Florida CTE

Transportation, Distribution & Logistics (2021): Advanced Automotive Service Technology

Adopted 2021

Advanced Automotive Service Technology (I470604)

Advanced Automotive Service Technology - Course Number: AER0011

0. Proficiently explain and apply required shop and personal safety tasks relating to the automotive industry.--The student will be able to: AAS.01.0
    01. Identify general shop safety rules and procedures. AAS.01.01
    02. Utilize safe procedures for handling of tools and equipment. AAS.01.02
    03. Identify and use proper placement of floor jacks and jack stands. AAS.01.03
    04. Identify and use proper procedures for safe lift operation. AAS.01.04
    05. Utilize proper ventilation procedures for working within the lab/shop area. AAS.01.05
    06. Identify marked safety areas. AAS.01.06
    07. Identify the location and the types of fire extinguishers and other fire safety equipment; demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment. AAS.01.07
    08. Identify the location and use of eye wash stations. AAS.01.08
    09. Identify the location of the posted evacuation routes. AAS.01.09
    10. Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities. AAS.01.10
    11. Identify and wear appropriate clothing for lab/shop activities. AAS.01.11
    12. Secure hair and jewelry for lab/shop activities. AAS.01.12
    13. Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits. AAS.01.13
    14. Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.). AAS.01.14
    15. Locate and demonstrate knowledge of safety data sheets (SDS). AAS.01.15
    16. Identify tools and their usage in automotive applications. AAS.01.16
    17. Identify standard and metric designation. AAS.01.17
    18. Demonstrate safe handling and use of appropriate tools. AAS.01.18
    19. Demonstrate proper cleaning, storage, and maintenance of tools and equipment. AAS.01.19
    20. Demonstrate proper use of precision measuring tools (i.e. micrometer, dial-indicator, dial caliper). AAS.01.20
    21. Identify information needed and the service requested on a repair order. AAS.01.21
    22. Identify purpose and demonstrate proper use of fender covers, mats. AAS.01.22
    23. Demonstrate use of the three C's (concern, cause, and correction). AAS.01.23
    24. Review vehicle service history. AAS.01.24

25. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. AAS.01.25
26. Ensure vehicle is prepared to return to customer per school/company policy (floor mats, steering wheel cover, etc.). AAS.01.26
27. Identify appropriate emergency first aid procedures. AAS.01.27
28. Identify proper procedures for safe pit usage. AAS.01.28
29. Use proper handling procedures for automotive fluids. AAS.01.29
30. Identify and describe typical automotive lubricants and lubricant properties. AAS.01.30
31. Research, identify, and interpret the Federal Law as recorded in (29 CFR-1910.1200). AAS.01.31
32. Identify and describe typical automotive seals and gaskets. AAS.01.32
33. Explain the effects of chemical/substance abuse. AAS.01.33
34. Identify principles of stress management. AAS.01.34
35. Identify and define career opportunities in the automotive service industry. AAS.01.35
36. Demonstrate knowledge of appropriate automotive industry certifications. AAS.01.36
37. Disable supplemental restraint systems (SRS) in accordance with manufacturers' procedures. AAS.01.37

0. Demonstrate proficiency in preparing vehicle for routine pre/post maintenance and customer services.--The student will be able to: AAS.02.0
    01. Identify automobiles according to engine location, cylinders, type of drive system, purpose, etc. AAS.02.01
    02. Locate and use Vehicle identification Number (VIN) vehicle information placards, decals, tags, as required. AAS.02.02
    03. Conduct an appropriate pre-service evaluation and report or note any concerns not already on the repair order. AAS.02.03
    04. Demonstrate retrieving stored diagnostic trouble codes. AAS.02.04
    05. Reset product specific service indicator. AAS.02.05
    06. Identify acceptable customer relations. AAS.02.06
    07. Identify and demonstrate proper customer relations skills. AAS.02.07
    08. Identify and define payroll deductions (taxes, insurance, and social security) employee benefits and pay systems. AAS.02.08
    09. Identify principles of time management. AAS.02.09
    10. Demonstrate proficiency in manufacturer electronic service information system, including flat rate manuals, technical service bulletins and replacement part identification; where applicable. AAS.02.10

11. Use proper chemicals for cleaning and lubrication. AAS.02.11
12. Determine the presence of a Tire Pressure Monitoring System (TPMS). AAS.02.12
13. Identify service considerations when equipped with a Tire Pressure Monitoring System (TPMS). AAS.02.13
14. Determine the presence of wheel locks. AAS.02.14
15. Determine the presence of an air suspension system. AAS.02.15
16. Check operation and status of instrument panel warning lights and gauges. AAS.02.16
17. Inspect under hood area for leaks, damage, and unusual conditions. AAS.02.17
18. Inspect undercar area for leaks, damage, and unusual conditions. AAS.02.18
19. Inspect engine assembly for fuel, oil, coolant, and other leaks. AAS.02.19
20. Determine fluid type requirements and identify fluid. AAS.02.20
21. Check engine oil level and condition; service as required. AAS.02.21
22. Check engine coolant level and condition; service as required. AAS.02.22
23. Inspect cooling system pipes and hoses for wear, damage, and proper routing. AAS.02.23
24. Check power steering fluid level and condition; service as required. AAS.02.24
25. Lubricate driveline, suspension and steering systems as applicable. AAS.02.25
26. Inspect and replace power steering hoses and fittings. AAS.02.26
27. Inspect struts, springs, and related components; service as required. AAS.02.27
28. Inspect stabilizer bar, bushings, brackets, and links; service as required. AAS.02.28
29. Inspect springs, torsion bars, and related components; service as required. AAS.02.29
30. Inspect shock absorbers and related components. AAS.02.30
31. Check windshield washer fluid level and condition; service as required. AAS.02.31
32. Check automatic transmission fluid level and condition; service as required. AAS.02.32
33. Check differential/transfer case fluid level; note unusual conditions; service as required. AAS.02.33
34. Check manual transmission fluid level; note unusual conditions; service as required. AAS.02.34
35. Service transmission; perform visual inspection; replace fluids and filters. AAS.02.35
36. Check hydraulic clutch fluid and condition; service as required. AAS.02.36
37. Check rear axle drive assembly seals and vents; check lube level. AAS.02.37

38. Inspect constant velocity (CV) axle shaft boots; service as required. AAS.02.38
39. Remove, inspect, and service front and rear wheel bearings on non-drive axles. AAS.02.39
40. Check wheel bearings for play and other signs of wear. AAS.02.40
41. Inspect, replace and adjust drive belts; inspect tensioners and pulleys. AAS.02.41
42. Inspect and replace air filter. AAS.02.42
43. Inspect and replace cabin air filter. AAS.02.43
44. Inspect tires, diagnose tire wear patterns, inspect spare and mounting system; check and adjust tire pressure; where applicable. AAS.02.44
45. Rotate tires according to manufacturer's recommendations. AAS.02.45
46. Balance wheel and tire assembly (static, dynamic and road force balance); where applicable. AAS.02.46
47. Dismount, inspect, repair, and remount tire on wheel. AAS.02.47
48. Repair tire according to industry standards. AAS.02.48
49. Identify nitrogen-filled tires. AAS.02.49
50. Reinstall wheel; torque wheel fasteners to specification. AAS.02.50
51. Perform a visual inspection of a brake drum system. AAS.02.51
52. Perform a visual inspection of a disc brake system. AAS.02.52
53. Check parking brake operation; check parking brake components for unusual conditions. AAS.02.53
54. Check master cylinder for internal and external leaks and proper operation. AAS.02.54
55. Fill master cylinder with recommended fluid and seat pads. AAS.02.55
56. Check brake fluid level and condition; service as required. AAS.02.56
57. Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear. AAS.02.57
58. Identify and use the proper procedures required for cutting tubing and double and ISO flaring. AAS.02.58
59. Inspect flexible brake hoses for leaks, kinks, cracks, bulging or wear; tighten loose fittings and supports. AAS.02.59
60. Inspect fuel tank, fuel cap and seal; inspect and replace fuel lines, fittings, and hoses; as applicable. AAS.02.60
61. Inspect and replace fuel filters as applicable. AAS.02.61
62. Inspect exhaust manifold, exhaust pipes, mufflers, resonators, tail pipes, and heat shields; repair or replace as needed. AAS.02.62
63. Inspect, test head lamps, tail lamps and stop lamps. Aim headlights. AAS.02.63
64. Inspect and replace exterior and courtesy lamps. AAS.02.64

65. Check wiper blades, inserts, and arms; replace wiper blades or inserts. AAS.02.65
66. Lubricate door latches and hinges. AAS.02.66
67. Perform slow/fast battery charge. AAS.02.67
68. Inspect, clean, fill, and replace battery. AAS.02.68
69. Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or replace as needed. AAS.02.69
70. Perform battery, starting, and charging system tests using appropriate tester. AAS.02.70
71. Perform battery test; determine needed service. AAS.02.71
72. Start a vehicle using jumper cables or a battery auxiliary power supply (jump box). AAS.02.72
73. Demonstrate knowledge of abnormal key-off battery drain. AAS.02.73
74. Perform starter current draw and circuit voltage drop test; determine necessary action. AAS.02.74
75. Remove and replace/reinstall starter. AAS.02.75
76. Remove, inspect, and replace/reinstall alternator. AAS.02.76
77. Observe dash warning lamps during bulb check. AAS.02.77
78. Practice recommended precautions when handling static sensitive devices. AAS.02.78
79. Check 12 volt non-computer electrical circuits with a test light; determine necessary action. AAS.02.79
80. Check voltage and voltage drop in electrical circuits using a digital multi-meter (DMM). AAS.02.80
81. Obtain and interpret digital multi-meter (DMM) readings. AAS.02.81
82. Check current flow in electrical/electronic circuits and components using an ammeter. AAS.02.82
83. Check electrical circuits using fused jumper wires. AAS.02.83
84. Inspect and test fusible links, circuit breakers, and fuses; confirm proper circuit operation; replace as needed. AAS.02.84
85. Maintain or restore electronic memory functions if required. AAS.02.85
86. Inspect and test positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; service or replace as needed. AAS.02.86
87. Remove and replace valve cover gaskets. AAS.02.87
88. Return cores for rebuilt and exchange items. AAS.02.88
89. Inspect driver and passenger restraint system. AAS.02.89
90. Demonstrate knowledge of manufacturer policies and procedures. AAS.02.90
91. Perform product specific service procedures. AAS.02.91

92. Identify and maintain product specific engine systems. AAS.02.92
93. Identify and maintain product specific automatic transmission systems. AAS.02.93
94. Identify and maintain product specific manual transmission systems. AAS.02.94
95. Identify and maintain product specific electrical and electronic systems. AAS.02.95
96. Identify and maintain product specific heating and A/C systems. AAS.02.96
97. Identify and maintain product specific steering and suspension systems. AAS.02.97
98. Identify and maintain product specific brake systems. AAS.02.98
99. Identify and maintain product specific audio systems. AAS.02.99
100. Identify and maintain product specific safety systems. AAS.02.100
101. Identify and maintain product specific accessories. AAS.02.101
102. Identify product specific engine performance and emission related components AAS.02.102
103. Use manufacturer specific scan tool to retrieve P, B, C and U type diagnostic trouble codes. AAS.02.103

0. Explain and apply proficiently the diagnosis, service and repair of engines, cylinder heads, valve train, engine block, lubrication and cooling systems.--The student will be able to: AAS.03.0
    01. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. AAS.03.01
    02. Research vehicle service information including fluid type, internal engine operation, vehicle service history, service precautions, and technical service bulletins. AAS.03.02
    03. Verify operation of the instrument panel engine warning indicators. AAS.03.03
    04. Inspect engine assembly for fuel, oil, coolant, and other leaks; determine needed action. AAS.03.04
    05. Install engine covers using gaskets, seals, and sealers as required. AAS.03.05
    06. Verify engine mechanical timing. AAS.03.06
    07. Perform common fastener and thread repair, to include: remove broken bolt, restore internal and external threads, and repair internal threads with thread insert. AAS.03.07
    08. Inspect, remove and/or replace engine mounts. AAS.03.08
    09. Identify service precautions related to service of the internal combustion engine of a hybrid vehicle. AAS.03.09
    10. Remove and reinstall engine on a newer vehicle equipped with OBD; reconnect all attaching components and restore the vehicle to running condition. Cylinder Head and Valve Train Diagnosis and Repair AAS.03.10

11. Remove cylinder head; inspect gasket condition; install cylinder head and gasket; tighten according to manufacturer's specification and procedure. AAS.03.11
12. Clean and visually inspect a cylinder head for cracks; check gasket surface areas for warpage and surface finish; check passage condition. AAS.03.12
13. Inspect pushrods, rocker arms, rocker arm pivots and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices); determine needed action. AAS.03.13
14. Adjust valves (mechanical or hydraulic lifters). AAS.03.14
15. Inspect and replace camshaft and drive belt/chain; includes checking drive gear wear and backlash, end play, sprocket and chain wear, overhead cam drive sprocket(s), drive belt(s), belt tension, tensioners, camshaft reluctor ring/tone-wheel, and valve timing components; verify correct camshaft timing. AAS.03.15
16. Establish camshaft position sensor indexing. AAS.03.16
17. Inspect valve springs for squareness and free height comparison; determine needed action. AAS.03.17
18. Replace valve stem seals on an assembled engine; inspect valve spring retainers, locks/keepers, and valve lock/keeper grooves; determine needed action. AAS.03.18
19. Inspect valve guides for wear; check valve stem-to-guide clearance; determine needed action. AAS.03.19
20. Inspect valves and valve seats; determine needed action. AAS.03.20
21. Check valve spring assembled height and valve stem height; determine needed action. AAS.03.21
22. Inspect valve lifters; determine needed action. AAS.03.22
23. Inspect and/or measure camshaft for runout, journal wear and lobe wear. AAS.03.23
24. Inspect camshaft bearing surface for wear, damage, out-of-round, and alignment; determine needed action. AAS.03.24
25. Remove, inspect, and/or replace crankshaft vibration damper (harmonic balancer). AAS.03.25
26. Disassemble engine block; clean and prepare components for inspection and reassembly. AAS.03.26
27. Inspect engine block for visible cracks, passage condition, core and gallery plug condition, and surface warpage; determine needed action. AAS.03.27
28. Inspect and measure cylinder walls/sleeves for damage, wear, and ridges; determine needed action. AAS.03.28
29. Deglaze and clean cylinder walls. AAS.03.29
30. Inspect and measure camshaft bearings for wear, damage, out-of-round, and alignment; determine needed action. AAS.03.30

31. Inspect crankshaft for straightness, journal damage, keyway damage, thrust flange and sealing surface condition, and visual surface cracks; check oil passage condition; measure end play and journal wear; check crankshaft position sensor reluctor ring (where applicable); determine needed action. AAS.03.31
32. Inspect main and connecting rod bearings for damage and wear; determine needed action. AAS.03.32
33. Identify piston and bearing wear patterns that indicate connecting rod alignment and main bearing bore problems; determine needed action. AAS.03.33
34. Inspect and measure piston skirts and ring lands; determine needed action. AAS.03.34
35. Determine piston-to-bore clearance. AAS.03.35
36. Inspect, measure, and install piston rings. AAS.03.36
37. Inspect auxiliary shaft(s) (balance, intermediate, idler, counterbalance and/or silencer); inspect shaft(s) and support bearings for damage and wear; determine needed action; reinstall and time. AAS.03.37
38. Assemble engine block. AAS.03.38
39. Perform cooling system pressure and dye tests to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant recovery tank, heater core, and galley plugs; determine needed action. AAS.03.39
40. Identify causes of engine overheating. AAS.03.40
41. Inspect, replace, and/or adjust drive belts, tensioners, and pulleys; check pulley and belt alignment. AAS.03.41
42. Inspect and/or test coolant; drain and recover coolant; flush and refill cooling system; use proper fluid type per manufacturer specification; bleed air as required. AAS.03.42
43. Inspect, remove, and replace water pump. AAS.03.43
44. Remove and replace radiator. AAS.03.44
45. Remove, inspect, and replace thermostat and gasket/seal. AAS.03.45
46. Inspect and test fan(s), fan clutch (electrical or mechanical), fan shroud, and air dams; determine needed action. AAS.03.46
47. Perform oil pressure tests; determine needed action. AAS.03.47
48. Perform engine oil and filter change; use proper fluid type per manufacturer specification. AAS.03.48
49. Inspect auxiliary coolers; determine needed action. AAS.03.49
50. Inspect, test, and replace oil temperature and pressure switches and sensors. AAS.03.50
51. Inspect oil pump gears or rotors, housing, pressure relief devices, and pump drive; perform needed action. AAS.03.51

52. Inspect and replace engine cooling and heater system hoses. AAS.03.52
53. Service product specific water pumps. AAS.03.53
54. Service product specific belt drive and tensioner systems. AAS.03.54
55. Service product specific engine systems. AAS.03.55
56. Diagnose engine noises and vibrations; determine necessary action. AAS.03.56
57. Diagnose the cause of excessive oil consumption, coolant consumption, unusual engine exhaust color and odor; determine necessary action. AAS.03.57
58. Perform engine vacuum tests; determine necessary action. AAS.03.58
59. Service product specific cam drive systems. AAS.03.59
60. Perform product specific valve adjustments. AAS.03.60
61. Perform cylinder power balance tests; determine necessary action. AAS.03.61
62. Perform cylinder cranking and running compression tests; determine necessary action. AAS.03.62
63. Perform cylinder leakage tests; determine necessary action. AAS.03.63
64. Remove and replace piston pin; where applicable. AAS.03.64
65. Service product specific engines AAS.03.65
66. Perform product specific relearn procedure AAS.03.66

Advanced Automatic Transmission and Transaxle Technician – Course Number: AER0258

0. Explain and apply proficiently the diagnosis, service, repair and overhaul of automatic transmissions/transaxles.--The student will be able to: AAS.04.0
    01. Identify and interpret transmission/transaxle concerns, differentiate between engine performance and transmission/transaxle concerns; determine needed action. AAS.04.01
    02. Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins. AAS.04.02
    03. Diagnose fluid loss and condition concerns; determine needed action. AAS.04.03
    04. Check fluid level in a transmission or a transaxle equipped with a dip-stick. AAS.04.04
    05. Check fluid level in a transmission or a transaxle not equipped with a dip-stick. AAS.04.05
    06. Perform pressure tests (including transmissions/transaxles equipped with electronic pressure control); determine needed action. AAS.04.06
    07. Diagnose noise and vibration concerns; determine needed action. AAS.04.07
    08. Perform stall test; determine needed action. AAS.04.08
    09. Perform lock-up converter system tests; determine needed action. AAS.04.09
    10. Diagnose transmission/transaxle gear reduction/multiplication concerns using driving, driven, and held member (power flow) principles. AAS.04.10
    11. Diagnose electronic transmission/transaxle control systems using appropriate test equipment and service information. AAS.04.11
    12. Diagnose pressure concerns in a transmission using hydraulic principles (Pascal's Law). AAS.04.12
    13. Inspect, adjust, and/or replace external manual valve shift linkage, transmission range sensor/switch, and/or park/neutral position switch. AAS.04.13
    14. Inspect for leakage; replace external seals, gaskets, and bushings. AAS.04.14
    15. Inspect, test, adjust, repair, and/or replace electrical/electronic components and circuits including computers, solenoids, sensors, relays, terminals, connectors, switches, and harnesses; demonstrate understanding of the relearn procedure. AAS.04.15
    16. Drain and replace fluid and filter(s); use proper fluid type per manufacturer specification. AAS.04.16
    17. Inspect, replace and align powertrain mounts. AAS.04.17
    18. Remove and reinstall transmission/transaxle and torque converter; inspect engine core plugs, rear crankshaft seal, dowel pins, dowel pin holes, and mounting surfaces. AAS.04.18

19. Inspect, leak test, flush, and/or replace transmission/transaxle oil cooler, lines, and fittings. AAS.04.19
20. Inspect converter flex (drive) plate, converter attaching bolts, converter pilot, converter pump drive surfaces, converter end play, and crankshaft pilot bore. AAS.04.20
21. Describe the operational characteristics of a continuously variable transmission (CVT). AAS.04.21
22. Describe the operational characteristics of a hybrid vehicle drive train. AAS.04.22
23. Disassemble, clean, and inspect transmission/transaxle. AAS.04.23
24. Inspect, measure, clean, and replace valve body (includes surfaces, bores, springs, valves, switches, solenoids, sleeves, retainers, brackets, check valves/balls, screens, spacers, and gaskets). AAS.04.24
25. Inspect servo and accumulator bores, pistons, seals, pins, springs, and retainers; determine needed action. AAS.04.25
26. Assemble transmission/transaxle. AAS.04.26
27. Inspect, measure, and reseal oil pump assembly and components. AAS.04.27
28. Measure transmission/transaxle end play and/or preload; determine needed action. AAS.04.28
29. Inspect, measure, and/or replace thrust washers and bearings. AAS.04.29
30. Inspect oil delivery circuits, including seal rings, ring grooves, and sealing surface areas, feed pipes, orifices, and check valves/balls. AAS.04.30
31. Inspect bushings; determine needed action. AAS.04.31
32. Inspect and measure planetary gear assembly components; determine needed action. AAS.04.32
33. Inspect case bores, passages, bushings, vents, and mating surfaces; determine needed action. AAS.04.33
34. Diagnose and inspect transaxle drive, link chains, sprockets, gears, bearings, and bushings; perform needed action. AAS.04.34
35. Inspect measure, repair, adjust or replace transaxle final drive components. AAS.04.35
36. Inspect clutch drum, piston, check-balls, springs, retainers, seals, friction plates, pressure plates, and bands; determine needed action. AAS.04.36
37. Measure clutch pack clearance; determine needed action. AAS.04.37
38. Air test operation of clutch and servo assemblies. AAS.04.38
39. Inspect one-way clutches, races, rollers, sprags, springs, cages, retainers; determine needed action. AAS.04.39
40. Install and seat torque converter to engage drive/splines. AAS.04.40
41. Inspect bands and drums; determine necessary action. AAS.04.41

42. Service product specific automatic transmissions/transaxles. AAS.04.42
43. Perform product specific relearn procedure. AAS.04.43
44. Diagnose electronic transmission control systems using appropriate test equipment, service information, technical service bulletins, and schematics; diagnose shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action. AAS.04.44
45. Differentiate between engine performance, or other vehicle systems, and transmission/transaxle related problems; determine necessary action. AAS.04.45
46. Diagnose shift quality concerns resulting from problems in the electronic transmission control system; determine necessary action. AAS.04.46

Advanced Manual Drivetrain and Axle Technician – Course Number: AER0275

0. Explain and apply proficiently the operation, assembly, diagnosis, service and repair of manual drivetrains, clutches, transmissions/transaxles, drive and half-shaft universals, constant velocity joints, rear axle differential assembly, limited slip, four-wheel drive and all-wheel drive.--The student will be able to: AAS.05.0
    01. Identify and interpret drive train concerns; determine needed action. AAS.05.01
    02. Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins. AAS.05.02
    03. Check fluid condition; check for leaks; determine needed action. AAS.05.03
    04. Drain and refill manual transmission/transaxle and final drive unit; use proper fluid type per manufacturer specification. AAS.05.04
    05. Diagnose clutch noise, binding, slippage, pulsation, and chatter; determine needed action. AAS.05.05
    06. Inspect clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; perform needed action. AAS.05.06
    07. Inspect and/or replace clutch pressure plate assembly, clutch disc, release (throw-out) bearing, linkage, and pilot bearing/bushing (as applicable). AAS.05.07
    08. Bleed clutch hydraulic system. AAS.05.08
    09. Check and adjust clutch master cylinder fluid level; check for leaks; use proper fluid type per manufacturer specification. AAS.05.09
    10. Inspect flywheel and ring gear for wear, cracks, and discoloration; determine needed action. AAS.05.10
    11. Measure flywheel runout and crankshaft end play; determine needed action. AAS.05.11
    12. Describe the operation and service of a system that uses a dual mass flywheel. AAS.05.12
    13. Inspect, adjust, lubricate, and/or replace shift linkages, brackets, bushings, cables, pivots, and levers. AAS.05.13
    14. Describe the operational characteristics of an electronically-controlled manual transmission/transaxle. AAS.05.14
    15. Diagnose noise concerns through the application of transmission/transaxle power-flow principles. AAS.05.15
    16. Diagnose hard shifting and jumping out of gear concerns; determine needed action. AAS.05.16
    17. Diagnose transaxle final drive assembly noise and vibration concerns; determine needed action. AAS.05.17
    18. Disassemble, inspect clean, and reassemble internal transmission/transaxle components. AAS.05.18

19. Diagnose constant-velocity (CV) joint noise and vibration concerns; determine needed action. AAS.05.19
20. Diagnose universal joint noise and vibration concerns; perform needed action. AAS.05.20
21. Inspect, remove, and/or replace bearings, hubs, and seals. AAS.05.21
22. Inspect, service, and/or replace shafts, yokes, boots, and universal/CV joints. AAS.05.22
23. Check shaft balance and phasing; measure shaft runout; measure and adjust driveline angles. AAS.05.23
24. Clean and inspect differential case; check for leaks; inspect housing vent. AAS.05.24
25. Check and adjust differential case fluid level; use proper fluid type per manufacturer specification. AAS.05.25
26. Drain and refill differential case; use proper fluid type per manufacturer specifications. AAS.05.26
27. Diagnose noise and vibration concerns; determine needed action. AAS.05.27
28. Inspect and replace companion flange and/or pinion seal; measure companion flange runout. AAS.05.28
29. Inspect ring gear and measure runout; determine needed action. AAS.05.29
30. Remove, inspect, reinstall and/or drive pinion and ring gear, spacers, sleeves, and bearings. AAS.05.30
31. Measure and adjust drive pinion depth. AAS.05.31
32. Measure and adjust drive pinion bearing preload. AAS.05.32
33. Measure and adjust side bearing preload and ring and pinion gear total backlash and backlash variation on a differential carrier assembly (threaded cup or shim types). AAS.05.33
34. Check ring and pinion tooth contact patterns; perform needed action. AAS.05.34
35. Disassemble, inspect, measure, adjust, and/or replace differential pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case. AAS.05.35
36. Reassemble and reinstall differential case assembly; measure runout; determine needed action. AAS.05.36
37. Diagnose noise, slippage, and chatter concerns; determine needed action. AAS.05.37
38. Measure rotating torque; determine needed action. AAS.05.38
39. Inspect and replace drive axle wheel studs. AAS.05.39
40. Remove and replace drive axle shafts. AAS.05.40
41. Inspect and replace drive axle shaft seals, bearings, and retainers. AAS.05.41

42. Measure drive axle flange runout and shaft end play; determine needed action. AAS.05.42

43. Diagnose drive axle shafts, bearings, and seals for noise, vibration, and fluid leakage concerns; determine needed action. AAS.05.43

44. Inspect, adjust, and repair shifting controls (mechanical, electrical, and vacuum), bushings, mounts, levers, and brackets. AAS.05.44

45. Inspect locking hubs; determine needed action. AAS.05.45

46. Check for leaks at drive assembly and transfer case seals; check vents; check fluid level; use proper fluid type per manufacturer specification. AAS.05.46

47. Identify concerns related to variations in tire circumference and/or final drive ratios. AAS.05.47

48. Diagnose noise, vibration, and unusual steering concerns; determine needed action. AAS.05.48

49. Diagnose, test, adjust, and/or replace electrical/electronic components of four-wheel drive/all-wheel drive systems. AAS.05.49

50. Disassemble, service, and reassemble transfer case and components. AAS.05.50

51. Locate and interpret vehicle major drivetrain components and identification numbers. AAS.05.51

52. Diagnose fluid loss, level, and condition concerns; determine necessary action. AAS.05.52

53. Inspect hydraulic clutch slave and master cylinders, lines, and hoses; determine necessary action. AAS.05.53

54. Inspect engine block, core plugs, rear main engine oil seal, clutch (bell) housing, transmission/transaxle case mating surfaces, and alignment dowels; determine necessary action. AAS.05.54

55. Remove and reinstall manual transmission/transaxle. AAS.05.55

56. Inspect transmission/transaxle case, extension housing, case mating surfaces, bores, bushings, and vents; perform necessary action. AAS.05.56

57. Inspect, replace, and align powertrain mounts. AAS.05.57

58. Inspect and replace gaskets, seals, and sealants; inspect sealing surfaces. AAS.05.58

59. Remove and replace transaxle final drive. AAS.05.59

60. Inspect, adjust, and reinstall shift cover, forks, levers, grommets, shafts, sleeves, detent mechanism, interlocks, and springs. AAS.05.60

61. Measure end play or preload (shim or spacer selection procedure) on transmission/transaxle shafts; perform necessary action. AAS.05.61

62. Inspect and reinstall synchronizer hub, sleeve, keys (inserts), springs, and blocking rings. AAS.05.62

63. Remove, inspect, measure, adjust, and reinstall transaxle final drive pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case

assembly. AAS.05.63

64. Inspect lubrication devices (oil pump or slingers); perform necessary action. AAS.05.64
65. Inspect, test, and replace transmission/transaxle sensors and switches. AAS.05.65
66. Inspect, service, and replace shaft center support bearings. AAS.05.66
67. Diagnose noise and vibration concerns; determine necessary action. AAS.05.67
68. Inspect and reinstall limited slip differential components. AAS.05.68
69. Remove and reinstall transfer case. AAS.05.69
70. Service product specific clutch assembly AAS.05.70
71. Service product specific manual transmission/transaxles AAS.05.71
72. Service product specific driveaxles/driveshafts AAS.05.72
73. Service product specific transfer cases AAS.05.73

Advanced Automotive Suspension and Steering Technician – Course Number: AER0459

0. Explain and apply proficiently the diagnosis, service and repair of front and rear suspensions systems, wheel alignment, and wheels and tires.--The student will be able to: AAS.06.0
    01. Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins. AAS.06.01
    02. Identify and interpret suspension and steering system concerns; determine needed action. AAS.06.02
    03. Disable and enable supplemental restraint system (SRS); verify indicator lamp operation. AAS.06.03
    04. Remove and replace steering wheel; center/time supplemental restraint system (SRS) coil (clock spring). AAS.06.04
    05. Diagnose steering column noises, looseness, and binding concerns (including tilt/telescoping mechanisms); determine needed action. AAS.06.05
    06. Diagnose power steering gear (non-rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; determine needed action. AAS.06.06
    07. Diagnose power steering gear (rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; determine needed action. AAS.06.07
    08. Inspect steering shaft universal-joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel; determine needed action. AAS.06.08
    09. Remove and replace rack and pinion steering gear; inspect mounting bushings and brackets. AAS.06.09
    10. Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellows boots; replace as needed. AAS.06.10
    11. Inspect power steering fluid level and condition. AAS.06.11
    12. Flush, fill, and bleed power steering system; use proper fluid type per manufacturer specification. AAS.06.12
    13. Inspect for power steering fluid leakage; determine needed action. AAS.06.13
    14. Remove, inspect, replace, and/or adjust power steering pump drive belt. AAS.06.14
    15. Remove and reinstall power steering pump. AAS.06.15
    16. Remove and reinstall press fit power steering pump pulley; check pulley and belt alignment. AAS.06.16
    17. Inspect, remove and/or replace power steering hoses and fittings. AAS.06.17
    18. Inspect, remove and/or replace pitman arm, relay (center-link/intermediate) rod, idler arm, mountings, and steering linkage damper. AAS.06.18

