

2027-2028 Transportation Education Courses



KENTUCKY CTE
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Kentucky Department of
EDUCATION

TRANSPORTATION EDUCATION COURSES

2027 – 2028

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AUTOMOTIVE EDUCATION COURSES

470301 Shop Management

This course introduces the basic principles of sound and efficient shop management. Inventory control, fiscal management, and customer relations are emphasized.

Recommended Grade Level: 10 – 12

Recommended Credit: .5

Students will:

1. Maintain tools/equipment.
2. Develop customer relations skills.
3. Prepare work orders.
4. Maintain inventory.
5. Maintain service records.
6. Supervise personnel.
7. Prepare parts requisition.
8. Provide fiscal management.
9. Complete an incident report.

470501 Auto Co-op*

Co-op provides supervised on-the-job work experience related to the student's educational objectives. Students who participate in the Cooperative Education program receive compensation for their work.

Prerequisite: Consent of Instructor

Recommended Grade Level: 11 – 12

Recommended Credit: 1

Students will:

1. Gain career awareness and the opportunity to test career choices.
2. Receive work experience related to career interests prior to graduation.
3. Integrate classroom studies with work experience.
4. Receive exposure to facilities and equipment unavailable in a classroom setting.
5. Increase employability potential after graduation.
6. Earn funds to help finance education expenses.

* In section 2 of [705 KAR 4:041](#), Cooperative education shall meet the minimum requirements established in this section:
(a) Enrolled in a course included within the student's chosen career pathway within the same academic year; or
(b) A career pathway completer by the conclusion of the student's junior year; or
(c) Enrolled in an approved registered youth or pre-apprenticeship program.

470504 Automotive Internship I

Internship for CTE courses provides supervised work-site experience for high school students who are enrolled in a course associated with their identified career pathway. Internship experiences consist of a combination of classroom instruction and field experiences. A student receiving pay for an intern experience is participating in an experience that lasts a semester or longer and has an established employee- employer relationship. A non-paid internship affects those students who participate on a short-term basis (semester or less).

Recommended Grade Level: 11 – 12

Recommended Credit: 1

Students will:

1. Gain career awareness and the opportunity to test career choices.
2. Receive work experience related to career interests prior to graduation.
3. Integrate classroom studies with work experience.
4. Receive exposure to facilities and equipment unavailable in a classroom setting.
5. Increase employability potential after graduation.

470507 Automotive Maintenance and Light Repair Section A

These courses introduce the student to the principles, theories, and concepts of Automotive Technology and include instruction in the maintenance and light repair of Engines, Brake Systems, Electrical/Electronic Systems, Suspension and Steering Systems, Automatic and Manual Transmission/Transaxles, and Engine Performance Systems. In all areas, appropriate theory, safety, and support instruction will be taught as required for performing each task, including proper care and cleaning of customers' vehicles. The instruction will also include the identification and use of appropriate tools and test/measurement equipment required to accomplish certain tasks. The student will also receive the necessary training to locate and use current reference and training materials from accepted industry publications and resources and demonstrate the ability to write work orders. **Courses A, B, C, and D can be completed in any sequence.** The current program standards/task list can be found on the [ASE Education Foundation website](#).

Recommended Grade Level: 11 – 12

Recommended Credit: 1

Students will:

1. Explain and apply required shop and personal safety tasks relating to the automotive industry.
2. Explain and apply required tasks associated with the proper use and handling of tools and equipment relating to the automotive industry.
3. Demonstrate proficiency in preparing a vehicle for routine pre/post-maintenance and customer services.
4. Explain and apply the diagnosis, service, maintenance and repair of engines, cylinder heads, valve train, engine block, lubrication, and cooling systems proficiently.
5. Explain and apply proficiently the diagnosis, service and repair of electrical/electronic system components, battery, starting, charging, lighting, instrument cluster, driver information, and body electrical systems.
6. Explain and apply proficiently the diagnosis, service and repair of front and rear steering/suspension systems, wheel alignments, and wheels and tires.
7. Explain and apply proficiently the diagnosis, service and repair of drum/disc brake, hydraulics, power assist units, electronic brakes, ABS, traction, and stability control systems, and related miscellaneous (wheel bearings, parking brake, electrical, etc.) systems.
8. Explain and apply proficiently the diagnosis, service, maintenance and repair of HVAC, heating and air conditioning, refrigeration, heating, ventilation, engine cooling, refrigerant recovery, recycling, handling, operating, and related control systems.
9. Explain and apply proficiently the diagnosis, service and repair of computerized engine controls, fuel, air induction, exhaust, and emission control systems.
10. Explain and apply the diagnosis, service, maintenance and repair of in-vehicle and off-vehicle automatic transmissions/transaxles proficiently.
11. Explain and apply proficiently the diagnosis, service maintenance, and repair of manual drivetrain, clutches, transmissions/transaxles, drive and half-shafts, universal and constant velocity joints, ring and pinion gears, differential case assemblies, drive axles, front-wheel, rear-wheel, four-wheel and all-wheel-drive systems.
12. Explain and apply the diagnosis, service, and repair of heating and air conditioning, refrigeration, heating, ventilation, engine cooling, operating and related control systems,

- refrigerant recovery, and recycling and handling proficiently.
13. Use and diagnose with a professional-level diagnostic scan tool for all electronic systems to identify the customer's concern correctly and quickly.
 14. Explain the operational characteristics of Hybrid/EV and identify safety protocols, including battery disconnect and service procedures for Hybrid vehicles.

470509 Automotive Maintenance and Light Repair Section B

The course description and all tasks/standards for the Automotive Maintenance and Light Repair Sections A, B, C, and D are listed in [Automotive Maintenance and Light Repair Section A](#).

Courses and standards/tasks in A, B, C, and D can be completed in any sequence. The current program standards/task list can be found on the [ASE Education Foundation website](#).

470511 Automotive Maintenance and Light Repair Section C

The course description and all tasks/standards for the Automotive Maintenance and Light Repair Sections A, B, C, and D are listed in [Automotive Maintenance and Light Repair Section A](#).

Courses and standards/tasks in A, B, C, and D can be completed in any sequence. The current program standards/task list can be found on the [ASE Education Foundation website](#).

470513 Automotive Maintenance and Light Repair Section D

The course description and all tasks/standards for the Automotive Maintenance and Light Repair Sections A, B, C, and D are listed in [Automotive Maintenance and Light Repair Section A](#).

Courses and standards/tasks in A, B, C, and D can be completed in any sequence. The current program standards/task list can be found on the [ASE Education Foundation website](#).

470515 Automobile Service Technology Section A

These courses present the theory, component identification, operation, diagnosis, and service and repair of engines, brake systems, electrical/electronic systems, suspension, steering systems, automatic and manual transmissions/transaxles, and engine performance systems. In all areas, appropriate theory, safety, and support instruction will be taught as required for performing each task. The instruction will also include the identification and use of appropriate tools and testing/measurement equipment required to accomplish certain tasks. The student will also locate and use current reference and training materials from accepted industry publications and resources and write industry-standard work orders. **Courses A, B, C, and D can be completed in any sequence.** The current program standards/task list can be found on the [ASE Education Foundation website](http://www.ase-education.org).

Prerequisite: Completion of all Automotive Maintenance and Light Repair Tasks

Recommended Grade Level: 11 – 12

Recommended Credit: 1

Students will:

1. Explain and apply required shop and personal safety tasks relating to the automotive industry.
2. Explain and apply required tasks associated with the proper use and handling of tools and equipment relating to the automotive industry.
3. Demonstrate proficiency in preparing a vehicle for routine pre/post-maintenance and customer services.
4. Explain and apply the diagnosis, service, maintenance, and repair of engines, cylinder heads, valve trains, engine blocks, lubrication, and cooling systems proficiently.
5. Explain and apply proficiently the diagnosis, service, and repair of electrical/electronic system components, battery, starting, charging, lighting, instrument cluster, driver information, and body electrical systems.
6. Explain and apply proficiently the diagnosis, service and repair of front and rear steering/suspension systems, wheel alignments, and wheels and tires.
7. Explain and apply proficiently the diagnosis, service and repair of drum/disc brake, hydraulics, power assist units, electronic brakes, ABS, traction and stability control systems, and related miscellaneous (wheel bearings, parking brake, electrical, etc.) systems.
8. Explain and apply proficiently the diagnosis, service, maintenance and repair of HVAC, heating and air conditioning, refrigeration, heating, ventilation, engine cooling, refrigerant recovery, recycling, and handling, operating and related control systems.
9. Explain and apply proficiently the diagnosis, service and repair of computerized engine controls, fuel, air induction, exhaust, and emission control systems.
10. Explain and apply the diagnosis, service, maintenance and repair of in-vehicle and off-vehicle automatic transmissions/transaxles proficiently.
11. Explain and apply proficiently the diagnosis, service maintenance and repair of manual drivetrain, clutches, transmissions/transaxles, drive and half-shafts, universal and constant velocity joints, ring and pinion gears, differential case assemblies, drive axles, front-wheel, rear-wheel, four-wheel and all-wheel-drive systems.
12. Explain and apply proficiently the diagnosis, service and repair of heating and air conditioning, refrigeration, heating, ventilation, engine cooling, operating and related

- control systems, refrigerant recovery, and recycling and handling.
13. Use and diagnose with a professional-level diagnostic scan tool for all electronic systems to identify the customer's concern correctly and quickly.
 14. Explain the operational characteristics of Hybrid/EV and identify safety protocols, including battery disconnect and service procedures for Hybrid vehicles.

470517 Automobile Service Technology Section B

The course description and all tasks/standards for the Automobile Service Technology Sections A, B, C, and D are listed in the [Automobile Service Technology Section A](#). **Courses and standards/tasks in A, B, C and D can be completed in any sequence.** The current program standards/task list can be found on the [ASE Education Foundation website](#).

470519 Automobile Service Technology Section C

The course description and all tasks/standards for the Automobile Service Technology Sections A, B, C, and D are listed in the [Automobile Service Technology Section A](#). **Courses and standards/tasks in A, B, C and D can be completed in any sequence.** The current program standards/task list can be found on the [ASE Education Foundation website](#).

470521 Automobile Service Technology Section D

The course description and all tasks/standards for the Automobile Service Technology Sections A, B, C, and D are listed in the [Automobile Service Technology Section A](#). **Courses and standards/tasks in A, B, C and D can be completed in any sequence.** The current program standards/task list can be found on the [ASE Education Foundation website](#).

470527 Light Vehicle Diesel Engines Section A

These courses introduce the student to the principles, theories, and concepts of Light Vehicle Diesel Engines and include instruction in General Engine Diagnosis, Cylinder Head and Valve Train Diagnosis and Repair, Engine Block Diagnosis and Repair, Lubrication and Cooling Systems Diagnosis and Repair, Air Induction and Exhaust Systems Diagnosis and Repair, and Fuel System Diagnosis and Repair. In all areas, appropriate theory, safety, and support instruction will be taught and required for performing each task, including proper care of customers' vehicles. The instruction will also include the identification and use of appropriate tools and testing/measurement equipment required to accomplish certain tasks. The student will also receive the necessary training to locate and use current reference and training materials from accepted industry publications and resources and demonstrate the ability to write work orders.

Instructors who teach this course must have the ASE A9 Light Vehicle Diesel Engines Certification.

