKS:

- Have students locate and understand MSDS Sheets over different sealants, solvents, types of oils and fuels.
- Discuss safety and health requirements for operating safe ports.
- Have students walk around the lab to identify safety hazards.
- Research the Challenger tragedy and identify safety issues that contributed to it. Indicate what could have been done differently that might have prevented this from happening.

MSACCT- AST7-6: Students will demonstrate appropriate oral and written communication on personal and professional levels.

- a. Explain the importance of clear concise communication between service technicians and customers.
- b. Contrast case studies of recent transportation events where good and poor communication had an impact.
- c. Create technical summaries of transportation stories and articles.

ACADEMIC STANDARDS:

ELA7W4: The student consistently uses the writing process to develop, revise, and evaluate writing.

NATIONAL ACADEMIC STANDARDS (NATEF):

LA267: The technician supplies clarifying information to customers, associates, the parts suppliers, and the supervisor.

SAMPLE TASKS:

- Have students complete a written report over a magazine article dealing with related information.

- Have students present an oral report over the article review.
- Have students complete a resume.
- Interpret schematic drawings of aircraft or automotive components.
- Create a diagram of an electrical circuit.
- Use Computer Aided Design to create a schematic of a cockpit instrument panel.

MSACCT- AST7-7: Students will demonstrate knowledge of related science principles.

- a. Explain the physical principles of force, work and power related to the ground, aerospace, and maritime transportation engines.
- b. Relate atmospheric principles to flight.
- c. Relate and describe buoyancy principles to maritime travels.
- d. Relate and describe drag, air flow, and related principles to ground travels.
- e. Describe the process, materials, and requirements for shipbuilding.

ACADEMIC STANDARDS:

S7CS3: Students will have the computation and estimation skills necessary for analyzing data and following scientific explanations.

NATIONAL ACADEMIC STANDARDS (NATEF):

MA171: The technician can determine the degree of conformance to the manufacturer specifications for length, volume and other appropriate measurements using the metric system.

SC282: The technician can explain the differences between heat and temperature and demonstrate an understanding of how to measure each.

SAMPLE TASKS:

- Have students complete a graphic organizer of the different types of energy produced in aerospace/transportation industry.
- Have students calculate and explain engine displacement, force, power, work, compression ratio and horsepower.
- Use a wind tunnel to illustrate effects of airspeed and angle of attack on lift.
- Define stall as loss of lift. Illustrate this concept on a flight simulator.
- Observe and record weather data using units of measurement (i.e., degrees, knots, miles per hour, etc.)
- Operate and employ weather tools (i.e. thermometer, barometer, hygrometer, etc.)
- Demonstrate proper use of weather symbols and weather coding.
- Communicate atmospheric conditions using appropriate terminology.
- Relate Bernoulli's Principle to changes in air pressure.
- Demonstrate the effect of temperature and water vapor on air density.
- Model the water cycle emphasizing cloud development and precipitation.

MSACCT- AST7-8: Students will participate in SkillsUSA activities.

- a) Establish a SkillsUSA chapter.
- b) Hold SkillsUSA chapter meetings.

- c) Attend a high school SkillsUSA event.

ACADEMIC STANDARDS:

ELA7R2: The student understands and acquires new vocabulary and uses it correctly in reading and writing.

ELA7RC2: The student participates in discussions related to curricular learning in all subject areas.

NATIONAL ACADEMIC STANDARDS (NATEF):

LA283: The technician uses computerized and other databases to obtain system information.

SAMPLE TASKS:

- Invite a high school officer to talk to chapter.
- Establish the different officers needed in the local chapter.
- Run for an office in the local chapter.
- Attend a high school SkillsUSA chapter meeting.
- Attend a regional SkillsUSA competition.
- Attend a state level SkillsUSA competition.
- Attend the SkillsUSA Career Expo.

