## Courses in Ground Transportation (T9)

<table>
<thead>
<tr>
<th>PATHWAY COURSES</th>
<th>SUBJECT CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground Transportation Maintenance</td>
<td>177000</td>
</tr>
<tr>
<td>Ground Transportation Engine and Power Train</td>
<td>177001</td>
</tr>
<tr>
<td>Ground Transportation Electrical/Electronics</td>
<td>177002</td>
</tr>
<tr>
<td>Automotive Braking, Suspension, and Steering Systems</td>
<td>177003</td>
</tr>
<tr>
<td>Ground Transportation HVAC</td>
<td>177004</td>
</tr>
<tr>
<td>Sports/Recreational Power Systems</td>
<td>177008</td>
</tr>
<tr>
<td>Truck Braking, Suspension, and Steering Systems</td>
<td>177005</td>
</tr>
<tr>
<td>Automotive Engine Performance</td>
<td>177006</td>
</tr>
<tr>
<td>Truck Diesel Engines</td>
<td>177007</td>
</tr>
<tr>
<td>Collision Electrical &amp; Mechanical Systems</td>
<td>177009</td>
</tr>
<tr>
<td>Collision Structural Inspection &amp; Repair</td>
<td>177010</td>
</tr>
<tr>
<td>Collision Nonstructural Inspection &amp; Repair</td>
<td>177011</td>
</tr>
<tr>
<td>Collision Painting &amp; Refinishing</td>
<td>177012</td>
</tr>
<tr>
<td>Transportation Capstone</td>
<td>177023</td>
</tr>
<tr>
<td>Outdoor Power Technology</td>
<td>010235</td>
</tr>
<tr>
<td>Hydraulics and Pneumatics</td>
<td>010225</td>
</tr>
</tbody>
</table>

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

### 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 utilize printed and electronic repair manuals to troubleshoot electrical circuits, test components and replace defective modules.
Automotive Braking, Suspension, and Steering Systems
Subject Code: 177003
Students will perform inspections, troubleshoot malfunctions and service automotive undercarriage systems. Students will identify poor performing hydraulic brake systems and replace malfunctioning components. 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. Additionally, students will disable and enable supplemental restraint systems (SRS) and replace antilock brake systems components.

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.

Truck Braking, Suspension, and Steering Systems
Subject Code: 177005
Students perform inspections, troubleshoot malfunctions, and service truck undercarriage systems. Students identify poor performing air brake systems and replace malfunctioning components. 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 a heavy object is emphasized.

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.

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.

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 & 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 & 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 & Repair
Subject Code: 177011
Students will learn the skills and knowledge of automotive body panel repairs, replacements, and adjustments. Students will analyze, document 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 & 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.

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.

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.

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.
Courses in Air Transportation (TA)

<table>
<thead>
<tr>
<th>PATHWAY COURSES</th>
<th>SUBJECT CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aviation(^1)</td>
<td>177013</td>
</tr>
<tr>
<td>Aviation Maintenance General</td>
<td>177014</td>
</tr>
<tr>
<td>Aviation Structure and Design</td>
<td>177015</td>
</tr>
<tr>
<td>Aviation Airframe Systems and Components</td>
<td>177016</td>
</tr>
<tr>
<td>Aviation Powerplant Theory and Maintenance</td>
<td>177017</td>
</tr>
<tr>
<td>Aviation Powerplant Systems and Components</td>
<td>177018</td>
</tr>
<tr>
<td>Aviation Meteorology</td>
<td>177019</td>
</tr>
<tr>
<td>Aviation Airport Management</td>
<td>177020</td>
</tr>
<tr>
<td>Aviation Pilot Training</td>
<td>177021</td>
</tr>
<tr>
<td>Aviation Air Traffic Control</td>
<td>177022</td>
</tr>
<tr>
<td>Transportation Capstone(^3)</td>
<td>177023</td>
</tr>
</tbody>
</table>

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

**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

Students will apply knowledge of aircraft ground handling safety procedures to aviation maintenance. Students will start, ground operate, service, and secure aircraft. Students will perform aircraft maintenance including detecting, identifying, removal, and treating of various types of corrosion found on ferrous and non-ferrous metals. In addition, students will identify methods of cleaning aircraft and aircraft components. The course content also focuses on developing communication, leadership, human relations and employability skills; and safe, efficient work practices.

**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 Systems and Components**

Subject Code: 177016

Students will learn the principles avionics and practical application of AC/DC electrical circuits with an emphasis on airborne installations. Students will learn power calculations, and the relationship of voltage, current, and resistance. 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. (68)

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 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 avionic 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.
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.