Prerequisite: Completion of all Automotive Maintenance and Light Repair Courses (Sections A, B, C, and D)

Recommended Grade Level: 10 – 12

Recommended Credit: 1

Students will:

1. GENERAL DIAGNOSIS:

- a. Verify the complaint and road/dyno test vehicle; review driver/customer concerns/expectations and vehicle service history (if available); determine further diagnosis.
- b. Record vehicle identification number (VIN). Identify engine model, calibration and serial numbers to research applicable vehicle and service information, service precautions, and technical service bulletins; determine needed actions.
- c. Perform scan tool check and visual inspection for physical damage and missing, modified, or tampered components; determine needed actions.
- d. Check and record electronic diagnostic codes, freeze frame and/or operational data; monitor scan tool data; determine further diagnosis.
- e. Clear diagnostic trouble codes (DTCs) and verify the repair.
- f. Inspect engine assembly and compartment for fuel, oil, coolant, exhaust, or other leaks; determine needed repairs.
- g. Inspect engine compartment wiring harnesses, connectors, seals, and locks; check for proper routing and condition; determine needed repairs.
- h. Listen for the isolated engine noises; determine needed repairs.
- i. Isolate and diagnose engine related vibration problems; determine needed actions.
- j. Check engine exhaust for abnormal odor and/or smoke color and volume; determine further diagnosis.
- k. Check fuel for contamination, quantity, quality, and consumption; determine needed actions.
- l. Perform crankcase pressure test; determine further diagnosis.
- m. Diagnose surging, rough operation, misfiring, low power, slow deceleration, slow acceleration, and shutdown problems; determine needed actions.

- n. Check the cooling system for freeze point, level, contamination, condition, temperature, pressure, circulation, and fan operation; determine needed repairs.
- o. Check the lubrication system for contamination, oil level, temperature, pressure, filtration, and oil consumption; take an oil sample and obtain oil analysis if needed; determine needed repairs.
- p. Diagnose no-cranking, cranks but fails to start, hard starting, and starts but does not continue to run problems; determine needed actions.
- q. Diagnose engine problems caused by battery condition, connections, or excessive key-off battery drain; determine needed repairs.
- r. Diagnose engine problems resulting from an electrical undercharge, overcharge, or a no-charge condition; determine needed action.

2. CYLINDER HEAD AND VALVE TRAIN DIAGNOSIS AND REPAIR:

- a. Remove, inspect, disassemble and clean cylinder head assembly(s).
- b. Inspect threaded holes, studs, and bolts for serviceability; service/replace as needed.
- c. Measure cylinder head thickness and check mating surfaces for flatness, corrosion, warpage and surface finish; inspect for cracks/damage; check condition of passages; inspect core and gallery plugs; determine serviceability and needed repairs.
- d. Inspect valves, guides, seats, springs, retainers, rotators, locks and seals; determine serviceability and needed repairs.
- e. Inspect and/or replace injector sleeves, glow plug sleeves, and seals; pressure test to verify repair (if applicable); measure injector tip, nozzle, or pre-chamber protrusion where specified by the manufacturer.
- f. Inspect and/or replace valve bridges (crossheads) and guides; adjust bridges (crossheads) if applicable.
- g. Reassemble, check, and determine the required cylinder head gasket thickness; install cylinder head assembly and gasket as specified by the manufacturer.
- h. Inspect pushrods, rocker arms, rocker arm shafts, electronic components, wiring harnesses, and seals; repair/replace as needed.
- i. Inspect, install, and adjust cam followers, lash adjusters and retainers; adjust valve clearance if applicable.
- j. Inspect, measure, and replace/reinstall overhead camshaft and bearings; measure and adjust endplay.
- k. Inspect and time drive gear train components (including gear, chain, and belt systems).

3. ENGINE BLOCK DIAGNOSIS AND REPAIR:

- a. Remove, inspect, service, and install pans, covers, ventilation systems, gaskets, seals, and wear rings.
- b. Disassemble, clean and inspect engine block for cracks; check mating surfaces and related components for damage or warpage and surface finish; check deck height; check the condition of passages, core, and gallery plugs; inspect threaded holes, studs, dowel pins and bolts for serviceability; service/replace as needed.
- c. Inspect and measure cylinder walls for wear and damage; determine needed service.
- d. Inspect in-block camshaft bearings for wear and damage; replace as needed.
- e. Inspect, measure, and replace/reinstall in-block camshaft; measure and correct end play; inspect, replace/reinstall, and adjust cam followers (if applicable).
- f. Clean and inspect crankshaft and journals for surface finish, cracks, and damage; check the condition of oil passages; check passage plugs; measure journal diameters; check mounting surfaces; determine needed service.

- g. Determine the proper select-fit components, such as pistons, connecting rods and main bearings.
 - h. Inspect and replace main bearings; check cap fit and bearing clearances; check and correct crankshaft end play.
 - i. Inspect, replace, verify, and adjust the drive gear train components (including gear, chain, and belt systems).
 - j. Inspect, measure, or replace pistons, pins, and retainers.
 - k. Measure piston-to-cylinder wall clearance.
 - l. Identify piston, connecting rod bearing, and main bearing wear patterns that indicate connecting rod and crankshaft alignment or bearing bore problems; check bearing bore and bushing condition; determine needed repairs.
 - m. Check ring-to-groove fit and end gaps; install rings on pistons; assemble pistons and connecting rods and install in block; check piston height/protrusion; check liner height/protrusion (if applicable); replace rod bearings and check clearances; check condition, position, and clearance of piston cooling jets (nozzles).
 - n. Inspect crankshaft vibration damper; determine needed repairs.
 - o. Inspect flywheel/flexplate and/or dual-mass flywheel (including ring gear) and mounting surfaces for cracks, wear, and runout; determine needed repairs.
4. LUBRICATION AND COOLING SYSTEMS DIAGNOSIS AND REPAIR:
- a. Verify base engine oil pressure and check the operation of pressure sensor/switch and pressure gauge; verify engine oil temperature and check the operation of temperature sensor.
 - b. Inspect, measure, repair/replace the oil pump, housing, drives, pipes, and screens, and check drive gear clearance.
 - c. Inspect, repair/replace oil pressure regulator assembly including housing, bore, spring, regulator valve(s), oil filter by-pass valve(s), and anti-drain back valve.
 - d. Inspect, clean, test, and reinstall/replace oil cooler, by-pass valve, lines, and hoses.
 - e. Inspect turbocharger lubrication and cooling systems; repair/replace as needed.
 - f. Change engine oil and filters using proper type, viscosity, and rating per manufacturer specifications.
 - g. Inspect and reinstall/replace pulleys, tensioners, and drive belts; adjust drive belts and check alignment.
 - h. Verify coolant temperature, and check the operation of temperature and level sensors, switches, and temperature gauge.
 - i. Inspect and replace thermostat(s), bypass/passes, housing(s), and seal(s).
 - j. Flush and refill cooling system; following manufacturer's specification, add proper coolant type; bleed air from system.
 - k. Inspect and replace water pump(s), housing(s), hoses, and idler pulley(s) or drive gear.
 - l. Inspect radiator(s), pressure cap(s), and tank(s); pressure test cooling system and radiator cap(s); determine needed repairs.
 - m. Inspect and repair/replace the cooling fan, fan hub, fan clutch, controls, and shroud(s).
5. AIR INDUCTION AND EXHAUST SYSTEMS DIAGNOSIS AND REPAIR:
- a. Inspect and service/replace air induction piping, air cleaner, and element; determine needed actions.
 - b. Perform intake manifold pressure test; inspect, test, clean, and/or replace charge air cooler and piping system; determine needed actions.
 - c. Inspect, test and replace turbocharger(s) (including variable ratio/geometry VGT), pneumatic, hydraulic, vacuum, and electronic controls and actuators; inspect, test,

- and replace wastegate and wastegate controls.
 - d. Inspect, test, and replace intake manifold(s), variable intake manifold(s), gaskets, actuators, temperature and pressure sensors, and connections.
 - e. Perform exhaust back pressure and temperature tests; determine needed actions.
 - f. Inspect and repair/replace exhaust manifold(s), gaskets, piping, mufflers, and mounting hardware.
 - g. Inspect, test, and repair/replace preheater/inlet air heater and/or glow plug system and controls.
 - h. Inspect, test, and replace exhaust after-treatment system components and controls, including diesel oxidation catalyst (DOC), selective catalyst reduction (SCR), diesel exhaust fluid (DEF), diesel particulate filter (DPF), and check regeneration system operation.
 - i. Inspect, test, service, and replace EGR system components, including EGR valve(s), EGR cooler by-pass valve(s), EGR cooler(s), piping, electronic sensors, actuators, controls, and wiring.
 - j. Inspect, test, and replace airflow control (throttle) valve(s) and controls.
 - k. Inspect, test, and replace crankcase ventilation system components, including sensors, filters, valves, and piping.
6. FUEL SYSTEM DIAGNOSIS AND REPAIR:
- a. Inspect, clean, test, and repair/replace fuel system tanks, vents, caps, mounts, valves, single/dual supply and return lines, and fittings.
 - b. Inspect, clean, test, and repair/replace fuel transfer and/or supply pumps, sensors, strainers, fuel/water separators/indicators, filters, heaters, coolers, ECM cooling plates (if applicable), and mounting hardware.
 - c. Check fuel system for air; determine needed repairs; prime and bleed fuel system; check and repair/replace primer pump.
 - d. Inspect, test, and repair/replace low fuel pressure regulator supply and return systems, including low-pressure switches.
 - e. Inspect and reinstall/replace high-pressure injection lines, fittings, transfer tubes, seals, and mounting hardware.
 - f. Inspect, adjust, and repair/replace electronic throttle and PTO control devices, circuits, and sensors.
 - g. Perform on-engine inspection tests and replace high-pressure common rail fuel system components and electronic controls.
 - h. Perform on-engine inspections and tests; replace hydraulic electronic unit injector(s) (HEUI) components and electronic controls.
 - i. Perform on-engine inspections and tests; replace pump-line nozzle fuel system (PLN-E) components and electronic controls.
 - j. Inspect and replace electrical connector terminals, pins, harnesses, seals, and locks.
 - k. Connect diagnostic scan tool to vehicle/engine; access, verify, and update software calibration settings injector calibration codes; perform control module re-learn procedures as needed.
 - l. Use a diagnostic scan tool to inspect and test the electronic engine control system, sensors, actuators, electronic control modules, and circuits; determine a further diagnosis.
 - m. Measure and interpret voltage, voltage drop, amperage, and resistance readings using a digital multimeter (DMM) or appropriate test equipment.
 - n. Diagnose engine problems resulting from failures of interrelated systems (for example, cruise control, security alarms/theft deterrent, transmission controls, exhaust after-treatment systems, electronic stability control, or non-OEM installed accessories.)

470528 Light Vehicle Diesel Engines Section B

The entire description and all tasks/standards for the Light Vehicle Diesel Engines Sections A, B, C, and D are listed in the [Light Vehicle Diesel Engines Section A](#). **Courses and standards/tasks in A, B, C and D can be completed in any sequence.**

470529 Light Vehicle Diesel Engines Section C

The entire description and all tasks/standards for the Light Vehicle Diesel Engines Sections A, B, C, and D are listed in the [Light Vehicle Diesel Engines Section A](#). **Courses and standards/tasks in A, B, C and D can be completed in any sequence.**

470530 Light Vehicle Diesel Engines Section D

The entire description and all tasks/standards for the Light Vehicle Diesel Engines Sections A, B, C, and D are listed in the [Light Vehicle Diesel Engines Section A](#). **Courses and standards/tasks in A, B, C and D can be completed in any sequence.**

470546 Precision Measurement

This class introduces the student to the fundamentals of precision measurement and its application in the industrial setting.

