

PROGRAM CONCENTRATION: Architecture, Construction, Communications & Transportation
COURSE TITLE: Investigation into Aerospace, Ground, and Maritime Transportation– Eighth Grade

COURSE DESCRIPTION:

The Eighth Grade Aerospace, Ground, and Maritime Transportation Technology Program is the course helping students continue to build on a strong knowledge base and develop skills related to the transportation sector. Tasks to be taught include knowledge of local and federal safety issues, entrepreneurship, vehicle maintenance, basic electricity and electronics, electrical wiring and circuits, oral and written communication and related physical science principles. Mastery of these standards will help prepare students for further studies in choosing a high school Career Pathway in Architecture, Construction, Communications and Transportation.

CRITICAL COMPONENTS:

MSACCT- AST8-1: Students will develop an aerospace, ground, and maritime transportation business ownership plan.

- a. Identify common types of business ownership related to the transportation industry.
- b. Explain relevant government regulations relating to the operation of a transportation related business.
- c. Discuss the types of risks that transportation businesses encounter.
- d. Invite a local business owner from a related field to speak to the class.

ACADEMIC STANDARDS:

SS8E3: The student will evaluate the influence of Georgia's economic growth and development.

NATIONAL ACADEMIC STANDARDS (NATEF):

LA074: The technician composes complete and accurate paragraphs that include information regarding symptoms, diagnosis results, and appropriate details when preparing warranty claims and information for inclusion on work orders.

MA229: The technician can identify the specific cause of the described problem by generating conclusions based on known symptoms related to the problem.

SC007: 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:

- Students will select a business that they would like to own and develop a layout.
- Students will survey shops like the one they have chosen and determine what it would take to start their business.
- Develop an excel program to list the tools, equipment, labor and their prices.
- Students will examine the costs involved with operating the business to determine the volume of work needed to keep the doors open.

- Visit an airport facility and complete a survey of the requirements for operating that type of business.

MSACCT- AST8-2: 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:

S8CS2: Students will use standard 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 the different fluids used in the assigned vehicle.
- Have students walk around the lab to identify safety hazards.
- Create a skit that compares safe practices with unsafe practices.
- Invite an aircraft owner or mechanic to explain aircraft maintenance requirements.

MSACCT- AST8-3: Students will inspect an aerospace, ground, and maritime transportation vehicle for maintenance needed for safe operation.

- a. Explain the importance of vehicle maintenance.
- b. Demonstrate how to check fluid levels, belts, hoses, tires, etc.
- c. Demonstrate safe practices while working with fluids.

ACADEMIC STANDARDS:

S8CS4: Students will use tools and instruments for observing, measuring, and manipulating equipment and materials in scientific activities utilizing safe laboratory procedures.

NATIONAL ACADEMIC STANDARDS (NATEF):

- LA074: The technician composes complete and accurate paragraphs that include information regarding symptoms, diagnosis results, and appropriate details when preparing warranty claims and information for inclusion on work orders.*
- MA229: The technician can identify the specific cause of the described problem by generating conclusions based on known symptoms related to the problem.*
- SC007: 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:

- Assign students a vehicle to inspect all fluid levels, belts, hoses, lights, windshield wiper blades, and tire pressures.
- Assign students a vehicle to perform lubrication jobs on live work.
- Visit a local airport and help preflight an airplane.
- Visit an aircraft maintenance facility and observe ongoing maintenance procedures on the airframe and different aircraft systems.

MSACCT- AST8-4: Students will demonstrate their understanding of basic electricity and electronics by calculating and measuring voltage, resistance and amperage. Students will demonstrate knowledge of science principles related to electrical and electronics.

- a. Explain the principles of electricity.
- b. Describe the basic electrical circuits.
- c. Identify basic electrical and electronic terms and components.

ACADEMIC STANDARDS:

- S8P5: Students will recognize characteristics of gravity, electricity, and magnetism as major kinds of forces acting in nature.*

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.*
- MA226: The technician can use conventional symbols (E for voltage, etc.) to solve problems using formulas such as Ohm's Law, $E=IR$.*
- SC177: The technician can demonstrate an understanding of and explain the properties of electricity that impact the lighting, engine management, and other electrical systems in the vehicle.*

SAMPLE TASKS:

- Show video or display overheads of ohms law and simple electrical circuits.
- Assign information sheets over ohms law, series and parallel circuits.

