

FY 2022 Transportation Systems Career Field Pathways and Course Structure

Ground Transportation T9 Pathway Courses	Air Transportation TA Pathway Courses
<p>Ground Transportation Maintenance^{2,4}</p> <p>Ground Transportation Engine & Power Train</p> <p>Ground Transportation Electrical/Electronics</p> <p>Ground Transportation HVAC</p> <p>Automotive Engine Performance</p> <p>Automotive Braking Systems</p> <p>Automotive Steering and Suspension Systems</p> <p>Truck Diesel Engines</p> <p>Truck Braking Systems</p> <p>Truck Steering and Suspension Systems</p> <p>Sports/Recreational Power Systems</p> <p>Collision Electrical & Mechanical Systems</p> <p>Collision Structural Inspection & Repair</p> <p>Collision Nonstructural Inspection & Repair</p> <p>Collision Painting & Refinishing</p> <p>Hydraulics and Pneumatics</p> <p>Outdoor Power Technology</p> <p>Transportation Capstone³</p>	<p>Aviation^{2,4}</p> <p>Aviation Maintenance General⁴</p> <p>Aviation Structure and Design</p> <p>Aviation Airframe Systems and Components</p> <p>Aviation Powerplant Theory and Maintenance</p> <p>Aviation Powerplant Systems and Components</p> <p>Aviation Meteorology⁴</p> <p>Aviation Airport Management⁴</p> <p>Aviation Pilot Training</p> <p>Aviation Air Traffic Control</p> <p>Unmanned Aircraft Systems⁴</p> <p>Transportation Capstone³</p>

¹First course in the Career Field; ²First course in the Pathway; ³Does not count as one of the required four courses;

⁴CTAG Available

Courses in Ground Transportation (T9)

Pathway Courses	Subject Code
Ground Transportation Maintenance ^{2,4}	177000
Ground Transportation Engine & Power Train	177001
Ground Transportation Electrical/Electronics	177002
Ground Transportation HVAC	177004
Automotive Engine Performance	177006
Automotive Braking Systems	177030
Automotive Steering and Suspension Systems	177031
Truck Diesel Engines	177007
Truck Braking Systems	177032
Truck Steering and Suspension Systems	177033
Sports/Recreational Power Systems	177008
Collision Electrical & Mechanical Systems	177009
Collision Structural Inspection & Repair	177010
Collision Nonstructural Inspection & Repair	177011
Collision Painting & Refinishing	177012
Hydraulics and Pneumatics	010225
Outdoor Power Technology	010235
Transportation Capstone ³	177023

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Ground Transportation Maintenance

Subject Code: 177000

In this first course, students will apply skills needed to inspect and perform general service on vehicles. Students will research applicable service information and technical service bulletins and perform maintenance on vehicles. Students will inspect and service engine, drive train, suspension, steering, electrical and braking systems. Students will perform ignition maintenance including spark plug/glow plug and ignition wire and coil pack replacement. Additionally, students change fluids, filters and inspect vehicles for leaks and fluid condition.

Ground Transportation Engine and Power Train

Subject Code: 177001

Students will inspect, adjust and repair internal combustion engines and drivetrain. Topics include physical and mechanical principles of engines, transmissions and transaxles, differentials and cooling systems. Students will learn precision measurement, inspection, and reconditioning techniques. Students will also identify customer's needs, determine labor rates, and create estimates.

Ground Transportation Electrical/Electronics

Subject Code: 177002

Student will diagnose and repair vehicle electrical systems, including chassis electrical, charging, starting and lighting systems. Students will learn the fundamentals of direct current (DC) electronics including series, parallel, and series-parallel circuits. Students will use electronic diagnostic tools, read schematics, and use printed and electronic resources to troubleshoot electrical circuits, test components and replace defective modules.

Ground Transportation HVAC

Subject Code: 177004

Students will learn principles of heating, ventilation and air conditioning systems (HVAC) for use in motor vehicles. They will also inspect, diagnose, repair and maintain vehicle air conditioning and heating systems. Students will use service equipment to evacuate, store and charge the air conditioning system. An emphasis will be given to the safe handling of refrigerants following EPA regulations.

Automotive Engine Performance

Subject Code: 177006

Students will research vehicle service histories using model specific service bulletins. Students will test and diagnose for engine performance in fuel, air induction and exhaust systems using advanced testing procedures. Topics include computerized engine controls including retrieving and recording diagnostic trouble codes using On Board Diagnostics (OBD). Additionally, students will diagnose drivability and emissions problems resulting from malfunctions of interrelated systems.

Automotive Brake Systems

Subject Code: 177030

Students will perform inspections, troubleshoot malfunctions and service automotive brake systems. Students will identify poor performing hydraulic brake systems and replace malfunctioning components. Additionally, students will disable and enable supplemental restraint systems (SRS) and replace antilock brake systems components.

Automotive Steering and Suspension Systems

Subject Code: 177031

Students will perform inspections, troubleshoot malfunctions and service automotive undercarriage systems. Students will install coil and leaf springs, shock absorbers and struts, and replace wheel bearings. Students will inspect and replace automotive steering components and perform wheel alignments.