Recommended Grade Level: 10 – 12

Recommended Credit: .5

Students will:

1. Measure with an English fraction rule.
2. Measure with an English decimal rule.
3. Measure with a metric steel rule.
4. Read an English Vernier caliper and height gauge scale.
5. Read a metric Vernier caliper and height gauge scale.
6. Read an English micrometer.
7. Read a metric micrometer.
8. Assemble English gauge blocks to specified measurements.
9. Assemble metric gauge blocks to specified measurements.
10. Use hole and plug gauges to check hole diameters.
11. Use thread gauges to check thread dimensions.
12. Read and use various dial indicators.
13. Identify pneumatic, electrical, electronic, and optical comparators.

470577 Applied Automotive Projects

Courses designed to enhance a student's understanding of shop situations and problems that arise when dealing with live work. It expands on the task lists that have already been taught in previous Automotive Education Courses. The instructor will teach students how to deal with real world problems that arise when repairing vehicles subjected to various types of customer road use. **Course content and objectives must align with Automotive Education standards upon approval from the Transportation Consultant by submitting a pathway modification request.**

Prerequisites: Completion of the Automotive Maintenance and Light Repair Courses/ Sections A, B, C and D.

Recommended Grade Level: 11 – 12

Recommended Credit: 1

Students will:

1. Diagnose and repair selected tasks/problems as determined by the instructor.

499930 Industrial Safety

This course provides practical training in industrial safety. The students are taught to observe general safety rules and regulations, to apply worksite and shop safety rules, and to apply OSHA regulations. Students are expected to obtain certification in first aid and cardiopulmonary resuscitation.

Recommended Grade Level: 10 – 12

Recommended Credit: .5

Students will:

1. Apply worksite and lab safety procedures.
2. Apply personal safety rules and procedures.
3. Apply fire prevention rules and procedures.
4. Obtain first aid certification.
5. Obtain CPR certification.
6. Demonstrate hazardous communications procedures.
7. Describe and demonstrate universal precautions procedures.

COLLISION REPAIR TECHNOLOGY COURSES

470601 Collision Repair Co-op*

Cooperative Education provides supervised on-the-job work experience related to the student's educational objectives. Students participating in the Cooperative Education program receive compensation for their work.

Recommended Grade Level: 11 – 12

Recommended Credit: 1

Students will:

1. Gain career awareness and the opportunity to test career choices.
2. Receive work experience related to career interests prior to graduation.
3. Integrate classroom studies with work experience.
4. Receive exposure to facilities and equipment unavailable in a classroom setting.
5. Increase employability potential after graduation.
6. Earn funds to help finance education expenses.

* In section 2 of [705 KAR 4:041](#), Cooperative education shall meet the minimum requirements established in this section:
(a) Enrolled in a course included within the student's chosen career pathway within the same academic year; or
(b) A career pathway completer by the conclusion of the student's junior year; or
(c) Enrolled in an approved registered youth or pre-apprenticeship program.

470604 Collision Repair Internship I

Internship for CTE courses provides supervised worksite experience for high school students who are enrolled in a course associated with their identified career pathway. Internship experiences consist of a combination of classroom instruction and field experiences. A student receiving pay for an intern experience is participating in an experience that lasts a semester or longer and has an established employee-employer relationship. A non-paid internship affects those students who participate on a short-term basis (semester or less).

Recommended Grade Level: 11 – 12

Recommended Credit: 1

Students will:

1. Gain career awareness and the opportunity to test career choices.
2. Receive work experience related to career interests prior to graduation.
3. Integrate classroom studies with work experience.
4. Receive exposure to facilities and equipment unavailable in a classroom setting.
5. Increase employability potential after graduation.

470620 Structural Analysis and Damage Repair I

These courses present instruction on the analysis, repair and replacement of structural panels on unibody automobiles and body and frame alignment on unibody and frame cars. They will be taught by demonstration and lecture. The skills required are most effectively taught and practiced on live work. Due to the unpredictable nature of live work, some tasks may carry over to other courses. For every task in Structural Analysis and Damage Repair, the following safety requirements must be strictly enforced: compliance with personal and environmental safety practices associated with clothing and the use of gloves, respiratory protection, eye protection, hand tools, power equipment, proper ventilation, and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations. Identify the vehicle manufacturer's SRS types, locations and recommended procedures before inspecting or replacing components. The most current program standards/task list can be found on the [ASE Education Foundation website](#).

Recommended Grade Level: 11 – 12

Recommended Credit: 1

Students will:

1. Measure and diagnose structural damage using a tram gauge.
2. Attach vehicle to anchoring devices.
3. Analyze, straighten and align mash (collapse) damage.
4. Analyze, straighten and align sag damage.
5. Analyze, straighten and align sidesway damage.
6. Analyze, straighten and align twist damage.
7. Analyze, straighten and align diamond frame damage.
8. Remove and replace damaged structural components.
9. Restore corrosion protection to repaired or replaced frame areas.
10. Analyze and identify misaligned or damaged steering, suspension, and power train components that can cause vibration, steering, and wheel alignment problems.
11. Align or replace misaligned or damaged steering, suspension, and power train components that can cause vibration, steering, and wheel alignment problems.
12. Identify or repair heat limitations and monitoring procedures for structural components.
13. Demonstrate an understanding of structural foam applications.
14. Measure and diagnose structural damage using a three-dimensional measuring system (mechanical, electronic, laser).
15. Measure and diagnose structural damage to vehicles using a dedicated (fixture) measuring system.
16. Determine the extent of the direct and indirect damage and the direction of impact, and document the methods and sequence of repair.
17. Analyze and identify crush/collapse zones.
18. Restore mounting and anchoring locations.
19. Analyze and identify misaligned or damaged steering, suspension, and power train components that can cause vibration, steering, and chassis alignment problems.
20. Realign or replace misaligned or damaged steering, suspension, and power train components that can cause vibration, steering and chassis alignment problems.
21. Measure and diagnose unibody damage using a tram gauge.
22. Determine and inspect the locations of all suspension, steering, and power train

- component attaching points on the vehicle.
23. Measure and diagnose unibody vehicles using a dedicated (fixture) measuring system.
 24. Diagnose and measure unibody vehicles using a three-dimensional measuring system (mechanical, electronic, and laser).
 25. Determine the extent of the direct and indirect damage and the direction of impact; plan and document the methods and sequence of repair.
 26. Attach anchoring devices to a vehicle; remove or reposition components as necessary.
 27. Straighten and align cowl assembly.
 28. Straighten and align roof rails/headers and roof panels.
 29. Straighten and align the hinge and lock pillars.
 30. Straighten and align vehicle openings, floor pans, and rocker panels.
 31. Straighten and align quarter panels, wheelhouse assemblies, and rear body sections (including rails and suspension/power train mounting points).
 32. Straighten and align front-end sections (aprons, strut towers, upper and lower rails, steering, and suspension/power train mounting points).
 33. Identify substrate and repair or replacement recommendations.
 34. Identify proper cold stress relief methods.
 35. Repair damage using power tools and hand tools to restore proper contours and dimensions.
 36. Remove and replace damaged sections of steel body structures.
 37. Determine the extent of damage to aluminum structural components; repair, weld, or replace.
 38. Analyze and identify crush/collapse zones.
 39. Restore mounting and anchoring locations.
 40. Remove and reinstall or replace fixed glass (heated and non-heated) using recommended materials and techniques.
 41. Remove and reinstall or replace modular glass using recommended materials.
 42. Check for water leaks, dust leaks, and wind noise.
 43. Identify weldable and non-weldable substrates used in vehicle construction.
 44. Weld and cut high-strength steel and other steels.
 45. Weld and cut aluminum.
 46. Determine the correct GMAW (MIG) welder type, electrode/wire type, diameter, and gas to be used in a specific welding situation.
 47. Set up and adjust the GMAW (MIG) welder to “tune” for proper electrode stickout, voltage, polarity, flow rate, and wire-feed speed required for the substrate being welded.
 48. Store, handle, and install high-pressure gas cylinders.
 49. Determine work clamp (ground) location and attach.
 50. Use the proper angle of the gun to the joint and direction of gun travel for the type of weld being made in the flat, horizontal, vertical, and overhead positions.
 51. Protect adjacent panels, glass, and vehicle interiors from welding and cutting operations.
 52. Protect computers and other electronic control modules during welding procedures.
 53. Clean and prepare the metal to be welded, ensure good metal fit-up, and apply weld-through primer if necessary, clamp or tack as required.
 54. Determine the joint type (butt weld with backing, lap) for the weld being made.
 55. Determine the type of weld (continuous, stitch weld, plug) for each specific welding operation.
 56. Perform the following welds: continuous, plug, butt weld with and without backing, and fillet.
 57. Perform visual and destructive tests on each weld type.
 58. Identify the causes of various welding defects; make necessary adjustments.
 59. Identify the cause of contact tip burn-back and failure of wire to feed; make necessary

adjustments.

60. Identify the cutting process for different substrates and locations; perform cutting operations.
61. Identify different methods of attaching structural components (squeeze type resistance spot welding (STRSW), riveting, structural adhesive, silicon bronze).

470622 Structural Analysis and Damage Repair II

The entire description and all tasks/standards for Structural Analysis and Damage Repair II are listed in [Structural Analysis and Damage Repair I](#). **Courses and standards/tasks in I and II can be completed in any sequence.** The most current program standards/task list can be found on the [ASE Education Foundation website](#).

470628 Non-Structural Analysis and Damage Repair IV

The entire description and all tasks/standards for Non-Structural Analysis and Damage Repair III are listed in [Non-Structural Analysis and Damage Repair I](#). **Courses and standards/tasks in I, II, III, and IV can be completed in any sequence.** The current program standards/task list can be found on the [ASE Education Foundation website](#).

Recommended Grade Level: 10 – 12

Recommended Credit: 1

Students will:

1. Position the vehicle for inspection.
2. Prepare vehicles for inspection by providing access to damaged areas.
3. Analyze damage to determine appropriate methods for overall repairs.
4. Determine the direction, point(s) of impact, and extent of direct, indirect, and inertia damage.
5. Gather details of the incident/accident necessary to determine the full extent of vehicle damage.
6. Identify and record pre-existing damage.
7. Identify and record prior repairs.
8. Perform visual inspection of structural components and members.
9. Identify structural damage using measuring tools and equipment.
10. Perform visual inspection of non-structural components and members.
11. Determine parts, components, material type(s) and procedures necessary for a proper repair.
12. Identify the type and condition of finish; determine if refinishing is required.
13. Identify suspension, electrical and mechanical component physical damage.
14. Identify the safety system's physical damage.
15. Identify interior component damage.
16. Identify damage to add-on accessories and modifications.
17. Identify single (one-time) use components.
18. Determine and record customer/vehicle owner information.
19. Identify and record vehicle identification number (VIN) information, including nation of origin, make, model, restraint system, body type, production date, engine type, and assembly plant.
20. Identify and record vehicle options, including trim level, paint code, transmission, accessories, and modifications.
21. Identify safety systems and determine replacement items.
22. Apply appropriate estimating and parts nomenclature (terminology).
23. Determine and apply appropriate estimating sequences.
24. Utilize estimating guide procedure pages.
25. Apply estimating guide footnotes and headnotes as needed.
26. Estimate labor value for operations requiring judgment.
27. Select the appropriate labor value for each operation (structural, non-structural, mechanical, and refinish).
28. Select and price OEM parts; verify availability, compatibility, and condition.
29. Select and price alternative/optional OEM parts; verify availability, compatibility and condition.
30. Select and price aftermarket parts; verify availability, compatibility, and condition.