CURRICULUM RESOURCES:

- Modern Automotive Technology
- MAVCC Safety Program
- Mitchell On Demand Service Data
- CDX Videos
- Skills/USA PDP Level 1

WEB SITES:

- www.doe.k12.ga.us/
- www.quest.nasa.gov
- www.faa.gov/education_research/education/
- www.nasm.si.edu/
- www.planemath.com/
- www.natef.org
- www.snapon.org
- www.skillsusa.org
- www.skillsusageorgia.org

READING STANDARD COMMENT:

After the elementary years, students are seriously engaged in reading for learning. This process sweeps across all disciplinary domains, extending even to the area of personal learning. Students encounter a variety of informational as well as fictional texts, and they experience text in all genres and modes of discourse. In the study of various disciplines of learning (language arts, mathematics, science, social studies), students must learn through reading the communities of discourse of each of those disciplines. Each subject has its own specific vocabulary, and for students to excel in all subjects, they must learn the specific vocabulary of those subject areas *in context*.

Beginning with the middle grade years, students begin to self-select reading materials based on personal interests established through classroom learning. Students become curious about science, mathematics, history, and literature as they form contexts for those subjects related to their personal and classroom experiences. As students explore academic areas through reading, they develop favorite subjects and become confident in their verbal discourse about those subjects.

Reading across curriculum content develops both academic and personal interests in students. As students read, they develop both content and contextual vocabulary. They also build good habits for reading, researching, and learning. The Reading Across the Curriculum standard focuses on the academic and personal skills students acquire as they read in all areas of learning.

CTAEMRC-1: Students will enhance reading in all curriculum areas by:

- a. Reading in all curriculum areas.
 - Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas.
 - Read both informational and fictional texts in a variety of genres and modes of discourse.
 - Read technical texts related to various subject areas.
- b. Discussing books.
 - Discuss messages and themes from books in all subject areas.
 - Respond to a variety of texts in multiple modes of discourse.
 - Relate messages and themes from one subject area to messages and themes in another area.
 - Evaluate the merit of texts in every subject discipline.
 - Examine author's purpose in writing.
 - Recognize the features of disciplinary texts.
- c. Building vocabulary knowledge.
 - Demonstrate an understanding of contextual vocabulary in various subjects.
 - Use content vocabulary in writing and speaking.
 - Explore understanding of new words found in subject area texts.
- d. Establishing context.
 - Explore life experiences related to subject area content.
 - Discuss in both writing and speaking how certain words are subject area related.
 - Determine strategies for finding content and contextual meaning for unknown words.

WRITING:

The student writes clear, coherent text. The writing shows consideration of the audience and purpose. The student progresses through the stages of the writing process (e.g., prewriting, drafting, revising, and editing successive versions).

CTAEW-1: The student demonstrates competence in a variety of genres.

The student produces technical writing (business correspondence: memoranda, emails, letters of inquiry, letters of complaint, instructions and procedures, lab reports, slide presentations) that:

- a) Creates or follows an organizing structure appropriate to purpose, audience, and context.
- b) Excludes extraneous and inappropriate information.
- c) Follows an organizational pattern appropriate to the type of composition.
- d) Applies rules of Standard English.

CTAEW-2: The student uses research and technology to support writing.

The student:

- a) Identifies topics, asks and evaluates questions, and develops ideas leading to inquiry, investigation, and research.

- b) Uses organizational features of electronic text (e.g., bulletin boards, databases, keyword searches, e-mail addresses) to locate relevant information.
- c) Includes researched information in different types of products (e.g., compositions, multimedia presentations, graphic organizers, projects, etc.).
- d) Uses appropriate structures to ensure coherence (e.g., transition elements).
- e) Supports statements and claims with anecdotes, descriptions, facts and statistics, and specific examples.
- f) Gives credit for both quoted and paraphrased information in a bibliography by using a consistent and sanctioned format and methodology for citations.

CTAEW-3: The student consistently uses the writing process to develop, revise, and evaluate writing.

The student:

- a) Plans and drafts independently and resourcefully.
- b) Uses strategies of note taking, outlining, and summarizing to impose structure on composition drafts.
- c) Edits writing to improve word choice after checking the precision of the vocabulary

ENTREPRENEURSHIP:

MKT-EN-1: Understands concepts and processes associated with successful entrepreneurial performance.