Truck Diesel Engines

Subject Code: 177007

Students will inspect, diagnose, and repair diesel truck engines. Students will learn the principles of valve train assemblies, lubrication, intake, exhaust and fuel systems. Additionally, skill development in engine testing, inspection and repair of electronic fuel management systems are emphasized. Students will break down and assemble heavy truck engines and supporting systems.

Truck Braking Systems

Subject Code: 177032

Students perform inspections, troubleshoot malfunctions, and service truck brake systems. Students identify poor performing air brake systems and replace malfunctioning components. Identifying workplace risk factors associated with repetitive motion and lifting, operating, and moving of heavy objects are emphasized.

Truck Steering and Suspension Systems

Subject Code: 177033

Students perform inspections, troubleshoot malfunctions, and service truck undercarriage systems. Students will install leaf springs, shock absorbers and air suspension components. Students inspect and replace truck steering components and replace wheel bearings. Additionally, students will perform wheel alignment and tire inspections, diagnostics, and repair. Identifying workplace risk factors associated with repetitive motion and lifting, operating, and moving of heavy objects are emphasized.

Sports/Recreational Power Systems

Subject Code: 177008

Students learn principles and skills to maintain and repair sports/recreational vehicles. Students will inspect, diagnose, and repair engine, drive train, and suspension systems. Students remove, disassemble, and repair components in engine cylinder head and block assemblies. Students inspect, adjust and repair drivetrain systems including shaft and chain drive components. Additionally, students will inspect, adjust and replace suspension components including shocks, seals and springs. Students will maintain and adjust systems specific to specialized vehicles.

Collision Electrical and Mechanical Systems

Subject Code: 177009

Students will perform inspections and repair electrical and mechanical damage due to collision. Topics include electrical and wiring harness, suspension, braking and cooling system repairs. Students will service supplemental restraint systems (SRS) and ensure the integrity of the systems.

Collision Structural Inspection and Repair

Subject Code: 177010

Students will perform automotive collision repair of full and unibody frames and attach non-structural components. Students will apply the skills and knowledge needed to measure and diagnose structural damage, create a parts list, and determine labor costs. Students will remove and replace damaged structural components. Emphasis will be given to joining and cutting aluminum, steel and other metals. Students will maintain tools and facilities while complying with personal and environmental safety practices.

Collision Nonstructural Inspection and Repair

Subject Code: 177011

Students will learn the skills and knowledge of automotive body panel repairs, replacements, and adjustments. Students will analyze, document, prepare estimates and repair nonstructural collision damage. Students will remove corrosion protection, undercoating, sealer, and other protective coatings as necessary to perform repairs. Emphasis will be given to joining and cutting aluminum, steel and other metals. Students will maintain tools and facilities while complying with personal and environmental safety practices.

Collision Painting and Refinishing

Subject Code: 177012

Students will restore and refinish vehicle exterior body and paint finish. Students will inspect and identify substrate, type of finish, surface condition, and film thickness; develop and execute a plan for refinishing using a total product system. Students will inspect, clean, and determine condition of spray guns and related equipment. Additionally, students will observe safety precautions when using hazardous materials.

Hydraulics and Pneumatics

Subject Code: 010225

Students will learn to diagnose, repair and rebuild hydraulic systems and their components. Students will learn the physical and mechanical principles of both hydraulic and hydrostatic operating units. Topics include testing system components and properly maintaining hydraulic and hydrostatic circuits. Students will demonstrate contamination control and system cleanliness in both hydraulic and hydrostatic operating systems. Throughout the course, site and personal safety procedures and business practices are reinforced.

Outdoor Power Technology

Subject Code: 010235

Students will perform technical skills needed to maintain, diagnose and repair outdoor power equipment. Students will learn the theory of power and examine the aspects of repairing various engines, drive trains, and ancillary systems that make up modern small engine powered equipment. In addition, students will develop troubleshooting skills for 2- and 4-stroke engines, electrical and fuel systems. Throughout the course, site and personal safety procedures along with business principles will be emphasized.

Transportation Capstone

Subject Code: 177023

The capstone course provides opportunities for students to apply knowledge, attitudes and skills that were learned in Transportation program in a more comprehensive and authentic way. Capstones often include project/problem-based learning opportunities that occur both in and away from school. Under supervision of the school and through community partnerships, students may combine classroom learning with work experience. This course can be delivered through a variety of delivery methods including cooperative education or apprenticeship.

Courses in Air Transportation (TA)

Pathway Courses	Subject Code
Aviation ^{2,4}	177013
Aviation Maintenance General ⁴	177014
Aviation Structure and Design	177015
Aviation Airframe Systems and Components	177016
Aviation Powerplant Theory and Maintenance	177017
Aviation Powerplant Systems and Components	177018
Aviation Meteorology ⁴	177019
Aviation Airport Management ⁴	177020
Aviation Pilot Training	177021
Aviation Air Traffic Control	177022
Unmanned Aircraft Systems ⁴	177024
Transportation Capstone ³	177023

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Aviation

Subject Code: 177013

In this first course, students apply knowledge of aviation theory and navigation to flight performance and planning. Students will apply principles of simple machines and fluid mechanics to aircraft operations. Identification of aircraft engines and airframe related systems will be emphasized. Weather theories and concepts are used to interpret weather-briefing documents. Additionally, students will distinguish among airport environments, and understand rules, regulations and orders relevant to the airport industry.