31. Select and price recyclable/used parts; verify availability, compatibility and condition.
32. Select and price re-manufactured, rebuilt, and reconditioned parts; verify availability, compatibility and condition.
33. Determine the price and source of necessary sublet operations.
34. Determine labor value, prices, charges, allowances, or fees for non-included operations and miscellaneous items.
35. Recognize and apply overlap deductions, including operations and additions.
36. Determine additional material and charges.
37. Determine refinishing material and charges.
38. Apply math skills to establish charges and totals.
39. Interpret computer-assisted and manually written estimates; verify the information is current.
40. Identify procedural differences between computer-assisted systems and manually written estimates.
41. Identify procedures to restore corrosion protection; establish labor values and material charges.
42. Determine the cost-effectiveness of the repair and determine the approximate vehicle retail and repair value.
43. Recognize the differences in estimation procedures when using different information provider systems.
44. Verify the accuracy of the estimate compared to the actual repair and replacement operations.
45. Identify the type of vehicle construction (space frame, unibody, body-over-frame).
46. Recognize the different damage characteristics of space frame, unibody, and body-over-frame vehicles.
47. Identify impact energy-absorbing components.
48. Identify steel types; determine repairability.
49. Identify aluminum/magnesium components; determine repairability.
50. Identify plastic/composite components; determine repairability.
51. Identify vehicle glass components and repair/replacement procedures.
52. Identify add-on accessories.
53. Acknowledge and/or greet customers/clients.
54. Listen to customer/client; collect information, identify customer/client concerns, needs, and expectations.
55. Establish a cooperative attitude with customers/clients.
56. Identify yourself to the customer/client; offer assistance.
57. Deal with angry customers/clients.
58. Identify customer/client preferred communication method; follow up to keep customer/client informed about parts and the repair process.
59. Recognize basic claims handling procedures; explain to customer/client.
60. Project a positive attitude and professional appearance.
61. Provide and review warranty information.
62. Provide and review technical and consumer protection information.
63. Estimate and explain the duration of out-of-service time.
64. Apply negotiation skills to obtain a mutual agreement.
65. Interpret and explain manual or computer-assisted estimates to customers/clients.

470631 Introduction to Collision Repair

This course introduces the student to safety, sanding, grinding, pulling, roughing and filling; the use of tools and equipment; and preparing and priming automotive panels through lectures and demonstrations.

Recommended Grade Level: 10 – 12

Recommended Credit: .5

Students will:

1. Review damage reports and analyze damage to determine appropriate methods for overall repair; develop a repair plan.
2. Inspect, remove, store, and replace exterior trim and moldings.
3. Protect panels, glass interior parts, and other vehicles adjacent to the repair area.
4. Soap and water wash the entire vehicle for inspection.
5. Remove the paint from the damaged area of the body panel.
6. Locate and repair surface irregularities on a damaged body panel.
7. Heat shrink stretched panel areas to proper contour.
8. Mix and apply body filler.
9. Rough sand cured body filler to contour, finish sand.
10. Mix primer, primer-surfacer, or primer-sealer.
11. Apply primer onto the surface of the prepared area.
12. Dry or wet sand areas to which primer surface has been applied.
13. Clean area to be refinished using a final cleaning solution.

470633 Non-Structural Analysis and Damage Repair I

These courses give instruction and provide practical experience in replacing and aligning bolts on automotive parts such as doors, hoods, and fenders, as well as instruction on the repair and replacement of non-structural weld-on automotive panels by aligning, welding, cutting, and drilling through demonstrations and lectures. They will be taught by demonstration and hands-on practice. The skills required are most effectively taught and practiced on live work. Due to the unpredictable nature of live work, some tasks may carry over to other courses. For every task in Non-Structural Analysis and Damage Repair (Body Components), the following safety requirements must be strictly enforced: compliance with personal and environmental safety practices associated with clothing and the use of gloves, respiratory protection, eye protection, hearing protection, hand tools, power equipment, proper ventilation, and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations. Identify the vehicle manufacturer's SRS types, locations and recommended procedures before inspecting or replacing components. The current program standards/task list can be found on the [ASE Education Foundation website](#).

Recommended Grade Level: 11 – 12

Recommended Credit: 1

Students will:

1. Review damage reports and analyze damage to determine appropriate methods for overall repair; develop and document a repair plan.
2. Inspect, remove, label, store, and reinstall exterior trim and moldings.
3. Inspect, remove, label, store, and reinstall interior trim and components.
4. Inspect, remove, label, store, and reinstall body panels and components that may interfere with or be damaged during repair.
5. Inspect, remove, label, store, and reinstall vehicle mechanical and electrical components that may interfere with or be damaged during repair.
6. Protect panels, glass, interior parts, and other vehicles adjacent to the repair area.
7. Soap and water wash the entire vehicle and complete the pre-repair inspection checklist.
8. Prepare damaged areas using water-based and solvent-based cleaners.
9. Remove corrosion protection, under-coatings, sealers, and other protective coatings as necessary to perform repairs.
10. Inspect, remove, and reinstall repairable plastics and other components for off-vehicle repair.
11. Determine the extent of direct and indirect/hidden damage and direction of impact; develop and document a repair plan.
12. Inspect, remove and replace bolted, bonded, and welded steel panel or panel assemblies.
13. Determine the extent of damage to aluminum body panels; repair or replace.
14. Inspect, remove, replace, and align hood, hood hinges, and hood latch.
15. Inspect, remove, replace, and align deck lid, lid hinges, and lid latch.
16. Inspect, remove, replace, and align doors, latches, hinges, and related hardware.
17. Inspect, remove, replace and align tailgates, hatches, lift gates and sliding doors.
18. Inspect, remove, replace, and align bumper bars, covers, reinforcement, guards, isolators, and mounting hardware.
19. Inspect, remove, replace and align fenders and related panels.
20. Restore corrosion protection during and after repair.

21. Replace door skins.
22. Restore sound deadeners and foam materials.
23. Perform panel bonding and weld bonding.
24. Diagnose and repair water leaks, dust leaks, and wind noise.
25. Identify one-time use fasteners.
26. Weld damaged or torn steel body panels; repair broken welds
27. Prepare a panel for body filler by abrading or removing the coatings; feather edge and refine scratches before the application of body filler
28. Locate and repair surface irregularities on a damaged body panel using power tools, hand tools, and weld-on pulling attachments.
29. Demonstrate hammer and dolly techniques.
30. Heat shrink stretched panel areas to proper contour
31. Cold shrink stretched panel areas to proper contour.
32. Identify body filler defects; correct the cause and condition. (Pinholing, ghosting, staining, over-catalyzing, etc.)
33. Identify different types of body fillers.
34. Shape body filler to contour; finish sand.
35. Perform proper metal finishing techniques for aluminum.
36. Perform proper application of body filler to aluminum.
37. Straighten contours of damaged panels to a suitable condition for body fillings or metal finishing using power tools, hand tools, and weld-on pulling attachments.
38. Inspect, adjust, repair or replace window regulators, run channels, glass, power mechanisms, and related controls.
39. Inspect, adjust, repair, remove, reinstall or replace weather-stripping.
40. Inspect, repair/replace, and adjust removable power-operated roof panels and hinges, latches, guides, handles, retainers, and controls of sunroofs.
41. Inspect, remove, reinstall, and align the convertible top and related mechanisms.
42. Initialize electrical components as needed.
43. Identify weldable and non-weldable substrates used in vehicle construction.
44. Weld and cut high-strength steel and other steels.
45. Weld and cut aluminum.
46. Determine the correct GMAW (MIG) welder type, electrode/wire type, diameter, and gas to be used in a specific welding situation.
47. Set up and adjust the GMAW (MIG) welder to "tune" for proper electrode stickout, voltage, polarity, flow rate, and wire-feed speed required for the substrate being welded.
48. Store, handle, and install high-pressure gas cylinders.
49. Determine work clamp (ground) location and attach.
50. Use the proper angle of the gun to the joint and direction of gun travel for the type of weld being made in the flat, horizontal, vertical, and overhead positions.
51. Protect adjacent panels, glass, vehicle interior, etc., from welding and cutting operations.
52. Protect computers and other electronic control modules during welding procedures.
53. Clean and prepare the metal to be welded, ensure good metal fit-up, and apply weld-through primer if necessary, clamp or tack as required.
54. Determine the joint type (butt weld with backing, lap, etc.) for the weld being made.
55. Determine the type of weld (continuous, stitch weld, plug, etc.) for each specific welding operation.
56. Perform the following welds: continuous, plug, butt weld with and without backing, fillet, etc.
57. Perform visual and destructive tests on each weld type.
58. Identify the causes of various welding defects; make necessary adjustments.
59. Identify the cause of contact tip burn-back and failure of wire to feed; make necessary

adjustments.

60. Identify the cutting process for different substrates and locations; perform cutting operations.
61. Identify different methods of attaching non-structural components (squeeze type resistant spot welds (STRSW), riveting, non-structural adhesive, silicon bronze, etc.)
62. Identify the types of plastics that determine repairability.
63. Clean and prepare the surface of plastic parts; identify the types of plastic repair procedures.
64. Repair rigid, semi-rigid, or flexible plastic panels.
65. Remove or repair damaged areas from rigid exterior composite panels.
66. Replace bonded rigid exterior composite body panels; straighten or align panel supports.

470639 Painting and Refinishing I

These courses provide instruction in the use of lacquer, acrylic enamel base coat/clear coat refinishing products, masking procedures, preparations and paint problems. They will be taught by demonstration and lecture. The skills required are most effectively taught and practiced on live work. Due to the unpredictable nature of live work, some tasks may carry over to other courses. For every task in Painting and Refinishing, the following safety requirements must be strictly enforced: compliance with personal and environmental safety practices associated with clothing and the use of gloves, respiratory protection, eye protection, hand tools, power equipment, proper ventilation, and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations. The current program standards/task list can be found on the [ASE Education Foundation website](#).

Recommended Grade Level: 11 – 12

Recommended Credit: 1

Students will:

1. Select and use proper personal safety equipment; take necessary precautions with hazardous operations and materials according to federal, state, and local regulations.
2. Identify safety and personal health hazards according to OSHA guidelines and the “Right to Know Law.”
3. Inspect spray environment and equipment to ensure compliance with federal, state and local regulations and for safety and cleanliness hazards.
4. Select and use a NIOSH-approved air-purifying respirator. Inspect condition and ensure fit and operation. Perform proper maintenance in accordance with OSHA Regulation 1910.134 and applicable state and local regulations.
5. Select and use a NIOSH-approved supplied air (Fresh Air Make-up) respirator system. Perform proper maintenance in accordance with OSHA Regulation 1910.134 and applicable state and local regulations.
6. Select and use the proper personal safety equipment for surface preparation, spray gun and related equipment operation, paint mixing, matching and application, paint defects, and detailing (gloves, suits, hoods, eye and ear protection, etc.).
7. Inspect, remove, store, protect, and replace exterior trim and components necessary for proper surface preparation.
8. Soap and water wash the entire vehicle; use appropriate cleaners to remove contaminants.
9. Inspect and identify the type of finish, surface condition, and film thickness; develop and document a plan for refinishing using a total product system.
10. Remove paint finish as needed.
11. Dry or wet sand areas to be refinished.
12. Featheredge areas to be refinished.
13. Apply suitable metal treatment or primer in accordance with total product systems.
14. Mask and protect other areas that will not be refinished.
15. Demonstrate different masking techniques (recess/back masking, foam door type, etc.).
16. Mix primer, primer-surfacer and primer-sealer.
17. Identify a complementary color or shade of undercoat to improve coverage.
18. Apply primer onto the surface of the repaired area.
19. Apply two-component finishing filler to minor surface imperfections.