- Build a circuit using a bread board, components and a power source to measure voltage, resistance, and amperage.
- Have students complete handouts over atoms, wiring diagrams and magnetic forces.
- Have students use a compass to test magnetic fields.
- Have students use a wiring diagram to trace a wire in a circuit.

MSACCT- AST8-5: Students will repair and build electrical circuits.

- a. Explain different kinds of aerospace/transportation vehicle wiring.
- b. Demonstrate fundamental electrical testing.

ACADEMIC STANDARDS:

S8P5: Students will recognize characteristics of gravity, electricity, and magnetism as major kinds of forces acting in nature.

NATIONAL ACADEMIC STANDARDS (NATEF):

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

MA001: The technician can use Ohm's Law to determine circuit parameters that are out of tolerance.

SC177: The technician can demonstrate an understanding of and explain the properties of electricity that impact the lighting, engine management, and other electrical systems in the vehicle.

SAMPLE TASKS:

- Have students perform wiring repairs.
- Have students build and test electrical lighting circuits using a training assembly.
- Have students build and test electrical motor circuits using a training assembly.

TRAINING AIDS:

- A-Tech Trainers

MSACCT- AST8-6: Students will diagnose, adjust and repair suspension and steering systems concerns related to aerospace, ground and maritime.

- a. Identify terminology
- b. Identify and interpret suspension and steering systems concerns; determine necessary action.
- c. Diagnose steering system for binding, uneven turning effort, looseness, hard steering, noise, and fluid leakage concerns; determine necessary action.
- d. Diagnose suspension system noises, sway, and uneven riding height concerns; determine necessary action.
- e. Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concerns; determine necessary action.

ACADEMIC STANDARDS:

S8CS4: Students will use tools and instruments for observing, measuring, and manipulating equipment and materials in scientific activities utilizing safe laboratory procedures.

NATIONAL ACADEMIC STANDARDS (NATEF):

NATEF IVA-2: Identify and interpret suspension and steering system concerns; determine necessary action.

NATEF IVB-4: Diagnose power steering gear (non-rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; determine necessary action.

NATEF IVC-2: Diagnose strut suspension system noises, body sway, and uneven ride height concerns; determine necessary action.

NATEF IVD-1: Inspect, remove, and replace shock absorbers.

SAMPLE TASKS:

- Students will complete terminology activities and master parts and components of selected suspension and steering systems dependent on type of transportation.
- Students will listen and be able to provide preliminary diagnosis of steering and suspension system issues in need of repair and write a paragraph and communicate necessary steps to fix type of steering problems and repair suspension issues.
- Students will diagnose steering complications in various vehicles using appropriate technologies, develop a plan to resolve problems and communicate necessary steps to fix.

MSACCT- AST8-7: Students will diagnose, adjust and repair braking system concerns related to aerospace, ground and maritime.

- a. Identify terminology
- b. Identify and interpret brake system concerns; determine necessary action.
- c. Diagnose poor stopping, pulling or dragging concerns caused by malfunctions in the hydraulic system; determine necessary action.
- d. Disassemble and clean brake assembly; inspect parts for wear, rust, scoring, and damage; replace seal, boot, and damaged or worn parts.

ACADEMIC STANDARDS:

S8CS4: Students will use tools and instruments for observing, measuring, and manipulating equipment and materials in scientific activities utilizing safe laboratory procedures.

NATIONAL ACADEMIC STANDARDS (NATEF):

NATEF VA-2: Identify and interpret brake system concern; determine necessary action.

NATEF VB-5: Diagnose poor stopping, pulling or dragging concerns caused by malfunctions in the hydraulic system; determine necessary action.

NATEF VD-5: Disassemble and clean caliper assembly; inspect parts for wear, rust, scoring, and damage; replace seal, boot, and damaged or worn parts.

SAMPLE TASKS:

- Students will complete terminology activities and master parts and components of selected brake systems dependent on type of transportation.
- Students will listen and be able to provide preliminary diagnosis of brake system issues in need of repair and write a paragraph and communicate necessary steps to fix type of brake problem.