19. Inspect, replace, and/or adjust tie rod ends (sockets), tie rod sleeves, and clamps. AAS.06.19
20. Inspect, test and diagnose electrically- assisted power steering systems (including using a scan tool); determine needed action. AAS.06.20
21. Identify hybrid vehicle power steering system electrical circuits and safety precautions. AAS.06.21
22. Test power steering system pressure; determine needed action. AAS.06.22
23. Diagnose short and long arm suspension system noises, body sway, and uneven ride height concerns; determine needed action. AAS.06.23
24. Diagnose strut suspension system noises, body sway, and uneven ride height concerns; determine needed action. AAS.06.24
25. Inspect, remove, and/or replace upper and lower control arms, bushings, shafts, and rebound bumpers. AAS.06.25
26. Inspect, remove, and/or replace strut rods and bushings. AAS.06.26
27. Inspect, remove, and/or replace upper and/or lower ball joints (with or without wear indicators). AAS.06.27
28. Inspect, remove, and/or replace steering knuckle assemblies. AAS.06.28
29. Inspect, remove and/or replace short and long arm suspension system coil springs and spring insulators. AAS.06.29
30. Inspect, remove, and/or replace torsion bars and mounts AAS.06.30
31. Inspect, remove, and/or replace front/rear stabilizer bar (sway bar) bushings, brackets, and links. AAS.06.31
32. Inspect, remove, and/or replace strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount. AAS.06.32
33. Inspect, remove, and/or replace track bar, strut rods/radius arms, and related mounts and bushings. AAS.06.33
34. Inspect rear suspension system leaf spring(s), spring insulators (silencers), shackles, brackets, bushings, center pins/bolts, and mounts. AAS.06.34
35. Inspect, remove, and/or replace shock absorbers; inspect mounts and bushings. AAS.06.35
36. Remove, inspect, service and/or replace front and rear wheel bearings. AAS.06.36
37. Describe the function of suspension and steering control systems and components, (i.e. active suspension and stability control). AAS.06.37
38. Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concerns; determine needed action. AAS.06.38
39. Perform pre-alignment inspection; measure vehicle ride height; determine needed action. AAS.06.39
40. Prepare vehicle for wheel alignment on alignment machine; perform four-wheel alignment by checking and adjusting front and rear wheel caster, camber and

toe as required; center steering wheel. AAS.06.40

41. Check toe-out-on-turns (turning radius); determine needed action. AAS.06.41
42. Check steering axis inclination (SAI) and included angle; determine needed action. AAS.06.42
43. Check rear wheel thrust angle; determine needed action. AAS.06.43
44. Check for front wheel setback; determine needed action. AAS.06.44
45. Check front and/or rear cradle (sub-frame) alignment; determine needed action. AAS.06.45
46. Reset steering angle sensor. AAS.06.46
47. Inspect tire condition; identify tire wear patterns; check for correct tire size, application (load and speed ratings), and air pressure as listed on the tire information placard/label. AAS.06.47
48. Diagnose wheel/tire vibration, shimmy, and noise; determine needed action. AAS.06.48
49. Rotate tires according to manufacturer's recommendation including vehicles equipped with tire pressure monitoring systems (TPMS) AAS.06.49
50. Measure wheel, tire, axle flange, and hub runout; determine needed action. AAS.06.50
51. Diagnose tire pull problems; determine needed action. AAS.06.51
52. Dismount, inspect, and remount tire on wheel; balance wheel and tire assembly. AAS.06.52
53. Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor. AAS.06.53
54. Inspect tire and wheel assembly for air loss; perform needed action. AAS.06.54
55. Repair tire following vehicle manufacturer approved procedure. AAS.06.55
56. Identify indirect and direct tire pressure monitoring system (TPMS); calibrate system; verify operation of instrument panel lamps. AAS.06.56
57. Demonstrate knowledge of steps required to remove and replace sensors in a tire pressure monitoring system (TPMS) including relearn procedure AAS.06.57
58. Service product specific suspension systems. AAS.06.58
59. Service product specific ride height control systems. AAS.06.59
60. Locate and interpret vehicle major suspension components and identification numbers. AAS.06.60
61. Adjust non-rack and pinion worm bearing preload and sector lash. AAS.06.61
62. Reinstall wheel; torque lug nuts. AAS.06.62
63. Service product specific tire pressure monitoring systems AAS.06.63
64. Service product specific electric power steering systems AAS.06.64
65. Reset product specific steering wheel sensors AAS.06.65

66. Interpret diagnostic trouble codes (DTCs) and scan tool data related to the steering and suspension control systems; determine necessary action. AAS.06.66

67. Perform multiplex check to determine that all steering and suspension components are communicating and are performing within specifications. AAS.06.67

Advanced Automotive Brake System Technician – Course Number: AER0419

0. Explain and apply proficiently the diagnosis, service and repair of drum/disc brake, hydraulics, power assist units, electronic brakes, traction control, stability control systems and miscellaneous (wheel bearings, parking brake, electrical, etc.) systems.--The student will be able to: AAS.07.0

    01. Identify and interpret brake system concerns; determine needed action. AAS.07.01

    02. Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins. AAS.07.02

    03. Describe procedure for performing a road test to check brake system operation including an anti-lock brake system (ABS). AAS.07.03

    04. Install wheel and torque lug nuts. AAS.07.04

    05. Diagnose pressure concerns in the brake system using hydraulic principles (Pascal's Law). AAS.07.05

    06. Measure brake pedal height, travel, and free play (as applicable); determine needed action. AAS.07.06

    07. Check master cylinder for internal/external leaks and proper operation; determine needed action. AAS.07.07

    08. Remove, bench bleed, and reinstall master cylinder. AAS.07.08

    09. Diagnose poor stopping, pulling or dragging concerns caused by malfunctions in the hydraulic system; determine needed action. AAS.07.09

    10. Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear; and loose fittings/supports; determine needed action. AAS.07.10

    11. Replace brake lines, hoses, fittings, and supports. AAS.07.11

    12. Fabricate brake lines using proper material and flaring procedures (double flare and ISO types). AAS.07.12

    13. Select, handle, store, and fill brake fluids to proper level; use proper fluid type per manufacturer specification. AAS.07.13

    14. Inspect, test, and/or replace components of brake warning light system. AAS.07.14

    15. Identify components of hydraulic brake warning light system. AAS.07.15

    16. Bleed and/or flush brake system. AAS.07.16

    17. Test brake fluid for contamination. AAS.07.17

    18. Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pedal pulsation concerns; determine needed action. AAS.07.18

    19. Remove, clean, and inspect brake drum; measure brake drum diameter; determine serviceability. AAS.07.19

    20. Refinish brake drum and measure final drum diameter; compare with specification. AAS.07.20

21. Remove, clean, inspect, and/or replace brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble. AAS.07.21
22. Inspect wheel cylinders for leaks and proper operation; remove and replace as needed. AAS.07.22
23. Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; perform final checks and adjustments. AAS.07.23
24. Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging, or pulsation concerns; determine needed action. AAS.07.24
25. Remove and clean caliper assembly; inspect for leaks, damage, and wear; determine needed action. AAS.07.25
26. Inspect caliper mounting and slides/pins for proper operation, wear, and damage; determine needed action. AAS.07.26
27. Remove, inspect, and/or replace brake pads and retaining hardware; determine needed action. AAS.07.27
28. Lubricate and reinstall caliper, brake pads, and related hardware; seat brake pads; inspect for leaks. AAS.07.28
29. Clean and inspect rotor and mounting surface; measure rotor thickness, thickness variation, and lateral runout; determine needed action. AAS.07.29
30. Remove and reinstall/replace rotor. AAS.07.30
31. Refinish rotor on vehicle; measure final rotor thickness and compare with specification. AAS.07.31
32. Refinish rotor off vehicle; measure final rotor thickness and compare with specification. AAS.07.32
33. Retract and re-adjust caliper piston on an integrated parking brake system. AAS.07.33
34. Check brake pad wear indicator; determine needed action. AAS.07.34
35. Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendations. AAS.07.35
36. Check brake pedal travel with and without engine running to verify proper power booster operation. AAS.07.36
37. Identify components of the brake power assist system (vacuum and hydraulic); check vacuum supply (manifold or auxiliary pump) to vacuum- type power booster. AAS.07.37
38. Inspect vacuum-type power booster unit for leaks; inspect the check-valve for proper operation; determine needed action. AAS.07.38
39. Inspect and test hydraulically-assisted power brake system for leaks and proper operation; determine needed action. AAS.07.39
40. Measure and adjust master cylinder pushrod length. AAS.07.40

41. Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine needed action. AAS.07.41

42. Remove, clean, inspect, repack, and install wheel bearings; replace seals; install hub and adjust bearings. AAS.07.42

43. Check parking brake system and components for wear, binding, and corrosion; clean, lubricate, adjust and/or replace as needed. AAS.07.43

44. Check parking brake operation and parking brake indicator light system operation; determine needed action. AAS.07.44

45. Check operation of brake stop light system. AAS.07.45

46. Replace wheel bearing and race. AAS.07.46

47. Remove, reinstall, and/or replace sealed wheel bearing assembly. AAS.07.47

48. Inspect and replace wheel studs. AAS.07.48

49. Identify and inspect electronic brake control system components (ABS, TCS, and ESC); determine needed action. AAS.07.49

50. Describe the operation of a regenerative braking system. AAS.07.50

51. Diagnose poor stopping, wheel lock-up, abnormal pedal feel, unwanted application, and noise concerns associated with the electronic brake control system; determine needed action. AAS.07.51

52. Diagnose electronic brake control system electronic control(s) and components by retrieving diagnostic trouble codes, and/or using recommended test equipment; determine needed action. AAS.07.52

53. Depressurize high-pressure components of an electronic brake control system. AAS.07.53

54. Bleed the electronic brake control system hydraulic circuits. AAS.07.54

55. Test, diagnose, and service electronic brake control system speed sensors (digital and analog), toothed ring (tone wheel), and circuits using a graphing multi-meter (GMM)/digital storage oscilloscope (DSO) (includes output signal, resistance, shorts to voltage/ground, and frequency data). AAS.07.55

56. 8. Diagnose electronic brake control system braking concerns caused by vehicle modifications (tire size, curb height, final drive ratio, etc.). AAS.07.56

57. Service product specific anti-lock brake systems AAS.07.57

58. Service product specific traction control systems. AAS.07.58

59. Locate and interpret vehicle major brake component and identification numbers (VIN, vehicle certification labels, calibration decals). AAS.07.59

60. Inspect, test, and/or replace metering (hold-off), proportioning (balance), pressure differential, and combination valves. AAS.07.60

61. Install wheel, torque lug nuts, and make final checks and adjustments associated with drum brakes. AAS.07.61

62. Install wheel, torque lug nuts, and make final checks and adjustments associated with disc brakes. AAS.07.62

63. Remove and install electronic brake control system electrical/electronic and hydraulic components. AAS.07.63

64. Service product specific braking systems. AAS.07.64

65. Perform product specific brakes relearn procedures AAS.07.65

66. Interpret diagnostic trouble codes (DTCs) and scan tool data related to the brake, traction control and vehicle stability control systems; determine necessary action. AAS.07.66

67. Perform multiplex check to determine that all brake, traction control and vehicle stability control components are communicating and are performing within specifications. AAS.07.67

Advanced Automotive Electrical/Electronic System Technician – Course Number: AER0319

0. Explain and apply proficiently the diagnosis, service and repair of electrical/electronic system components, battery, starting, charging, lighting, gauges, warning devices, driver information, horn, wiper/washer and accessory systems.--The student will be able to: AAS.08.0
    01. Research vehicle service information including vehicle service history, service precautions, and technical service bulletins. AAS.08.01
    02. Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law). AAS.08.02
    03. Demonstrate proper use of a digital multi-meter (DMM) when measuring source voltage, voltage drop (including grounds), current flow and resistance. AAS.08.03
    04. Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits. AAS.08.04
    05. Demonstrate proper use of a test light on an electrical circuit. AAS.08.05
    06. Use fused jumper wires to check operation of electrical circuits. AAS.08.06
    07. Use wiring diagrams during the diagnosis (troubleshooting) of electrical/electronic circuit problems. AAS.08.07
    08. Diagnose the cause(s) of excessive key-off battery drain (parasitic draw); determine needed action. AAS.08.08
    09. Inspect and test fusible links, circuit breakers, and fuses; determine needed action. AAS.08.09
    10. Inspect, test, repair, and/or replace components, connectors, terminals, harnesses, and wiring in electrical/electronic systems (including solder repairs); determine needed action. AAS.08.10
    11. Check electrical/electronic circuit waveforms; interpret readings and determine needed repairs. AAS.08.11
    12. Repair data bus wiring harness. AAS.08.12
    13. Perform battery state-of-charge test; determine needed action. AAS.08.13
    14. Confirm proper battery capacity for vehicle application; perform battery capacity and load test; determine needed action. AAS.08.14
    15. Maintain or restore electronic memory functions. AAS.08.15
    16. Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold-downs. AAS.08.16
    17. Perform slow/fast battery charge according to manufacturer's recommendations. AAS.08.17
    18. Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply. AAS.08.18

19. Identify safety precautions for high voltage systems on electric, hybrid, hybrid-electric, and diesel vehicles. AAS.08.19
20. Identify electrical/electronic modules, security systems, radios, and other accessories that require re-initialization or code entry after reconnecting vehicle battery. AAS.08.20
21. Identify hybrid vehicle auxiliary (12v) battery service, repair, and test procedures. AAS.08.21
22. Perform starter current draw tests; determine needed action. AAS.08.22
23. Perform starter circuit voltage drop tests; determine needed action. AAS.08.23
24. Inspect and test starter relays and solenoids; determine needed action. AAS.08.24
25. Remove and install starter in a vehicle. AAS.08.25
26. Inspect and test switches, connectors, and wires of starter control circuits; determine needed action. AAS.08.26
27. Differentiate between electrical and engine mechanical problems that cause a slow-crank or a no-crank condition. AAS.08.27
28. Demonstrate knowledge of an automatic idle-stop/start-stop system. AAS.08.28
29. Perform charging system output test; determine needed action. AAS.08.29
30. Diagnose (troubleshoot) charging system for causes of undercharge, no-charge, or overcharge conditions. AAS.08.30
31. Inspect, adjust, and/or replace generator (alternator) drive belts; check pulleys and tensioners for wear; check pulley and belt alignment. AAS.08.31
32. Remove, inspect, and/or replace generator (alternator). AAS.08.32
33. Perform charging circuit voltage drop tests; determine needed action. AAS.08.33
34. Diagnose (troubleshoot) the causes of brighter-than-normal, intermittent, dim, or no light operation; determine needed action. AAS.08.34
35. Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving lights); replace as needed. AAS.08.35
36. Aim headlights. AAS.08.36
37. Identify system voltage and safety precautions associated with high-intensity discharge headlights. AAS.08.37
38. Inspect and test gauges and gauge sending units for causes of abnormal readings; determine needed action. AAS.08.38
39. Diagnose (troubleshoot) the causes of incorrect operation of warning devices and other driver information systems; determine needed action. AAS.08.39
40. Reset maintenance indicators as required. AAS.08.40
41. Diagnose operation of comfort and convenience accessories and related circuits (such as: power window, power seats, pedal height, power locks, truck locks, remote start, moon roof, sun roof, sun shade, remote keyless entry, voice

activation, steering wheel controls, back-up camera, park assist, cruise control, and auto dimming headlamps); determine needed repairs. AAS.08.41

42. Diagnose operation of security/anti-theft systems and related circuits (such as: theft deterrent, door locks, remote keyless entry, remote start, and starter/fuel disable); determine needed repairs. AAS.08.42

43. Diagnose operation of entertainment and related circuits (such as: radio, DVD, remote CD changer, navigation, amplifiers, speakers, antennas, and voice-activated accessories); determine needed repairs. AAS.08.43

44. Diagnose operation of safety systems and related circuits (such as: horn, airbags, seat belt pretensioners, occupancy classification, wipers, washers, speed control/collision avoidance, heads-up display, park assist, and back-up camera); determine needed repairs. AAS.08.44

45. Diagnose body electronic systems circuits using a scan tool; check for module communication errors (data communication bus systems); determine needed action. AAS.08.45

46. Describe the process for software transfer, software updates, or reprogramming of electronic modules. AAS.08.46

47. Service and repair product specific electrical/electronic systems. AAS.08.47

48. Perform product specific diagnostic procedures. AAS.08.48

49. Locate and interpret vehicle major electrical/electronic components and identification numbers. AAS.08.49

50. Identify location of hybrid vehicle high voltage circuits disconnect (service plug) location and safety procedures. AAS.08.50

51. Manufacturer specific battery test; determine necessary action. AAS.08.51

52. Inspect and test sensors, connectors, and wires of electronic (digital) instrument circuits; determine necessary action. AAS.08.52

53. Diagnose incorrect heated glass, mirror, or seat operation; determine necessary action. AAS.08.53

54. Perform product specific electrical/electronic relearning procedures AAS.08.54

55. Diagnose operation of entertainment and related circuits (such as: radio, DVD, remote CD changer, navigation, amplifiers, speakers, antennas, and voice activated accessories); determine needed repairs. AAS.08.55

56. Diagnose operation of heated and cooled accessories and related circuits (such as: heated/cooled seats, heated steering wheel, heated mirror, heated glass, and heated/cooled cup holders); determine needed repairs. AAS.08.56

57. Diagnose operation of safety systems and related circuits (such as: airbags, seat belt pretensioners, occupancy classification, wipers, washers, speed control/collision avoidance, heads-up display, park assist, and back up camera); determine needed repairs. AAS.08.57

58. Diagnose operation of comfort and convenience accessories and related circuits (such as: power windows, power seats, pedal height, power locks, truck locks, remote start, moon roof, sun roof, sun shade, remote keyless entry, voice

activation, steering wheel controls, back-up camera, park assist, and auto dimming headlamps); determine needed repairs. AAS.08.58

Advanced Automotive Heating and Air Conditioning Technician – Course Number: AER0173

0. Explain and apply proficiently the diagnosis, service and repair of heating and air conditioning, refrigeration, compressors, compressor clutches, evaporators, receiver driers, accumulators, condensers, heating and engine cooling, related control systems, refrigerant recovery, and recycling and handling.--The student will be able to: AAS.09.0
    01. Identify and interpret heating and air conditioning problems; determine needed action. AAS.09.01
    02. Research vehicle service information including refrigerant/oil type, vehicle service history, service precautions, and technical service bulletins. AAS.09.02
    03. Performance test A/C system; identify problems. AAS.09.03
    04. Identify abnormal operating noises in the A/C system; determine needed action. AAS.09.04
    05. Identify refrigerant type; select and connect proper gauge set/test equipment; record temperature and pressure readings. AAS.09.05
    06. Leak test A/C system; determine needed action. AAS.09.06
    07. Inspect condition of refrigerant oil removed from A/C system; determine needed action. AAS.09.07
    08. Determine recommended oil and oil capacity for system application. AAS.09.08
    09. Using a scan tool, observe and record related HVAC data and trouble codes. AAS.09.09
    10. Inspect, remove, and/or replace A/C compressor drive belts, pulleys, tensioners and visually inspect A/C components for signs of leaks; determine needed action. AAS.09.10
    11. Inspect, test, service and/or replace A/C compressor clutch components and/or assembly; check compressor clutch air gap; adjust as needed. AAS.09.11
    12. Remove, inspect, reinstall, and/or replace A/C compressor and mountings; determine recommended oil type and quantity. AAS.09.12
    13. Identify hybrid vehicle A/C system electrical circuits and service/safety precautions. AAS.09.13
    14. Determine need for an additional A/C system filter; perform needed action. AAS.09.14
    15. Remove and inspect A/C system mufflers, hoses, lines, fittings, O-rings, seals, and service valves; perform needed action. AAS.09.15
    16. Inspect for proper A/C condenser airflow; determine needed action. AAS.09.16
    17. Remove, inspect, and replace receiver/drier or accumulator/drier; determine recommended oil type and quantity. AAS.09.17
    18. Remove, inspect, and install expansion valve or orifice (expansion) tube. AAS.09.18

19. Inspect evaporator housing water drain; perform needed action. AAS.09.19
20. Diagnose A/C system conditions that cause the protection devices (pressure, thermal, and/or control module) to interrupt system operation; determine needed action. AAS.09.20
21. Determine procedure to remove and reinstall evaporator; determine required oil type and quantity. AAS.09.21
22. Inspect engine cooling and heater systems hoses and pipes; perform needed action. AAS.09.22
23. Inspect and test heater control valve(s); perform needed action. AAS.09.23
24. Diagnose temperature control problems in the HVAC system; determine needed action. AAS.09.24
25. Determine procedure to remove, inspect, reinstall, and/or replace heater core. AAS.09.25
26. Inspect and test HVAC system blower motors, resistors, switches, relays, wiring, and protection devices; determine needed action. AAS.09.26
27. Diagnose A/C compressor clutch control systems; determine needed action. AAS.09.27
28. Diagnose malfunctions in the vacuum, mechanical, and electrical components and controls of the heating, ventilation, and A/C (HVAC) system; determine needed action. AAS.09.28
29. Inspect and test HVAC system control panel assembly; determine needed action. AAS.09.29
30. Inspect and test HVAC system control cables, motors, and linkages; perform needed action. AAS.09.30
31. Inspect HVAC system ducts, doors, hoses, cabin filters, and outlets; perform needed action. AAS.09.31
32. Identify the source of HVAC system odors. AAS.09.32
33. Check operation of automatic or semi-automatic HVAC control systems; determine needed action. AAS.09.33
34. Perform correct use and maintenance of refrigerant handling equipment according to equipment manufacturer's standards. AAS.09.34
35. Identify A/C system refrigerant; test for sealants; recover, evacuate, and charge A/C system; add refrigerant oil as required. AAS.09.35
36. Recycle, label, and store refrigerant. AAS.09.36
37. Service product specific climate control systems. AAS.09.37
38. Locate and interpret vehicle heating and air conditioning major components and identification numbers. AAS.09.38
39. Perform cooling system pressure tests; check coolant condition, inspect and test radiator, cap (pressure/vacuum), coolant recovery tank, and hoses; perform necessary action. AAS.09.39

40. Inspect, test, and replace thermostat and gasket/seal. AAS.09.40
41. Determine coolant condition and coolant type for vehicle application; drain and recover coolant. AAS.09.41
42. Flush system; refill system with recommended coolant; bleed system. AAS.09.42
43. Inspect and test cooling fan, fan clutch, fan shroud, and air dams; perform necessary action. AAS.09.43
44. Inspect and test electric cooling fan, fan control system and circuits; determine necessary action. AAS.09.44
45. Service product specific hybrid heating and A/C systems. AAS.09.45
46. Perform product specific heating and A/C relearn procedure AAS.09.46
47. Interpret diagnostic trouble codes (DTCs) and scan tool data related to the Heating and Air Conditioning systems; determine necessary action. AAS.09.47
48. Perform multiplex check to determine that Heating and Air Conditioning components are communicating and are performing within specifications. AAS.09.48
49. Identify proper service precautions and procedures for R1234yf systems. AAS.09.49

Advanced Automotive Engine Performance Technician – Course Number: AER0506

0. Explain and apply proficiently the diagnosis, service and repair of engines, ignition, fuel, air induction, exhaust, computer engine and emission control systems.--The student will be able to: AAS.10.0
    01. Identify and interpret engine performance concerns; determine needed action. AAS.10.01
    02. Research vehicle service information including vehicle service history, service precautions, and technical service bulletins. AAS.10.02
    03. Diagnose abnormal engine noises or vibration concerns; determine needed action. AAS.10.03
    04. Diagnose the cause of excessive oil consumption, coolant consumption, unusual exhaust color, odor, and sound; determine needed action. AAS.10.04
    05. Perform engine absolute manifold pressure tests (vacuum/boost); determine needed action. AAS.10.05
    06. Perform cylinder power balance test; determine needed action. AAS.10.06
    07. Perform cylinder cranking and running compression tests; determine needed action. AAS.10.07
    08. Perform cylinder leakage test; determine needed action. AAS.10.08
    09. Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns; determine needed action. AAS.10.09
    10. Verify engine operating temperature; determine needed action. AAS.10.10
    11. Verify correct camshaft timing including engines equipped with variable valve timing systems (VVT). AAS.10.11
    12. Retrieve and record diagnostic trouble codes (DTC), OBD monitor status, and freeze frame data; clear codes when applicable. AAS.10.12
    13. Access and use service information to perform step-by-step (troubleshooting) diagnosis. AAS.10.13
    14. Perform active tests of actuators using a scan tool; determine needed action. AAS.10.14
    15. Describe the use of OBD monitors for repair verification. AAS.10.15
    16. Diagnose the causes of emissions or drive-ability concerns with stored or active diagnostic trouble codes (DTC); obtain, graph, and interpret scan tool data. AAS.10.16
    17. Diagnose emissions or drive-ability concerns without stored or active diagnostic trouble codes; determine needed action. AAS.10.17
    18. Inspect and test computerized engine control system sensors, powertrain/engine control module (PCM/ECM), actuators, and circuits using a graphing multi-meter (GMM)/digital storage oscilloscope (DSO); perform needed action. AAS.10.18

19. Diagnose drive-ability and emissions problems resulting from malfunctions of interrelated systems (cruise control, security alarms, suspension controls, traction controls, HVAC, automatic transmissions, non-OEM installed accessories, or similar systems); determine needed action. AAS.10.19
20. Diagnose (troubleshoot) ignition system related problems such as no-starting, hard starting, engine misfire, poor drive-ability, spark knock, power loss, poor mileage, and emissions concerns; determine needed action. AAS.10.20
21. Inspect and test crankshaft and camshaft position sensor(s); determine needed action. AAS.10.21
22. Inspect, test, and/or replace ignition control module, powertrain/engine control module; reprogram/initialize as needed. AAS.10.22
23. Remove and replace spark plugs; inspect secondary ignition components for wear and damage. AAS.10.23
24. Diagnose (troubleshoot) hot or cold no-starting, hard starting, poor drive-ability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems; determine needed action. AAS.10.24
25. Check fuel for contaminants; determine needed action. AAS.10.25
26. Inspect and test fuel pump(s) and pump control system for pressure, regulation, and volume; perform needed action. AAS.10.26
27. Replace fuel filter(s) where applicable. AAS.10.27
28. Inspect, service, or replace air filters, filter housings, and intake duct work. AAS.10.28
29. Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air. AAS.10.29
30. Inspect, test, and/or replace fuel injectors. AAS.10.30
31. Verify idle control operation. AAS.10.31
32. Inspect integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields; perform needed action. AAS.10.32
33. Inspect condition of exhaust system hangers, brackets, clamps, and heat shields; determine needed action. AAS.10.33
34. Perform exhaust system back-pressure test; determine needed action. AAS.10.34
35. Check and refill diesel exhaust fluid (DEF). AAS.10.35
36. Test the operation of turbocharger/supercharger systems; determine needed action. AAS.10.36
37. Diagnose oil leaks, emissions, and drive-ability concerns caused by the positive crankcase ventilation (PCV) system; determine needed action. AAS.10.37
38. Inspect, test, service, and/or replace positive crankcase ventilation (PCV) filter/breather, valve, tubes, orifices, and hoses; perform needed

action. AAS.10.38

39. Diagnose emissions and drive-ability concerns caused by the exhaust gas recirculation (EGR) system; inspect, test, service and/or replace electrical/electronic sensors, controls, wiring, tubing, exhaust passages, vacuum/pressure controls, filters, and hoses of exhaust gas recirculation (EGR) systems; determine needed action. AAS.10.39
40. Diagnose emissions and drive-ability concerns caused by the secondary air injection system; inspect, test, repair, and/or replace electrical/electronically-operated components and circuits of secondary air injection systems; determine needed action. AAS.10.40
41. Diagnose emissions and drive-ability concerns caused by the evaporative emissions control (EVAP) system; determine needed action. AAS.10.41
42. Diagnose emission and drive-ability concerns caused by catalytic converter system; determine needed action. AAS.10.42
43. Interpret diagnostic trouble codes (DTCs) and scan tool data related to the emissions control systems; determine needed action. AAS.10.43
44. Adjust valves on engines with mechanical or hydraulic lifters. AAS.10.44
45. Remove and replace timing belt; verify correct camshaft timing. AAS.10.45
46. Remove and replace thermostat and gasket/seal. AAS.10.46
47. Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; perform necessary action. AAS.10.47
48. Perform common fastener and thread repairs, to include: remove broken bolt, restore internal and external threads, and repair internal threads with a threaded insert. AAS.10.48
49. Inspect engine oil and/or filter for condition and determine necessary action. AAS.10.49
50. Identify hybrid vehicle internal combustion engine service precautions. AAS.10.50
51. Demonstrate proficiency in use of computer-based information systems. AAS.10.51
52. Perform product specific OBD II drive cycle diagnostic tests. AAS.10.52
53. Service product specific ignition systems. AAS.10.53
54. Inspect and test distributor; service as needed. AAS.10.54
55. Perform exhaust system back-pressure test; determine needed action. AAS.10.55
56. Service product specific fuel injection systems. AAS.10.56
57. Locate and interpret vehicle engine performance major components and identification numbers. AAS.10.57
58. Demonstrate knowledge of using a 4 or 5 gas analyzer, interpret readings, and determine necessary action. AAS.10.58

59. Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action. AAS.10.59
60. Check for module communication (including CAN/BUS systems) errors using a scan tool. AAS.10.60
61. Inspect and test ignition primary and secondary circuit wiring and solid state components; test ignition coil(s); perform necessary action. AAS.10.61
62. Inspect and test mechanical components of secondary air injection systems; perform necessary action. AAS.10.62
63. Demonstrate knowledge of direct injection systems. AAS.10.63
64. Interpret diagnostic trouble codes (DTCs) and scan tool data related to the engine control systems; determine necessary action. AAS.10.64
65. Perform multiplex check to determine that engine control components are communicating and are performing within specifications. AAS.10.65
66. Perform universal drive cycle to run monitors and erase permanent DTCs. AAS.10.66
67. Perform high voltage disconnect procedure; reconnect/enable high voltage system. AAS.10.67
68. Select, test and use proper safety gloves. AAS.10.68
69. Select, qualify and use proper electrical testing equipment and leads. AAS.10.69
70. Diagnose problems caused by damaged or failed harnesses, connectors, terminals and fuses. AAS.10.70
71. Diagnose high voltage (HV) battery pack malfunctions. AAS.10.71
72. Remove and install high voltage battery pack. AAS.10.72
73. Test, diagnose and repair high voltage leaks/loss of isolation. AAS.10.73
74. Test, diagnose and repair high voltage battery pack heating and cooling systems. AAS.10.74
75. Test, diagnose, repair or replace high voltage battery pack internal components. AAS.10.75
76. Test and diagnose charging problems when using electric vehicle supply equipment (EVSE). AAS.10.76
77. Retrieve and diagnose DTCs; determine needed repairs AAS.10.77
78. Determine if the internal combustion engine (ICE) is in CRANK mode or RUN mode. AAS.10.78
79. Differentiate between driveability problems caused by the internal combustion engine and/or hybrid drive system. AAS.10.79
80. Perform internal combustion engine cranking compression test. AAS.10.80
81. Keep the internal combustion engine running during service. AAS.10.81

82. Diagnose internal combustion engine no-crank condition. AAS.10.82
83. Diagnose internal combustion engine cranks/no-start condition. AAS.10.83
84. Interpret vacuum and compression readings on Atkinson cycle engines. AAS.10.84
85. Identify engine start/stop strategy; diagnose malfunctions. AAS.10.85
86. Service engine cooling system. AAS.10.86
87. Perform high voltage disconnect procedure; reconnect/enable high voltage system. AAS.10.87
88. Select, test and use proper safety gloves. AAS.10.88
89. Select, qualify and use proper electrical testing equipment and leads. AAS.10.89
90. Retrieve and diagnose driveline DTCs; determine needed repairs. AAS.10.90
91. Diagnose problems caused by damaged or failed harnesses, connectors, and terminals. AAS.10.91
92. Test, diagnose and repair high voltage leaks/loss of isolation. AAS.10.92
93. Remove and install rotor from stator. AAS.10.93
94. Diagnose motor-rotor position sensor (Resolver or Encoder type). AAS.10.94
95. Diagnose drive/traction motor-generator assembly for proper operation (such as an inoperative condition, noise, shudder, overheating, etc.). AAS.10.95
96. Diagnose improper electrically actuated parking pawl operation; determine needed repair. AAS.10.96
97. Identify transmission fluid and coolant fluid requirements; verify fluid levels. AAS.10.97
98. Perform high voltage disconnect procedure; reconnect/enable high voltage system. AAS.10.98
99. Select, test and use proper safety gloves. AAS.10.99
100. Select, qualify and use proper electrical testing equipment and leads. AAS.10.100
101. Retrieve and diagnose DTCs; determine needed repairs. AAS.10.101
102. Diagnose problems caused by damaged or failed harnesses, connectors, and terminals. AAS.10.102
103. Identify procedures necessary to establish the proper vehicle operational power mode during service (OFF, ACCESSORY, POWER ON, READY TO DRIVE). AAS.10.103
104. Diagnose the cause of a hybrid system warning displayed on the instrument panel and/or driveability complaint. AAS.10.104
105. Diagnose impact sensor problems; determine needed repair. AAS.10.105
106. Diagnose AC/DC inverter overheating; determine needed repair. AAS.10.106
107. Diagnose AC/DC inverter failure; determine needed repair. AAS.10.107

108. Replace AC/DC inverter cooling pump. AAS.10.108
109. Remove and install AC/DC inverter. AAS.10.109
110. Diagnose failures in the data communications bus network; determine needed repair. AAS.10.110
111. Locate and test the voltage level of capacitors. AAS.10.111
112. Diagnose, locate and safely disable/enable safety interlocks. AAS.10.112
113. Diagnose failed DC/DC converter; determine needed repair. AAS.10.113
114. Remove and install DC/DC converter. AAS.10.114
115. Test high voltage cable integrity and loss of isolation. AAS.10.115
116. Perform 12-volt battery testing. AAS.10.116
117. Diagnose system main relay (SMR)/contactor malfunctions; determine needed repairs. AAS.10.117
118. Perform high voltage disconnect procedure; reconnect/enable high voltage system. AAS.10.118
119. Select, test and use proper safety gloves. AAS.10.119
120. Select, qualify and use proper electrical testing equipment and leads. AAS.10.120
121. Diagnose problems caused by damaged or failed harnesses, connectors, and terminals. AAS.10.121
122. Retrieve and diagnose DTCs; determine needed repairs. AAS.10.122
123. Inspect, test and diagnose EVAP emission system components; determine needed repairs. AAS.10.123
124. Observe and interpret driver indicators, power flow display and energy monitor; determine necessary action. AAS.10.124
125. Test and diagnose high voltage air compressor malfunctions; determine necessary action. AAS.10.125
126. Remove and install high voltage air conditioning compressor; identify and select proper system oil. AAS.10.126
127. Diagnose cabin heating system performance problems; determine needed repairs. AAS.10.127
128. Diagnose and repair electric/electronic steering systems. AAS.10.128
129. Diagnose brake system performance problems; differentiate between braking problems caused by the hydraulic system and the regenerative system; determine needed repairs. AAS.10.129
130. Deactivate brake system self-test prior to service. AAS.10.130
131. Service liquid cooling system(s). AAS.10.131

Automotive Collision Technology Technician (T401300)

The Automotive Collision Repair and Refinishing Helper/Assistant - Course Number: ARR0140

0. Proficiently explain and apply required shop and personal safety tasks relating to the automotive collision industry.--The student will be able to: AC.01.0
    01. Identify and apply general shop safety rules and procedures, EPA and OSHA standards. AC.01.01
    02. Demonstrate knowledge of related Industry Certifications AC.01.02
    03. Research, identify, and interpret the Federal Law as recorded in (29 CFR-1910.1200). AC.01.03
    04. Identify and use appropriate emergency first aid procedures. AC.01.04
    05. Utilize and demonstrate safe procedures for handling of hand tools, lifting tools, jack stands, and related equipment. AC.01.05
    06. Utilize and identify proper PPE, ventilation and safety procedures for working within the lab/shop area, and be able to identify and use fire extinguishers, SDS, posted evacuation routes and eye wash stations. AC.01.06
0. Explain and apply required tasks associated with the proper use and handling of tools and equipment relating to the automotive collision industry.--The student will be able to: AC.02.0
    01. Identify tools and equipment and their appropriate usage in automotive applications. AC.02.01
    02. Identify, apply and use standard and metric measurement skills and designation. AC.02.02
    03. Demonstrate proper cleaning, storage, and maintenance of tools and equipment. AC.02.03
0. Demonstrate proficiency in preparing vehicle for routine pre/post maintenance and customer services.--The student will be able to: AC.03.0
    01. Identify information needed and the service requested on a repair order. AC.03.01
    02. Identify automobiles according to engine location, cylinders, type of drive system, purpose, etc. AC.03.02
    03. Identify purpose and demonstrate proper use of fender covers, floor mats and other vehicle protection equipment. AC.03.03
    04. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. AC.03.04
    05. Conduct an appropriate pre-service evaluation and report or note any concerns not already on the repair order. AC.03.05
    06. Check operation and status of instrument panel warning lights and gauges. AC.03.06
    07. Locate and use the Vehicle Identification Number (VIN), information placards, decals, tags, as required. AC.03.07

08. Check fluid levels, replace as required. AC.03.08
09. Inspect undercar area for leaks, damage, and unusual conditions. AC.03.09
10. Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear. AC.03.10
11. Inspect cooling system pipes and hoses for wear, damage, and proper routing. AC.03.11
12. Reinstall wheel; torque wheel fasteners to specification. AC.03.12
13. Perform a visual inspection of a disc brake system. AC.03.13
14. Charge battery as needed. AC.03.14
15. Inspect and clean battery and battery cable clamp connections. AC.03.15
16. Perform battery, starting, and charging system tests using appropriate tester. AC.03.16
17. Start vehicle using an auxiliary power supply. AC.03.17
18. Maintain or restore electronic memory functions if required. AC.03.18

Automotive Collision Refinishing Technician – Course Number: ARR0141

0. Explain and apply safety precautions; surface preparation; spray gun and related equipment operation; paint mixing, matching and applying; paint defects (causes and cures); and final detailing.--The student will be able to: AC.04.0

    01. Select and use proper personal safety equipment; take necessary precautions with hazardous operations and materials according to federal, state, and local regulations. AC.04.01

    02. Identify safety and personal health hazards according to OSHA guidelines and the Federal Law as recorded in (29 CFR-1910.1200). AC.04.02

    03. Inspect spray environment and equipment to ensure compliance with federal, state and local regulations, and for safety and cleanliness hazards. AC.04.03

    04. 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 regulation. AC.04.04

    05. Select and identify 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 regulation. AC.04.05

    06. 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.). AC.04.06

    07. Soap and water wash entire vehicle; use appropriate cleaner to remove contaminants.HP-1 AC.04.07

    08. Inspect and identify type of finish, surface condition, and film thickness; develop and document a plan for refinishing using a total product system. AC.04.08

    09. Remove paint finish as needed. AC.04.09

    10. Dry or wet sand areas to be refinished. AC.04.10

    11. Featheredge areas to be refinished. AC.04.11

    12. Apply suitable metal treatment or primer in accordance with total product systems. AC.04.12

    13. Creatively identify, mask and protect other areas that will not be refinished. AC.04.13

    14. Creatively demonstrate different masking techniques (recess/back masking, foam door type, etc.). AC.04.14

    15. Creatively mix primer, primer-surfacer or primer-sealer. AC.04.15

    16. Artistically identify a complimentary color or shade of undercoat to improve coverage. AC.04.16

    17. Artistically apply primer onto surface of repaired area. AC.04.17

    18. Artistically apply two-component finishing filler to minor surface imperfections. AC.04.18

19. Block sand area to which primer-surfacer has been applied. AC.04.19
20. Dry sand area to which finishing filler has been applied. AC.04.20
21. Remove dust from area to be refinished, including cracks or moldings of adjacent areas. AC.04.21
22. Clean area to be refinished using a final cleaning solution. AC.04.22
23. Remove, with a tack rag, any dust or lint particles from the area to be refinished. AC.04.23
24. Artistically apply suitable primer sealer to the area being refinished. AC.04.24
25. Creatively scuff sand to remove nibs or imperfections from a sealer. AC.04.25
26. Creatively and artistically apply stone chip resistant coating. AC.04.26
27. Restore caulking and seam sealers to repaired areas. AC.04.27
28. Prepare panels for blending as needed. AC.04.28
29. Identify the types of rigid, semi-rigid or flexible plastic parts to be refinished; determine the materials needed, preparation, and refinishing procedures. AC.04.29
30. Identify metal parts to be refinished; determine the materials needed, preparation, and refinishing procedures. AC.04.30
31. Inspect, clean, and determine condition of spray guns and related equipment (air hoses, regulators, air lines, air source, and spray environment). AC.04.31
32. Select spray gun setup (fluid needle, nozzle, and cap) for product being applied. AC.04.32
33. Test and adjust spray gun using fluid, air and pattern control valves. AC.04.33
34. Identify color code by manufacturer's vehicle information label. AC.04.34
35. Shake, stir, reduce, catalyze/activate, and strain refinish materials. AC.04.35
36. Artistically apply finish using appropriate spray techniques (gun arc, angle, distance, travel speed, and spray pattern overlap) for the finish being applied. AC.04.36
37. Artistically apply selected product on test or let-down panel; check for color match. AC.04.37
38. Artistically apply single stage topcoat. AC.04.38
39. Artistically apply basecoat/clearcoat for panel blending and panel refinishing. AC.04.39
40. Artistically apply basecoat/clearcoat for overall refinishing. AC.04.40
41. Remove nibs or imperfections from basecoat. AC.04.41
42. Identify product expiration dates as applicable. AC.04.42
43. Artistically refinish plastic parts. AC.04.43
44. Artistically apply multi-stage coats for panel blending and overall refinishing. AC.04.44

45. Identify and mix paint using a formula. AC.04.45
46. Identify poor hiding colors; determine necessary action. AC.04.46
47. Creatively and artistically tint color using formula to achieve a blend-able match. AC.04.47
48. Identify alternative color formula to achieve a blend-able match. AC.04.48
49. Identify the materials equipment, and preparation differences between solvent and waterborne technologies. AC.04.49
50. Identify blistering (raising of the paint surface, air entrapment); correct the cause(s) and the condition. AC.04.50
51. Identify a dry spray appearance in the paint surface; correct the cause(s) and the condition. AC.04.51
52. Identify the presence of fish-eyes (crater-like openings) in the finish; correct the cause(s) and the condition. AC.04.52
53. Identify lifting; correct the cause(s) and the condition. AC.04.53
54. Identify clouding (mottling and streaking in metallic finishes); correct the cause(s) and the condition. AC.04.54
55. Identify orange peel; correct the cause(s) and the condition. AC.04.55
56. Identify overspray; correct the cause(s) and the condition. AC.04.56
57. Identify solvent popping in freshly painted surface; correct the cause(s) and the condition. AC.04.57
58. Identify sags and runs in paint surface; correct the cause(s) and the condition. AC.04.58
59. Identify sanding marks or sand-scratch swelling; correct the cause(s) and the condition. AC.04.59
60. Identify contour mapping/edge mapping; correct the cause(s) and the condition. AC.04.60
61. Identify color difference (off-shade); correct the cause(s) and the condition. AC.04.61
62. Identify tape tracking; correct the cause(s) and the condition. AC.04.62
63. Identify low gloss condition; correct the cause(s) and the condition. AC.04.63
64. Identify poor adhesion; determine the cause(s) and correct the condition. AC.04.64
65. Identify paint cracking (shrinking, splitting, crows-feet or line-checking, micro-checking, etc.); correct the cause(s) and the condition. AC.04.65
66. Identify corrosion; correct the cause(s) and the condition. AC.04.66
67. Identify dirt or dust in the paint surface; correct the cause(s) and the condition. AC.04.67
68. Identify water spotting; correct the cause(s) and the condition. AC.04.68

69. Identify finish damage caused by bird droppings, tree sap, and other natural causes; correct the condition. AC.04.69

70. Identify finish damage caused by airborne contaminants (acids, soot, rail dust, and other industrial-related causes); correct the condition. AC.04.70

71. Identify die-back conditions (dulling of the paint film showing haziness); correct the cause(s) and the condition. AC.04.71

72. Identify chalking (oxidation); correct the cause(s) and the condition. AC.04.72

73. Identify bleed-through (staining); correct the cause(s) and the condition. AC.04.73

74. Identify pin-holing; correct the cause(s) and the condition. AC.04.74

75. Identify buffing-related imperfections (swirl marks, wheel burns); correct the condition. AC.04.75

76. Identify pigment flotation (color change through film build); correct the cause(s) and the condition. AC.04.76

77. Apply decals, transfers, tapes, woodgrains, pinstripes (painted and taped), etc. AC.04.77

78. Sand, buff and polish fresh or existing finish to remove defects as required. AC.04.78

79. Clean interior, exterior, and glass. AC.04.79

80. Clean body openings (door jambs and edges, etc.). AC.04.80

81. Remove overspray. AC.04.81

82. Perform vehicle clean-up; complete quality control using a checklist. AC.04.82

83. Ensure vehicle is prepared to return to customer per school/company policy (floor mats, steering wheel cover, etc.). AC.04.83

Non-Structural Damage Repair Technician – Course Number: ARR0312

0. Explain and apply safety precautions; preparation; outer body panel repairs, replacements, and adjustments; metal finishing and body filling; movable glass and hardware; plastics and adhesives; electrical; and brakes.--The student will be able to: AC.05.0

    01. Select and use proper personal safety equipment; take necessary precautions with hazardous operations and materials in accordance with federal, state, and local regulations. AC.05.01

    02. Locate procedures and precautions that may apply to the vehicle being repaired. AC.05.02

    03. Identify vehicle system hazard types (supplemental restraint system (SRS), hybrid/electric/alternative fuel vehicles), locations and recommended procedures before inspecting or replacing components. AC.05.03

    04. 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 regulation. AC.05.04

    05. Review damage report and analyze damage to determine appropriate methods for overall repair; develop and document a repair plan. AC.05.05

    06. Inspect, remove, store, protect, and replace exterior trim and components necessary for proper surface preparation. AC.05.06

    07. Inspect, remove, label, store, and reinstall necessary trim and moldings. AC.05.07

    08. Inspect, remove, label, store, and reinstall body panels and components that may interfere with or be damaged during repair. AC.05.08

    09. Inspect, remove, protect label, store, and reinstall vehicle mechanical and electrical components that may interfere with or be damaged during repair. AC.05.09

    10. Protect panels, glass, interior parts, and other vehicles adjacent to the repair area. AC.05.10

    11. Soap and water wash entire vehicle; complete pre-repair inspection checklist. AC.05.11

    12. Prepare damaged area using water-based and solvent-based cleaners. AC.05.12

    13. Remove corrosion protection, under-coatings, sealers, and other protective coatings as necessary to perform repairs. AC.05.13

    14. Determine the presence of a Tire Pressure Monitoring System (TPMS). AC.05.14

    15. Determine the presence of wheel locks. AC.05.15

    16. Determine the presence of an air suspension system. AC.05.16

    17. Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.) AC.05.17

    18. Identify procedures to reset maintenance indicators. AC.05.18

19. Verify status of instrument panel warning lights and gauges. AC.05.19
20. Test and replace fuses; confirm proper circuit operation. AC.05.20
21. Inspect and replace exterior and courtesy lamps. AC.05.21
22. Document damage, unusual conditions, and concerns. AC.05.22
23. Inspect/locate direct, indirect, or hidden damage and direction of impact. AC.05.23
24. Inspect, remove and replace mechanically fastened welded steel panel or panel assemblies. AC.05.24
25. Determine the extent of damage to aluminum body panels; repair or replace. AC.05.25
26. Inspect, remove, replace, and align hood, hood hinges, and hood latch. (when available) AC.05.26
27. Inspect, remove, replace, and align deck lid, lid hinges, and lid latch. AC.05.27
28. Inspect, remove, replace, and align doors, latches, hinges, and related hardware. (when available) AC.05.28
29. Inspect, remove, replace and align tailgates, hatches, lift-gates and sliding doors. (when available) AC.05.29
30. Inspect, remove, replace, and align bumper bars, covers, reinforcements, guards, impact absorbers, and mounting hardware. AC.05.30
31. Inspect, remove, replace and align fenders, and related panels. AC.05.31
32. Restore corrosion protection during and after the repair. AC.05.32
33. Identify procedures to replace door skins. AC.05.33
34. Identify procedures to restore sound deadeners and foam materials. AC.05.34
35. Identify procedures to perform panel bonding and weld bonding. AC.05.35
36. Identify procedures to diagnose and repair water leaks, dust leaks, and wind noise. AC.05.36
37. Identify one-time use fasteners. AC.05.37
38. Identify procedures to weld damaged or torn steel body panels; repaired broken welds. AC.05.38
39. Prepare a panel for body filler by abrading or removing the coatings; featheredge and refine scratches before the application of body filler. AC.05.39
40. Locate and repair surface irregularities on a damaged body panel using power tools, hand tools, and weld-on pulling attachments. AC.05.40
41. Demonstrate hammer and dolly techniques. AC.05.41
42. Identify procedures to Hot or cold shrink stretched panel areas to proper contour. AC.05.42
43. Identify body filler defects; correct the cause and condition. (Pin-holing, ghosting, staining, over catalyzing, etc.) AC.05.43
44. Identify different types of body fillers. AC.05.44

45. Shape body filler to contour; finish sand. AC.05.45
46. Identify the processes to perform proper metal finishing techniques for ferrous and non-ferrous metals. AC.05.46
47. Straighten contours of damaged panels to a suitable condition for body filling or metal finishing using power tools, hand tools, and weld-on pulling attachments. AC.05.47
48. Inspect, adjust, repair or replace window regulators, run channels, glass, power mechanisms, and related controls. AC.05.48
49. Inspect, adjust, repair, remove, reinstall or replace weather-stripping. AC.05.49
50. Inspect, repair or replace, and adjust removable power operated roof panel and hinges, latches, guides, handles, retainer, and controls of sunroofs. AC.05.50
51. Inspect, remove, reinstall, and align convertible top and related mechanisms. AC.05.51
52. Identify procedures to initialize electrical components as needed. AC.05.52
53. Identify the types of plastics; determine repair-ability. AC.05.53
54. Clean and prepare the surface of plastic parts; identify the types of plastic repair procedures. AC.05.54
55. Repair rigid, semi-rigid, or flexible plastic panels. AC.05.55
56. Remove or repair damaged areas from rigid exterior composite panels. AC.05.56
57. Identify procedures to replace bonded rigid exterior composite body panels; straighten or align panel supports. AC.05.57
58. Inspect, remove, and reinstall repairable plastics and other components for off-vehicle repair. AC.05.58
59. Identify processes and procedures to check for available voltage, voltage drop and current, and resistance in electrical wiring circuits and components with a DMM (digital multi-meter). AC.05.59
60. Identify processes and procedures to repair wiring and connectors. AC.05.60
61. Identify processes and procedures to inspect, test, and replace fusible links, circuit breakers, and fuses. AC.05.61
62. Identify processes and procedures to perform battery state-of-charge test and slow/fast battery charge. AC.05.62
63. Identify processes and procedures to inspect, clean, repair or replace battery, battery cables, connectors and clamps. AC.05.63
64. Dispose of batteries and battery acid according to local, state, and federal requirements. AC.05.64
65. Identify programmable electrical/electronic components and check for malfunction indicator lamp (MIL) and fault codes; record data for reprogramming before disconnecting battery. AC.05.65

66. Identify processes and procedures to inspect alignment, adjust, remove and replace alternator (generator), drive belts, pulleys, and fans. AC.05.66
67. Check operation and aim headlamp assemblies and fog/driving lamps; determine needed repairs. AC.05.67
68. Identify processes and procedures to inspect, test, and repair or replace bulbs, sockets, connectors, and ground wires of interior and exterior light circuits. AC.05.68
69. Identify processes and procedures to remove and replace horn(s); check operation. AC.05.69
70. Identify processes and procedures to check operation of wiper/washer systems; determine needed repairs. AC.05.70
71. Identify processes and procedures to check operation of power side and tailgate window; determine needed repairs. AC.05.71
72. Identify processes and procedures to inspect, remove and replace power seat, motors, linkages, cables, etc. AC.05.72
73. Identify processes and procedures to inspect, remove and replace components of electric door and hatch/trunk lock. AC.05.73
74. Identify processes and procedures to inspect, remove and replace components of keyless lock/unlock devices and alarm systems. AC.05.74
75. Identify processes and procedures to inspect, remove and replace components of electrical sunroof and convertible/retractable hard top. AC.05.75
76. Identify processes and procedures to identify processes and procedures to check operation of electrically heated mirrors, windshields, back lights, panels, etc.; determine needed repairs. AC.05.76
77. Identify processes and procedures to demonstrate the proper self-grounding procedures (anti-static) for handling electronic components. AC.05.77
78. Identify processes and procedures to check for module communication errors using a scan tool. AC.05.78
79. Identify processes and procedures to use wiring diagrams, component location, and diagnostic flow charts during diagnosis of electrical circuit problems. AC.05.79
80. Identify processes and procedures to identify safe disabling techniques of high voltage systems on hybrid/electric vehicles. AC.05.80
81. Identify processes and procedures to identify potential safety and material handling concerns associated with high voltage hybrid/electric vehicle battery systems. AC.05.81
82. Identify processes and procedures to inspect brake lines, hoses, and fittings for damage or wear; tighten fittings and supports; replace brake lines (double flare and ISO types). AC.05.82
83. Identify processes and procedures to replace hoses, fittings, seals, and supports. AC.05.83

84. Identify processes and procedures to identify, handle, store, and fill with appropriate brake fluids. AC.05.84
85. Identify processes and procedures to bleed (manual, pressure, or vacuum) hydraulic brake system. AC.05.85
86. Identify processes and procedures to pressure test brake hydraulic system; determine necessary action. AC.05.86
87. Identify processes and procedures to adjust brake shoes or pads; remove and reinstall brake drums or drum/hub assemblies. AC.05.87
88. Identify processes and procedures to remove, clean and inspect caliper and rotor assembly and mountings for wear and damage; reinstall. AC.05.88
89. Identify processes and procedures to inspect parking brake system operation; repair or adjust as necessary; verify operation. AC.05.89
90. Identify processes and procedures to identify the proper procedures for handling brake dust. AC.05.90
91. Identify processes and procedures to check for bent or damaged brake system components. AC.05.91
92. Identify processes and procedures to demonstrate an understanding of various types of advanced braking systems (ABS, electronic parking brake, hydraulic, electronic, traction and stability control). AC.05.92

Damage Analysis and Estimating – Course Number: ARR0022

0. Explain and apply safety precautions; damage analysis; estimating; vehicle construction and parts identification; and customer relations and sales skills.--The student will be able to: AC.06.0
    01. Select and use proper personal safety equipment; take necessary precautions with hazardous operations and materials in accordance with federal, state, and local regulations. AC.06.01
    02. Locate procedures and precautions that may apply to the vehicle being repaired. AC.06.02
    03. Identify vehicle system hazard types (supplemental restraint system (SRS), hybrid/electric/alternative fuel vehicles), locations and recommended procedures before inspecting or replacing components. AC.06.03
    04. 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 regulation. AC.06.04
    05. Prepare vehicle for inspection by providing access to damaged areas. AC.06.05
    06. Analyze damage to determine appropriate methods for overall repairs. AC.06.06
    07. Determine the direction, point(s) of impact, and extent of direct, indirect, and inertia damage. AC.06.07
    08. Gather details of the incident/accident necessary to determine the full extent of vehicle damage. AC.06.08
    09. Identify and record pre-existing damage. AC.06.09
    10. Identify and record prior repairs. AC.06.10
    11. Perform visual inspection of structural components. AC.06.11
    12. Identify structural damage using measuring tools and equipment. AC.06.12
    13. Perform visual inspection of non-structural components. AC.06.13
    14. Determine parts, components, material type(s) and procedures necessary for a proper repair. AC.06.14
    15. Identify type and condition of finish; determine if refinishing is required. AC.06.15
    16. Identify suspension, electrical, and mechanical component physical damage. AC.06.16
    17. Identify safety systems physical damage. AC.06.17
    18. Identify interior component damage. AC.06.18
    19. Identify damage to add-on accessories and modifications. AC.06.19
    20. Identify single (one time) use components. AC.06.20
    21. Inspect under-hood area for leaks, damage, and unusual conditions. AC.06.21
    22. Determine fluid type requirements and identify fluid. AC.06.22

23. Determine and record customer/vehicle owner information. AC.06.23
24. 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. AC.06.24
25. Identify and record vehicle options, including trim level, paint code, transmission, accessories, and modifications. AC.06.25
26. Identify safety systems; determine replacement items. AC.06.26
27. Apply appropriate estimating and parts nomenclature (terminology). AC.06.27
28. Determine and apply appropriate estimating sequence. AC.06.28
29. Utilize estimating guide procedure pages. AC.06.29
30. Apply estimating guide footnotes and headnotes as needed. AC.06.30
31. Identify operations requiring labor value judgment. AC.06.31
32. Select appropriate labor value for each operation (structural, non-structural, mechanical, and refinish). AC.06.32
33. Select and price OEM parts; verify availability, compatibility, and condition. AC.06.33
34. Locate and use technical service bulletins (TSBs). AC.06.34
35. Utilize flat rate manuals, service manuals, service bulletins, parts manuals and electronic service information. AC.06.35
36. Select and price alternative/optional OEM parts; verify availability, compatibility and condition. AC.06.36
37. Select and price alternative/optional OEM parts, aftermarket parts, used, recycled, rebuilt or remanufactured parts; verify availability, compatibility and condition. AC.06.37
38. Determine price and source of necessary sublet operations. AC.06.38
39. Determine labor value, prices, charges, allowances, or fees for non-included operations and miscellaneous items. AC.06.39
40. Recognize and apply overlap deductions, included operations, and additions. AC.06.40
41. Determine additional material and charges. AC.06.41
42. Determine refinishing material and charges. AC.06.42
43. Apply math skills to establish charges and totals. AC.06.43
44. Identify procedural differences between computer generated and manually written estimates. AC.06.44
45. Identify procedures to restore corrosion protection; establish labor values, and material charges. AC.06.45
46. Determine the cost effectiveness of the repair and determine the approximate vehicle retail, and repair value. AC.06.46

47. Recognize the differences in estimation procedures when using different information provider systems. AC.06.47
48. Verify accuracy of estimate compared to the actual repair and replacement operations. AC.06.48
49. Document observed damage, unusual conditions, and concerns. AC.06.49
50. Identify type of vehicle construction (space frame, unibody, body-over-frame). AC.06.50
51. Recognize the different damage characteristics of space frame, unibody, and body-over-frame vehicles. AC.06.51
52. Identify impact energy absorbing components. AC.06.52
53. Identify steel types; determine repair-ability. AC.06.53
54. Identify aluminum/magnesium components; determine repair-ability. AC.06.54
55. Identify plastic/composite components; determine repair-ability. AC.06.55
56. Identify vehicle glass components and repair/replacement procedures. AC.06.56
57. Identify add-on accessories. AC.06.57
58. Visually inspect suspension, steering and related components. AC.06.58
59. Acknowledge and/or greet customer/client. AC.06.59
60. Listen to customer/client; collect information and identify customers/client's concerns, needs and expectations. AC.06.60
61. Establish cooperative attitude with customer/client. AC.06.61
62. Identify yourself to customer/client; offer assistance. AC.06.62
63. Deal with angry customer/client. AC.06.63
64. Identify customer/client preferred communication method; follow up to keep customer/client informed about parts and the repair process. AC.06.64
65. Recognize basic claims handling procedures; explain to customer/client. AC.06.65
66. Project positive attitude and professional appearance. AC.06.66
67. Provide and review warranty information. AC.06.67
68. Provide and review technical and consumer protection information. AC.06.68
69. Estimate and explain duration of out-of-service time. AC.06.69
70. Demonstrate negotiation skills to obtain a mutual agreement. AC.06.70
71. Interpret and explain manual or computer-assisted estimate to customer/client. AC.06.71