20. Block sand area to which primer-surfacer has been applied.
21. Dry sand area to which finishing filler has been applied.
22. Remove dust from the area to be refinished, including cracks or moldings of adjacent areas.
23. Clean area to be refinished using a final cleaning solution.
24. Remove, with a tack rag, any dust or lint particles from the area to be refinished.
25. Apply a suitable primer-sealer to the area being refinished.
26. Scuff sand to remove nibs or imperfections from a sealer.
27. Apply stone chip-resistant coating.
28. Restore caulking and seam sealers to repaired areas.
29. Prepare adjacent panels for blending.
30. Identify the types of rigid, semi-rigid or flexible plastic parts to be refinished; determine the materials needed, preparation, and refinishing procedures.
31. Identify metal parts to be refinished; determine the materials needed, preparation, and refinishing procedures.
32. Inspect, clean, and determine the condition of spray guns and related equipment (air hoses, regulators, air lines, air source, and spray environment).
33. Select the spray gun setup (fluid needle, nozzle, and cap) for the product being applied.
34. Test and adjust spray guns using fluid, air and pattern control valves.
35. Demonstrate an understanding of the operation of pressure spray equipment.
36. Identify color code by manufacturer's vehicle information label.
37. Shake, stir, reduce, catalyze/activate, and strain refinish materials.
38. Apply the finish using appropriate spray techniques (gun arc, angle, distance, travel speed, and spray pattern overlap) for the finish being applied.
39. Apply the selected product on the test or let-down panel, and check for color match.
40. Apply single-stage topcoat.
41. Apply basecoat/clearcoat for panel blending and panel refinishing.
42. Apply basecoat/clearcoat for overall refinishing.
43. Remove nibs or imperfections from the base coat.
44. Identify product expiration dates as applicable.
45. Refinish plastic parts.
46. Apply multi-stage coats for panel blending and overall refinishing.
47. Identify and mix paint using a formula.
48. Identify poor hiding colors; determine necessary action.
49. Tint color using a formula to achieve a blendable match.
50. Identify alternative color formulas to achieve a blendable match.
51. Identify the materials, equipment, and preparation differences between solvent and waterborne technologies.
52. Identify blistering (raising of the paint surface, air entrapment); correct the cause(s) and the condition.
53. Identify a dry spray appearance on the paint surface; correct the cause(s) and the condition.
54. Identify the presence of fisheyes (crater-like openings) in the finish; correct the cause(s) and the condition.
55. Identify lifting; correct the cause(s) and the condition.
56. Identify clouding (mottling and streaking in metallic finishes); correct the cause(s) and the condition.
57. Identify orange peel; correct the cause(s) and the condition.
58. Identify overspray; correct the cause(s) and the condition.
59. Identify solvent popping in freshly painted surfaces; correct the cause(s) and the condition.

60. Identify sags and runs in the paint surface; correct the cause(s) and the condition.
61. Identify sanding marks or sand scratch swelling; correct the cause(s) and the condition.
62. Identify contour mapping/edge mapping; correct the cause(s) and the condition.
63. Identify color difference (off-shade); correct the cause(s) and the condition.
64. Identify tape tracking; correct the cause(s) and the condition.
65. Identify low gloss condition; correct the cause(s) and the condition.
66. Identify poor adhesion; correct the cause(s) and the condition.
67. Identify paint cracking (shrinking, splitting, crow's feet or line-checking, micro-checking, etc.); correct the cause(s) and the condition.
68. Identify corrosion; correct the cause(s) and the condition.
69. Identify dirt or dust in the paint surface; correct the cause(s) and the condition.
70. Identify water spotting; correct the cause(s) and the condition.
71. Identify finish damage caused by bird droppings, tree sap, and other natural causes; correct the condition.
72. Identify finish damage caused by airborne contaminants (acids, soot, rail dust, and other industrial-related causes); correct the condition.
73. Identify die-back conditions (dulling of the paint film showing haziness); correct the cause(s) and the condition.
74. Identify chalking (oxidation); correct the cause(s) and the condition.
75. Identify bleed-through (staining); correct the cause(s) and the condition.
76. Identify pin-holing; correct the cause(s) and the condition.
77. Identify buffing-related imperfections (swirl marks, wheel burns); correct the condition.
78. Identify pigment flotation (color change through film build); correct the cause(s) and the condition.
79. Apply decals, transfers, tapes, woodgrains, pinstripes (painted and taped), etc.
80. Sand, buff and polish fresh or existing finish to remove defects as required.
81. Clean interior, exterior, and glass.
82. Clean body openings (door jambs and edges, etc.).
83. Remove overspray.
84. Perform vehicle clean-up; complete quality control using a checklist.

470640 Painting and Refinishing II

The entire description and all tasks/standards for Painting and Refinishing II are listed in [Painting and Refinishing I](#). **Courses and standards/tasks in Painting and Refinishing I, II, III and IV can be completed in any sequence.** The most current program standards/task list can be found on the [ASE Education Foundation website](#).

470642 Mechanical and Electrical Components I

These courses provide instruction in the diagnosis, repair and/or replacement of suspension, steering, electrical, brake, drive train, fuel, exhaust, and restraint systems. They will be taught by demonstration and lecture. The theories and concepts of heating and air conditioning systems will also be discussed and demonstrated. These courses provide practical experience in the inspection and repair or replacement of suspension and steering systems. They will be taught by demonstration and hands-on experience. The skills required are most effectively taught and practiced on live work. Due to the unpredictable nature of live work, some tasks may carry over to other courses. The current program standards/task list can be found on the [ASE Education Foundation website](#).

Prerequisite: Consent of Instructor

Recommended Grade Level: 11 – 12

Recommended Credit: 1

Students will:

1. Perform visual inspection and measuring checks to identify steering and suspension collision damage.
2. Identify one-time use fasteners.
3. Clean, inspect, and prepare reusable fasteners.
4. Remove, replace, inspect or adjust power steering pump, pulleys, belts, hoses, fittings and pump mounts.
5. Remove and replace the power steering gear (non-rack and pinion type).
6. Inspect, remove, and replace the power rack and pinion steering gear and related components.
7. Inspect and replace parallelogram steering linkage components.
8. Inspect, remove and replace upper and lower control arms and related components.
9. Inspect, remove and replace steering knuckle/spindle/hub assemblies (including bearings, races, and seals).
10. Inspect, remove and replace front suspension system coil springs and spring insulators (silencers).
11. Inspect, remove, replace, and adjust suspension system torsion bars and inspect mounts.
12. Inspect, remove and replace stabilizer bar bushings, brackets, and links.
13. Inspect, remove and replace MacPherson strut cartridge or assembly, upper bearing, and mount.
14. Inspect, remove, and replace rear suspension system transverse links, control arms, stabilizer bars, bushings, and mounts.
15. Inspect, remove, and replace suspension system leaf spring(s) and related components.
16. Inspect axle assembly for damage and misalignment.
17. Inspect, remove and replace shock absorbers.
18. Diagnose, inspect, adjust, repair or replace active suspension systems and associated lines and fittings.
19. Measure vehicle ride height and wheelbase; determine needed repairs.
20. Inspect, remove, replace, and align front and rear frames (cradles/sub).
21. Diagnose and inspect the steering wheel, steering column, and components.
22. Verify proper operation of the steering system.
23. Diagnose front and rear suspension system noises and body sway problems; determine needed repairs.

24. Diagnose vehicle wandering, pulling, hard steering, bump steer, memory steering, torque steering, and steering return problems; determine needed repairs.
25. Demonstrate an understanding of suspension and steering alignments (caster, camber, toe, SAI).
26. Diagnose tire wear patterns; determine needed repairs.
27. Inspect tires; identify the direction of rotation and location; check tire size, tire pressure monitoring system (TPM) and adjust air pressure.
28. Diagnose wheel/tire vibration, shimmy, tire pull (lead), and wheel hop problems; determine needed repairs.
29. Measure wheel, tire, axle, and hub runout; determine needed repairs.
30. Reinstall wheels and torque lug nuts.
31. Check for available voltage, voltage drop and current in electrical wiring circuits and components with a DMM (digital multimeter).
32. Repair electrical circuits, wiring, and connectors.
33. Inspect, test, and replace fusible links, circuit breakers, and fuses.
34. Perform battery state-of-charge test and slow/fast battery charge.
35. Inspect, clean, repair or replace batteries, battery cables, connectors and clamps.
36. Dispose of batteries and battery acid according to local, state, and federal requirements.
37. Identify programmable electrical/electronic components and check for malfunction indicator lamp (MIL); record data for reprogramming before disconnecting the battery.
38. Inspect alignment, adjust, remove and replace alternator (generator), drive belts, pulleys, and fans.
39. Check operation and aim headlamp assemblies and fog/driving lamps. Determine needed repairs.
40. Inspect, test, and repair or replace switches, relays, bulbs, sockets, connectors, and wires of interior and exterior light circuits.
41. Remove and replace horn(s) and check operation.
42. Check operation of wiper/washer systems; determine needed repairs.
43. Check the operation of the power side and tailgate window; determine needed repairs.
44. Inspect, remove and replace power seats, motors, linkages, and cables.
45. Inspect, remove and replace components of the electric door and hatch/trunk lock.
46. Inspect, remove and replace components of keyless lock/unlock devices and alarm systems.
47. Inspect, remove and replace components of the electrical sunroof and convertible/retractable hard top.
48. Check the operation of electrically heated mirrors, windshields, backlights, and panels; determine needed repairs.
49. Demonstrate the proper self-grounding procedures for handling electronic components.
50. Check for module communication errors using a scan tool.
51. Use wiring diagrams and diagnostic flow charts during diagnosis of electrical circuit problems.
52. Demonstrate safe disarming techniques of high voltage systems on hybrid vehicles.
53. Identify potential safety and environmental concerns associated with hybrid vehicle systems.
54. Inspect brake lines, hoses, and fittings for leaks, dents, kinks, rust, cracks or wear; tighten fittings and supports; replace brake lines (double flare and ISO types), hoses, fittings, seals, and supports.
55. Identify, handle, store, and install appropriate brake fluids; dispose of them in accordance with federal, state, and local regulations.
56. Bleed (manual, pressure, vacuum or surge) hydraulic brake system.
57. Pressure test brake hydraulic system; determine needed repair.