- Students will disassemble and reassemble an entire brake assembly using appropriate technologies to resolve problems and communicate necessary steps to fix.

MSACCT- AST8-8: Students will diagnose, adjust and repair engine performance system concerns related to aerospace, ground and maritime.

- a. Identify terminology
- b. Identify and interpret engine performance concern; determine necessary action.
- c. Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns with an oscilloscope and/or engine diagnostic equipment; determine necessary action.

ACADEMIC STANDARDS:

S8CS4: Students will use tools and instruments for observing, measuring, and manipulating equipment and materials in scientific activities utilizing safe laboratory procedures.

NATIONAL ACADEMIC STANDARDS (NATEF):

NATEF VIIIA-2: Identify and interpret engine performance concern; determine necessary action.

NATEF VIIIA-13: Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test, and obtain exhaust readings; interpret readings, and determine necessary action.

SAMPLE TASKS:

- Students will complete terminology activities and master parts and components of selected engines.
- Students will listen and be able to provide preliminary diagnosis of engines in need of repair and write a paragraph and communicate necessary steps to fix engine.
- Students will work with specific systems in an engine using appropriate technologies to resolve problems and communicate necessary steps to fix.

MSACCT- AST8-9: Students will demonstrate Aircraft Support skills as they relate to maintenance, flight planning and communication.

- a. Identify aircraft terminology.
- b. Utilize aircraft drawings and blueprints to determine maintenance points, critical preflight inspections, servicing, and flight planning.
- c. Develop understandings and workings of aircraft control surfaces, how they are wired, and how they control the aircraft.

ACADEMIC STANDARDS:

S8P2: Students will be familiar with the forms and transformations of energy.

S8P3: Students will investigate relationship between force, mass, and the motion of objects.

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.

NATIONAL ACADEMIC STANDARDS (NATEF):

MA229: The technician can identify the specific cause of the described problem by generating conclusions based on known symptoms related to the problem.

MA226: The technician can use conventional symbols (E for voltage, etc.) to solve problems using formulas such as Ohm's Law, $E=IR$.

SAMPLE TASKS:

- Students will plan a flight using current weather, weather observations, and flight restrictions.
- Students will conduct a preflight inspection of an aircraft.
- Students will review aircraft maintenance logs to assure compliance with current FAR's.
- Students will conduct tests on fuel and oil for contaminants.

MSACCT- AST8-10: Students will relate applicable laws of science to aircraft performance and aviation weather.

- a. Identify systems of an aircraft where Boyle's, Charles', Pascal's Laws and Bernouli's Principle apply.
- b. Determine relationships between force, mass and motion.
- c. Understand the relationship between air pressure, temperature and density.

ACADEMIC STANDARDS:

S8P2: Students will be familiar with the forms and transformations of energy.

S8P3: Students will investigate relationship between force, mass, and the motion of objects.

S8P5: Students will recognize characteristics of gravity, electricity, and magnetism as major kinds of forces acting in nature.

NATIONAL ACADEMIC STANDARDS (NATEF):

SC177: The technician can demonstrate an understanding of and explain the properties of electricity that impact the lighting, engine management, and other electrical systems in the vehicle.

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

SAMPLE TASKS:

- Build a model aircraft that includes control surfaces to explore the principles of force, mass and motion.
- Demonstrate the layers of the atmosphere indicating where meteorological weather conditions occur. Include information on temperatures, density, water vapor, and air currents.
- Relate basic scientific principles to the operation of aircraft instruments (altimeter, airspeed indicator, bank and turn coordinator, vertical speed indicator,

MSACCT- AST8-11: 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:

ELA8W4: 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 prepare a complete cross-country flight plan including current local weather conditions.

MSACCT- AST8-12: Students will participate in all areas of SkillsUSA.

- a) Establish and maintain a SkillsUSA chapter.
- b) Research SkillsUSA competitions on both a state and national level.
- c) Participate in SkillsUSA competitions.

ACADEMIC STANDARDS:

ELA8RC3: The student acquires new vocabulary in each content area and uses it correctly.

ELA8RC2: 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:

- Attend SkillsUSA meetings.
- Compete in a SkillsUSA competition.
- Attend a regional or state SkillsUSA competition.

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.