Automotive Collision Welding, Cutting and Joining – Course Number: ARR0112

0. Explain and apply safety precautions; metal welding, cutting, and joining.--The student will be able to: AC.07.0

    01. Select and use proper personal safety equipment; take necessary precautions with hazardous operations and materials in accordance with federal, state, and local regulations. AC.07.01

    02. Locate procedures and precautions that may apply to the vehicle being repaired. AC.07.02

    03. Identify vehicle system hazard types (supplemental restraint system (SRS), hybrid/electric/alternative fuel vehicles), locations and recommended procedures before inspecting or replacing components. AC.07.03

    04. 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 regulation. AC.07.04

    05. Identify the considerations for cutting, removing, and welding various types of steel, aluminum, and other metals. AC.07.05

    06. Determine the correct GMAW welder type, electrode/wire type, diameter, and gas to be used in a specific welding situation. AC.07.06

    07. Set up, attach work clamp (ground), and adjust the GMAW welder to "tune" for proper electrode stick-out, voltage, polarity, flow rate, and wire-feed speed required for the substrate being welded. AC.07.07

    08. Store, handle, and install high-pressure gas cylinders; test for leaks. AC.07.08

    09. Determine the proper angle of the gun to the joint and direction of gun travel for the type of weld being made. AC.07.09

    10. Protect adjacent panels, glass, vehicle interior, etc., from welding and cutting operations. AC.07.10

    11. Identify hazards; foam coatings and flammable materials prior to welding/cutting procedures. AC.07.11

    12. Protect computers and other electronics/wires during welding procedures. AC.07.12

    13. Clean and prepare the metal to be welded, assure good metal fit-up, apply weld-through primer if necessary, and clamp or tack as required. AC.07.13

    14. Determine the joint type (butt weld with backing, lap, etc.) for weld being made. AC.07.14

    15. Determine the type of weld (continuous, stitch weld, plug, etc.) for each specific welding operation. AC.07.15

    16. Perform the following welds: plug, butt weld with and without backing, and fillet, etc., in the flat, horizontal, vertical, and overhead positions. AC.07.16

    17. Perform visual evaluation and destructive test on each weld type. AC.07.17

    18. Identify the causes of various welding defects; make necessary adjustments. AC.07.18

19. Identify cause of contact tip burn-back and failure of wire to feed; make necessary adjustments. AC.07.19
20. Identify cutting process for different substrates and locations; perform cutting operation AC.07.20
21. Identify different methods of attaching structural components (squeeze type resistance spot welding (STRSW), riveting, structural adhesive, MIG bronze, etc.). AC.07.21

Structural Damage Repair Technician – Course Number: ARR0295

0. Explain and apply safety precautions; frame inspection and repair; unibody and unitized structure inspection, measurement, repair; fixed glass; steering and suspension; heating and air conditioning; cooling systems; drive train; fuel, intake and exhaust systems; and restraint systems.--The student will be able to: AC.08.0

    01. Select and use proper personal safety equipment; take necessary precautions with hazardous operations and materials in accordance with federal, state, and local regulations. AC.08.01

    02. Locate procedures and precautions that may apply to the vehicle being repaired. AC.08.02

    03. Identify vehicle system hazard types (supplemental restraint system (SRS), hybrid/electric/alternative fuel vehicles), locations and recommended procedures before inspecting or replacing components. AC.08.03

    04. 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 regulation. AC.08.04

    05. Measure and diagnose structural damage using a tram gauge. AC.08.05

    06. Identify processes and procedures to Attach vehicle to anchoring devices. AC.08.06

    07. Identify processes and procedures to Analyze, straighten and align mash (collapse) damage. AC.08.07

    08. Identify processes and procedures to Analyze, straighten and align sag damage. AC.08.08

    09. Identify processes and procedures to Analyze, straighten and align side sway damage. AC.08.09

    10. Identify processes and procedures to Analyze, straighten and align twist damage. AC.08.10

    11. Identify processes and procedures to Analyze, straighten and align diamond frame damage. AC.08.11

    12. Identify processes and procedures to Remove and replace damaged structural components. AC.08.12

    13. Identify processes and procedures to Replace protective coatings, restore corrosion protection to repaired or replaced frame areas and anchoring locations. AC.08.13

    14. Identify processes and procedures to Analyze and identify misaligned or damaged steering, suspension, and powertrain mounting points. AC.08.14

    15. Identify processes and procedures to Align or replace misaligned or damaged steering, suspension, and powertrain mounting points that can cause vibration, steering, and wheel alignment problems. AC.08.15

    16. Identify heat limitations and monitoring procedures for structural components. AC.08.16

17. Demonstrate an understanding of foam applications. AC.08.17
18. Measure and diagnose structural damage using a measuring system (mechanical, electronic, laser), etc. AC.08.18
19. Determine the extent of the direct and indirect damage and the direction of impact; document the methods and sequence of repair. AC.08.19
20. Analyze and identify crush/collapse zones. AC.08.20
21. Analyze, identify and understand procedures to replace and align misaligned or damaged steering, suspension, and powertrain mounting points that can cause vibration, steering, and chassis alignment problems. AC.08.21
22. Measure and diagnose unibody damage using tram gauge. AC.08.22
23. Measure and diagnose unibody vehicles using a dedicated (fixture) measuring system. AC.08.23
24. Diagnose and measure unibody vehicles using a three-dimensional measuring system (mechanical, electronic, and laser, etc.). AC.08.24
25. Determine the extent of the direct and indirect damage and the direction of impact; plan and document the methods and sequence of repair. AC.08.25
26. Attach anchoring devices to vehicle; remove or reposition components as necessary. AC.08.26
27. Identify processes and procedures to straighten and align roof rails/headers and roof panels. AC.08.27
28. Straighten and align rocker panels and pillars. AC.08.28
29. Straighten and align vehicle openings, and floor pans. AC.08.29
30. Straighten and align quarter panels, wheelhouse assemblies, and rear body sections (including rails and suspension/powertrain mounting points). AC.08.30
31. Straighten and align front-end sections (aprons, strut towers, upper and lower rails, steering, and suspension/powertrain mounting points). AC.08.31
32. Identify substrate and repair or replacement recommendations. AC.08.32
33. Identify proper cold stress relief methods. AC.08.33
34. Repair damage using power tools and hand tools to restore proper contours and dimensions. AC.08.34
35. Determine sectioning procedures of a steel body structure. AC.08.35
36. Identify processes and procedures to restore corrosion protection to repaired or replaced structural areas, and anchoring locations. AC.08.36
37. Identify processes and procedures to determine the extent of damage to aluminum structural components; repair, weld, or replace. AC.08.37
38. Analyze and identify crush/collapse zones. AC.08.38
39. Identify considerations for removal, handling, and installation of advanced glass systems (rain sensors, navigation, cameras, and collision avoidance systems). AC.08.39

40. Identify processes and procedures to remove and reinstall or replace modular glass using recommended materials. AC.08.40
41. Check for water leaks, dust leaks, and wind noise. AC.08.41
42. Perform visual inspection and measuring checks to identify steering and suspension collision damage. AC.08.42
43. Identify one–time use fasteners. AC.08.43
44. Clean, inspect, and prepare reusable fasteners. AC.08.44
45. Identify processes and procedures to remove, replace, inspect or adjust power steering pump, pulleys, belts, hoses, fittings and pump mounts. AC.08.45
46. Identify processes and procedures to remove and replace power steering gear (non-rack and pinion type). AC.08.46
47. Identify processes and procedures to inspect, remove, and replace power rack and pinion steering gear and related components. AC.08.47
48. Identify processes and procedures to inspect and replace parallelogram steering linkage components. AC.08.48
49. Identify processes and procedures to inspect, remove and replace upper and lower control arms and related components. AC.08.49
50. Identify processes and procedures to inspect, remove and replace steering knuckle/spindle/hub assemblies (including bearings, races, seals, etc.). AC.08.50
51. Identify processes and procedures to inspect, remove and replace front suspension system coil springs and spring insulators (silencers). AC.08.51
52. Identify processes and procedures to inspect, remove, replace, and adjust suspension system torsion bars, and mounts. AC.08.52
53. Identify processes and procedures to inspect, remove and replace stabilizer bar bushings, brackets, and links. AC.08.53
54. Identify processes and procedures to inspect, remove and replace MacPherson strut or assembly, upper bearing, and mount. AC.08.54
55. Identify processes and procedures to inspect, remove, and replace rear suspension system transverse links, control arms, stabilizer bars, bushings, and mounts. AC.08.55
56. Identify processes and procedures to inspect, remove, and replace suspension system leaf spring(s) and related components. AC.08.56
57. Identify processes and procedures to inspect axle assembly for damage and misalignment. AC.08.57
58. Identify processes and procedures to inspect, remove and replace shock absorbers. AC.08.58
59. Identify processes and procedures to diagnose, inspect, adjust, repair or replace active suspension systems and associated lines and fittings. AC.08.59
60. Identify processes and procedures to measure vehicle ride height and wheel base; determine necessary action. AC.08.60

61. Identify processes and procedures to inspect, remove, replace, and align front and rear frame (cradles/sub). AC.08.61
62. Identify processes and procedures to diagnose and inspect steering wheel, steering column, and components. AC.08.62
63. Identify processes and procedures to verify proper operation of steering systems including electronically controlled, hydraulic and electronically assisted steering systems. AC.08.63
64. Identify processes and procedures to diagnose front and rear suspension system noises and body sway problems; determine necessary action. AC.08.64
65. Diagnose vehicle wandering, pulling, hard steering, bump steer, memory steering, torque steering, and steering return problems; determine necessary action. AC.08.65
66. Demonstrate an understanding of wheel suspension and steering alignments (caster, camber, toe, SAI etc.). AC.08.66
67. Diagnose tire wear patterns; determine cause. AC.08.67
68. Identify processes and procedures to inspect tires; identify direction of rotation and location; check tire size, tire pressure monitoring system (TPM) and adjust air pressure. AC.08.68
69. Identify processes and procedures to diagnose wheel/tire vibration, shimmy, tire pull (lead), wheel hop problems; determine needed repairs. AC.08.69
70. Measure wheel, tire, axle, and hub runout; determine needed repairs. AC.08.70
71. Reinstall wheels and torque lug nuts. AC.08.71
72. Identify processes and procedures to perform initialization or calibration procedures following suspension and/or steering system repairs. AC.08.72
73. Identify processes and procedures to comply with environmental regulations relating to refrigerants and coolants. AC.08.73
74. Maintain and verify correct operation of certified refrigerant recovery and recharging equipment. AC.08.74
75. Locate and identify A/C system service ports. AC.08.75
76. Identify processes and procedures to identify refrigerant contamination, recover, label, store, and recycle refrigerant from an A/C system. AC.08.76
77. Identify processes and procedures to select refrigerant, evacuate, and recharge an A/C system; check for leaks. AC.08.77
78. Identify processes and procedures to select oil type and install correct amount in A/C system. AC.08.78
79. Identify processes and procedures to inspect, adjust, and replace A/C compressor drive belts; check pulley alignment. AC.08.79
80. Identify processes and procedures to remove and replace A/C compressor; inspect, repair or replace A/C compressor mount. AC.08.80
81. Identify processes and procedures to inspect, repair or replace A/C system mufflers, hoses, lines, fittings, orifice tube, expansion valve, and seals. AC.08.81

82. Identify processes and procedures to inspect, test, and replace A/C system condenser and mounts. AC.08.82

83. Identify processes and procedures to inspect and replace receiver/drier or accumulator/drier. AC.08.83

84. Identify processes and procedures to inspect and repair A/C component wiring. AC.08.84

85. Demonstrate an understanding of safe handling procedures associated with high voltage A/C compressors and wiring. AC.08.85

86. Identify processes and procedures to inspect and protect open A/C system components from contaminants during repairs. AC.08.86

87. Check engine cooling and heater system hoses and belts; determine necessary action. AC.08.87

88. Identify processes and procedures to inspect, test, remove, and replace radiator, pressure cap, coolant system components, and water pump. AC.08.88

89. Identify processes and procedures to recover, refill, and bleed system with proper coolant and check level of protection; leak test system and dispose of materials in accordance with EPA regulations. AC.08.89

90. Identify processes and procedures to remove, inspect and replace fan (both electrical and mechanical), fan sensors, fan pulley, fan clutch, and fan shroud; check operation. AC.08.90

91. Identify processes and procedures to inspect, remove, and replace auxiliary oil/fluid coolers; check oil levels. AC.08.91

92. Demonstrate an understanding of hybrid/electric cooling systems. AC.08.92

93. Identify processes and procedures to remove, replace, and adjust shift or clutch linkage as required. AC.08.93

94. Identify processes and procedures to remove and replace electronic sensors, wires, and connectors. AC.08.94

95. Identify processes and procedures to remove and reinstall powertrain assembly; inspect, replace, and align powertrain mounts. AC.08.95

96. Identify processes and procedures to remove and replace drive axle assembly. AC.08.96

97. Identify processes and procedures to inspect, remove and replace half shafts and axle constant velocity (CV) joints. AC.08.97

98. Identify processes and procedures to inspect, remove and replace drive shafts and universal joints. AC.08.98

99. Demonstrate an understanding of safe handling procedures associated with high voltage powertrain components. AC.08.99

100. Identify processes and procedures to inspect, remove and replace exhaust pipes, mufflers, converters, resonators, tail pipes, and heat shields. AC.08.100

101. Identify processes and procedures to inspect, remove and replace fuel/DEF tank, tank filter, cap, filler hose, pump/sending unit and inertia switch; inspect

and replace fuel lines and hoses. AC.08.101

102. Identify processes and procedures to identify processes and procedures to inspect, remove and replace engine components of air intake systems. AC.08.102
103. Identify processes and procedures to inspect, remove and replace canister, filter, vent, and purge lines of fuel vapor (EVAP) control systems. AC.08.103
104. Identify processes and procedures to inspect, remove, and replace seatbelt and shoulder harness assembly and components. AC.08.104
105. Identify processes and procedures to inspect restraint system mounting areas for damage; repair as needed. AC.08.105
106. Identify processes and procedures to inspect the operation of the seatbelt system. AC.08.106
107. Identify processes and procedures to disable and enable Supplemental Restraint System (SRS). AC.08.107
108. Identify processes and procedures to inspect, protect, remove and replace Supplemental Restraint Systems (SRS) sensors and wiring; ensure sensor orientation. AC.08.108
109. Identify processes and procedures to verify that Supplemental Restraint System (SRS) is operational. AC.08.109
110. Identify processes and procedures to inspect, remove, replace and dispose of deployed and non-deployed airbag(s) and pre-tensioners. AC.08.110
111. Identify processes and procedures to use Diagnostic Trouble Codes (DTC) to diagnose and repair the Supplemental Restraint System (SRS). AC.08.111
112. Demonstrate an understanding of advanced restraint systems. AC.08.112
113. Identify components of Supplemental Restraint Systems (SRS). AC.08.113
114. Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits. AC.08.114
115. Identify processes and procedures to disable supplemental restraint systems (SRS) in accordance with manufacturers' procedures. AC.08.115

Automotive Maintenance and Light Repair Technician (T404100)

Maintenance and Light Repair Technician 1 – Course Number: AER0025

0. Proficiently explain and apply required shop and personal safety tasks relating to the automotive industry.--The student will be able to: 01.0
    01. Identify and apply general shop safety rules and procedures, EPA and OSHA standards. 01.01
    02. Demonstrate knowledge of appropriate automotive industry certifications. 01.02
    03. Identify and define career opportunities in the automotive service industry. 01.03
    04. Research, identify, and interpret the Federal Law as recorded in (29 CFR-1910.1200). 01.04
    05. Identify appropriate emergency first aid procedures. 01.05
    06. Utilize and demonstrate safe procedures for handling of tools and equipment. 01.06
    07. Identify and use proper placement of floor jacks and jack stands. 01.07
    08. Identify and use proper procedures for safe lift operation. 01.08
    09. Utilize proper ventilation procedures for working within the lab/shop area. 01.09
    10. Identify proper procedures for safe pit usage. 01.10
    11. Identify marked safety areas. 01.11
    12. Identify the location and the types of fire extinguishers and other fire safety equipment. 01.12
    13. Demonstrate knowledge of the procedures for using fire extinguishers and other safety equipment. 01.13
    14. Identify the location and use of eye wash stations. 01.14
    15. Identify the location of the posted evacuation routes. 01.15
    16. Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities. 01.16
    17. Identify and wear appropriate clothing for lab/shop activities. 01.17
    18. Secure hair and jewelry for lab/shop activities. 01.18
    19. Use proper handling procedures for automotive fluids. 01.19
    20. Identify and describe typical automotive lubricants and lubricant properties. 01.20
    21. Identify and describe typical automotive seals and gaskets. 01.21
    22. Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits. 01.22
    23. Disable supplemental restraint systems (SRS) in accordance with manufacturers' procedures. 01.23

24. Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.) 01.24
25. Locate and demonstrate knowledge of Safety Data Sheets (SDS). 01.25

0. Explain and apply required tasks associated with the proper use and handling of tools and equipment relating to the automotive industry.--The student will be able to: 02.0
    01. Identify tools and equipment and their appropriate usage in automotive applications. 02.01
    02. Identify and use standard and metric measurement skills and designation. 02.02
    03. Demonstrate proper cleaning, storage, and maintenance of tools and equipment. 02.03
    04. Demonstrate proper use of precision-measuring tools (i.e. micrometer, digital/dial-indicator, digital/dial caliper) and torque methods. 02.04
0. Demonstrate proficiency in preparing vehicle for routine pre/post maintenance and customer services.--The student will be able to: 03.0
    01. Identify information needed and the service requested on a repair order. 03.01
    02. Identify automobiles according to engine location, cylinders, type of drive system, purpose, etc. 03.02
    03. Identify purpose and demonstrate proper use of fender covers, floor mats and other vehicle protection equipment. 03.03
    04. Demonstrate use of the three C's (Concern, Cause, and Correction). 03.04
    05. Review vehicle service history. 03.05
    06. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. 03.06
    07. Conduct an appropriate pre-service evaluation and report or note any concerns not already on the repair order. 03.07
    08. Determine the presence of a Tire Pressure Monitoring System (TPMS). 03.08
    09. Determine the presence of wheel locks. 03.09
    10. Determine the presence of an air suspension system or hydraulic system. 03.10
    11. Check operation and status of instrument panel warning lights and gauges. 03.11
    12. Locate and use Vehicle identification Number (VIN) vehicle information placards, decals, tags, as required. 03.12
    13. Demonstrate proficiency in manufacturer electronic service information system, including flat rate manuals, technical service bulletins and replacement part identification; where applicable. 03.13
    14. Use proper chemicals for cleaning and lubrication. 03.14

15. Reset maintenance indicators as applicable. 03.15
16. Ensure vehicle is prepared to return to customer per school/company policy (floor mats, steering wheel cover, etc.). 03.16
17. Inspect under-hood area for leaks, damage, and unusual conditions. 03.17
18. Determine fluid type requirements and identify fluid. 03.18
19. Check engine oil level and condition; service as required. 03.19
20. Check engine coolant level and condition; service as required. 03.20
21. Check power steering fluid level and condition; service as required. 03.21
22. Check brake fluid level and condition; service as required. 03.22
23. Check hydraulic clutch fluid and condition; service as required. 03.23
24. Check windshield washer fluid level and condition; service as required. 03.24
25. Check automatic transmission fluid level and condition; service as required. 03.25
26. Inspect undercar area for leaks, damage, and unusual conditions. 03.26
27. Check differential/transfer c fluid level; note unusual conditions; service as required. 03.27
28. Check manual transmission fluid level; note unusual conditions; service as required. 03.28
29. Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear. 03.29
30. Lubricate driveline, suspension and steering systems as applicable. 03.30
31. Inspect cooling system pipes and hoses for wear, damage, and proper routing. 03.31
32. Inspect and replace inline fuel filters as applicable. 03.32
33. Inspect and replace air filter. 03.33
34. Inspect and replace cabin air filter. 03.34
35. Inspect, replace and adjust drive belts; inspect tensioners and pulleys. 03.35
36. Document observed damage, unusual conditions, and concerns. 03.36
37. Inspect struts, springs, and related components; service as required. 03.37
38. Inspect stabilizer bar, bushings, brackets, and links; service as required. 03.38
39. Inspect springs, torsion bars, and related components; service as required. 03.39
40. Inspect shock absorbers and related components. 03.40
41. Inspect constant velocity (CV) axle shaft boots; service as required. 03.41
42. Identify service considerations when equipped with a Tire Pressure Monitoring System (TPMS). 03.42
43. Identify nitrogen-filled tires. 03.43

44. Inspect tires, diagnose tire wear patterns, inspect spare and mounting system; check and adjust tire pressure; where applicable. 03.44
45. Rotate tires according to manufacturer's recommendations. 03.45
46. Balance wheel and tire assembly (static, dynamic and road force balance); where applicable. 03.46
47. Dismount, inspect, and remount tire on wheel. 03.47
48. Repair tire according to industry standards. 03.48
49. Reinstall wheel; torque wheel fasteners to specification. 03.49
50. Check wheel bearings for play and other signs of wear. 03.50
51. Perform a visual inspection of a brake drum system. 03.51
52. Perform a visual inspection of a disc brake system. 03.52
53. Check parking brake operation; check parking brake components for unusual conditions. 03.53
54. Check wiper blades, inserts, and arms; replace wiper blades or inserts. 03.54
55. Lubricate door latches and hinges. 03.55
56. Inspect fuel tank, fuel cap and seal; inspect and replace fuel lines, fittings, and hoses; as applicable. 03.56
57. Identify the type of battery and perform slow or fast battery charge. 03.57
58. Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or replace as needed. 03.58
59. Perform battery, starting, and charging system tests using appropriate tester. 03.59
60. Start a vehicle using jumper cables or a battery auxiliary power supply (jump box). 03.60
61. Maintain or restore electronic memory functions if required. 03.61
62. Inspect and replace exterior and courtesy lamps. 03.62

0. Explain and apply proficiently the diagnosis, service and repair of engines, cylinder heads, valve train, lubrication and cooling systems.--The student will be able to: 04.0
   01. Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins. 04.01
   02. Verify operation of the instrument panel engine warning indicators. 04.02
   03. Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action. 04.03
   04. Install engine covers using gaskets, seals and sealers as required. 04.04
   05. Verify engine mechanical timing. 04.05
   06. Perform common fastener and thread repair, to include: remove broken bolt, restore internal and external threads, and repair internal threads with thread insert. 04.06

07. Identify service precautions related to service of the internal combustion engine of a hybrid vehicle. 04.07

08. Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable. 04.08

09. Adjust valves (mechanical or hydraulic lifters). 04.09

10. Identify components of the cylinder head and valve train. 04.10

11. Perform cooling system pressure and dye tests to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant recovery tank, heater core, and galley plugs; determine necessary action. 04.11

12. Inspect, replace, and/or adjust drive belts, tensioners, and pulleys; check pulley and belt alignment. 04.12

13. Remove, inspect, and replace thermostat and gasket/seal. 04.13

14. Inspect and test coolant; drain and recover coolant; flush and refill cooling system; use proper fluid type per manufacturer specification; bleed air as required. 04.14

15. Perform engine oil and filter change; use proper fluid type per manufacturer specification; reset maintenance reminder as require. 04.15

16. Identify components of the lubrication and cooling systems. 04.16

Maintenance and Light Repair Technician 2 – Course Number: AER0026

0. Explain and apply proficiently the diagnosis, service and repair of electrical/electronic system components, battery, starting, charging, lighting, security, infotainment, and accessory systems.--The student will be able to: 05.0
    01. Research vehicle service information including vehicle service history, service precautions, and technical service bulletins. 05.01
    02. Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law). 05.02
    03. Use wiring diagrams to trace electrical/electronic circuits. 05.03
    04. Demonstrate proper use of a digital multi-meter (DMM) when measuring source voltage, voltage drop (including grounds), current flow, and resistance. 05.04
    05. Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits. 05.05
    06. Use a test light to check operation of electrical circuits. 05.06
    07. Use fused jumper wires to check operation of electrical circuits. 05.07
    08. Measure key-off battery drain (parasitic draw). 05.08
    09. Inspect and test fusible links, circuit breakers, and fuses; determine necessary action. 05.09
    10. Repair and/or replace connectors, terminal ends, and wiring of electrical/electronic systems (including solder repair) 05.10
    11. Identify electrical/electronic system components and configuration. 05.11
    12. Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable. 05.12
    13. Perform battery state-of-charge test; determine necessary action. 05.13
    14. Confirm size, type and proper battery capacity for vehicle application; perform battery capacity and load test; determine necessary action. 05.14
    15. Maintain or restore electronic memory functions. 05.15
    16. Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold-downs. 05.16
    17. Perform slow/fast battery charge according to manufacturer's recommendations. 05.17
    18. Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply. 05.18
    19. Identify safety precautions for high voltage systems on electric, hybrid-electric, and diesel vehicles. 05.19
    20. Identify electrical/electronic modules, security systems, radios, and other accessories that require re-initialization or code entry after reconnecting vehicle battery. 05.20

21. Identify hybrid vehicle auxiliary (12v) battery service, repair and test procedures. 05.21
22. Perform starter current draw tests; determine necessary action. 05.22
23. Perform starter circuit voltage drop tests; determine necessary action. 05.23
24. Inspect and test starter relays and solenoids; determine necessary action. 05.24
25. Remove and install starter in a vehicle. 05.25
26. Inspect and test switches, connectors, and wires of starter control circuits; determine necessary action. 05.26
27. Demonstrate knowledge of an automatic idle-stop/start-stop system. 05.27
28. Confirm proper manufacture battery capacity for vehicle application; perform charging system output test; determine necessary action. 05.28
29. Inspect, adjust, and/or replace generator (alternator) drive belts, check pulleys, and tensioners for wear; check pulley and belt alignment. 05.29
30. Remove, inspect, and/or replace generator (alternator). 05.30
31. Perform charging circuit voltage drop test; determine necessary action. 05.31
32. Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving lights); replace as needed. 05.32
33. Aim headlights. 05.33
34. Identify system voltage and safety precautions associated with high-intensity discharge headlights. 05.34
35. Disable and enable supplemental restraint system (SRS); verify indicator lamp operation. 05.35
36. Remove and reinstall door panel. 05.36
37. Describe the operation of keyless entry/remote-start systems. 05.37
38. Verify operation of instrument panel gauges and warning /indicator lights; reset maintenance indicators. 05.38
39. Verify windshield wiper and washer operation, replace wiper blades. 05.39
40. Describe the operation of Infotainment systems ie; audio video and recording operations. 05.40
41. Describe the various security systems both on-car and remote operational type systems. 05.41

Maintenance and Light Repair Technician 3 – Course Number: AER0027

0. Explain and apply proficiently the diagnosis, service and repair of front and rear suspensions systems, wheel alignment, and wheels and tires.--The student will be able to: 06.0
    01. Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins. 06.01
    02. Disable and enable supplemental restraint system (SRS); verify indicator lamp operation. 06.02
    03. Identify suspension and steering system components and configurations. 06.03
    04. Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable. 06.04
    05. Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellows boots. 06.05
    06. Inspect power steering fluid level and condition. 06.06
    07. Flush, fill, and bleed power steering system; use proper fluid type per manufacturer specification. 06.07
    08. Inspect for power steering fluid leakage. 06.08
    09. Remove, inspect, replace, and/or adjust power steering pump drive belt. 06.09
    10. Inspect and replace power steering hoses and fittings. 06.10
    11. Inspect pitman arm, relay (center-link/intermediate) rod, idler arm, mountings, and steering linkage damper. 06.11
    12. Inspect tie rod ends (sockets), tie rod sleeves, and clamps. 06.12
    13. Inspect upper and lower control arms, bushings, and shafts. 06.13
    14. Inspect and replace rebound bumpers. 06.14
    15. Inspect track bar, strut rods/radius arms and related mounts and bushings. 06.15
    16. Inspect upper and lower ball joints (with or without wear indicators). 06.16
    17. Inspect suspension system coil springs and spring insulators (silencers). 06.17
    18. Inspect suspension system torsion bars and mounts. 06.18
    19. Inspect and/or replace front stabilizer bar (sway bar) bushings, brackets, and links. 06.19
    20. Inspect, remove, and/or replace strut cartridge or assembly; inspect mounts and bushings. 06.20
    21. Inspect front strut bearing and mount. 06.21
    22. Inspect rear suspension system lateral links/arms (track bars), control (trailing) arms. 06.22
    23. Inspect rear suspension system leaf spring(s), spring insulators (silencers), shackles, brackets, bushings, center pins/bolts and mounts. 06.23

24. Inspect, remove, and/or replace shock absorbers; inspect mounts and bushings. 06.24
25. Inspect electric power steering assist system. 06.25
26. Identify hybrid vehicle power steering system electrical circuits and safety precautions. 06.26
27. Describe the function of suspension and steering control systems and components, (i.e. active suspension, and stability control). 06.27
28. Inspect steering shaft universal-joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel; perform necessary action. 06.28
29. Perform pre-alignment inspection; measure vehicle ride height. 06.29
30. Describe alignment angles (camber, caster and toe) 06.30
31. Identify alignment related symptoms such as wander, drift and pull. 06.31
32. Measure front and rear wheel camber; adjust as needed. 06.32
33. Measure caster; adjust as needed. 06.33
34. Measure front wheel toe; adjust as needed. 06.34
35. Center the steering wheel using mechanical methods. 06.35
36. Measure rear wheel toe, adjust as needed. 06.36
37. Measure thrust angle. 06.37
38. Calibrate steering angle sensor. 06.38
39. Inspect tire condition; identify tire wear patterns; check for correct tire size, application (load and speed ratings), and air pressure as listed on the tire information placard/label. 06.39
40. Rotate tires according to manufacturer's recommendations including vehicles equipped with tire pressure monitoring systems (TPMS). 06.40
41. Dismount, inspect, and remount tire on wheel; balance wheel and tire assembly. 06.41
42. Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor. 06.42
43. Inspect tire and wheel assembly for air loss; determine necessary action. 06.43
44. Repair tire following vehicle manufacturer approved procedure. 06.44
45. Identify indirect and direct tire pressure monitoring systems (TPMS); calibrate system; verify operation of instrument panel lamps. 06.45
46. Demonstrate knowledge of steps required to remove and replace sensors in a tire pressure monitoring system (TPMS) including relearn procedure. 06.46