58. Adjust brake shoes; remove and reinstall brake drums or drum/hub assemblies and wheel bearings.
59. Remove, clean and inspect caliper and rotor assembly and mountings for wear and damage; reinstall.
60. Check parking brake system operation.
61. Identify the proper procedures for handling brake dust.
62. Check for bent or damaged brake system components.
63. Demonstrate an understanding of various types of advanced braking systems (ABS, hydraulic, electronic, traction and stability control).
64. Identify and comply with environmental concerns relating to refrigerants and coolants.
65. Maintain and verify correct operation of certified refrigerant recovery and recharging equipment.
66. Locate and identify A/C system service ports.
67. Identify, recover, label and store refrigerant from the A/C system.
68. Recycle refrigerant in accordance with EPA regulations.
69. Evacuate and recharge the A/C system; check for leaks.
70. Identify the oil type and maintain the correct amount in the A/C system.
71. Inspect, adjust, and replace A/C compressor drive belts and check pulley alignment.
72. Remove and replace the A/C compressor; inspect, repair or replace the A/C compressor mount.
73. Inspect, repair or replace A/C system mufflers, hoses, lines, fittings, orifice tubes, expansion valves, and seals.
74. Inspect, test, and replace A/C system condenser and mounts.
75. Inspect and replace the receiver/drier or accumulator/drier.
76. Inspect and repair A/C component wiring.
77. Demonstrate an understanding of safe handling procedures associated with high voltage A/C compressors and wiring.
78. Check engine cooling and heater system hoses and belts; determine needed repairs.
79. Inspect, test, remove, and replace the radiator, pressure cap, coolant recovery system, and water pump.
80. Recover, refill, and bleed system with proper coolant and check the level of protection; leak test system and dispose of materials in accordance with EPA specifications.
81. Remove, inspect and replace the fan (both electrical and mechanical), fan sensors, fan pulley, fan clutch, and fan shroud, and check operation.
82. Inspect, remove, and replace auxiliary oil/fluid coolers and check oil levels.
83. Demonstrate an understanding of hybrid cooling systems.
84. Remove, replace, and adjust shift or clutch linkage as required.
85. Remove, replace, and adjust cables or linkages for the throttle valve (TV), kickdown, and accelerator pedal.
86. Remove and replace electronic sensors, wires, and connectors.
87. Remove and replace powertrain assembly; inspect, replace, and align powertrain mounts.
88. Remove and replace the drive axle assembly.
89. Inspect, remove and replace half shafts and axle constant velocity (CV) joints.
90. Inspect, remove and replace drive shafts and universal joints.
91. Demonstrate an understanding of safe handling procedures associated with high-voltage powertrain components.
92. Inspect, remove and replace exhaust pipes, mufflers, converters, resonators, tailpipes, and heat shields.
93. Inspect, remove and replace fuel tank, tank filter, cap, filler hose, pump/sending unit and inertia switch; inspect and replace fuel lines and hoses.
94. Inspect, remove and replace engine components of air intake systems.

95. Inspect, remove and replace canister, filter, vent, and purge lines of fuel vapor (EVAP) control systems.
96. Identify the vehicle manufacturer's SRS recommended procedures before inspecting or replacing components.
97. Inspect, remove, and replace seatbelt and shoulder harness assembly and components.
98. Inspect restraint system mounting areas for damage; repair as needed.
99. Verify proper operation of seatbelt.
100. Deactivate and reactivate the Supplemental Restraint System (SRS).
101. Inspect, remove and replace Supplemental Restraint System (SRS) sensors and wiring; ensure sensor orientation.
102. Verify that the Supplemental Restraint System (SRS) is operational.
103. Inspect, remove, replace and dispose of deployed and non-deployed airbag(s) and pretensioners.
104. Use Diagnostic Trouble Codes (DTC) to diagnose and repair the Supplemental Restraint System (SRS).
105. Demonstrate an understanding of advanced restraint systems.

470644 Non-Structural Analysis and Damage Repair II

The entire description and all tasks/standards for Non-Structural Damage Repair II are listed in [Non-Structural Analysis and Damage Repair I](#). **Courses and standards/ tasks in I, II, III and IV can be completed in any sequence.** The current program standards/task list can be found on the [ASE Education Foundation website](#).

470645 Painting and Refinishing III

The entire description and all tasks/standards for Painting and Refinishing III are listed in [Painting and Refinishing I](#). **Courses and standards/tasks in Painting and Refinishing I, II, III and IV can be completed in any sequence.** The most current program standards/task list can be found on the [ASE Education Foundation website](#).

470647 Painting and Refinishing IV

The entire description and all tasks/standards for Painting and Refinishing II are listed in [Painting and Refinishing I](#). **Courses and standards/tasks in Painting and Refinishing I, II, III, and IV can be completed in any sequence.** The most current program standards/ task list can be found on the [ASE Education Foundation website](#).

Prerequisite: Consent of Instructor

Recommended Grade Level: 10 – 12

Recommended Credit: 1

Students will:

1. Diagnose and repair selected tasks/problems as determined by the instructor.

470649 Non-Structural Analysis and Damage Repair III

The entire description and all tasks/standards for Non-Structural Analysis and Damage Repair III are listed in [Non-Structural Analysis and Damage Repair I](#). **Courses and standards/tasks in I, II, III and IV can be completed in any sequence.** The current program standards/task list can be found on the [ASE Education Foundation website](#).

470677 Applied Collision Repair Projects

Courses designed to enhance a student's understanding of shop situations and problems that arise when dealing with live work. It expands on the task lists that have already been taught in previous Collision Repair Technology Courses. The instructor will teach students how to deal with real world problems that arise when repairing vehicles subjected to various types of customer road use. **Course content and objectives must align with Collision Repair Technology standards upon approval from the Transportation Consultant by submitting a pathway modification request.**

Prerequisite: Consent of Instructor

Recommended Grade Level: 11 – 12

Recommended Credit: 1

Students will:

1. Diagnose and repair selected tasks/problems as determined by the instructor.

499930 Industrial Safety

This course provides practical training in industrial safety. The students are taught to observe general safety rules and regulations, apply work site and shop safety rules, and apply OSHA (Occupational Safety and Health Administration) regulations. Students are expected to obtain certification in first aid and cardiopulmonary resuscitation.

Recommended Grade Level: 9 – 12

Recommended Credit: .5

Students will:

1. Introduce First Aid and CPR (cardiopulmonary resuscitation).
2. Apply worksite and lab safety procedures.
3. Apply personal safety rules and procedures.
4. Apply fire prevention rules and procedures.
5. Demonstrate hazardous communications procedures.
6. Describe and demonstrate universal precautions procedures.
7. Obtain 1926 Construction OSHA (Occupational Safety and Health Administration) 10 certification (recommended but not required).
8. Obtain First Aid and CPR (cardiopulmonary resuscitation) certifications if provisions allow.

DIESEL/MEDIUM-HEAVY TRUCK TECHNOLOGY COURSES

470406 Mechanical Concepts

This course introduces the student to the fundamentals of precision measurement and its application to the industrial setting.

Recommended Grade Level: 10 – 12

Recommended Credit: .5

Students will:

1. Measure with a metric rule.
2. Read an English Vernier caliper and height gauge scale.
3. Read a metric Vernier caliper and height gauge scale.
4. Read an English micrometer.
5. Read a metric micrometer.
6. Identify and use hole and plug gauges to check hole diameters.
7. Identify and use thread gauges to check thread dimensions.
8. Read and use various dial indicators.
9. Identify and install fasteners.
10. Identify, use, and maintain hand tools.
11. Identify and use taps and dies.
12. Identify and use proper rigging methods.
13. Identify and use flaring tools.
14. Identify and use a torque wrench.

470442 Diesel Co-op*

Cooperative Education provides supervised on-the-job work experience related to the student's educational objectives. Students participating in the Cooperative Education program receive compensation for their work.

Recommended Grade Level: 11 – 12

Recommended Credit: 1

Students will:

1. Gain career awareness and the opportunity to test career choices.
2. Receive work experience related to career interests prior to graduation.
3. Integrate classroom studies with work experience.
4. Receive exposure to facilities and equipment unavailable in a classroom setting.
5. Increase employability potential after graduation.
6. Earn funds to help finance education expenses.

* In section 2 of [705 KAR 4:041](#), Cooperative education shall meet the minimum requirements established in this section:
(a) Enrolled in a course included within the student's chosen career pathway within the same academic year; or
(b) A career pathway completer by the conclusion of the student's junior year; or
(c) Enrolled in an approved registered youth or pre-apprenticeship program.

470445 Internship I (Diesel)

Internships for CTE courses provide supervised worksite experience for high school students who are enrolled in a course associated with their identified career pathway. Internship experiences consist of a combination of classroom instruction and field experiences. A student receiving pay for an intern experience is participating in an experience that lasts a semester or longer and has an established employee-employer relationship. A non-paid internship affects those students who participate on a short-term basis (semester or less).

Recommended Grade Level: 11 – 12

Recommended Credit: 1

Students will:

1. Gain career awareness and the opportunity to test career choices.
2. Receive work experience related to career interests prior to graduation.
3. Integrate classroom studies with work experience.
4. Receive exposure to facilities and equipment unavailable in a classroom setting.
5. Increase employability potential after graduation.

470450 Diesel Medium/Heavy Duty Truck Inspection, Maintenance, and Minor Repair (IMMR) Section A

These courses introduce the student to the tasks/standards included in the Inspection, Maintenance, and Minor Repair. The tasks included in the Inspection, Maintenance, and Minor Repair option are entry-level technician inspection tasks designed to introduce the student to correct procedures and practices of vehicle inspection in a teaching/learning environment. These courses will instruct the student in the principles, theories, and concepts of Medium/Heavy Duty Diesel Truck Technology and include instruction on Diesel Engines, Brake Systems, Electrical/Electronic Systems, Suspension and Steering Systems, Drivetrains, Preventive Maintenance, and Engine Performance Systems. In all areas, appropriate theory, safety, and support instruction will be taught and required for performing each task. The instruction will also include the identification and use of appropriate tools and testing/measurement equipment required to accomplish certain tasks. The student will also receive the necessary training to locate and use current reference and training materials from accepted industry publications and resources and demonstrate the ability to write work orders.

These courses are not intended to satisfy the Annual Federal Vehicle Inspection requirement as prescribed in the Federal Motor Carrier Safety Regulations, Part 396, Appendix G to Subchapter B, Minimum Periodic Inspection Standards. **Courses A, B, C, and D can be completed in any sequence.** The current program standards/task list can be found on the [ASE Education Foundation website](#).

Recommended Grade Level: 11 – 12

Recommended Credit: 1

Students will:

1. Explain and apply required shop and personal safety tasks relating to the automotive industry.
2. Explain and apply required tasks associated with the proper use and handling of tools and equipment relating to the automotive industry.
3. Demonstrate proficiency in preparing vehicles for routine pre/post-maintenance and customer services.
4. Demonstrate workplace employability skills related to personal standards and work habits/ethics.
5. Identify the basic diesel components and functions.
6. Identify principles, assemblies, and systems of engine operation.
7. Explain and apply the diagnosis, service, maintenance, and repair of engines, cylinder heads, valve trains, engine blocks, lubrication and cooling systems, air induction and exhaust systems, fuel systems, and engine braking systems proficiently.
8. Explain and apply proficiently the diagnosis, service, maintenance and repair of various drivetrain systems and components, including clutch, transmissions, driveshafts, universal joints, and drive axles.
9. Explain and apply proficiently the diagnosis, service and repair of braking systems, including air brakes and related systems, hydraulic brakes and related systems, wheel bearings, parking brake systems, power assist systems, Vehicle Dynamic Brake Systems (Air and Hydraulic): Antilock Brake System (ABS), Automatic Traction Control (ATC) System, and Electronic Stability Control (ESC) Systems.