Aviation Maintenance General

Subject Code: 177014

In this first course, students apply knowledge of aviation theory and navigation to flight performance and planning. Students will apply principles of simple machines and fluid mechanics to aircraft operations. Identification of aircraft engines and airframe related systems will be emphasized. Weather theories and concepts are used to interpret weather-briefing documents. Additionally, students will distinguish among airport environments, and understand rules, regulations and orders relevant to the airport industry.

Aviation Structure and Design

Subject Code: 177015

Students will inspect, repair, and refinish aircraft airframes and external components. Students will rig rotary and fixed-wing aircraft, evaluate and repair sheet metal and nonmetallic structures. Students will form, lay out, bend and join metal airframe components using welding processes, rivets and fasteners. Students will inspect, repair and assemble wooden, metal, aluminum, fiberglass and composite components. Students will inspect and repair external finishes including surface preparation and refinishing.

Aviation Airframe System and Components

Subject Code: 177016

Students will learn the major components of an airframe system. Students will inspect, repair, and install instrument, communication and navigation systems. Additionally, students will evaluate and service airframe electrical systems including position, warning, hazard control, ignition systems.

Aviation Powerplant Theory and Maintenance

Subject Code: 177017

Students will learn the principles of theory, operation, and maintenance of powerplant electrical systems including ignition, starting, and fire protection. Students will inspect, repair, and install aircraft powerplants including reciprocating, radial, and turbine engines. Students examine and service systems that support each engine type including fuel, lubrication and cooling. Additionally, will perform powerplant conformity and airworthiness inspections, troubleshoot malfunctions and service aircraft to assure continued operation and reliability.

Aviation Powerplant Systems and Components

Subject Code: 177018

Students will inspect, repair and replace fuel systems for fixed and rotary wing aircraft. Topics will include troubleshooting and servicing fuel management transfer, pressure fueling, fluid quantity, fuel indicator and temperature warning systems. Additionally, students will evaluate and service unducted fan, fuel dump, and induction and exhaust systems including heat exchangers and superchargers. Students will perform planned preventative maintenance on tools and equipment, and maintain a clean and safe work environment.

Aviation Meteorology

Subject Code: 177019

Learners apply principles of meteorology forecasting to aviation. Students will take, record, encode, and disseminate surface weather observations using forecasting equipment. Topics include concepts of aviation meteorology in the study of temperature, pressure, moisture, stability, clouds, air masses, fronts, thunderstorms, icing, and fog. Additionally, students will interpret and use of weather information for pre-flight and in-flight support to aviation.

Aviation Airport Management

Subject Code: 177020

Learners will distinguish between controlled and nontowered fields and apply management principles to airport environments. Students will interpret and use weather, Automatic Terminal Information Systems (ATIS), and Traffic Collision Avoidance Systems (TCAS) to control aircraft operations. Students will sequence aircraft approaches and departures with approach control radar. Students will interpret and use airport lighting, navigation principles and avionics communication systems including Very High Frequency (VHF), Ultra-High Frequency (UHF), radio and phraseology.

Aviation Pilot Training

Subject Code: 177021

Students will learn the essentials of piloting an aircraft. Students will learn principles of aircraft operations, air traffic control, meteorology, and navigation. Students learn aircraft performance functions including spins, recovery, stalls, landings and takeoffs. Additionally, students learn to use aircraft instruments and flight controls. Students will apply skills to tie-off, transfer and defuel aircraft. An emphasis is given to Federal Aviation Administration regulations, and mitigation of personal and aviation hazards.

Aviation Air Traffic Control

Subject Code: 177022

Students will learn and simulate fundamentals of air traffic control. Subjects taught include principles of aircraft tracking using radar and transponders, controlling aircraft departures, takeoffs, ground operation and in air flight control. Students will learn and simulate techniques of sequencing aircraft approaches and departures using approach control radar. Students will study concepts of meteorology, the flight environment, identification of emergency codes, fundamental aspects of flight and air navigation.

Aviation Unmanned Aircraft Systems

Subject Code: 177024

Students will learn and simulate fundamentals of air traffic control. Subjects taught include principles of aircraft tracking using radar and transponders, controlling aircraft departures, takeoffs, ground operation and in air flight control. Students will learn and simulate techniques of sequencing aircraft approaches and departures using approach control radar. Students will study concepts of meteorology, the flight environment, identification of emergency codes, fundamental aspects of flight and air navigation.

Transportation Capstone

Subject Code: 177023

The capstone course provides opportunities for students to apply knowledge, attitudes and skills that were learned in Transportation program in a more comprehensive and authentic way. Capstones often include project/problem-based learning opportunities that occur both in and away from school. Under supervision of the school and through community partnerships, students may combine classroom learning with work experience. This course can be delivered through a variety of delivery methods including cooperative education or apprenticeship.