0. Explain and apply proficiently the diagnosis, service and repair of drum/disc brake, hydraulics, power assist units, electronic brakes, and miscellaneous (wheel bearings, parking brake, electrical, etc.) systems.--The student will be able to: 07.0
   01. Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins. 07.01

02. Describe procedure for performing a road test to check brake system operation, including an anti-lock brake system (ABS). 07.02
03. Install wheel and torque lug nuts. 07.03
04. Identify brake system components and configuration. 07.04
05. Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable. 07.05
06. Describe proper brake pedal height, travel, and feel. 07.06
07. Check master cylinder for external leaks and proper operation. 07.07
08. Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear, and loose fittings/supports. 07.08
09. Select, handle, store, and fill brake fluids to proper level; use proper fluid type per manufacturer specification. 07.09
10. Identify components of hydraulic brake warning light system. 07.10
11. Bleed and/or flush brake system. 07.11
12. Test brake fluid for contamination. 07.12
13. Diagnose pressure concerns in the brake system using hydraulic principles (Pascal's Law). 07.13
14. Remove, clean, and inspect brake drum; measure brake drum diameter; determine serviceability. 07.14
15. Refinish brake drum and measure final drum diameter; compare with specification. 07.15
16. Remove, clean, inspect, and/or replace brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble. 07.16
17. Inspect wheel cylinders for leaks and proper operation; remove and replace as needed. 07.17
18. Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; make final checks and adjustments. 07.18
19. Remove and clean caliper assembly; inspect for leaks and damage/wear; determine necessary action. 07.19
20. Inspect caliper mounting and slides/pins for proper operation, wear, and damage; determine necessary action. 07.20
21. Remove, inspect, and/or replace brake pads and retaining hardware; determine necessary action. 07.21
22. Lubricate and reinstall caliper, brake pads, and related hardware; seat brake pads and inspect for leaks. 07.22
23. Clean and inspect rotor and mounting surface, measure rotor thickness, thickness variation, and lateral runout; determine necessary action. 07.23
24. Remove and reinstall/replace rotor. 07.24

25. Refinish rotor on vehicle; measure final rotor thickness and compare with specification. 07.25
26. Refinish rotor off vehicle; measure final rotor thickness and compare with specification. 07.26
27. Retract and re-adjust caliper piston on an integral parking brake system. 07.27
28. Check brake pad wear indicator; determine necessary action. 07.28
29. Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendation. 07.29
30. Check brake pedal travel with, and without, engine running to verify proper power booster operation. 07.30
31. Identify components of the brake power assist system (vacuum and hydraulic); check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster. 07.31
32. Remove, clean, inspect, repack, and install wheel bearings; replace seals; install hub and adjust bearings. 07.32
33. Check parking brake system components for wear, binding, and corrosion; clean, lubricate, adjust and/or replace as needed. 07.33
34. Check parking brake operation, both mechanical and electronic type systems and parking brake indicator light system operation; determine necessary action. 07.34
35. Check operation of brake stop light system. 07.35
36. Replace wheel bearing and race. 07.36
37. Inspect and replace wheel studs. 07.37
38. Identify traction control/vehicle stability control system components. 07.38
39. Describe the operation of a regenerative braking system. 07.39

Maintenance and Light Repair Technician 4 – Course Number: AER0028

0. Explain and apply proficiently the diagnosis, service and repair of heating and air conditioning, refrigeration, heating, ventilation, and engine cooling, operating and related control systems.--The student will be able to: 08.0
    01. Research vehicle service information, including refrigerant/oil type, vehicle service history, service precautions, and technical service bulletins. 08.01
    02. Identify heating, ventilation and air conditioning (HVAC) components and configuration. 08.02
    03. Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable. 08.03
    04. Inspect and replace A/C compressor drive belts, pulleys, and tensioners; visually inspect A/C components for signs of leaks; determine necessary action. 08.04
    05. Identify hybrid vehicle A/C system electrical circuits and service/safety precautions. 08.05
    06. Inspect A/C condenser for airflow restrictions; determine necessary action. 08.06
    07. Inspect engine cooling and heater system hoses and pipes; determine necessary action. 08.07
    08. Inspect A/C-heater ducts, doors, hoses, cabin filters and outlets; determine necessary action. 08.08
    09. Identify the source of A/C system odors. 08.09
0. Explain and apply proficiently the diagnosis, service and repair of engine computerized controls, fuel, air induction, exhaust, and emission control systems.--The student will be able to: 09.0
    01. Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins. 09.01
    02. Perform engine absolute manifold pressure tests (vacuum/boost); document results. 09.02
    03. Perform cylinder power balance test; document results. 09.03
    04. Perform cylinder cranking and running compression tests; document results. 09.04
    05. Perform cylinder leakage test; document results. 09.05
    06. Verify engine operating temperature. 09.06
    07. Remove and replace spark plugs; inspect secondary ignition components for wear and damage. 09.07
    08. Retrieve and record diagnostic trouble codes (DTC), OBD monitor status, and freeze frame data; clear codes when applicable. 09.08
    09. Describe the use of the OBD monitors for repair verification. 09.09
    10. Replace fuel filter(s) where applicable. 09.10

11. Inspect, service or replace air filters, filter housings, and intake duct work. 09.11
12. Inspect integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields; determine necessary action. 09.12
13. Inspect condition of exhaust system hangers, brackets, clamps, and heat shields; determine necessary action. 09.13
14. Check and refill diesel exhaust fluid (DEF). 09.14
15. Inspect, test, and service positive crankc ventilation (PCV) filter/breather, valve, tubes, orifices, and hoses; perform necessary action. 09.15

0. Explain and apply proficiently the diagnosis, service, repair and overhaul of in-vehicle and off-vehicle automatic transmissions/transaxles.--The student will be able to: 10.0
    01. Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins. 10.01
    02. Check fluid level in a transmission or a transaxle equipped with a dipstick. 10.02
    03. Check fluid level in a transmission or a transaxle not equipped with a dipstick. 10.03
    04. Check transmission fluid condition; check for leaks. 10.04
    05. Identify drive train components and configuration. 10.05
    06. Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable. 10.06
    07. Inspect, adjust, and/or replace external manual valve shift linkage, transmission range sensor/switch, and/or park/neutral position switch. 10.07
    08. Inspect for leakage at external seals, gaskets, and bushings. 10.08
    09. Inspect, replace, and/or align power train mounts. 10.09
    10. Drain and replace fluid and filter(s); use proper fluid type per manufacturer specification. 10.10
    11. Describe the operational characteristics of a continuously variable transmission (CVT). 10.11
    12. Describe the operational characteristics of a hybrid vehicle drive train. 10.12
0. Explain and apply proficiently the diagnosis, service and repair of manual drivetrain, clutches, transmissions/transaxles, drive and half-shafts, universal and constant velocity joints, differential c assemblies, drive axles, four-wheel and all-wheel drive systems.--The student will be able to: 11.0
    01. Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins. 11.01
    02. Drain and refill manual transmission/transaxle and final drive unit; use proper fluid type per manufacturer specification. 11.02

03. Check fluid condition; check for leaks. `11.03`
04. Identify manual drive train and axle components and configuration. `11.04`
05. Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable. `11.05`
06. Check and adjust clutch master cylinder fluid level; use proper fluid type per manufacturer specification `11.06`
07. Check for hydraulic system leaks. `11.07`
08. Describe the operational characteristics of an electronically controlled manual transmission/transaxle. `11.08`
09. Inspect, remove, and/or replace bearings, hubs, and seals. `11.09`
10. Inspect, service, and/or replace shafts, yokes, boots, and universal/CV joints. `11.10`
11. Inspect locking hubs. `11.11`
12. Check for leaks at drive assembly and transfer c seals; check vents; check fluid level; use proper fluid type per manufacturer specification. `11.12`
13. Clean and inspect differential c; check for leaks; inspect housing vent. `11.13`
14. Check and adjust differential c fluid level; use proper fluid type per manufacturer specification. `11.14`
15. Drain and refill differential housing. `11.15`
16. Inspect and replace drive axle wheel studs. `11.16`

Automotive Service Technology (I470608)

Automotive Services Assistor – Course Number: AER0014

0. Proficiently explain and apply required shop and personal safety tasks relating to the automotive industry.--The student will be able to: AST.01.0
    01. Identify and apply general shop safety rules and procedures, EPA and OSHA standards. AST.01.01
    02. Demonstrate knowledge of appropriate automotive industry certifications. AST.01.02
    03. Identify and define career opportunities in the automotive service industry. AST.01.03
    04. Research, identify, and interpret the Federal Law as recorded in (29 CFR-1910.1200). AST.01.04
    05. Identify appropriate emergency first aid procedures. AST.01.05
    06. Utilize and demonstrate safe procedures for handling of tools and equipment. AST.01.06
    07. Identify and use proper placement of floor jacks and jack stands. AST.01.07
    08. Identify and use proper procedures for safe lift operation. AST.01.08
    09. Utilize proper ventilation procedures for working within the lab/shop area. AST.01.09
    10. Identify proper procedures for safe pit usage. AST.01.10
    11. Identify marked safety areas. AST.01.11
    12. Identify the location and the types of fire extinguishers and other fire safety equipment. AST.01.12
    13. Demonstrate knowledge of the procedures for using fire extinguishers and other safety equipment. AST.01.13
    14. Identify the location and use of eye wash stations. AST.01.14
    15. Identify the location of the posted evacuation routes. AST.01.15
    16. Comply with the required use of personal protection equipment (PPE) to include safety glasses, ear protection, gloves, shoes, and other devices as required during lab/shop activities. AST.01.16
    17. Identify and wear appropriate clothing for lab/shop activities. AST.01.17
    18. Secure hair and jewelry for lab/shop activities. AST.01.18
    19. Use proper handling procedures for automotive fluids. AST.01.19
    20. Identify and describe typical automotive lubricants and lubricant properties. AST.01.20
    21. Identify and describe typical automotive seals and gaskets. AST.01.21
    22. Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits. AST.01.22

23. Disable supplemental restraint systems (SRS) in accordance with manufacturers' procedures. AST.01.23
24. Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.) AST.01.24
25. Locate and demonstrate knowledge of Safety Data Sheets (SDS). AST.01.25

0. Explain and apply required tasks associated with the proper use and handling of tools and equipment relating to the automotive industry.--The student will be able to: AST.02.0
    01. Identify tools and equipment and their appropriate usage in automotive applications. AST.02.01
    02. Identify and use standard and metric measurement skills and designation. AST.02.02
    03. Demonstrate proper cleaning, storage, and maintenance of tools and equipment. AST.02.03
    04. Demonstrate proper use of precision-measuring tools (i.e. micrometer, digital/dial-indicator, digital/dial caliper) and torque methods. AST.02.04
0. Demonstrate proficiency in preparing vehicle for routine pre/post maintenance and customer services.--The student will be able to: AST.03.0
    01. Identify information needed and the service requested on a repair order. AST.03.01
    02. Identify automobiles according to engine location, cylinders, type of drive system, purpose, etc. AST.03.02
    03. Identify purpose and demonstrate proper use of fender covers, floor mats and other vehicle protection equipment. AST.03.03
    04. Demonstrate use of the three C's (Concern, Cause, and Correction). AST.03.04
    05. Review vehicle service history. AST.03.05
    06. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. AST.03.06
    07. Conduct an appropriate pre-service evaluation and report or note any concerns not already on the repair order. AST.03.07
    08. Determine the presence of a Tire Pressure Monitoring System (TPMS). AST.03.08
    09. Determine the presence of wheel locks. AST.03.09
    10. Determine the presence of an air suspension system. AST.03.10
    11. Check operation and status of instrument panel warning lights and gauges. AST.03.11
    12. Locate and use Vehicle Identification Number (VIN) vehicle information placards, decals, tags, as required. AST.03.12

13. Demonstrate proficiency in manufacturer electronic service information system, including flat rate manuals, technical service bulletins and replacement part identification; where applicable. AST.03.13
14. Use proper chemicals for cleaning and lubrication. AST.03.14
15. Reset maintenance indicators; as applicable. AST.03.15
16. Ensure vehicle is prepared to return to customer per school/company policy (floor mats, steering wheel cover, etc.). AST.03.16
17. Inspect under-hood area for leaks, damage, and unusual conditions. AST.03.17
18. Determine fluid type requirements and identify fluid. AST.03.18
19. Check engine oil level and condition; service as required. AST.03.19
20. Check engine coolant level and condition; service as required. AST.03.20
21. Check power steering fluid level and condition; service as required. AST.03.21
22. Check brake fluid level and condition; service as required. AST.03.22
23. Check hydraulic clutch fluid and condition; service as required. AST.03.23
24. Check windshield washer fluid level and condition; service as required. AST.03.24
25. Check automatic transmission fluid level and condition; service as required. AST.03.25
26. Inspect undercar area for leaks, damage, and unusual conditions. AST.03.26
27. Check differential/transfer c fluid level; note unusual conditions; service as required. AST.03.27
28. Check manual transmission fluid level; note unusual conditions; service as required. AST.03.28
29. Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear. AST.03.29
30. Lubricate driveline, suspension and steering systems; as applicable. AST.03.30
31. Inspect cooling system pipes and hoses for wear, damage, and proper routing. AST.03.31
32. Change engine oil and filter. AST.03.32
33. Inspect and replace fuel filters; as applicable. AST.03.33
34. Inspect and replace air filter. AST.03.34
35. Inspect and replace cabin air filter. AST.03.35
36. Inspect, replace and adjust drive belts; inspect tensioners and pulleys. AST.03.36
37. Document observed damage, unusual conditions, and concerns. AST.03.37
38. Inspect struts, springs, and related components; service as required. AST.03.38
39. Inspect stabilizer bar(s), bushings, brackets, and links; service as required. AST.03.39

40. Inspect springs, torsion bars, and related components; service as required. AST.03.40
41. Inspect shock absorbers and related components. AST.03.41
42. Inspect constant velocity (CV) axle shaft boots; service as required. AST.03.42
43. Identify service considerations when equipped with a Tire Pressure Monitoring System (TPMS). AST.03.43
44. Identify nitrogen-filled tires. AST.03.44
45. Inspect tires, diagnose tire wear patterns, inspect spare and mounting system; check and adjust tire pressure; where applicable. AST.03.45
46. Rotate tires according to manufacturer's recommendations. AST.03.46
47. Balance wheel and tire assembly (static, dynamic and road force balance); where applicable. AST.03.47
48. Dismount, inspect, and remount tire on wheel. AST.03.48
49. Repair tire according to industry standards. AST.03.49
50. Reinstall wheel; torque wheel fasteners to specification. AST.03.50
51. Check wheel bearings for play and other signs of wear. AST.03.51
52. Perform a visual inspection of a brake drum system. AST.03.52
53. Perform a visual inspection of a disc brake system. AST.03.53
54. Check parking brake operation (manual/electric); check parking brake components for unusual conditions. AST.03.54
55. Check wiper blades, inserts, and arms; replace wiper blades or inserts. AST.03.55
56. Lubricate door latches and hinges. AST.03.56
57. Inspect fuel tank, fuel cap and seal; inspect and replace fuel lines, fittings, and hoses; as applicable. AST.03.57
58. Perform slow/fast battery charge. AST.03.58
59. Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or replace as needed. AST.03.59
60. Perform battery, starting, and charging system tests using appropriate tester. AST.03.60
61. Start a vehicle using jumper cables or a battery auxiliary power supply (jump box). AST.03.61
62. Maintain or restore electronic memory functions if required. AST.03.62
63. Inspect and test fusible links, circuit breakers, and fuses; confirm proper circuit operation; replace as needed. AST.03.63
64. Inspect and replace exterior and courtesy lamps. AST.03.64

Engine Repair Technician – Course Number: AER0110

0. Explain and apply proficiently the diagnosis, service and repair of engines, cylinder heads, valve train, engine block, lubrication and cooling systems.--The student will be able to: AST.04.0

    01. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. AST.04.01

    02. Research vehicle service information including fluid type, internal engine operation, vehicle service history, service precautions, and technical service bulletins. AST.04.02

    03. Verify operation of the instrument panel engine warning indicators. AST.04.03

    04. Inspect engine assembly for fuel, oil, coolant, and other leaks; determine needed action. AST.04.04

    05. Install engine covers using gaskets, seals, and sealers as required. AST.04.05

    06. Verify engine mechanical timing. AST.04.06

    07. Perform common fastener and thread repair, to include: remove broken bolt, restore internal and external threads, and repair internal threads with thread insert. AST.04.07

    08. Inspect, remove and/or replace engine mounts. AST.04.08

    09. Identify service precautions related to service of the internal combustion engine of a hybrid vehicle. AST.04.09

    10. Remove and reinstall engine on a newer vehicle equipped with OBD; reconnect all attaching components and restore the vehicle to running condition. AST.04.10

    11. Identify and interpret engine concern; determine necessary action. AST.04.11

    12. Locate and interpret vehicle and major component identification numbers. AST.04.12

    13. Diagnose engine noises and vibrations; determine necessary action. AST.04.13

    14. Diagnose the cause of excessive oil consumption, coolant consumption, unusual engine exhaust color and odor; determine necessary action. AST.04.14

    15. Perform engine vacuum tests; determine necessary action. AST.04.15

    16. Perform cylinder power balance tests; determine necessary action. AST.04.16

    17. Perform cylinder cranking and running compression tests; determine necessary action. AST.04.17

    18. Perform cylinder leakage tests; determine necessary action. AST.04.18

    19. Remove cylinder head; inspect gasket condition; install cylinder head and gasket; tighten according to manufacturer's specification and procedure. AST.04.19

    20. Clean and visually inspect a cylinder head for cracks; check gasket surface areas for warpage and surface finish; check passage condition. AST.04.20

21. Inspect pushrods, rocker arms, rocker arm pivots and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices); determine needed action. AST.04.21
22. Adjust valves (mechanical or hydraulic lifters). AST.04.22
23. Inspect and replace camshaft and drive belt/chain; includes checking drive gear wear and backlash, end play, sprocket and chain wear, overhead cam drive sprocket(s), drive belt(s), belt tension, tensioners, camshaft reluctor ring/tone-wheel, and valve timing components; verify correct camshaft timing. AST.04.23
24. Establish camshaft position sensor indexing. AST.04.24
25. Inspect valve springs for squareness and free height comparison; determine needed action. AST.04.25
26. Replace valve stem seals on an assembled engine; inspect valve spring retainers, locks/keepers, and valve lock/keeper grooves; determine needed action. AST.04.26
27. Inspect valve guides for wear; check valve stem-to-guide clearance; determine needed action. AST.04.27
28. Inspect valves and valve seats; determine needed action. AST.04.28
29. Check valve spring assembled height and valve stem height; determine needed action. AST.04.29
30. Inspect valve lifters; determine needed action. AST.04.30
31. Inspect and/or measure camshaft for runout, journal wear and lobe wear. AST.04.31
32. Inspect camshaft bearing surface for wear, damage, out-of-round, and alignment; determine needed action. AST.04.32
33. Remove, inspect, and/or replace crankshaft vibration damper (harmonic balancer). AST.04.33
34. Disassemble engine block; clean and prepare components for inspection and reassembly. AST.04.34
35. Inspect engine block for visible cracks, passage condition, core and gallery plug condition, and surface warpage; determine needed action. AST.04.35
36. Inspect and measure cylinder walls/sleeves for damage, wear, and ridges; determine needed action. AST.04.36
37. Deglaze and clean cylinder walls. AST.04.37
38. Inspect and measure camshaft bearings for wear, damage, out-of-round, and alignment; determine needed action. AST.04.38
39. Inspect crankshaft for straightness, journal damage, keyway damage, thrust flange and sealing surface condition, and visual surface cracks; check oil passage condition; measure end play and journal wear; check crankshaft position sensor reluctor ring (where applicable); determine needed action. AST.04.39

40. Inspect main and connecting rod bearings for damage and wear; determine needed action. AST.04.40
41. Identify piston and bearing wear patterns that indicate connecting rod alignment and main bearing bore problems; determine needed action. AST.04.41
42. Inspect and measure piston skirts and ring lands; determine needed action. AST.04.42
43. Determine piston-to-bore clearance. AST.04.43
44. Inspect, measure, and install piston rings. AST.04.44
45. Inspect auxiliary shaft(s) (balance, intermediate, idler, counterbalance and/or silencer); inspect shaft(s) and support bearings for damage and wear; determine needed action; reinstall and time. AST.04.45
46. Remove and replace piston pin; where applicable. AST.04.46
47. Assemble engine block. AST.04.47
48. Perform cooling system pressure and dye tests to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant recovery tank, heater core, and galley plugs; determine needed action. AST.04.48
49. Identify causes of engine overheating. AST.04.49
50. Inspect, replace, and/or adjust drive belts, tensioners, and pulleys; check pulley and belt alignment. AST.04.50
51. Inspect and/or test coolant; drain and recover coolant; flush and refill cooling system; use proper fluid type per manufacturer specification; bleed air as required. AST.04.51
52. Inspect, remove, and replace water pump. AST.04.52
53. Remove and replace radiator. AST.04.53
54. Remove, inspect, and replace thermostat and gasket/seal. AST.04.54
55. Inspect and test fan(s), fan clutch (electrical or mechanical), fan shroud, and air dams; determine needed action. AST.04.55
56. Perform oil pressure tests; determine needed action. AST.04.56
57. Perform engine oil and filter change; use proper fluid type per manufacturer specification. AST.04.57
58. Inspect auxiliary coolers; determine needed action. AST.04.58
59. Inspect, test, and replace oil temperature and pressure switches and sensors. AST.04.59
60. Inspect oil pump gears or rotors, housing, pressure relief devices, and pump drive; perform needed action. AST.04.60
61. Inspect and replace engine cooling and heater system hoses. AST.04.61

Automatic Transmission and Transaxle Technician – Course Number: AER0257

0. Explain and apply proficiently the diagnosis, service, repair and overhaul of automatic transmissions/transaxles.--The student will be able to: AST.05.0

    01. Identify and interpret transmission/transaxle concerns, differentiate between engine performance and transmission/transaxle concerns; determine needed action. AST.05.01

    02. Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins. AST.05.02

    03. Diagnose fluid loss and condition concerns; determine needed action. AST.05.03

    04. Check fluid level in a transmission or a transaxle equipped with a dip-stick. AST.05.04

    05. Check fluid level in a transmission or a transaxle not equipped with a dip-stick. AST.05.05

    06. Perform pressure tests (including transmissions/transaxles equipped with electronic pressure control); determine needed action. AST.05.06

    07. Diagnose noise and vibration concerns; determine needed action. AST.05.07

    08. Perform stall test; determine needed action. AST.05.08

    09. Perform lock-up converter system tests; determine needed action. AST.05.09

    10. Diagnose transmission/transaxle gear reduction/multiplication concerns using driving, driven, and held member (power flow) principles. AST.05.10

    11. Diagnose electronic transmission/transaxle control systems using appropriate test equipment and service information. AST.05.11

    12. Diagnose pressure concerns in a transmission using hydraulic principles (Pascal's Law). AST.05.12

    13. Inspect, adjust, and/or replace external manual valve shift linkage, transmission range sensor/switch, and/or park/neutral position switch. AST.05.13

    14. Inspect for leakage; replace external seals, gaskets, and bushings. AST.05.14

    15. Inspect, test, adjust, repair, and/or replace electrical/electronic components and circuits including computers, solenoids, sensors, relays, terminals, connectors, switches, and harnesses; demonstrate understanding of the relearn procedure. AST.05.15

    16. Drain and replace fluid and filter(s); use proper fluid type per manufacturer specification. AST.05.16

    17. Inspect, replace and align powertrain mounts. AST.05.17

    18. Diagnose electronic transmission control systems using a scan tool; determine necessary action. AST.05.18

    19. Remove and reinstall transmission/transaxle and torque converter; inspect engine core plugs, rear crankshaft seal, dowel pins, dowel pin holes, and mounting surfaces. AST.05.19

20. Inspect, leak test, flush, and/or replace transmission/transaxle oil cooler, lines, and fittings. AST.05.20
21. Inspect converter flex (drive) plate, converter attaching bolts, converter pilot, converter pump drive surfaces, converter end play, and crankshaft pilot bore. AST.05.21
22. Describe the operational characteristics of a continuously variable transmission (CVT). AST.05.22
23. Describe the operational characteristics of a hybrid vehicle drive train. AST.05.23
24. Disassemble, clean, and inspect transmission/transaxle. AST.05.24
25. Inspect, measure, clean, and replace valve body (includes surfaces, bores, springs, valves, switches, solenoids, sleeves, retainers, brackets, check valves/balls, screens, spacers, and gaskets). AST.05.25
26. Inspect servo and accumulator bores, pistons, seals, pins, springs, and retainers; determine needed action. AST.05.26
27. Assemble transmission/transaxle. AST.05.27
28. Inspect, measure, and reseal oil pump assembly and components. AST.05.28
29. Measure transmission/transaxle end play and/or preload; determine needed action. AST.05.29
30. Inspect, measure, and/or replace thrust washers and bearings. AST.05.30
31. Inspect oil delivery circuits, including seal rings, ring grooves, and sealing surface areas, feed pipes, orifices, and check valves/balls. AST.05.31
32. Inspect bushings; determine needed action. AST.05.32
33. Inspect and measure planetary gear assembly components; determine needed action. AST.05.33
34. Inspect c bores, passages, bushings, vents, and mating surfaces; determine needed action. AST.05.34
35. Diagnose and inspect transaxle drive, link chains, sprockets, gears, bearings, and bushings; perform needed action. AST.05.35
36. Inspect measure, repair, adjust or replace transaxle final drive components. AST.05.36
37. Inspect clutch drum, piston, check-balls, springs, retainers, seals, friction plates, pressure plates, and bands; determine needed action. AST.05.37
38. Measure clutch pack clearance; determine needed action. AST.05.38
39. Air test operation of clutch and servo assemblies. AST.05.39
40. Inspect one-way clutches, races, rollers, sprags, springs, cages, retainers; determine needed action. AST.05.40
41. Install and seat torque converter to engage drive/splines. AST.05.41
42. Inspect bands and drums; determine necessary action. AST.05.42

Manual Drivetrain and Axle Technician – Course Number: AER0274

0. Explain and apply proficiently the operation, assembly, diagnosis, service and repair of manual drivetrains, clutches, transmissions/transaxles, drive and half-shaft universals, constant velocity joints, rear axle differential assembly, limited slip, four-wheel drive and all-wheel drive.--The student will be able to: AST.06.0
    01. Identify and interpret drive train concerns; determine needed action. AST.06.01
    02. Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins. AST.06.02
    03. Check fluid condition; check for leaks; determine needed action. AST.06.03
    04. Drain and refill manual transmission/transaxle and final drive unit; use proper fluid type per manufacturer specification. AST.06.04
    05. Diagnose fluid loss, level, and condition concerns; determine necessary action. AST.06.05
    06. Diagnose clutch noise, binding, slippage, pulsation, and chatter; determine needed action. AST.06.06
    07. Inspect clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; perform needed action. AST.06.07
    08. Inspect and/or replace clutch pressure plate assembly, clutch disc, rele (throw-out) bearing, linkage, and pilot bearing/bushing (as applicable). AST.06.08
    09. Bleed clutch hydraulic system. AST.06.09
    10. Check and adjust clutch master cylinder fluid level; check for leaks; use proper fluid type per manufacturer specification. AST.06.10
    11. Inspect flywheel and ring gear for wear, cracks, and discoloration; determine needed action. AST.06.11
    12. Measure flywheel runout and crankshaft end play; determine needed action. AST.06.12
    13. Describe the operation and service of a system that uses a dual mass flywheel. AST.06.13
    14. Inspect hydraulic clutch slave and master cylinders, lines, and hoses; determine necessary action. AST.06.14
    15. Describe the operation and service of an electronically controlled dual clutch system. AST.06.15
    16. Inspect engine block, core plugs, rear main engine oil seal, clutch (bell) housing, transmission/transaxle c mating surfaces, and alignment dowels; determine necessary action. AST.06.16
    17. Inspect, adjust, lubricate, and/or replace shift linkages, brackets, bushings, cables, pivots, and levers. AST.06.17
    18. Describe the operational characteristics of an electronically-controlled manual transmission/transaxle. AST.06.18

19. Diagnose noise concerns through the application of transmission/transaxle powerflow principles. AST.06.19
20. Diagnose hard shifting and jumping out of gear concerns; determine needed action. AST.06.20
21. Diagnose transaxle final drive assembly noise and vibration concerns; determine needed action. AST.06.21
22. Disassemble, inspect clean, and reassemble internal transmission/transaxle components. AST.06.22
23. Remove and reinstall manual transmission/transaxle. AST.06.23
24. Inspect transmission/transaxle c, extension housing, c mating surfaces, bores, bushings, and vents; perform necessary action. AST.06.24
25. Inspect, replace, and align powertrain mounts. AST.06.25
26. Inspect and replace gaskets, seals, and sealants; inspect sealing surfaces. AST.06.26
27. Remove and replace transaxle final drive. AST.06.27
28. Inspect, adjust, and reinstall shift cover, forks, levers, grommets, shafts, sleeves, detent mechanism, interlocks, and springs. AST.06.28
29. Measure end play or preload (shim or spacer selection procedure) on transmission/transaxle shafts; perform necessary action. AST.06.29
30. Inspect and reinstall synchronizer hub, sleeve, keys (inserts), springs, and blocking rings. AST.06.30
31. Inspect lubrication devices (oil pump or slingers); perform necessary action. AST.06.31
32. Inspect, test, and replace transmission/transaxle sensors and switches. AST.06.32
33. Diagnose constant-velocity (CV) joint noise and vibration concerns; determine needed action. AST.06.33
34. Diagnose universal joint noise and vibration concerns; perform needed action. AST.06.34
35. Inspect, remove, and/or replace bearings, hubs, and seals. AST.06.35
36. Inspect, service, and/or replace shafts, yokes, boots, and universal/CV joints. AST.06.36
37. Check shaft balance and phasing; measure shaft runout; measure and adjust driveline angles. AST.06.37
38. Inspect, service, and replace shaft center support bearings. AST.06.38
39. Clean and inspect differential c; check for leaks; inspect housing vent. AST.06.39
40. Check and adjust differential c fluid level; use proper fluid type per manufacturer specification. AST.06.40