10. Explain and apply proficiently the diagnosis, service and repair of suspension and steering systems, including steering columns, steering pump and gear units, steering linkage, suspension systems, wheel alignments, wheels and tires, and frame and coupling devices.
11. Explain and apply proficiently the diagnosis, service and repair of electrical and electronic systems, including battery system, starting system, charging system, lighting system, instrument cluster and driver information systems.
12. Explain and apply proficiently the diagnosis, service and repair of HVAC systems, including the components, HVAC cooling systems, operating system and related controls.
13. Explain and apply proficiently the diagnosis, service and repair of the CAB, including instruments and controls, safety equipment, and hardware.
14. Explain and apply proficiently the diagnosis, service and repair of hydraulic systems.

470451 Diesel Medium/Heavy Duty Truck Inspection, Maintenance, and Minor Repair (IMMR) Section B

The entire description and all tasks/standards for the Diesel Medium/Heavy Duty Truck Inspection, Maintenance, and Minor Repair (IMMR) Sections A, B, C, and D are listed in the [Diesel Medium/Heavy Duty Truck Inspection, Maintenance, and Minor Repair \(IMMR\) Section A](#). **Courses and standards/tasks in A, B, C and D can be completed in any sequence.** The current program standards/task list can be found on the [ASE Education Foundation website](#).

470452 Diesel Medium/Heavy Duty Truck Inspection, Maintenance, and Minor Repair (IMMR) Section C

The entire description and all tasks/standards for the Diesel Medium/Heavy Duty Truck Inspection, Maintenance, and Minor Repair (IMMR) Sections A, B, C, and D are listed in the [Diesel Medium/Heavy Duty Truck Inspection, Maintenance, and Minor Repair \(IMMR\) Section A](#). **Courses and standards/tasks in A, B, C and D can be completed in any sequence.** The current program standards/task list can be found on the [ASE Education Foundation website](#).

470453 Diesel Medium/Heavy Duty Truck Inspection, Maintenance, and Minor Repair (IMMR) Section D

The entire description and all tasks/standards for the Diesel Medium/Heavy Duty Truck Inspection, Maintenance, and Minor Repair (IMMR) Sections A, B, C, and D are listed in the [Diesel Medium/Heavy Duty Truck Inspection, Maintenance, and Minor Repair \(IMMR\) Section A](#). **Courses and standards/tasks in A, B, C and D can be completed in any sequence.** The current program standards/task list can be found on the [ASE Education Foundation website](#).

470460 Diesel Medium/Heavy Truck Service Technology (TST)

Section A

These courses present the theory, component identification, operation, diagnosis, and service and repair of Medium/Heavy Duty Truck Diesel Engines, Brake Systems, Electrical/Electronic Systems, Suspension and Steering Systems, Drivetrain Systems, Engine Performance Systems, and Preventive Maintenance. In all areas, appropriate theory, safety, and support instruction will be taught and required for performing each task. The instruction will also include the identification and use of appropriate tools and testing/measurement equipment required to accomplish certain tasks. The student will also locate and use current reference and training materials from accepted industry publications and resources and write industry-standard work orders. **Courses A, B, C and D can be completed in any sequence.** The current program standards/task list can be found on the [ASE Education Foundation website](#).

Prerequisite: Completion of all Diesel Medium/Heavy Duty Truck Inspection, Maintenance and Minor Repair (IMMR) tasks.

Recommended Grade Level: 11 – 12

Recommended Credit: 1

Students will:

1. Explain and apply required shop and personal safety tasks relating to the automotive industry.
2. Explain and apply required tasks associated with the proper use and handling of tools and equipment relating to the automotive industry.
3. Demonstrate proficiency in preparing a vehicle for routine pre/post-maintenance and customer services.
4. Demonstrate workplace employability skills related to personal standards and work habits/ethics.
5. Identify the basic diesel components and functions.
6. Identify principles, assemblies, and systems of engine operation.
7. Explain and apply the diagnosis, service, maintenance, and repair of engines, cylinder heads, valve trains, engine blocks, lubrication and cooling systems, air induction and exhaust systems, fuel systems, and engine braking systems proficiently.
8. Explain and apply proficiently the diagnosis, service, maintenance and repair of various drivetrain systems and components, including clutch, transmissions, driveshafts, universal joints, and drive axles.
9. Explain and apply proficiently the diagnosis, service and repair of braking systems to include, including air brakes and related systems, hydraulic brakes and related systems, wheel bearings, parking brake systems, power assist systems, and Vehicle Dynamic Brake Systems (Air and Hydraulic): Antilock Brake System (ABS), Automatic Traction Control (ATC) System, and Electronic Stability Control (ESC) Systems.
10. Explain and apply proficiently the diagnosis, service and repair of suspension and steering systems, including steering columns, steering pump and gear units, steering linkage, suspension systems, wheel alignments, wheels and tires, frame and coupling devices.
11. Explain and apply proficiently the diagnosis, service and repair of electrical and electronic systems, including battery system, starting system, charging system, lighting system,

instrument cluster and driver information systems.

12. Explain and apply proficiently the diagnosis, service and repair of HVAC systems, including the components, HVAC cooling systems, operating system and related controls.
13. Explain and apply proficiently the diagnosis, service and repair of the CAB, including instruments and controls, safety equipment, and hardware.
14. Explain and apply proficiently the diagnosis, service and repair of hydraulic systems.

470461 Diesel Medium/Heavy Truck Service Technology (TST) Section B

The entire description and all tasks/standards for the Diesel Medium/Heavy Truck Service Technology (TST) Sections A, B, C, and D are listed in the [Diesel Medium/Heavy Truck Service Technology \(TST\) Section A](#). **Courses and standards/tasks in A, B, C and D can be completed in any sequence.** The current program standards/task list can be found on the [ASE Education Foundation website](#).

470462 Diesel Medium/Heavy Truck Service Technology (TST) Section C

The entire description and all tasks/standards for the Diesel Medium/Heavy Truck Service Technology (TST) Sections A, B, C, and D are listed in the [Diesel Medium/Heavy Truck Service Technology \(TST\) Section A](#). **Courses and standards/tasks in A, B, C and D can be completed in any sequence.** The current program standards/task list can be found on the [ASE Education Foundation website](#).

470463 Diesel Medium/Heavy Truck Service Technology (TST) Section D

The entire description and all tasks/standards for the Diesel Medium/Heavy Truck Service Technology (TST) Sections A, B, C, and D are listed in the [Diesel Medium/Heavy Truck Service Technology \(TST\) Section A](#). **Courses and standards/tasks in A, B, C and D can be completed in any sequence.** The current program standards/task list can be found on the [ASE Education Foundation website](#).

470477 Applied Diesel Projects

This course is designed to enhance a student's understanding of shop situations and problems that arise when dealing with live work. It expands on the task lists that have already been taught in previous Diesel/Medium Heavy Technology Courses. The instructor will teach students how to deal with real-world problems that arise when repairing Medium/Heavy Truck vehicles subjected to various types of customer road use. **Course content and objectives must align with Diesel/ Medium-Heavy Technology standards upon approval from the Transportation Consultant by submitting a pathway modification request.**

Recommended Grade Level: 11 – 12

Recommended Credit: 1

Students will:

1. Diagnose and repair selected tasks/problems as determined by the instructor.

470546 Precision Measurement

This course introduces the student to the fundamentals of precision measurement and its application in the industrial setting.

Recommended Grade Level: 10 – 12

Recommended Credit: .5

Students will:

1. Measure with an English fraction rule.
2. Measure with an English decimal rule.
3. Measure with a metric steel rule.
4. Read an English Vernier caliper and height gauge scale.
5. Read a metric Vernier caliper and height gauge scale.
6. Read an English micrometer.
7. Read a metric micrometer.
8. Assemble English gauge blocks to specified measurements.
9. Assemble metric gauge blocks to specified measurements.
10. Use hole and plug gauges to check hole diameters.
11. Use thread gauges to check thread dimensions.
12. Read and use various dial indicators.
13. Identify pneumatic, electrical, electronic, and optical comparators.

FLIGHT AND AVIATION COURSES

210139 Introduction to Aircraft Maintenance Technology

The purpose of this course is for students to develop basic knowledge and personal skills that can be applied to a broad range of career opportunities with an emphasis on aviation maintenance technology. Students will gain experience in electricity and electronics, metalworking, woodworking, plastics and composite materials through the use of tools, machines and materials that are basic to the aviation industry. It will cover both hand and machine-tool operations and supply background knowledge on equipment and processes utilized in the aviation industry and manufacturing. The program allows students to learn basic problem-solving skills, instruction in mechanical drawing, blueprint reading, engineering CAD, and the application of engineering concepts and mathematics. Participation in Kentucky Technology Student Association will greatly enhance instruction.

Prerequisites: [210226](#) Introduction to Aerospace and Aviation **AND/OR** [210233](#) Aviation I

Recommended Grade Level: 10 – 12

Recommended Credit: 1

Students will:

1. Apply the design process involving problem identification, conceptualization, research, refinement of preliminary ideas, design analysis, development and implementation, detailed documentation of final design, optimization and final presentation.
2. Perform basic electricity skills.
3. Perform basic aircraft drawing skills.
4. Demonstrate aircraft weight and balance skills.
5. Maintain aircraft fluid lines and fittings.
6. Perform aircraft materials and processing skills.
7. Perform cleaning and corrosion-control operations.
8. Apply basic physics to aircraft systems.
9. Demonstrate an appropriate understanding of basic science.
10. Demonstrate the use of maintenance publications.
11. Interpret mechanical privileges and limitations.
12. Identify Federal Aviation Administration (FAA) licensing requirements.
13. Demonstrate appropriate communication skills.
14. Demonstrate employability skills as an Aviation General Maintenance Technician Helper.
15. Maintain wood structures.
16. Perform aircraft covering.
17. Apply aircraft finishes.
18. Repair sheet-metal structures.

210226 Introduction to Aerospace and Aviation

This core aerospace and aviation course provides the foundation for all flight and aviation pathways. Students will gain an appreciation for the similarities and differences between aviation and aerospace. Students will also gain a historical perspective, starting from the earliest flying machines to the wide variety of modern aircraft and the integral role they play in making today's world work. Students will learn about the history and impact of space exploration and have opportunities to build and fly historical and contemporary aircraft and spacecraft designs. Students will also begin to drill down into the various sectors of aviation and the parts that make up the aviation and aerospace ecosystem. They will discover how advances in aviation created a need for regulation and will learn about the promulgation of civil aviation oversight. Participation in Kentucky Technology Student Association will greatly enhance instruction.