- a) Define entrepreneurship.
- b) Identify and analyze characteristics of a successful entrepreneur.
- c) Identify the reasons for planning in entrepreneurial businesses.
- d) Discuss the entrepreneurial discovery processes.
- e) Assess global trends and opportunities.
- f) Determine opportunities for business creation.
- g) Generate ideas for business.
- h) Determine feasibility of ideas.
- i) Determine the major reasons for business failure.

ACADEMIC STANDARDS:

ELA8W1: The student produces writing that establishes an appropriate organizational structure, sets a context and engages the reader, maintains a coherent focus throughout, and signals a satisfying closure.

ELA8W3: The student uses research and technology to support writing.

SSEF6: The student will explain how productivity, economic growth and future standards of living are influenced by investment in factories, machinery, new technology and the health, education and training of people.

SSEIN1: The student will explain why individuals, businesses and governments trade goods and services.

MKT-EN-2: Explain the fundamental concepts of business ownership.

- a) Determine the relationship of competition to our private, free enterprise system.
- b) Explain the effects of competition on buyers and sellers.
- c) Identify the common types of business ownership.
- d) Compare and contrast the advantages and disadvantages of each type of ownership.
- e) Explain relevant government regulations relating to the operation of a business.
- f) Discuss the types of risks that businesses encounter.
- g) Explain how businesses deal with the various types of risks.
- h) Identify the market segment for the business.
- i) Formulate a marketing mix designed to reach a specific market segment.
- j) Utilize the marketing functions to determine the competitive advantage of the proposed business.

ACADEMIC STANDARDS:

ELA8W1: The student produces writing that establishes an appropriate organizational structure, sets a context and engages the reader, maintains a coherent focus throughout, and signals a satisfying closure.

ELA8W3: The student uses research and technology to support writing.

SSEF5: The student will describe the roles of government in a market economy.

CTAE FOUNDATION SKILLS:

The Foundation Skills for Career, Technical and Agricultural Education (CTAE) are critical competencies that students pursuing any career pathway should exhibit to be successful. As core standards for all career pathways in all program concentrations, these skills link career, technical and agricultural education to the state's academic performance standards.

The CTAE Foundation Skills are aligned to the foundation of the U.S. Department of Education's 16 Career Clusters. Endorsed by the National Career Technical Education Foundation (NCTEF) and the National Association of State Directors of Career Technical Education Consortium (NASDCTEc), the foundation skills were developed from an analysis of all pathways in the sixteen occupational areas. These standards were identified and validated by a national advisory group of employers, secondary and postsecondary educators, labor associations, and other stakeholders. The Knowledge and Skills provide learners a broad foundation for managing lifelong learning and career transitions in a rapidly changing economy.

CTAE-FS-1 Technical Skills: Learners achieve technical content skills necessary to pursue the full range of careers for all pathways in the program concentration.

CTAE-FS-2 Academic Foundations: Learners achieve state academic standards at or above grade level.

CTAE-FS-3 Communications: Learners use various communication skills in expressing and interpreting information.

CTAE-FS-4 Problem Solving and Critical Thinking: Learners define and solve problems, and use problem-solving and improvement methods and tools.

CTAE-FS-5 Information Technology Applications: Learners use multiple information technology devices to access, organize, process, transmit, and communicate information.

CTAE-FS-6 Systems: Learners understand a variety of organizational structures and functions.

CTAE-FS-7 Safety, Health and Environment: Learners employ safety, health and environmental management systems in corporations and comprehend their importance to organizational performance and regulatory compliance.

CTAE-FS-8 Leadership and Teamwork: Learners apply leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives.

CTAE-FS-9 Ethics and Legal Responsibilities: Learners commit to work ethics, behavior, and legal responsibilities in the workplace.

CTAE-FS-10 Career Development: Learners plan and manage academic-career plans and employment relations.

CTAE-FS-11 Entrepreneurship: Learners demonstrate understanding of concepts, processes, and behaviors associated with successful entrepreneurial performance.