41. Drain and refill differential c; use proper fluid type per manufacturer specifications. AST.06.41
42. Diagnose noise and vibration concerns; determine needed action. AST.06.42
43. Inspect and replace companion flange and/or pinion seal; measure companion flange runout. AST.06.43
44. Inspect ring gear and measure runout; determine needed action. AST.06.44
45. Remove, inspect, reinstall and/or drive pinion and ring gear, spacers, sleeves, and bearings. AST.06.45
46. Measure and adjust drive pinion depth. AST.06.46
47. Measure and adjust drive pinion bearing preload. AST.06.47
48. Measure and adjust side bearing preload and ring and pinion gear total backlash and backlash variation on a differential carrier assembly (threaded cup or shim types). AST.06.48
49. Check ring and pinion tooth contact patterns; perform needed action. AST.06.49
50. Disassemble, inspect, measure, adjust, and/or replace differential pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and c. AST.06.50
51. Reassemble and reinstall differential c assembly; measure runout; determine needed action. AST.06.51
52. Diagnose noise and vibration concerns; determine necessary action. AST.06.52
53. Diagnose noise, slippage, and chatter concerns; determine needed action. AST.06.53
54. Measure rotating torque; determine needed action. AST.06.54
55. Inspect and reinstall limited slip differential components. AST.06.55
56. Inspect and replace drive axle wheel studs. AST.06.56
57. Remove and replace drive axle shafts. AST.06.57
58. Inspect and replace drive axle shaft seals, bearings, and retainers. AST.06.58
59. Measure drive axle flange runout and shaft end play; determine needed action. AST.06.59
60. Diagnose drive axle shafts, bearings, and seals for noise, vibration, and fluid leakage concerns; determine needed action. AST.06.60
61. Inspect, adjust, and repair shifting controls (mechanical, electrical, and vacuum), bushings, mounts, levers, and brackets. AST.06.61
62. Inspect locking hubs; determine needed action. AST.06.62
63. Check for leaks at drive assembly and transfer c seals; check vents; check fluid level; use proper fluid type per manufacturer specification. AST.06.63
64. Identify concerns related to variations in tire circumference and/or final drive ratios. AST.06.64

65. Diagnose noise, vibration, and unusual steering concerns; determine needed action. AST.06.65
66. Diagnose, test, adjust, and/or replace electrical/electronic components of four-wheel drive/all-wheel drive systems. AST.06.66
67. Disassemble, service, and reassemble transfer c and components. AST.06.67
68. Remove and reinstall transfer c. AST.06.68

Automotive Suspension and Steering Technician – Course Number: AER0453

0. Explain and apply proficiently the diagnosis, service and repair of front and rear suspensions systems, wheel alignment, and wheels and tires.--The student will be able to: AST.07.0

    01. Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins. AST.07.01

    02. Identify and interpret suspension and steering system concerns; determine needed action. AST.07.02

    03. Disable and enable supplemental restraint system (SRS); verify indicator lamp operation. AST.07.03

    04. Remove and replace steering wheel; center/time supplemental restraint system (SRS) coil (clock spring). AST.07.04

    05. Diagnose steering column noises, looseness, and binding concerns (including tilt/telescoping mechanisms); determine needed action. AST.07.05

    06. Diagnose power steering gear (non-rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; determine needed action. AST.07.06

    07. Diagnose power steering gear (rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; determine needed action. AST.07.07

    08. Inspect steering shaft universal-joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel; determine needed action. AST.07.08

    09. Remove and replace rack and pinion steering gear; inspect mounting bushings and brackets. AST.07.09

    10. Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellows boots; replace as needed. AST.07.10

    11. Inspect power steering fluid level and condition. AST.07.11

    12. Flush, fill, and bleed power steering system; use proper fluid type per manufacturer specification. AST.07.12

    13. Inspect for power steering fluid leakage; determine needed action. AST.07.13

    14. Remove, inspect, replace, and/or adjust power steering pump drive belt. AST.07.14

    15. Remove and reinstall power steering pump. AST.07.15

    16. Remove and reinstall press fit power steering pump pulley; check pulley and belt alignment. AST.07.16

    17. Inspect, remove and/or replace power steering hoses and fittings. AST.07.17

    18. Inspect, remove and/or replace pitman arm, relay (center-link/intermediate) rod, idler arm, mountings, and steering linkage damper. AST.07.18

19. Inspect, replace, and/or adjust tie rod ends (sockets), tie rod sleeves, and clamps. AST.07.19
20. Inspect, test and diagnose electrically- assisted power steering systems (including using a scan tool); determine needed action. AST.07.20
21. Identify hybrid vehicle power steering system electrical circuits and safety precautions. AST.07.21
22. Test power steering system pressure; determine needed action. AST.07.22
23. Diagnose short and long arm suspension system noises, body sway, and uneven ride height concerns; determine needed action. AST.07.23
24. Diagnose strut suspension system noises, body sway, and uneven ride height concerns; determine needed action. AST.07.24
25. Inspect, remove, and/or replace upper and lower control arms, bushings, shafts, and rebound bumpers. AST.07.25
26. Inspect, remove, and/or replace strut rods and bushings. AST.07.26
27. Inspect, remove, and/or replace upper and/or lower ball joints (with or without wear indicators). AST.07.27
28. Inspect, remove, and/or replace steering knuckle assemblies. AST.07.28
29. Inspect, remove and/or replace short and long arm suspension system coil springs and spring insulators. AST.07.29
30. Inspect, remove, and/or replace torsion bars and mounts AST.07.30
31. Inspect, remove, and/or replace front/rear stabilizer bar (sway bar) bushings, brackets, and links. AST.07.31
32. Inspect, remove, and/or replace strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount. AST.07.32
33. Inspect, remove, and/or replace track bar, strut rods/radius arms, and related mounts and bushings. AST.07.33
34. Inspect rear suspension system leaf spring(s), spring insulators (silencers), shackles, brackets, bushings, center pins/bolts, and mounts. AST.07.34
35. Inspect, remove, and/or replace shock absorbers; inspect mounts and bushings. AST.07.35
36. Remove, inspect, service and/or replace front and rear wheel bearings. AST.07.36
37. Describe the function of suspension and steering control systems and components, (i.e. active suspension and stability control). AST.07.37
38. Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concerns; determine needed action. AST.07.38
39. Perform pre-alignment inspection; measure vehicle ride height; determine needed action. AST.07.39
40. Prepare vehicle for wheel alignment on alignment machine; perform four-wheel alignment by checking and adjusting front and rear wheel caster, camber and

toe as required; center steering wheel. AST.07.40

41. Check toe-out-on-turns (turning radius); determine needed action. AST.07.41
42. Check steering axis inclination (SAI) and included angle; determine needed action. AST.07.42
43. Check rear wheel thrust angle; determine needed action. AST.07.43
44. Check for front wheel setback; determine needed action. AST.07.44
45. Check front and/or rear cradle (sub-frame) alignment; determine needed action. AST.07.45
46. Reset steering angle sensor and related equipment. AST.07.46
47. Inspect tire condition; identify tire wear patterns; check for correct tire size, application (load and speed ratings), and air pressure as listed on the tire information placard/label. AST.07.47
48. Diagnose wheel/tire vibration, shimmy, and noise; determine needed action. AST.07.48
49. Rotate tires according to manufacturer's recommendation including vehicles equipped with tire pressure monitoring systems (TPMS) AST.07.49
50. Measure wheel, tire, axle flange, and hub runout; determine needed action. AST.07.50
51. Diagnose tire pull problems; determine needed action. AST.07.51
52. Dismount, inspect, and remount tire on wheel; balance wheel and tire assembly. AST.07.52
53. Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor. AST.07.53
54. Inspect tire and wheel assembly for air loss; perform needed action. AST.07.54
55. Repair tire following vehicle manufacturer approved procedure. AST.07.55
56. Identify indirect and direct tire pressure monitoring system (TPMS); calibrate system; verify operation of instrument panel lamps. AST.07.56
57. Demonstrate knowledge of steps required to remove and replace sensors in a tire pressure monitoring system (TPMS) including relearn procedure AST.07.57
58. Reinstall wheel; torque lug nuts. AST.07.58

Automotive Brake System Technician – Course Number: AER0418

0. Explain and apply proficiently the diagnosis, service and repair of drum/disc brake, hydraulics, power assist units, electronic brakes, traction control, stability control systems and miscellaneous (wheel bearings, parking brake, electrical, etc.) systems.--The student will be able to: AST.08.0

    01. Identify and interpret brake system concerns; determine needed action. AST.08.01

    02. Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins. AST.08.02

    03. Describe procedure for performing a road test to check brake system operation including an anti-lock brake system (ABS). AST.08.03

    04. Install wheel and torque lug nuts. AST.08.04

    05. Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals). AST.08.05

    06. Diagnose pressure concerns in the brake system using hydraulic principles (Pascal's Law). AST.08.06

    07. Measure brake pedal height, travel, and free play (as applicable); determine needed action. AST.08.07

    08. Check master cylinder for internal/external leaks and proper operation; determine needed action. AST.08.08

    09. Remove, bench bleed, and reinstall master cylinder. AST.08.09

    10. Diagnose poor stopping, pulling or dragging concerns caused by malfunctions in the hydraulic system; determine needed action. AST.08.10

    11. Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear; and loose fittings/supports; determine needed action. AST.08.11

    12. Replace brake lines, hoses, fittings, and supports. AST.08.12

    13. Fabricate brake lines using proper material and flaring procedures (double flare and ISO types). AST.08.13

    14. Select, handle, store, and fill brake fluids to proper level; use proper fluid type per manufacturer specification. AST.08.14

    15. Inspect, test, and/or replace components of brake warning light system. AST.08.15

    16. Identify components of hydraulic brake warning light system. AST.08.16

    17. Bleed and/or flush brake system. AST.08.17

    18. Test brake fluid for contamination. AST.08.18

    19. Inspect, test, and/or replace metering (hold-off), proportioning (balance), pressure differential, and combination valves. AST.08.19

    20. Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pedal pulsation concerns; determine needed action. AST.08.20

21. Remove, clean, and inspect brake drum; measure brake drum diameter; determine serviceability. AST.08.21
22. Refinish brake drum and measure final drum diameter; compare with specification. AST.08.22
23. Remove, clean, inspect, and/or replace brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble. AST.08.23
24. Inspect wheel cylinders for leaks and proper operation; remove and replace as needed. AST.08.24
25. Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; perform final checks and adjustments. AST.08.25
26. Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging, or pulsation concerns; determine needed action. AST.08.26
27. Remove and clean caliper assembly; inspect for leaks, damage, and wear; determine needed action. AST.08.27
28. Inspect caliper mounting and slides/pins for proper operation, wear, and damage; determine needed action. AST.08.28
29. Remove, inspect, and/or replace brake pads and retaining hardware; determine needed action. AST.08.29
30. Lubricate and reinstall caliper, brake pads, and related hardware; seat brake pads; inspect for leaks. AST.08.30
31. Clean and inspect rotor and mounting surface; measure rotor thickness, thickness variation, and lateral runout; determine needed action. AST.08.31
32. Remove and reinstall/replace rotor. AST.08.32
33. Refinish rotor on vehicle; measure final rotor thickness and compare with specification. AST.08.33
34. Refinish rotor off vehicle; measure final rotor thickness and compare with specification. AST.08.34
35. Retract and re-adjust caliper piston on an integrated parking brake system. AST.08.35
36. Check brake pad wear indicator; determine needed action. AST.08.36
37. Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendations. AST.08.37
38. Disassemble and clean caliper assembly; inspect parts for wear, rust, scoring, and damage; replace seal, boot, and damaged or worn parts. AST.08.38
39. Check brake pedal travel with and without engine running to verify proper power booster operation. AST.08.39
40. Identify components of the brake power assist system (vacuum, hydraulic, and electric); check vacuum supply (manifold or auxiliary pump) to vacuum- type power booster. AST.08.40

41. Inspect vacuum-type power booster unit for leaks; inspect the check-valve for proper operation; determine needed action. AST.08.41
42. Inspect and test hydraulically-assisted power brake system for leaks and proper operation; determine needed action. AST.08.42
43. Measure and adjust master cylinder pushrod length. AST.08.43
44. Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine needed action. AST.08.44
45. Remove, clean, inspect, repack, and install wheel bearings; replace seals; install hub and adjust bearings. AST.08.45
46. Check parking brake system and components for wear, binding, and corrosion; clean, lubricate, adjust and/or replace as needed. AST.08.46
47. Check parking brake operation and parking brake indicator light system operation; determine needed action. AST.08.47
48. Check operation of brake stop light system. AST.08.48
49. Replace wheel bearing and race. AST.08.49
50. Remove, reinstall, and/or replace sealed wheel bearing assembly. AST.08.50
51. Inspect and replace wheel studs. AST.08.51
52. Identify and inspect electronic brake control system components (ABS, TCS, & ESC); determine needed action. AST.08.52
53. Describe the operation of a regenerative braking system (to include hybrid vehicles). AST.08.53
54. Diagnose poor stopping, wheel lock-up, abnormal pedal feel, unwanted application, and noise concerns associated with the electronic brake control system; determine needed action. AST.08.54
55. Diagnose electronic brake control system electronic control(s) and components by retrieving diagnostic trouble codes, and/or using recommended test equipment; determine needed action (to include hybrid vehicles). AST.08.55
56. Depressurize high-pressure components of an electronic brake control system. AST.08.56
57. Bleed the electronic brake control system hydraulic circuits. AST.08.57
58. Test, diagnose, and service electronic brake control system speed sensors (digital and analog), toothed ring (tone wheel), and circuits using a graphing multi-meter (GMM)/digital storage oscilloscope (DSO) (includes output signal, resistance, shorts to voltage/ground, and frequency data). AST.08.58
59. Diagnose electronic brake control system braking concerns caused by vehicle modifications (tire size, curb height, final drive ratio, etc.). AST.08.59
60. Remove and install electronic brake control system electrical/electronic and hydraulic components. AST.08.60

Automotive Electrical/Electronic System Technician – Course Number: AER0360

0. Explain and apply proficiently the diagnosis, service and repair of electrical/electronic system components, battery, starting, charging, lighting, gauges, warning devices, driver information, horn, wiper/washer and accessory systems.--The student will be able to: AST.09.0
    01. Research vehicle service information including vehicle service history, service precautions, and technical service bulletins. AST.09.01
    02. Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law). AST.09.02
    03. Demonstrate proper use of a digital multi-meter (DMM) when measuring source voltage, voltage drop (including grounds), current flow and resistance. AST.09.03
    04. Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits. AST.09.04
    05. Demonstrate proper use of a test light on an electrical circuit. AST.09.05
    06. Use fused jumper wires to check operation of electrical circuits. AST.09.06
    07. Use wiring diagrams during the diagnosis (troubleshooting) of electrical/electronic circuit problems. AST.09.07
    08. Diagnose the cause(s) of excessive key-off battery drain (parasitic draw); determine needed action. AST.09.08
    09. Inspect and test fusible links, circuit breakers, and fuses; determine needed action. AST.09.09
    10. Inspect, test, repair, and/or replace components, connectors, terminals, harnesses, and wiring in electrical/electronic systems (including solder repairs); determine needed action. AST.09.10
    11. Check electrical/electronic circuit waveforms; interpret readings and determine needed repairs. AST.09.11
    12. Repair data bus wiring harness. AST.09.12
    13. Identify and interpret electrical/electronic system concern; determine necessary action. AST.09.13
    14. Identify location of hybrid vehicle high voltage circuit disconnect (service plug) location and safety procedures. AST.09.14
    15. Perform battery state-of-charge test; determine needed action. AST.09.15
    16. Confirm proper battery capacity for vehicle application; perform battery capacity and load test; determine needed action. AST.09.16
    17. Maintain or restore electronic memory functions. AST.09.17
    18. Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold-downs. AST.09.18
    19. Perform slow/fast battery charge according to manufacturer's recommendations. AST.09.19

20. Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply. AST.09.20
21. Identify safety precautions for high voltage systems on electric, hybrid, hybrid-electric, and diesel vehicles. AST.09.21
22. Identify electrical/electronic modules, security systems, radios, and other accessories that require re-initialization or code entry after reconnecting vehicle battery. AST.09.22
23. Identify hybrid vehicle auxiliary (12v) battery service, repair, and test procedures. AST.09.23
24. Perform battery conductance test; determine necessary action. AST.09.24
25. Perform starter current draw tests; determine needed action. AST.09.25
26. Perform starter circuit voltage drop tests; determine needed action. AST.09.26
27. Inspect and test starter relays and solenoids; determine needed action. AST.09.27
28. Remove and install starter in a vehicle. AST.09.28
29. Inspect and test switches, connectors, and wires of starter control circuits; determine needed action. AST.09.29
30. Differentiate between electrical and engine mechanical problems that cause a slow-crank or a no-crank condition. AST.09.30
31. Demonstrate knowledge of an automatic idle-stop/start-stop system. AST.09.31
32. Perform charging system output test; determine needed action. AST.09.32
33. Diagnose (troubleshoot) charging system for causes of undercharge, no-charge, or overcharge conditions. AST.09.33
34. Inspect, adjust, and/or replace alternator (generator) drive belts; check pulleys and tensioners for wear; check pulley and belt alignment. AST.09.34
35. Remove, inspect, and/or replace alternator (generator). AST.09.35
36. Perform charging circuit voltage drop tests; determine needed action. AST.09.36
37. Diagnose (troubleshoot) the causes of brighter-than-normal, intermittent, dim, or no light operation; determine needed action. AST.09.37
38. Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving lights); replace as needed. AST.09.38
39. Aim headlights. AST.09.39
40. Describe operation and diagnosis of an adaptive headlight system. AST.09.40
41. Identify system voltage and safety precautions associated with high-intensity discharge headlights. AST.09.41
42. Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action. AST.09.42

43. Inspect and test gauges and gauge sending units for causes of abnormal readings; determine needed action. AST.09.43

44. Diagnose (troubleshoot) the causes of incorrect operation of warning devices and other driver information systems; determine needed action. AST.09.44

45. Reset maintenance indicators as required. AST.09.45

46. Inspect and test sensors, connectors, and wires of electronic (digital) instrument circuits; determine necessary action. AST.09.46

47. Diagnose operation of comfort and convenience accessories and related circuits (such as: power window, power seats, pedal height, power locks, truck locks, remote start, moon roof, sun roof, sun shade, remote keyless entry, voice activation, steering wheel controls, back-up camera, park assist, cruise control, and auto dimming headlamps); determine needed repairs. AST.09.47

48. Diagnose operation of security/anti-theft systems and related circuits (such as: theft deterrent, door locks, remote keyless entry, remote start, and starter/fuel disable); determine needed repairs. AST.09.48

49. Diagnose operation of entertainment and related circuits (such as: radio, DVD, remote CD changer, navigation, amplifiers, speakers, antennas, and voice-activated accessories); determine needed repairs. AST.09.49

50. Diagnose operation of safety systems and related circuits (such as: horn, airbags, seat belt pretensioners, occupancy classification, wipers, washers, speed control/collision avoidance, heads-up display, park assist, and back-up camera); determine needed repairs. AST.09.50

51. Diagnose body electronic systems circuits using a scan tool; check for module communication errors (data communication bus systems); determine needed action. AST.09.51

52. Describe the process for software transfer, software updates, or reprogramming of electronic modules. AST.09.52

53. Diagnose incorrect heated glass, mirror, or seat operation; determine necessary action. AST.09.53

Automotive Heating and Air Conditioning Technician – Course Number: AER0172

0. Explain and apply proficiently the diagnosis, service and repair of heating and air conditioning, refrigeration, compressors, compressor clutches, evaporators, receiver driers, accumulators, condensers, heating and engine cooling, related control systems, refrigerant recovery, and recycling and handling.--The student will be able to: AST.10.0

    01. Identify and interpret heating and air conditioning problems; determine needed action. AST.10.01
    02. Research vehicle service information including refrigerant/oil type, vehicle service history, service precautions, and technical service bulletins. AST.10.02
    03. Performance test A/C system; identify problems. AST.10.03
    04. Identify abnormal operating noises in the A/C system; determine needed action. AST.10.04
    05. Identify refrigerant type; select and connect proper gauge set/test equipment; record temperature and pressure readings. AST.10.05
    06. Leak test A/C system; determine needed action. AST.10.06
    07. Inspect condition of refrigerant oil removed from A/C system; determine needed action. AST.10.07
    08. Determine recommended oil and oil capacity for system application. AST.10.08
    09. Using a scan tool, observe and record related HVAC data and trouble codes. AST.10.09
    10. Inspect, remove, and/or replace A/C compressor drive belts, pulleys, tensioners and visually inspect A/C components for signs of leaks; determine needed action. AST.10.10
    11. Inspect, test, service and/or replace A/C compressor clutch components and/or assembly; check compressor clutch air gap; adjust as needed. AST.10.11
    12. Remove, inspect, reinstall, and/or replace A/C compressor and mountings; determine recommended oil type and quantity. AST.10.12
    13. Identify hybrid vehicle A/C system electrical circuits and service/safety precautions. AST.10.13
    14. Determine need for an additional A/C system filter; perform needed action. AST.10.14
    15. Remove and inspect A/C system mufflers, hoses, lines, fittings, O-rings, seals, and service valves; perform needed action. AST.10.15
    16. Inspect for proper A/C condenser airflow; determine needed action. AST.10.16
    17. Remove, inspect, and replace receiver/drier or accumulator/drier; determine recommended oil type and quantity. AST.10.17
    18. Remove, inspect, and install expansion valve or orifice (expansion) tube. AST.10.18
    19. Inspect evaporator housing water drain; perform needed action. AST.10.19

20. Diagnose A/C system conditions that cause the protection devices (pressure, thermal, and/or control module) to interrupt system operation; determine needed action. AST.10.20
21. Determine procedure to remove and reinstall evaporator; determine required oil type and quantity. AST.10.21
22. Perform cooling system pressure tests; check coolant condition, inspect and test radiator, cap (pressure/vacuum), coolant recovery tank, and hoses; perform necessary action. AST.10.22
23. Inspect engine cooling and heater systems hoses and pipes; perform needed action. AST.10.23
24. Inspect and test heater control valve(s); perform needed action. AST.10.24
25. Diagnose temperature control problems in the HVAC system; determine needed action. AST.10.25
26. Determine procedure to remove, inspect, reinstall, and/or replace heater core. AST.10.26
27. Inspect, test, and replace thermostat and gasket/seal. AST.10.27
28. Determine coolant condition and coolant type for vehicle application; drain and recover coolant. AST.10.28
29. Flush system; refill system with recommended coolant; bleed system. AST.10.29
30. Inspect and test cooling fan, fan clutch, fan shroud, and air dams; perform necessary action. AST.10.30
31. Inspect and test electric cooling fan, fan control system and circuits; determine necessary action. AST.10.31
32. Inspect and test HVAC system blower motors, resistors, switches, relays, wiring, and protection devices; determine needed action. AST.10.32
33. Diagnose A/C compressor clutch control systems; determine needed action. AST.10.33
34. Diagnose malfunctions in the vacuum, mechanical, and electrical components and controls of the heating, ventilation, and A/C (HVAC) system; determine needed action. AST.10.34
35. Inspect and test HVAC system control panel assembly; determine needed action. AST.10.35
36. Inspect and test HVAC system control cables, motors, and linkages; perform needed action. AST.10.36
37. Inspect HVAC system ducts, doors, hoses, cabin filters, and outlets; perform needed action. AST.10.37
38. Identify the source of HVAC system odors. AST.10.38
39. Check operation of automatic or semi-automatic HVAC control systems; determine needed action. AST.10.39

40. Perform correct use and maintenance of refrigerant handling equipment according to equipment manufacturer's standards. AST.10.40
41. Identify A/C system refrigerant; test for sealants; recover, evacuate, and charge A/C system; add refrigerant oil as required. AST.10.41
42. Recycle, label, and store refrigerant. AST.10.42

Automotive Engine Performance Technician – Course Number: AER0503

0. Explain and apply proficiently the diagnosis, service and repair of engines, ignition, fuel, air induction, exhaust, computer engine and emission control systems.--The student will be able to: AST.11.0
    01. Identify and interpret engine performance concerns; determine needed action. AST.11.01
    02. Research vehicle service information including vehicle service history, service precautions, and technical service bulletins. AST.11.02
    03. Diagnose abnormal engine noises or vibration concerns; determine needed action. AST.11.03
    04. Diagnose the cause of excessive oil consumption, coolant consumption, unusual exhaust color, odor, and sound; determine needed action. AST.11.04
    05. Perform engine absolute manifold pressure tests (vacuum/boost); determine needed action. AST.11.05
    06. Perform cylinder power balance test; determine needed action. AST.11.06
    07. Perform cylinder cranking and running compression tests; determine needed action. AST.11.07
    08. Perform cylinder leakage test; determine needed action. AST.11.08
    09. Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns; determine needed action. AST.11.09
    10. Verify engine operating temperature; determine needed action. AST.11.10
    11. Verify correct camshaft timing including engines equipped with variable valve timing systems (VVT). AST.11.11
    12. Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action. AST.11.12
    13. Demonstrate knowledge of using a 4 or 5 gas analyzer, interpret readings, and determine necessary action. AST.11.13
    14. Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action. AST.11.14
    15. Retrieve and record diagnostic trouble codes (DTC), OBD monitor status, and freeze frame data; clear codes when applicable. AST.11.15
    16. Access and use service information to perform step-by-step (troubleshooting) diagnosis. AST.11.16
    17. Perform active tests of actuators using a scan tool; determine needed action. AST.11.17
    18. Describe the use of OBD monitors for repair verification. AST.11.18
    19. Diagnose the causes of emissions or drive-ability concerns with stored or active diagnostic trouble codes (DTC); obtain, graph, and interpret scan tool data. AST.11.19

20. Diagnose emissions or drive-ability concerns without stored or active diagnostic trouble codes; determine needed action. AST.11.20
21. Inspect and test computerized engine control system sensors, powertrain/engine control module (PCM/ECM), actuators, and circuits using a graphing multi-meter (GMM)/digital storage oscilloscope (DSO); perform needed action. AST.11.21
22. Diagnose drive-ability and emissions problems resulting from malfunctions of interrelated systems (cruise control, security alarms, suspension controls, traction controls, HVAC, automatic transmissions, non-OEM installed accessories, or similar systems); determine needed action. AST.11.22
23. Check for module communication (including CAN/BUS systems) errors using a scan tool. AST.11.23
24. Diagnose (troubleshoot) ignition system related problems such as no-starting, hard starting, engine misfire, poor drive-ability, spark knock, power loss, poor mileage, and emissions concerns; determine needed action. AST.11.24
25. Inspect and test crankshaft and camshaft position sensor(s); determine needed action. AST.11.25
26. Inspect, test, and/or replace ignition control module, powertrain/engine control module; reprogram/initialize as needed. AST.11.26
27. Remove and replace spark plugs; inspect secondary ignition components for wear and damage. AST.11.27
28. Inspect and test ignition primary and secondary circuit wiring and solid state components; test ignition coil(s); perform necessary action. AST.11.28
29. Diagnose (troubleshoot) hot or cold no-starting, hard starting, poor drive-ability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems; determine needed action. AST.11.29
30. Check fuel for contaminants; determine needed action. AST.11.30
31. Inspect and test fuel pump(s) and pump control system for pressure, regulation, and volume; perform needed action. AST.11.31
32. Replace fuel filter(s) where applicable. AST.11.32
33. Inspect, service, or replace air filters, filter housings, and intake duct work. AST.11.33
34. Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air. AST.11.34
35. Inspect, test, and/or replace fuel injectors. AST.11.35
36. Verify idle control operation. AST.11.36
37. Inspect integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields; perform needed action. AST.11.37

38. Inspect condition of exhaust system hangers, brackets, clamps, and heat shields; determine needed action. AST.11.38
39. Perform exhaust system back-pressure test; determine needed action. AST.11.39
40. Check and refill diesel exhaust fluid (DEF). AST.11.40
41. Test the operation of turbocharger/supercharger systems; determine needed action. AST.11.41
42. Diagnose oil leaks, emissions, and drive-ability concerns caused by the positive crankc ventilation (PCV) system; determine needed action. AST.11.42
43. Inspect, test, service, and/or replace positive crankc ventilation (PCV) filter/breather, valve, tubes, orifices, and hoses; perform needed action. AST.11.43
44. Diagnose emissions and drive-ability concerns caused by the exhaust gas recirculation (EGR) system; inspect, test, service and/or replace electrical/electronic sensors, controls, wiring, tubing, exhaust passages, vacuum/pressure controls, filters, and hoses of exhaust gas recirculation (EGR) systems; determine needed action. AST.11.44
45. Diagnose emissions and drive-ability concerns caused by the secondary air injection system; inspect, test, repair, and/or replace electrical/electronically-operated components and circuits of secondary air injection systems; determine needed action. AST.11.45
46. Diagnose emissions and drive-ability concerns caused by the evaporative emissions control (EVAP) system; determine needed action. AST.11.46
47. Diagnose emission and drive-ability concerns caused by catalytic converter system; determine needed action. AST.11.47
48. Interpret diagnostic trouble codes (DTCs) and scan tool data related to the emissions control systems; determine needed action. AST.11.48
49. Inspect and test mechanical components of secondary air injection systems; perform necessary action. AST.11.49
50. Adjust valves on engines with mechanical or hydraulic lifters; as applicable. AST.11.50
51. Remove and replace timing belt; verify correct camshaft timing. AST.11.51
52. Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; perform necessary action. AST.11.52
53. Inspect engine oil and/or filter for condition and determine necessary action. AST.11.53
54. Identify hybrid vehicle internal combustion engine service precautions. AST.11.54

Avionics Systems Technician (T400310)

Basic Electronics Wiring Installer/Technician – Course Number: AVS0680

0. Demonstrate proficiency in the fundamentals of aviation maintenance technology.--The student will be able to: AVI.01.0
    01. Apply proper Occupational Safety Health Administration (OSHA) safety standards. AVI.01.01
    02. Research and report on a career field that supports aviation maintenance technology AVI.01.02
    03. Identify the parts of an aircraft. AVI.01.03
    04. Describe how avionics systems integrate with aircraft airframe and propulsion systems. AVI.01.04
    05. Research and describe the certifications associated with the avionics maintenance technician. AVI.01.05
    06. Research and report on a type of unmanned aerial vehicle (UAV) or unmanned aerial system (UAS). AVI.01.06
0. Demonstrate skills in technical communications.--The student will be able to: AVI.02.0
    01. Draw and interpret electronic schematics AVI.02.01
    02. Write reports and make oral presentations. AVI.02.02
    03. Maintain test logs. AVI.02.03
    04. Write formal reports of laboratory experiences AVI.02.04
    05. Read and follow written instructions. AVI.02.05
    06. Answer and ask questions coherently and concisely AVI.02.06
    07. Read critically by recognizing assumptions and implications and evaluating ideas. AVI.02.07
0. Demonstrate proficiency in basic aircraft wiring and PCB practices.--The student will be able to: AVI.03.0
    01. Explain the theoretical concepts and safety precautions of soldering. AVI.03.01
    02. Use appropriate hand tools to cut, strip, crimp, splice, solder, and stamp/identify wires and cables to industry standards for aircraft installation. AVI.03.02
    03. Prepare, use, install, and inspect general purpose connectors. AVI.03.03
    04. Research and identify the proper AN-MS connectors for use in aircraft electrical systems. AVI.03.04
    05. Identify and use power tools properly. AVI.03.05
    06. Demonstrate acceptable PCB soldering techniques. AVI.03.06
    07. Demonstrate acceptable de-soldering techniques. AVI.03.07
    08. Demonstrate electrostatic discharge (ESD) safety procedures. AVI.03.08
    09. Describe the construction of printed circuit boards (PCB's). AVI.03.09