Recommended Grade Level: 9 – 10

Recommended Credit: 1

Students will:

1. Demonstrate an understanding of the history and development of aviation and space transportation.
2. Explain and demonstrate an understanding of the principles of flight, including Bernoulli's Principle, Newton's Laws of Motion, Universal Gravitation, and the forces that affect flight.
3. Describe and demonstrate an understanding of basic aerodynamics and airfoils.
4. Describe how flight simulators are used for training and their importance.
5. Perform flight maneuvers in a simulator: straight and level, turns and climbs and descents.
6. Demonstrate practical knowledge of digital technology and communications related to aviation/aerospace projects.
7. Identify and model specific functions of various aircraft structures.
8. Describe and demonstrate an understanding of the materials that are used in aircraft design and development.
9. Understand various aviation professional organizations and government resources/entities.
10. Introduce aviation safety, risk management, and aeronautical decision-making.
11. Explore and demonstrate the layout and general operations of the airport environment, including chart supplements, runway layout, and airport information database.
12. Define and safely demonstrate Unmanned Aircraft Systems (UAS) types and operations and regulations.
13. Describe and demonstrate an understanding of rocketry/space system technology and its application in space environments.
14. Explore the role of spacecraft in the exploration and colonization of space.
15. Describe the aviation/aerospace industry nationally and in Kentucky.
16. Demonstrate an understanding of career opportunities and requirements in the field of aerospace technologies.

210227 Flight and Aviation Co-op*

Cooperative Education for CTE (Career and Technical Education) courses provide supervised work site experience related to the student's identified career pathway. A student must be enrolled in an approved pathway course during the same school year that the co-op experience is completed or have already completed the pathway the previous year. Students who participate receive a salary for these experiences, in accordance with local, state, and federal minimum wage requirements according to the [Work-Based Learning Manual](#). Must hold a professional Kentucky teaching certificate in any content area, have a minimum of a Rank II, and 5 years teaching experience.

Recommended Grade Level: 11 – 12

Recommended Credit: 1

Students will:

1. Demonstrate and practice safe work habits at all times.
2. Gain career awareness and the opportunity to test career choices.
3. Receive work experience related to career interests.
4. Integrate classroom studies with work experience.
5. Receive exposure to facilities and equipment unavailable in a classroom setting.
6. Increase employability potential.

* In section 2 of [705 KAR 4:041](#), Cooperative education shall meet the minimum requirements established in this section:
(a) Enrolled in a course included within the student's chosen career pathway within the same academic year; or
(b) A career pathway completer by the conclusion of the student's junior year; or
(c) Enrolled in an approved registered youth or pre-apprenticeship program.

210233 Aviation I

This course will introduce students to basic aircraft structures and their major components, principles of flight, and the fundamental physical laws affecting flight. Students will learn about basic aerodynamics and the forces that act on aircraft in flight. This course will provide students with a foundational understanding of basic physics concepts related to flight. Design characteristics will be covered, including concepts surrounding aircraft stability, controllability, and the effect of weight and balance on flight performance. The course will cover primary and secondary flight control systems. It also covers the different types of power plants and how they support the operation of the aircraft. Students will learn about several different types of fuel systems and gain an understanding of the critical components of aircraft electrical systems. Finally, students will learn about various systems that drive flight instruments and how those flight instruments operate. Participation in Kentucky Technology Student Association will greatly enhance instruction.

Recommended Grade Level: 9 – 12

Recommended Credit: 1

Students will:

1. Communicate the importance of aviation safety, including aeronautical decision-making, risk management, positive aircraft control, stall/spin awareness, collision avoidance, runway incursion avoidance, and checklist usage.
2. Explain and demonstrate the interrelationships among aerodynamic forces that affect an aircraft on the ground and in flight.
3. Describe the characteristics and functions of aircraft control surfaces.
4. Compare and contrast the characteristics and operating principles of various power plants.
5. Distinguish between the functions and characteristics of primary flight instruments.
6. Perform intermediate flight maneuvers in a simulator: standard rate turns, advanced turns, constant angle turns, constant speed climbs, constant rate climbs, climbing and descending turns, power on/off stalls, traffic pattern operations, and landings.
7. Recognize airport lighting, markings, and signage.
8. Identify the different elements of each classification of airspace.
9. Demonstrate ATC/pilot communication procedures with the use of correct terminology and radio phraseology.
10. Utilize dead reckoning and pilotage to navigate.
11. Use a self-assessment checklist to determine the fitness of flight according to basic aviation physiology.
12. Apply basic meteorological principles to weather theory and aviation weather reports.
13. Demonstrate crew resource management principles of manned and unmanned aircraft.

210234 Aviation II

This course prepares students for flight training and aircraft operations. Students will gain knowledge and skills in airport systems, air traffic control procedures, aviation weather, air navigation, radio communication procedures, and Federal Aviation Regulations (FARs). This course covers the history of aviation law, federal regulation of air transportation and the role of state and federal government in aviation law, including functions of the Federal Aviation Administration. Students will become familiar with aircraft power plants, principles of flight, aircraft systems/instruments, and the science of weather. Participation in Kentucky Technology Student Association will greatly enhance instruction.

Prerequisites: [210226](#) Introduction to Aerospace and Aviation **AND/OR** [210233](#) Aviation I

Recommended Grade Level: 11 – 12

Recommended Credit: 1

Students will:

1. Apply the design process involving problem identification, conceptualization, research, refinement of preliminary ideas, design analysis, development and implementation, detailed documentation of final design, optimization and final presentation.
2. Demonstrate an understanding of the history and development of aviation and space transportation.
3. Recognize the important milestones prior to the first successful flight.
4. Describe and demonstrate an understanding of the principles of flight.
5. Describe different wing platforms and how they alter flight performance and characteristics.
6. Demonstrate an understanding of power systems, including internal combustion engines, jet engines, rocket engines, solar cells and nuclear power used in aviation/aerospace applications.
7. Describe the important developments in commercial aviation following the war and how the world changed its attitudes toward passenger airlines.
8. Recognize the major developments in air warfare during WWII and the impact of future aviation.
9. Describe the major materials and methods of aircraft construction.
10. Describe and demonstrate principles of navigation.
11. Define the term general aviation and be able to recognize the major fields within the general aviation community.
12. Know the most important and successful airplanes and their manufacturers.
13. Describe various factors critical to aircraft performance.
14. Demonstrate an understanding of the differences between the wing and rotary aircraft flight principles and characteristics.

210237 Aviation III

This course discusses the Federal Aviation Regulations covering the privileges, limitations, and operations of a commercial pilot, and the operations for which an air taxi/commercial operator, agricultural aircraft operator, and external load operator certificate, waiver, or exemption is required. The course also discusses the safe and efficient operation of airplanes, including inspection and certification requirements, operating limitations, high altitude operations and physiological considerations, loading computations, the significance of the use of airplane performance speeds, the computations involved in the runway and obstacle clearance and crosswind component considerations, and cruise control. Participation in Kentucky Technology Student Association will greatly enhance instruction.

Prerequisites: [210226](#) Introduction to Aerospace and Aviation **AND/OR** [210233](#) Aviation I

Recommended Grade Level: 11 – 12

Recommended Credit: 1

Students will:

1. Apply the design process involving problem identification, conceptualization, research, refinement of preliminary ideas, design analysis, development and implementation, detailed documentation of final design, optimization and final presentation.
2. Demonstrate an understanding of the history and development of the commercial aviation industry.
3. Describe the commercial aviation industry environment.
4. Describe and demonstrate an understanding of commercial pilot aerodynamics.
5. Demonstrate an understanding of electrical, mechanical, fluid, and pneumatic systems that could be used on/in aviation/aerospace environments.
6. Demonstrate an understanding of advanced aircraft systems, including turbine engines, hydraulic flight controls, environmental systems and GPS navigation.
7. Demonstrate technical knowledge of the Air Traffic Control systems as it is related to commercial aviation technology.
8. Demonstrate knowledge of positive exchange of the flight control procedures.
9. Demonstrate knowledge and understanding of processing temporary flight restrictions (TFRs).
10. Describe and demonstrate principles of ADM and risk management.
11. Explore the role of the “Air Taxi” charter flight services.
12. Describe various factors critical to aircraft performance in high-performance aircraft.
13. Demonstrate appropriate skills in analyzing and evaluating technological advancements as reported by the media.
14. Perform advanced study and technical skills related to commercial aviation standards.
15. Demonstrate an understanding of career opportunities and requirements in the field of commercial aviation and commercial pilots.

210240 Aviation Capstone

Aviation scope, content, and professional practices are presented through practical applications in this capstone course. In teams, students apply technology, Kentucky Academic Standards, and skills to solve aviation design problems and create innovative designs. Students research, develop, test and analyze aviation designs using criteria such as design effectiveness, public safety, human factors and ethics. Participation in Kentucky Technology Student Association will greatly enhance instruction.

Prerequisites: [210226](#) Introduction to Aerospace and Aviation **AND/OR** [210233](#) Aviation I

Recommended Grade Level: 11 – 12

Recommended Credit: 1

Students will:

1. Complete tasks as determined by the instructor.

210251 Unmanned Aircraft Systems

This course is an introduction to unmanned aircraft systems (UAS). A history of UAS, typical applications and an overview of regulations, airframe and powerplant systems, sensors, ground control stations, airspace, weather, and other foundational skills needed to safely operate UAS in the U.S. airspace systems will be covered. This course will incorporate hands-on practical applications and will give students the opportunity to design, build, and pilot UAS, both remotely and autonomously. Students will be prepared to complete the *Federal Aviation Administration's Part 107 Remote Pilot* written exam upon completion of this course. Participation in Kentucky Technology Student Association will greatly enhance instruction.

Recommended Grade Level: 11 – 12

Recommended Credit: 1

Students will:

1. Explain some of the significant milestones in the history of UAS.
2. Describe several commercial and military applications of UAS.
3. Identify and define the major components on an UAS.
4. Explain how sensing systems function in an UAS.
5. Describe the fundamentals of airframe and powerplant design for UAS
6. Describe the fundamentals of communication, command, and control for UAS.
7. Explain the basic principles of detect and avoid.
8. Interpret a VFR sectional aeronautical chart.
9. Locate and interpret NOTAMs.
10. Evaluate launch sites for UAS operations.
11. Explain the different classes of airspace and the restrictions on UAS operations in each.
12. Read and interpret aviation weather reports including METARs, TAFS, SIGMETs, and AIRMETS.
13. Describe the rules for UAS operations as defined in FAA CFR part 107.
14. Determine the effects of aircraft loading, weight and balance on UAS operation.
15. Design, build and pilot a UAS safely and effectively.
16. Operate a UAS both remotely and autonomously.
17. Use proper radio communication procedures.
18. Identify physical and psychological factors that affect UAS operations.
19. Describe preflight and preventative maintenance procedures for an UAS.
20. Explain airport operations that could impact UAS operations.
21. Apply aeronautical decision-making and judgment during the use of UAS.

210330 Engineering Co-op*

Cooperation Education is a paid education program consisting of in-school instruction combined with the program related to on-the-job work experience in a business or industrial establishment. These are planned experiences supervised by the school and the employer to ensure that each phase contributes to the student's Individual Learning Plan (ILP). Refer to the KDE [Work-Based Learning Manual](#) for further specifications. Participation in Kentucky Technology Student Association will greatly enhance instruction.

Recommended Grade Level: 11 – 12

Recommended Credit: 1

Students will:

1. Gain career awareness and the opportunity to test career choices.
2. Receive work experience related to career interests prior to graduation.
3. Integrate classroom studies with work experience.
4. Receive exposure to facilities and equipment unavailable in a classroom setting.
5. Increase employability potential after graduation.
6. Earn funds to help finance education expenses.

* In section 2 of [705 KAR 4:041](#), Cooperative education shall meet the minimum requirements established in this section:
(a) Enrolled in a course included within the student's chosen career pathway within the same academic year; or
(b) A career pathway completer by the conclusion of the student's junior year; or
(c) Enrolled in an approved registered youth or pre-apprenticeship program.