10. Demonstrate proficiency in reworking and repairing aircraft wiring and PCB's. AVI.03.10

0. Demonstrate proficiency in basic direct current (DC) circuits.--The student will be able to: AVI.04.0

    01. Solve problems in electronic units utilizing metric prefixes. AVI.04.01
    02. Identify sources of electricity. AVI.04.02
    03. Define voltage, current, resistance, power and energy. AVI.04.03
    04. Apply Ohm's law and power formulas. AVI.04.04
    05. Read and interpret color codes and symbols to identify electrical components and values. AVI.04.05
    06. Measure properties of a DC circuit using an analog volt-ohm (VOM) meter. AVI.04.06
    07. Measure properties of a DC circuit using a digital multi-meter (DMM). AVI.04.07
    08. Measure properties of a DC circuit using an oscilloscope. AVI.04.08
    09. Compute conductance and compute and measure resistance of conductors and insulators. AVI.04.09
    10. Apply Ohm's law to series circuits. AVI.04.10
    11. Analyze and troubleshoot series circuits. AVI.04.11
    12. Apply Ohm's law to parallel circuits. AVI.04.12
    13. Analyze and troubleshoot parallel circuits. AVI.04.13

0. Demonstrate proficiency in advanced direct current (DC) circuits.--The student will be able to: AVI.05.0

    01. Solve algebraic problems to include exponentials to DC. AVI.05.01
    02. Relate electricity to the nature of matter. AVI.05.02
    03. Apply Ohm's law to series-parallel and parallel-series circuits. AVI.05.03
    04. Verify the operation of series-parallel, parallel-series, and bridge circuits. AVI.05.04
    05. Troubleshoot series-parallel and parallel-series and bridge circuits. AVI.05.05
    06. Identify and define voltage divider circuits (loaded and unloaded). AVI.05.06
    07. Verify the operation of voltage divider circuits (loaded and unloaded). AVI.05.07
    08. Analyze and troubleshoot voltage divider circuits (loaded and unloaded). AVI.05.08
    09. Describe magnetic properties of circuits and devices. AVI.05.09
    10. Determine the physical and electrical characteristics of capacitors and inductors. AVI.05.10
    11. Define resistor-capacitor (R-C) and resistor-inductor (R-L) time constants. AVI.05.11

12. Adjust and operate power supplies for DC circuits. AVI.05.12

0. Demonstrate proficiency in aircraft direct current (DC) power systems.--The student will be able to: AVI.06.0

    01. Identify the types and construction of aircraft batteries. AVI.06.01

    02. Define battery shop safety features and precautions when servicing various types of aircraft batteries. AVI.06.02

    03. Explain the process of servicing lead-acid and nickel-cadmium batteries. AVI.06.03

    04. Describe the types of aircraft DC generation systems. AVI.06.04

    05. Describe the purpose and operation of aircraft DC current limiters, regulators, and reverse current relays. AVI.06.05

Electrical Systems Technician – Course Number: AVS0681

0. Demonstrate proficiency in alternating current (AC) circuits.--The student will be able to: AVI.07.0
    01. Solve basic trigonometric problem as applicable to electronics. AVI.07.01
    02. Measure the properties of AC circuits using multi-meters. AVI.07.02
    03. Measure the properties of an AC circuit using an oscilloscope. AVI.07.03
    04. Identify the sources of AC electricity. AVI.07.04
    05. Use a function generator to inject signals into an AC circuits. AVI.07.05
    06. Define frequency, cycle, Hertz, wavelength, sine wave, phase angle, and period. AVI.07.06
    07. Calculate peak-to-peak, average, and RMS values of an AC signal. AVI.07.07
    08. Identify sine waves, square waves, saw-tooth waves, and ramp waveforms. AVI.07.08
    09. Use Ohm's law to determine resistance in an AC circuit. AVI.07.09
    10. Define the characteristics of AC capacitive circuits. AVI.07.10
    11. Analyze and troubleshoot AC capacitive circuits. AVI.07.11
    12. Define the characteristics of AC inductive circuits. AVI.07.12
    13. Analyze and troubleshoot AC inductive circuits. AVI.07.13
0. Demonstrate proficiency in advanced alternating current (AC) circuits.--The student will be able to: AVI.08.0
    01. Define characteristics of resistive, Inductive and Capacitive (RLC) circuits (series, parallel and complex). AVI.08.01
    02. Define the characteristics of series and parallel resonant circuits. AVI.08.02
    03. Analyze and troubleshoot R-C, R-L, and RLC circuits. AVI.08.03
    04. Define the characteristics of frequency selective filter circuits. AVI.08.04
    05. Analyze and troubleshoot frequency selective filter circuits. AVI.08.05
    06. Define the characteristics of poly-phase circuits. AVI.08.06
0. Demonstrate proficiency in alternating current (AC) circuit components.--The student will be able to: AVI.09.0
    01. Define and apply the principles of transformers to AC circuits. AVI.09.01
    02. Calculate transformer primary and secondary voltage, turn ratio, current, and power. AVI.09.02
    03. Analyze and troubleshoot step-up, step-down, and auto transformers. AVI.09.03
    04. Describe the characteristics and operation of relays and switches. AVI.09.04
    05. Analyze and troubleshoot relays and switches. AVI.09.05
    06. Define basic AC generator theory and operation. AVI.09.06

07. Define basic AC motor theory and operation. AVI.09.07
08. Adjust and operate power supplies for AC circuits. AVI.09.08
09. Analyze and measure power in AC circuits. AVI.09.09

0. Demonstrate proficiency in aircraft alternating current (AC) power systems.--The student will be able to: AVI.10.0
    01. Describe the types and operation of aircraft AC generation systems. AVI.10.01
    02. Describe the operation of basic aircraft DC and AC power distribution systems. AVI.10.02
    03. Describe the operation of aircraft multi-engine power distribution systems. AVI.10.03
0. Demonstrate proficiency with aircraft drawings.--The student will be able to: AVI.11.0
    01. Identify and define the symbols, lines, and markings on aircraft flowcharts, drawings and diagrams. AVI.11.01
    02. Read and interpret aircraft drawings and blueprints. AVI.11.02
    03. Prepare sketches of aircraft repairs and alterations. AVI.11.03
    04. Use of charts and graphs. AVI.11.04
    05. Describe the types of CAD systems and demonstrate the basic functions of a CAD program. AVI.11.05

Analog Circuits Technician – Course Number: AVS0682

0. Demonstrate proficiency in solid state devices.--The student will be able to: AVI.12.0
    01. Identify and define properties of semiconductor materials. AVI.12.01
    02. Identify and define operating characteristics and applications of junction diodes. AVI.12.02
    03. Identify and define operating characteristics and applications of special diodes. AVI.12.03
    04. Analyze and troubleshoot diode circuits. AVI.12.04
    05. Identify and define operating characteristics and applications of bipolar transistors, AVI.12.05
    06. Identify and define operating characteristics and applications of field effect transistors. AVI.12.06
    07. Identify and define operating characteristics and applications of single-stage amplifiers. AVI.12.07
    08. Analyze and troubleshoot single-stage amplifiers. AVI.12.08
    09. Analyze and troubleshoot thyristor circuitry. AVI.12.09
    10. Set up and operate DVM for solid-state devices. AVI.12.10
    11. Set up and operate power supplies for solid-state devices. AVI.12.11
    12. Set up and operate oscilloscopes for solid-state devices. AVI.12.12
    13. Set up and operate function generators for solid-state devices. AVI.12.13
    14. Demonstrate transistor testing techniques. AVI.12.14
0. Demonstrate proficiency in analog circuits.--The student will be able to: AVI.13.0
    01. Identify and define operational characteristics and applications of multistage amplifiers. AVI.13.01
    02. Analyze and troubleshoot multistage amplifiers. AVI.13.02
    03. Identify and define operating characteristics and applications of linear integrated circuits. AVI.13.03
    04. Identify and define operating characteristics and applications of basic power supplies and filters. AVI.13.04
    05. Analyze and troubleshoot differentiator and integrator circuits. AVI.13.05
    06. Identify and define operating characteristics and applications of differential and operational amplifiers. AVI.13.06
    07. Analyze and troubleshoot differential and operational amplifier circuits. AVI.13.07
    08. Identify and define operating characteristics of audio power amplifiers. AVI.13.08
    09. Analyze and troubleshoot audio power amplifiers. AVI.13.09

10. Identify and define operating characteristics and applications of power supply regulator circuits. AVI.13.10
11. Analyze and troubleshoot power supply regulator circuits. AVI.13.11
12. Identify and define operating characteristics and applications of active filters. AVI.13.12
13. Analyze and troubleshoot active filter circuits. AVI.13.13
14. Identify and define operating characteristics and applications of sinusoidal and non-sinusoidal oscillator circuits. AVI.13.14
15. Analyze and troubleshoot oscillator circuits. AVI.13.15
16. Identify and define operating characteristics and applications of cathode ray tubes. AVI.13.16
17. Identify and define operating characteristics and applications of optoelectronic devices. AVI.13.17
18. Define the operating characteristics of analog-type servo motors. AVI.13.18
19. Use basic electronics test equipment to measure and analyze analog circuits. AVI.13.19

0. Demonstrate an understanding of basic avionics corrosion.--The student will be able to: AVI.14.0

01. Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content. AVI.14.01
02. Describe the types of corrosion and explain their effects on avionics equipment. AVI.14.02
03. Describe the preventative processes to reduce or eliminate avionics corrosion. AVI.14.03

0. Demonstrate proficiency in aircraft aerodynamic fundamentals.--The student will be able to: AVI.15.0

01. Identify and explain the effects of aerodynamic forces on aircraft structures and components AVI.15.01

02. Identify and describe the purpose aircraft flight controls and aircraft how they affect flight operations. AVI.15.02
03. Define the concept of weight and balance in aircraft to include arms, weights, moments, the Law of Lever, and the center of gravity. AVI.15.03
04. Describe the effects of installing equipment, modifying equipment, modifying airframe structures and repositioning equipment on weight and balance. AVI.15.04

0. Demonstrate proficiency in Unmanned Aerial Systems Foundations.--The students will be able to: AVI.16.0

01. Compare and contrast the differences between UAS and UAV components, elements and systems. AVI.16.01
02. Identify UAV structures, fabrication methods, and components. AVI.16.02

03. Describe the types of UAV aerodynamics and flight characteristics AVI.16.03
04. Define the certifications and requirements required of UAS operators and technicians AVI.16.04
05. Explain cost and risk factors associated with and alleviated by the usage of Unmanned Aerial System. AVI.16.05

0. Demonstrate knowledge in Unmanned Aerial Vehicle Operations.--The students will able to: AVI.17.0
    01. Demonstrate an understanding of the levels of direct and autonomous control currently in use for guiding, navigating, and controlling a UAV. AVI.17.01
    02. Discriminate the various types of UAV payloads, power, and communications systems. AVI.17.02
    03. Understand and apply the regulatory requirements outlined by the FAA (Federal Aviation Administration) in the ownership, use, and operation of an Unmanned Aerial Vehicle. AVI.17.03

Aircraft Electronics Technician – Course Number: AVS0683

0. Demonstrate proficiency in digital circuits.--The student will be able to: AVI.18.0
    01. Define and apply numbering systems to codes and arithmetic operations. AVI.18.01
    02. Analyze and minimize logic circuits using Boolean operations. AVI.18.02
    03. Set up and operate logic probes for digital circuits. AVI.18.03
    04. Set up and operate power supplies for digital circuits and solve power distribution and noise problems. AVI.18.04
    05. Set up and operate pulsers for digital circuits. AVI.18.05
    06. Set up and operate oscilloscopes for digital circuits. AVI.18.06
    07. Set up and operate logic analyzers for digital circuits. AVI.18.07
    08. Set up and operate pulse generators for digital circuits. AVI.18.08
    09. Identify types of logic gates and their truth tables. AVI.18.09
    10. Verify combinational logic circuits made up of integrated circuits. AVI.18.10
    11. Troubleshoot logic circuits. AVI.18.11
    12. Analyze types of flip-flops and their truth tables. AVI.18.12
    13. Troubleshoot flip-flops. AVI.18.13
    14. Identify, define and measure characteristics of integrated circuit (IC) logic families. AVI.18.14
    15. Identify types of registers and counters. AVI.18.15
    16. Troubleshoot registers and counters. AVI.18.16
    17. Analyze clock and timing circuits. AVI.18.17
    18. Troubleshoot clock and timing circuits. AVI.18.18
    19. Identify types of arithmetic-logic circuits. AVI.18.19
    20. Troubleshoot arithmetic-logic circuits. AVI.18.20
    21. Identify types of encoding and decoding devices. AVI.18.21
    22. Troubleshoot encoders and decoders. AVI.18.22
    23. Identify types of multiplexer and de-multiplexer circuits. AVI.18.23
    24. Troubleshoot multiplexer and de-multiplexer circuits. AVI.18.24
    25. Identify types of memory circuits. AVI.18.25
    26. Relate the uses of digital-to-analog and analog-to-digital conversions. AVI.18.26
    27. Troubleshoot digital-to-analog and analog-to-digital circuits. AVI.18.27
    28. Identify types of digital displays. AVI.18.28
    29. Troubleshoot digital display circuits. AVI.18.29

30. Demonstrate the operating characteristics of digital-type servo and stepper motors AVI.18.30

0. Demonstrate proficiency in fundamental microprocessors.--The student will be able to: AVI.19.0

    01. Identify central processing unit (CPU) building blocks and their uses (architecture). AVI.19.01

    02. Analyze bus concepts. AVI.19.02

    03. Analyze various memory schemes. AVI.19.03

    04. Verify memory device operation. AVI.19.04

    05. Set up and operate oscilloscopes for microprocessor systems. AVI.19.05

    06. Identify types of input and output devices and peripherals. AVI.19.06

    07. Interface input and output ports to peripherals. AVI.19.07

    08. Analyze and troubleshoot input and output ports. AVI.19.08

    09. Develop a simple microprocessor and/or microcontroller application program. AVI.19.09

0. Demonstrate an understanding of workplace safety practices.--The student will be able to: AVI.20.0

    01. Use Safety Data Sheets (SDS) information to determine the use, safety precautions, and disposition of chemicals used in avionics applications. AVI.20.01

    02. Identify health-related problems, which may result from exposure to work related chemicals and hazardous materials, and know the proper precautions required for handling such materials. AVI.20.02

    03. Describe flight line safety to include foreign object elimination, situational awareness, aircraft movement precautions, fire classifications, and fire extinguishing. AVI.20.03

0. Demonstrate appropriate communication skills.--The student will be able to: AVI.21.0

    01. Write logical and understandable statements, or phrases, to accurately fill out forms/invoices commonly used in business and industry. AVI.21.01

    02. Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area. AVI.21.02

    03. Demonstrate appropriate telephone/communication skills. AVI.21.03

    04. Make equipment failure reports. AVI.21.04

    05. Specify and requisition simple electronic components. AVI.21.05

    06. Compose technical letters and memoranda. AVI.21.06

    07. Draft preventive maintenance procedures. AVI.21.07

    08. Use an analysis of technical data to form conclusions and recommend changes. AVI.21.08

0. Demonstrate employability skills.--The student will be able to: AVI.22.0
    01. Discuss elements of job search. AVI.22.01
    02. Develop sources of information about a job. AVI.22.02
    03. Identify documents that may be required when applying for a job. AVI.22.03
    04. Complete a job application correctly. AVI.22.04
    05. Demonstrate competence in job interview techniques. AVI.22.05
    06. Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons. AVI.22.06
    07. Identify acceptable work habits. AVI.22.07
    08. Demonstrate knowledge of how to make appropriate job changes. AVI.22.08
    09. Demonstrate acceptable employee health habits. AVI.22.09
    10. Demonstrate knowledge of the Federal Law as recorded in (29 CFR–1910.1200). AVI.22.10
    11. Write a proper resume. AVI.22.11
0. Demonstrate an understanding of entrepreneurship.--The student will be able to: AVI.23.0
    01. Define entrepreneurship. AVI.23.01
    02. Describe the importance of entrepreneurship to the American economy. AVI.23.02
    03. List the advantages and disadvantages of business ownership. AVI.23.03
    04. Identify the risks involved in ownership of a business. AVI.23.04
    05. Identify the necessary personal characteristics of an entrepreneur. AVI.23.05
    06. Identify the business skills needed to operate a small business efficiently and effectively. AVI.23.06
    07. Define various corporate structures. (e.g., S-Corp, C-Corp, Sole Proprietor, LLC, and ESOP). AVI.23.07
0. Demonstrate knowledge of basic avionics systems.--The student will be able to: AVI.24.0
    01. Identify and describe aircraft communications systems. AVI.24.01
    02. Identify and describe aircraft short-range navigation systems. AVI.24.02
    03. Identify and describe aircraft long-range navigation systems AVI.24.03
    04. Identify the types of flight instruments and state their purpose. AVI.24.04

Avionics Installer/Technician – Course Number: AVS0684

0. Demonstrate proficiency in installing avionics systems.--The student will be able to: AVI.25.0
    01. Prepare an avionics installation plan AVI.25.01
    02. Design wiring interconnection for Comm, Nav, GPS, Traffic Avoidance, Audio Integrating etc. AVI.25.02
    03. Install circuit protective devices, switches, lamps, and relays. AVI.25.03
    04. Fabricate wiring harnesses AVI.25.04
    05. Perform a mechanical avionics installation AVI.25.05
    06. Perform an electrical installation AVI.25.06
    07. Perform an original manufacturers equipment (OEM) installation AVI.25.07
    08. Determine antenna placement with regards to noise interference AVI.25.08
0. Demonstrate proficiency in structural applications.--The student will be able to: AVI.26.0
    01. Select, install, and remove conventional and special fasteners AVI.26.01
    02. Layout, form, inspect, modify, and repair metal structures. AVI.26.02
    03. Fabricate, modify, and repair composite structures AVI.26.03
    04. Install aircraft antennas and doubler plates. AVI.26.04
0. Demonstrate proficiency in avionics radio station regulations and procedures.--The student will be able to: AVI.27.0
    01. Define repair station related regulatory and standardization agencies and their purposes. AVI.27.01
    02. Define repair station certification requirements. AVI.27.02
    03. Define requirements for certification of radio repair technicians. AVI.27.03
    04. Practice proper station operation procedures. AVI.27.04
    05. Prepare repair station reports and documentation. AVI.27.05
    06. Describe FCC rules pertaining to AM and FM transmitter maintenance and operation. AVI.27.06
0. Demonstrate proficiency in AM and FM transmitters.--The student will be able to: AVI.28.0
    01. Define Double Sideband (DSB), Single Sideband (SSB) and FM modulation. AVI.28.01
    02. Analyze and troubleshoot AM and FM Radio Frequency (RF) oscillator circuits. AVI.28.02
    03. Analyze and troubleshoot buffer and multiplier circuits. AVI.28.03
    04. Analyze and troubleshoot RF power amplifier circuits. AVI.28.04
    05. Analyze and troubleshoot AM and FM modulation circuits. AVI.28.05

06. Analyze and troubleshoot microphone circuits. AVI.28.06
07. Analyze and troubleshoot balanced modulators and SSB filter circuits. AVI.28.07
08. Analyze and troubleshoot AM and FM power supply circuits. AVI.28.08
09. Make power, frequency and modulation measurements of AM and FM transmitters. AVI.28.09
10. Align and troubleshoot AM and FM transmitters. AVI.28.10

0. Demonstrate proficiency in AM and FM receivers.--The student will be able to: AVI.29.0
    01. Analyze and troubleshoot receiver audio voltage and power amplifiers and speaker/headphone circuits. AVI.29.01
    02. Analyze and troubleshoot AM and FM detector circuits. AVI.29.02
    03. Analyze and troubleshoot AM Intermediate Frequency (IF) amplifier circuits. AVI.29.03
    04. Analyze and troubleshoot FM IF amplifier and limited circuits. AVI.29.04
    05. Analyze and troubleshoot receiver oscillator and automatic frequency control (AFC) circuits. AVI.29.05
    06. Analyze and troubleshoot RF mixer/heterodyne circuits. AVI.29.06
    07. Analyze and troubleshoot receiver RF amplifier circuits. AVI.29.07
    08. Analyze and troubleshoot automatic voltage control/automatic gain control (AVC/AGC) circuits. AVI.29.08
    09. Analyze and troubleshoot receiver power supplies. AVI.29.09
    10. Align and troubleshoot AM and FM receivers. AVI.29.10
0. Demonstrate proficiency in AM and FM transceivers.--The student will be able to: AVI.30.0
    01. Analyze and troubleshoot transceiver control, metering and switching circuits. AVI.30.01
    02. Analyze and troubleshoot transceiver frequency synthesizers and phase locked loop circuits. AVI.30.02
    03. Analyze and troubleshoot squelch circuits. AVI.30.03
    04. Align and troubleshoot transceivers. AVI.30.04
0. Demonstrate proficiency in electromagnetic wave emissions.--The student will be able to: AVI.31.0
    01. Define the radio frequency spectrum. AVI.31.01
    02. Define types and classification of RF emissions. AVI.31.02
    03. Define the characteristics of radio waves. AVI.31.03
    04. Define radio wave propagation method. AVI.31.04
    05. Define the basic types of antennas. AVI.31.05

06. Draw the voltage and current relationships and radiation patterns for the basic types of antennas. AVI.31.06
07. Define methods for antenna tuning, gain and directivity. AVI.31.07
08. Define transmission lines in terms of electrical and physical properties. AVI.31.08
09. Define standing waves, cause and effect, and measure standing wave ratios. AVI.31.09
10. Define tuned transmission lines and describe applications. AVI.31.10
11. Construct transmission lines. AVI.31.11
12. Define waveguides, resonant cavities and their applications. AVI.31.12

0. Demonstrate proficiency in line maintenance of airborne communication systems.--The student will be able to: AVI.32.0
01. Identify regulatory agencies affecting aircraft electronic systems AVI.32.01
02. Analyze and troubleshoot Aircraft Audio Integration Systems AVI.32.02
03. Analyze and troubleshoot VHF Communication Systems AVI.32.03
04. Analyze and troubleshoot HF Communication Systems AVI.32.04
05. Analyze and troubleshoot Satellite Communication Systems AVI.32.05
06. Describe the operation of a selective calling system. AVI.32.06
07. Define the operation and the types of data managed by the Aircraft Communication Automatic Reporting System (ACARS). AVI.32.07

Advanced Avionics Installer/Technician – Course Number: AVS0685

0. Demonstrate proficiency in line maintenance of aircraft instrument systems.--The student will be able to: AVI.33.0
    01. Identify and define the operation of basic flight instruments. AVI.33.01
    02. Identify and define the operation of electronic flight instruments. AVI.33.02
    03. Identify and define the operation of navigation instruments to include HSI, RMI, VOR. AVI.33.03
    04. Identify, and define the operation of compass systems. AVI.33.04
0. Demonstrate proficiency in aircraft data bus systems.--The student will be able to: AVI.34.0
    01. Define the operation of an aircraft digital data communications system AVI.34.01
    02. Compare and contrast the differences between ARINC data bus systems used in commercial aircraft. AVI.34.02
    03. Identify data bus systems used in general aviation aircraft and explain their operation. AVI.34.03
    04. Troubleshoot an aircraft data bus system. AVI.34.04
0. Demonstrate proficiency in line maintenance of airborne navigation systems and equipment.--The student will be able to: AVI.35.0
    01. Use navigation principles to understand dead-reckoning, earth coordinate system, great circle navigation, short-range navigation and long-range navigation. AVI.35.01
    02. Understand the operating principles of Global Position Satellite (GPS) System AVI.35.02
    03. Distinguish the operation principles of a VHF Omni Range (VOR) System AVI.35.03
    04. Define the operating characteristics of a Distance Measuring Equipment (DME) System AVI.35.04
    05. Explain the purpose and operation of, and the precautions when using, an Automatic Direction Finder (ADF) System AVI.35.05
    06. Define the elements of an Instrument Landing System (ILS) to include the characteristics of the localizer, glide slope, and marker beacon. AVI.35.06
    07. Explain the operating principles of a Microwave Landing System (MLS). AVI.35.07
    08. Describe the purpose and operation of ADS-B/transponder systems. AVI.35.08
    09. Understand the relationships of various navigation systems to the aircraft flight management system. AVI.35.09
    10. Define the operation of an autopilot, auto-throttle, and auto stabilization system. AVI.35.10

0. Demonstrate proficiency in primary and secondary radar systems.--The student will be able to: AVI.36.0
    01. Explain the theory and operation of the primary radar system. AVI.36.01
    02. Given a primary radar block diagram, explain the relationship between the major components of the system. AVI.36.02
    03. Describe the operation of a Doppler radar AVI.36.03
    04. Secondary (ATC) Radar Transponder AVI.36.04
    05. Define the purpose and operation of the altitude encoding function of radar. AVI.36.05
    06. Define the purpose and operation of the lightning detection function of radar. AVI.36.06
    07. Describe the operation of a XM Weather System. AVI.36.07
    08. Analyze and troubleshoot a radar system. AVI.36.08
0. Demonstrate proficiency with in-flight entertainment systems.--The student will be able to: AVI.37.0
    01. Describe the types of in-flight entertainment systems and compare their operation to each other. AVI.37.01
    02. Determine installation considerations when installing or upgrading an in-flight entertainment system. AVI.37.02
0. Demonstrate proficiency with engine and airframe monitoring systems.--The student will be able to. AVI.38.0
    01. Identify and interpret data from various types of displays. AVI.38.01
    02. Define aircraft built-in test equipment systems. AVI.38.02
    03. Interpret data from built-in test equipment. AVI.38.03
0. Demonstrate proficiency with pitot-static systems.--The students will be able to: AVI.39.0
    01. Understand purpose and function of pitot-static systems AVI.39.01
    02. Perform pitot-static integrity checks AVI.39.02
    03. Troubleshoot pitot-static systems AVI.39.03
0. Demonstrate proficiency with aircraft safety systems.--The students will be able to: AVI.40.0
    01. Understand purpose and function of caution, warning and advisory systems AVI.40.01
    02. Understand the purpose and operation of terminal collision avoidance systems (TCAS) AVI.40.02
    03. Understand the purpose and operation of ground proximity warning systems (GPWS). AVI.40.03
    04. Define the purpose and data collected by the aircraft flight data computer and voice recorder. AVI.40.04

05. Describe the purpose, operation and testing of the Emergency Locator Transmitter (ELT) AVI.40.05

06. Describe the operation of the stall warning and avoidance systems. AVI.40.06

Commercial Class "B" Driving (I490251)

Truck Driver Heavy Florida Class "B" – Course Number: TRA0084

0. Understand vehicle safety and accident prevention procedures.--The student will be able to: CCB.01.0
    01. Understand, identify and explain the use of vehicle safety equipment. CCB.01.01
    02. Understand the use of fire extinguishers. CCB.01.02
    03. Utilize seat belts and personal protection gear appropriate to type of operation. CCB.01.03
    04. Describe safe lifting procedures. CCB.01.04
    05. Describe personal safety equipment and procedures. CCB.01.05
    06. Describe actions applicable for vehicle accidents. CCB.01.06
    07. Review reports in a classroom activity. CCB.01.07
    08. Understand accident reporting requirements (company, state, federal). CCB.01.08
    09. Identify all information needed for accident reports to the State, the employer and the insurance company. CCB.01.09
    10. Review an accident report. CCB.01.10
    11. Describe procedures for protecting the scene of an accident. CCB.01.11
    12. Describe personal liability requirements. CCB.01.12
    13. Identify hazardous road conditions that are a potential threat to the safety of the truck driver. CCB.01.13
    14. Describe activities and characteristics of other road users that make them potentially dangerous. CCB.01.14
    15. Describe the potential consequences of excessive speed. CCB.01.15
    16. Describe the potential consequences of use of drugs or alcohol. CCB.01.16
    17. Describe and demonstrate safety procedures for entering and exiting vehicles. CCB.01.17
0. Understand and comply with vehicle operating regulations.--The student will be able to: CCB.02.0
    01. Understand and comply with Hours of Service regulations. CCB.02.01
    02. Maintain a complete, neat and accurate driver's duty status log including discussion of electronic logs. CCB.02.02
    03. Keep accurate records required by hours of service regulations. CCB.02.03
    04. Review mathematical calculations necessary to recap and apply totals to the hours of service regulations. CCB.02.04
    05. Determine driving hours remaining on a particular day or tour of duty. CCB.02.05
    06. Understand and comply with applicable United States Department of Transportation regulations including Federal Motor Carrier Safety

Administration rules and regulations - Compliance, Safety, and Accountability (CSA) particularly the role of drivers and motor carriers. CCB.02.06

07. Understand and comply with Federal, State and local traffic laws including restrictions on vehicle size and weight including permits when required. CCB.02.07

0. Demonstrate proper cargo handling and documentation procedures.--The student will be able to: CCB.03.0

    01. Understand how to load and unload cargo safely and efficiently. CCB.03.01

    02. Understand legal gross weight and axle weight. CCB.03.02

    03. Describe cargo load to meet legal weight and safety requirements. CCB.03.03

    04. Understand how to secure cargo using blocking, bracing, packing, rope, cable, chains and strapping. CCB.03.04

    05. Identify types of hazardous cargoes. CCB.03.05

    06. Understand the placement of placards when carrying hazardous materials. CCB.03.06

    07. Understand procedure for use of common cargo handling equipment, including pallets, jacks, dollies, handtrucks, nets, slings, poles and other equipment. CCB.03.07

    08. Understand categories of hazardous materials and the need for specialized training to handle hazardous materials. CCB.03.08

    09. Understand hazardous materials documentation requirements. CCB.03.09

    10. Verify nature, amount and condition of cargo on both pickup and delivery. CCB.03.10

    11. Verify information on bill of lading and properly record and report discrepancies and damage to the cargo. CCB.03.11

    12. Verify appropriate signatures on delivery receipts and other required forms. CCB.03.12

    13. Compare door seal number against shipping document. CCB.03.13

    14. Comply with inspection station procedures. CCB.03.14

0. Demonstrate trip planning preparation procedures.--The student will be able to: CCB.04.0

    01. Check vehicle registration and permit. CCB.04.01

    02. Check accident report packets for proper contents. CCB.04.02

    03. Plan a route from one point to another that is optimal in terms of travel time, fuel costs, potential hazards and federal, state and local travel restrictions. CCB.04.03

    04. Describe the use of manual and contemporary GPS navigation systems. CCB.04.04

    05. Estimate travel times and arrange for a secure place for layovers, especially when transporting hazardous materials. CCB.04.05

06. Demonstrate map reading skills. CCB.04.06
07. Estimate fuel consumption and plan fuel stops. CCB.04.07
08. Estimate expense money and obtain funds and/or credit cards. CCB.04.08

0. Demonstrate vehicle inspection procedures.--The student will be able to: CCB.05.0
    01. Check for previous days DVIR. CCB.05.01
    02. Check general appearance and condition of vehicle. CCB.05.02
    03. Check fuel, oil, water levels, automatic transmission fluid level and diesel emissions fluid (DEF). CCB.05.03
    04. Check signal lights, stoplights and running lights. CCB.05.04
    05. Check tires, rims and suspension. CCB.05.05
    06. Check horn, windshield wipers, mirrors and reflectors. CCB.05.06
    07. Check emergency bi-directional reflective triangles and fire extinguishers. CCB.05.07
    08. Check instruments for normal readings. CCB.05.08
    09. Check steering system, brake action and tractor protection valve. CCB.05.09
    10. Check cargo blocking, bracing and tie down. CCB.05.10
    11. Perform enroute inspections. CCB.05.11
    12. Perform post-trip inspection of vehicle and all systems. CCB.05.12

0. Perform vehicle maintenance and servicing procedures.--The student will be able to: CCB.06.0
    01. Describe function and operation of principle vehicle systems including, engine, engine auxiliary brake, drive train, coupling, suspension and electrical system, DEP engines, and regeneration processes where applicable. CCB.06.01
    02. Check engine fuel, DEF fluid, oil, coolant, battery and filters. CCB.06.02
    03. Check tire air pressure. CCB.06.03
    04. Check for proper tire and wheel mounting. CCB.06.04
    05. Drain moisture from air brake supply reservoirs. CCB.06.05
    06. Check brakes and related systems. CCB.06.06
    07. Clean and repair lights. CCB.06.07
    08. Check fuses and reset circuit breakers. CCB.06.08
    09. Clean interior and exterior of vehicle. CCB.06.09
    10. Check mud/rain flaps. CCB.06.10

0. Demonstrate basic vehicle control procedures.--The student will be able to: CCB.07.0
    01. Place transmission in neutral before starting engine. CCB.07.01
    02. Start, warm up and shut down the engine, according to the manufacturer's specifications. CCB.07.02

03. Build full pressure (120-140 PSI) in air tanks or to governed cut-out. CCB.07.03
04. Test parking brake and service brake before moving/driving vehicle. CCB.07.04
05. Coordinate use of accelerator and clutch to achieve smooth acceleration and avoid clutch abuse (if applicable). CCB.07.05
06. Maintain proper engine RPM while driving (if applicable). CCB.07.06
07. Properly modulate air brakes to bring vehicle to a smooth stop. CCB.07.07
08. Properly shift up and down through all gears using clutch (if applicable). CCB.07.08
09. Double clutch non-synchronized transmissions and time shift for smooth and fuel efficient performance (if applicable). CCB.07.09
10. Select proper gear for speed and highway conditions (if applicable). CCB.07.10
11. Operate automatic or semiautomatic transmissions. CCB.07.11
12. Coordinate steering, braking and acceleration to take the vehicle through a desired path forward and backward in a straight line. CCB.07.12
13. Use clutch and gears to maintain proper operating range/power/RPM of the motor while slowing the vehicle (if applicable). CCB.07.13
14. Park the vehicle, set brakes and shut off the engine. CCB.07.14
15. Discuss proper choking procedures. CCB.07.15

0. Demonstrate backing skills and basic vehicle maneuvers.--The student will: CCB.08.0
    01. Check area before and during backing. CCB.08.01
    02. Properly utilize guides and mirrors. CCB.08.02
    03. Properly back in straight line and curved paths. CCB.08.03
    04. Properly back into both a 45°and 90°alley docks. CCB.08.04
    05. Navigate through a 100 feet alley both forward and backward. CCB.08.05
    06. Properly demonstrate an offset left/right backing maneuver. CCB.08.06
    07. Properly position unit for backing into a loading dock. CCB.08.07
    08. Properly back to a dock. (actual or simulated) CCB.08.08
    09. Properly stop unit within 36 inches of the dock without contacting dock. (actual or simulated) CCB.08.09
    10. Properly parallel park (sightside/blindside). CCB.08.10
    11. Judge side, rear and overhead clearances and path of the trailer. CCB.08.11
    12. Make a straight-in approach to an alley. CCB.08.12
    13. Drive forward through an alley for 100 feet. CCB.08.13
0. Demonstrate road driving skills.--The student will be able to: CCB.09.0
    01. Carefully enter traffic from a stopped or parked position. CCB.09.01
    02. Use clutch and gears properly (if applicable). CCB.09.02

03. Proceed from a stopped position without rolling backward. CCB.09.03
04. Use mirrors properly. CCB.09.04
05. Signal intention to turn well in advance of turn. CCB.09.05
06. Get into proper lane well in advance of turn. CCB.09.06
07. Check traffic conditions and turn only when intersection is clear. CCB.09.07
08. Restrict traffic from passing on right when preparing to complete a right hand turn. Maintain 3 feet or less on right side of vehicle. CCB.09.08
09. Execute a right hand turn maintaining 3 feet or less on right side of vehicle. CCB.09.09
10. Complete a turn promptly and safely and not impede other traffic. CCB.09.10
11. Select and shift to proper gear prior to beginning any turn (if applicable). CCB.09.11
12. Obey all traffic signals. CCB.09.12
13. Plan stop in advance and adjust speed correctly. CCB.09.13
14. Use brakes properly on grades. CCB.09.14
15. Plan stops far enough in advance to avoid hard braking. CCB.09.15
16. Stop clear of crosswalks. CCB.09.16
17. Come to a complete stop at all stop signs. CCB.09.17
18. Yield right of way at intersections having yield signs. CCB.09.18
19. Check for cross traffic regardless of traffic signals. CCB.09.19
20. Approach all intersections prepared to stop if necessary. CCB.09.20
21. Stop a minimum of 15 feet but not more than 50 feet before railroad grade crossing if stop is necessary. CCB.09.21
22. Select proper gear to avoid shifting gears on railroad grade crossing (if applicable). CCB.09.22
23. Determine sufficient space required for passing. CCB.09.23
24. Pass only in safe locations. CCB.09.24
25. Describe in detail how to pass safely on a two-lane highway. CCB.09.25
26. Describe in detail how to pass safely on a four or more lane highway. CCB.09.26
27. Signal lane changes before and after passing. CCB.09.27
28. Pass only when appropriate to avoid impeding other traffic. CCB.09.28
29. Return to right lane promptly, but only when safe to do so. CCB.09.29
30. Observe speed limits. CCB.09.30
31. Adjust speed properly to road, weather and traffic conditions. CCB.09.31
32. Slowdown in advance of curves, danger zones and intersections. CCB.09.32
33. Maintain consistent speed where possible. CCB.09.33

34. Yield right of way. CCB.09.34
35. Allow faster traffic to pass. CCB.09.35
36. Understand or demonstrate the proper procedures for navigating a weigh station. CCB.09.36
37. Use horn only when necessary. CCB.09.37
38. Park only in legally permissible parking areas. CCB.09.38
39. Check instruments at regular intervals. CCB.09.39
40. Maintain proper engine RPM while driving. CCB.09.40
41. Determine minimum front-to-rear distances when following other vehicles using industry recognized standards. CCB.09.41

0. Demonstrate hazardous driving skills.--The student will be able to: CCB.10.0
   01. Understand preparation for operation in cold weather. CCB.10.01
   02. Demonstrate proper procedure for expelling moisture from the air tanks after each trip. CCB.10.02
   03. Understand proper procedure for checking ice accumulation on brakes, slack adjuster, air hoses, electrical wiring and radiator shutters during operation. CCB.10.03
   04. Perform operational adjustments necessary to maintain control in all weather conditions, including speed selection, braking and following distance. CCB.10.04
   05. Describe procedures to check safe operation of brakes after driving through deep water. CCB.10.05
   06. Perform proper use of windshield wipers, washers and defrosters to maintain visibility. CCB.10.06
   07. Demonstrate the ability to recognize and evaluate changing road conditions that produce low traction, including initial rainfall, ice, snow and mud. CCB.10.07
   08. Describe and understand procedures to avoid skidding. CCB.10.08
   09. Understand procedures to avoid hydroplaning and describe the road and vehicle conditions that produce it. CCB.10.09
   10. Understand procedures for mounting and dismounting tire chains. CCB.10.10
   11. Understand procedures for extricating the vehicle from snow, sand and mud by maneuvering or towing. CCB.10.11
   12. Demonstrate ability to adjust rate of change in speed and direction to accommodate road conditions to avoid skidding. CCB.10.12
   13. Describe procedures required to coordinate acceleration and shifting to overcome the resistance of snow, sand and mud. CCB.10.13
   14. Demonstrate ability to perform brake checks on equipment prior to mountain driving. CCB.10.14

15. Understand procedures required to use right lane or special truck lane going up grades. CCB.10.15
16. Understand procedures required to place transmission in appropriate gear for engine braking before starting downgrade. CCB.10.16
17. Understand procedures required to use proper braking techniques and maintain proper engine braking before starting downgrades. CCB.10.17
18. Understand proper use of truck escape ramp when brakes fail on a downgrade. CCB.10.18
19. Understand procedure required for observing temperature gauge frequently when pulling heavy loads up long grades. CCB.10.19
20. Understand the effect of vehicle weight and speed upon braking and shifting ability on long downgrades. CCB.10.20
21. Identify the meaning and use of percent of grade signs. CCB.10.21
22. Understand bringing the truck to a stop in the shortest possible distance while maintaining directional control on a dry surface. CCB.10.22
23. Understand procedures to make an evasive turn off the roadway and return to the roadway while maintaining directional control. CCB.10.23
24. Understand procedures to bring the vehicle to a stop in the event of a brake failure. CCB.10.24
25. Understand procedures to maintain control of the vehicle in the event of a blowout. CCB.10.25
26. Understand procedures to bring truck to a stop in the shortest possible distance while maintaining directional control when operating on a slippery surface. CCB.10.26
27. Understand procedures to recover from vehicle skids induced by snow, ice, water, oil, sand, wet leaves or other slippery surfaces. CCB.10.27
28. Understand procedures to counter-steer out of a skid in a way that will regain directional control and not produce another skid. CCB.10.28
29. Understand procedure to operate brakes properly to provide maximum braking without loss of control. CCB.10.29

0. Apply concepts learned for obtaining a Commercial Driver's License (CDL).--The student will be able to: CCB.11.0
   01. Demonstrate competence in performing basic Commercial Vehicle Driving skills utilizing the CDL testing criteria. CCB.11.01
   02. Demonstrate understanding and knowledge of Commercial Vehicle Driving Laws as required, to safely and legally operate a commercial vehicle. CCB.11.02

Commercial Vehicle Driving (I490205)

Tractor Trailer Truck Driver – Course Number: TRA0080

0. Understand vehicle safety and accident prevention procedures.--The student will be able to: 01.0
    01. Understand, identify and explain the use of vehicle safety equipment. 01.01
    02. Understand the use of fire extinguishers. 01.02
    03. Utilize seat belts and personal protection gear appropriate to type of operation. 01.03
    04. Demonstrate safe lifting procedures through use of hands-on labs or through viewing safety video. 01.04
    05. Describe personal safety equipment and procedures. 01.05
    06. Describe actions applicable for vehicle accidents. 01.06
    07. Review reports in a classroom activity. 01.07
    08. Understand accident reporting requirements (company, state, federal). 01.08
    09. Identify all information needed for accident reports to the State, the employer and the insurance company. 01.09
    10. Review an accident report. 01.10
    11. Describe procedures for protecting the scene of an accident. 01.11
    12. Describe personal liability requirements. 01.12
    13. Identify hazardous road conditions that are a potential threat to the safety of the truck driver. 01.13
    14. Describe activities and characteristics of other road users that make them potentially dangerous. 01.14
    15. Describe the potential consequences of excessive speed. 01.15
    16. Describe the potential consequences of use of drugs or alcohol. 01.16
    17. Describe and demonstrate safety procedures for entering and exiting vehicles. 01.17
0. Understand and comply with vehicle operating regulations.--The student will be able to: 02.0
    01. Understand and comply with Hours of Service regulations. 02.01
    02. Maintain a complete, neat and accurate driver's duty status log including discussion of electronic logs. 02.02
    03. Keep accurate records required by hours of service regulations. 02.03
    04. Review mathematical calculations necessary to recap and apply totals to the hours of service regulations. 02.04
    05. Determine driving hours remaining on a particular day or tour of duty. 02.05
    06. Understand and comply with applicable United States Department of Transportation regulations including Federal Motor Carrier Safety Administration rules and regulations - Compliance, Safety, and Accountability (CSA) particularly the role of drivers and motor carriers. 02.06

07. Understand and comply with Federal, State and local traffic laws including restrictions on vehicle size and weight including permits when required. 02.07

0. Demonstrate proper cargo handling and documentation procedures.--The student will be able to: 03.0

    01. Understand how to load and unload cargo safely and efficiently. 03.01
    02. Understand legal gross weight and axle weight. 03.02
    03. Describe cargo load to meet legal weight and safety requirements. 03.03
    04. Understand how to secure cargo using blocking, bracing, packing, rope, cable, chains and strapping. 03.04
    05. Identify types of hazardous cargoes. 03.05
    06. Understand the placement of placards when carrying hazardous materials. 03.06
    07. Understand procedure for use of common cargo handling equipment, including pallets, jacks, dollies, hand trucks, nets, slings, poles and other equipment. 03.07
    08. Understand categories of hazardous materials and the need for specialized training to handle hazardous materials. 03.08
    09. Understand hazardous materials documentation requirements. 03.09
    10. Verify nature, amount and condition of cargo on both pickup and delivery. 03.10
    11. Verify information on bill of lading and properly record and report discrepancies and damage to the cargo. 03.11
    12. Verify appropriate signatures on delivery receipts and other required forms. 03.12
    13. Compare door seal number against shipping document. 03.13
    14. Describe the handling of C.O.D. shipments. 03.14
    15. Comply with weigh station and other inspection station procedures. 03.15

0. Demonstrate trip planning preparation procedures.--The student will be able to: 04.0

    01. Check vehicle registration and permit. 04.01
    02. Check accident report packets for proper contents. 04.02
    03. Plan a route from one point to another that is optimal in terms of travel time, fuel costs, potential hazards and federal, state and local travel restrictions. 04.03
    04. Describe the use of manual and contemporary GPS navigation systems. 04.04
    05. Estimate travel times and arrange for a secure place for layovers, especially when transporting hazardous materials. 04.05
    06. Demonstrate map reading skills. 04.06
    07. Estimate fuel consumption and plan fuel stops. 04.07

08. Estimate expense money and obtain funds and/or credit cards. 04.08

0. Demonstrate vehicle inspection procedures.--The student will be able to: 05.0
    01. Check for previous days DVIR. 05.01
    02. Check general appearance and condition of vehicle. 05.02
    03. Check fuel, oil, water levels and automatic transmission fluid level and diesel emissions fluid (DEF). 05.03
    04. Check signal lights, stop lights and running lights. 05.04
    05. Check tires, rims and suspension. 05.05
    06. Check horn, windshield wipers, mirrors and reflectors. 05.06
    07. Check fifth wheel, trailer hook-up and brake lines. 05.07
    08. Check emergency bi-directional reflective triangles and fire extinguishers. 05.08
    09. Check instruments for normal readings. 05.09
    10. Check steering system, brake action and tractor protection valve. 05.10
    11. Check cargo-blocking, bracing and tie down. 05.11
    12. Perform enroute inspections. 05.12
    13. Perform post-trip inspection of vehicle and all systems. 05.13
0. Perform vehicle maintenance and servicing procedures.--The student will be able to: 06.0
    01. Describe function and operation of principle vehicle systems including, engine, engine auxiliary brake, drive train, coupling, suspension and electrical system, DEP engines, and regeneration processes where applicable. 06.01
    02. Check engine fuel, oil, DEF fluid, coolant, battery and filters. 06.02
    03. Check tire air pressure. 06.03
    04. Drain moisture from air brake supply reservoirs. 06.04
    05. Check brakes and related systems. 06.05
    06. Check fuses and reset circuit breakers. 06.06
    07. Clean interior and exterior of vehicle. 06.07
    08. Check mud/rain flaps. 06.08
    09. Review adjusting procedures for tandem and fifth-wheel slides, if so equipped. 06.09
0. Demonstrate basic vehicle control procedures.--The student will: 07.0
    01. Place transmission in neutral before starting engine. 07.01
    02. Start, warm up and shut down the engine, according to the manufacturer's specifications. 07.02
    03. Build full pressure (90-120 PSI) in air tanks or to governed cut-out. 07.03
    04. Test parking brake and service brake before moving/driving vehicle. 07.04

05. Coordinate use of accelerator and clutch to achieve smooth acceleration and avoid clutch abuse (if applicable). 07.05
06. Maintain proper engine RPM while driving (if applicable). 07.06
07. Properly modulate air brakes to bring vehicle to a smooth stop. 07.07
08. Properly shift up and down through all gears using clutch (if applicable). 07.08
09. Double clutch non-synchronized transmissions and time shift for smooth and fuel efficient performance (if applicable). 07.09
10. Select proper gear for speed and highway conditions (if applicable). 07.10
11. Operate manual, automatic or semiautomatic transmissions as available training equipment allows. 07.11
12. Coordinate steering, braking and acceleration to take the vehicle through a desired path forward and backward in a straight line. 07.12
13. Adequately judge the path trailer will take (off tracking) as vehicle negotiates left or right curves and turns. 07.13
14. Use clutch and gears to maintain proper operating range/power/RPM of the motor while slowing the vehicle (if applicable). 07.14
15. Park the vehicle, set brakes and shut off the engine. 07.15
16. Discuss chocking procedures. 07.16

0. Demonstrate backing skills and basic vehicle maneuvers.--The student will: 08.0
    01. Check area before and during backing. 08.01
    02. Properly utilize guides and mirrors. 08.02
    03. Properly back in straight line and curved paths. 08.03
    04. Properly back into both a 45° and 90°alley docks. 08.04
    05. Navigate through a 100 feet alley both forward and backward. 08.05
    06. Properly demonstrate an offset left/right backing maneuver. 08.06
    07. Properly position unit for backing into a loading dock. 08.07
    08. Properly back to a dock. (actual or simulated) 08.08
    09. Properly stop unit within 36 inches of the dock without contacting dock. (actual or simulated) 08.09
    10. Properly parallel park (sightside/blindside). 08.10
    11. Judge side, rear and overhead clearances and path of the trailer. 08.11
    12. Make a straight-in approach to an alley. 08.12
    13. Drive forward through an alley for 100 feet. 08.13
0. Demonstrate coupling and uncoupling skills.--The student will be able to: 09.0
    01. Reverse-steer and articulate a vehicle. 09.01
    02. Align the tractor properly to connect with trailer. 09.02

03. Back and secure the tractor properly into the trailer kingpin without damage. 09.03
04. Perform tug test against the locking mechanisms and visual checks to make sure coupling is secure. 09.04
05. Connect electrical and air lines properly. 09.05
06. Set in-cab air brake controls properly. 09.06
07. Retract and secure landing gear after coupling is secure. 09.07
08. Properly uncouple and secure the trailer. 09.08

0. Demonstrate road driving skills.--The student will be able to: 10.0
    01. Carefully enter traffic from a stopped or parked position. 10.01
    02. Use clutch and gears properly (if applicable). 10.02
    03. Proceed from a stopped position without rolling backward. 10.03
    04. Use mirrors properly. 10.04
    05. Signal intention to turn well in advance of turn. 10.05
    06. Get into proper lane to turn well in advance of turn. 10.06
    07. Check traffic conditions and turn only when intersection is clear. 10.07
    08. Restrict traffic from passing on right when preparing to complete a right hand turn. Maintain 3 feet or less on right side of vehicle. 10.08
    09. Execute a right hand turn maintaining 3 feet or less on right side of vehicle. 10.09
    10. Complete a turn promptly and safely and not impede other traffic. 10.10
    11. Select and shift to proper gear prior to beginning any turn (if applicable). 10.11
    12. Obey all traffic signals. 10.12
    13. Plan stop in advance and adjust speed correctly. 10.13
    14. Use brakes properly on grades. 10.14
    15. Plan stops far enough in advance to avoid hard braking. 10.15
    16. Stop clear of crosswalks. 10.16
    17. Come to a complete stop at all stop signs. 10.17
    18. Yield right of way at intersections having yield signs. 10.18
    19. Check for cross traffic regardless of traffic signals. 10.19
    20. Approach all intersections prepared to stop if necessary. 10.20
    21. Stop a minimum of 15 feet but not more than 50 feet before railroad grade crossing if stop is necessary. 10.21
    22. Select proper gear to avoid shifting gears on railroad grade crossing (if applicable). 10.22
    23. Determine sufficient space required for passing. 10.23

24. Pass only in safe locations. 10.24
25. Describe in detail how to pass safely on a two-lane highway. 10.25
26. Describe in detail how to pass safely on a four or more lane highway. 10.26
27. Signal lane changes before and after passing. 10.27
28. Pass only when appropriate to avoid impeding other traffic. 10.28
29. Return to right lane promptly, but only when safe to do so. 10.29
30. Observe speed limits. 10.30
31. Adjust speed properly to road, weather and traffic conditions. 10.31
32. Slowdown in advance of curves, danger zones and intersections. 10.32
33. Maintain consistent speed where possible. 10.33
34. Yield right of way. 10.34
35. Allow faster traffic to pass. 10.35
36. Understand or demonstrate the proper procedures for navigating a weigh station. 10.36
37. Use horn only when necessary. 10.37
38. Park only in legally permissible parking areas. 10.38
39. Check instruments at regular intervals. 10.39
40. Maintain proper engine RPM while driving. 10.40
41. Determine minimum front-to-rear distances when following other vehicles using industry recognized standards. 10.41

0. Demonstrate hazardous driving skills.--The student will be able to: 11.0
   01. Understand preparation for operation in cold weather. 11.01
   02. Demonstrate proper procedure for expelling moisture from the air tanks after each trip. 11.02
   03. Understand proper procedure for checking ice accumulation on brakes, slack adjuster, air hoses, electrical wiring and radiator shutters during operation. 11.03
   04. Perform operational adjustments necessary to maintain control in all weather conditions, including speed selection, braking and following distance. 11.04
   05. Describe procedures to check safe operation of brakes after driving through deep water. 11.05
   06. Perform proper use of windshield wipers, washers and defrosters to maintain visibility. 11.06
   07. Demonstrate the ability to recognize and evaluate changing road conditions that produce low traction, including initial rainfall, ice, snow and mud. 11.07
   08. Demonstrate or understand ability for recognizing conditions that produce low traction, including initial rainfall, ice, snow and mud. 11.08
   09. Describe and understand procedures to avoid skidding and jackknifing. 11.09

10. Understand procedures to avoid hydroplaning and describe the road and vehicle conditions that produce it. 11.10
11. Understand procedures for mounting and dismounting tire chains. 11.11
12. Understand procedures for extricating the vehicle from snow, sand and mud by maneuvering or towing. 11.12
13. Demonstrate ability to adjust rate of change in speed and direction to accommodate road conditions to avoid skidding. 11.13
14. Describe procedures required to coordinate acceleration and shifting to overcome the resistance of snow, sand and mud. 11.14
15. Demonstrate ability to perform brake checks on equipment prior to mountain driving. 11.15
16. Understand procedures required to use right lane or special truck lane going up grades. 11.16
17. Understand procedures required to place transmission in appropriate gear for engine braking before starting downgrade. 11.17
18. Understand procedures required to use proper braking techniques and maintain proper engine braking before starting downgrades. 11.18
19. Understand proper use of truck escape ramp when brakes fail on a downgrade. 11.19
20. Understand procedure required for observing temperature gauge frequently when pulling heavy loads up long grades. 11.20
21. Understand the effect of vehicle weight and speed upon braking and shifting ability on long downgrades. 11.21
22. Identify the meaning and use of percent of grade signs. 11.22
23. Understand bringing the truck to a stop in the shortest possible distance while maintaining directional control on a dry surface. 11.23
24. Understand procedures to make an evasive turn off the roadway and return to the roadway while maintaining directional control. 11.24
25. Understand procedures to bring the vehicle to a stop in the event of a brake failure. 11.25
26. Understand procedures to maintain control of the vehicle in the event of a blowout. 11.26
27. Understand procedures to bring truck to a stop in the shortest possible distance while maintaining directional control when operating on a slippery surface. 11.27
28. Understand procedures to recover from vehicle skids induced by snow, ice, water, oil, sand, wet leaves or other slippery surfaces. 11.28
29. Understand procedures to counter steer out of a skid in a way that will regain directional control and not produce another skid. 11.29
30. Understand procedure to operate brakes properly to provide maximum braking without loss of control. 11.30

0. Apply concepts learned for obtaining a Commercial Driver's License (CDL).--The student will be able to: `12.0`

    01. Demonstrate competence in performing basic Commercial Vehicle Driving skills utilizing the CDL testing criteria. `12.01`

    02. Demonstrate understanding and knowledge of Commercial Vehicle Driving Laws as required, to safely and legally operate a commercial vehicle. `12.02`

Diesel Maintenance Technician (T440400)

Diesel Preventative Maintenance Technology - Course Number: T440400

0. Proficiently explain and apply required shop and personal safety tasks.--The student will be able to: D.01.0
    01. Identify basic shop organization and management regulations. D.01.01
    02. Identify and apply general and required shop safety rules and procedures. D.01.02
    03. Utilize safe procedures for handling of tools and equipment. D.01.03
    04. Identify and use proper placement of floor jacks and jack stands. D.01.04
    05. Identify and use proper procedures for safe lift operation. D.01.05
    06. Utilize proper ventilation procedures for working within the lab/shop area. D.01.06
    07. Identify the location and the types of fire extinguishers and other fire safety equipment; demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment. D.01.07
    08. Identify the location and use of eye wash stations. D.01.08
    09. Identify and comply with the required use of Personal Protection Equipment (PPE) during lab/shop activities. D.01.09
    10. Secure hair and jewelry for lab/shop activities. D.01.10
    11. Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits. D.01.11
    12. Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.). D.01.12
    13. Locate and demonstrate knowledge of Safety Data Sheets (SDS). D.01.13
    14. Assist in activities and job tasks, in accordance with local, state, and federal safety and environmental regulations. D.01.14
    15. Identify and comply with personal and environmental safety practices associated with the handling, storage, and disposal of chemicals and hazardous materials. D.01.15
0. Identify the basic diesel components and functions.--The student will be able to: D.02.0
    01. Identify seals, gaskets, and bearings. D.02.01
    02. Identify drive train components and functions. D.02.02
    03. Identify threaded fasteners by size, type, thread series, thread classes, material hardness, and compatibility D.02.03
0. Explain and apply required tasks associated with the proper use and handling of tools and equipment.--The student will be able to: D.03.0
    01. Identify and demonstrate tools and their proper usage. D.03.01

02. Identify standard and metric designation. D.03.02

03. Demonstrate proper cleaning, storage, and maintenance of tools and equipment. D.03.03

04. Demonstrate proper use of precision measuring tools (i.e. micrometer, dial-indicator, dial-caliper, etc.). D.03.04

0. Identify principles, assemblies, and systems of engine operation.--The student will be able to: D.04.0

    01. Explain the basic principles in the operation of the four-stroke-cycle diesel engine D.04.01

    02. Identify engine assemblies and systems. D.04.02

    03. Identify the components of and explain the operating principles of a four-stroke-cycle engine. D.04.03

0. Demonstrate proficiency in preparing vehicle for routine pre/post maintenance and customer services.--The student will be able to: D.05.0

    01. Identify information needed and the service requested on a repair order. D.05.01

    02. Identify purpose and demonstrate proper use of fender covers, mats. D.05.02

    03. Demonstrate use of the three C's (Concern, Cause, and Correction). D.05.03

    04. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. D.05.04

    05. Ensure vehicle is prepared to return to customer per school/company policy (floor mats, steering wheel cover, etc.) D.05.05

    06. Describe a Federal Dept. of Transportation inspection requirement. D.05.06

    07. Demonstrate proper preventive maintenance (PE). D.05.07

0. Demonstrate workplace employability skills related to personal standards and work habits/ethics.--The student will be able to: D.06.0

    01. Reports to work daily on time; able to take directions and motivated to accomplish the task at hand. D.06.01

    02. Dresses appropriately and uses language and manners suitable for the workplace. D.06.02

    03. Maintains appropriate personal hygiene. D.06.03

    04. Meets and maintains employment eligibility criteria, such as drug/alcohol-free status, clean driving record, etc. D.06.04

    05. Demonstrates honesty, integrity and reliability. D.06.05

    06. Complies with workplace policies/laws D.06.06

    07. Contributes to the success of the team, assists others and requests help when needed. D.06.07

    08. Works well with all customers and coworkers. D.06.08

09. Negotiates solutions to interpersonal and workplace conflicts. D.06.09
10. Contributes ideas and initiative. D.06.10
11. Follows directions. D.06.11
12. Communicates (written and verbal) effectively with customers and coworkers. D.06.12
13. Reads and interprets workplace documents; writes clearly and concisely. D.06.13
14. Analyzes and resolves problems that arise in completing assigned tasks. D.06.14
15. Organizes and implements a productive plan of work. D.06.15
16. Uses scientific, technical, engineering and mathematics principles and reasoning to accomplish assigned tasks. D.06.16
17. Identifies and address the needs of all customers, providing helpful, courteous and knowledgeable service and advice as needed. D.06.17

Diesel Air Brakes Technician – Course Number: DIM0131

0. Diagnose and repair air supply and service systems.--The student will be able to: D.07.0
    01. Identify and diagnose poor stopping, air leaks, premature wear, pulling, grabbing, dragging, or balance problems caused by supply and service system malfunctions; determine needed action. D.07.01
    02. Check air system build-up time; determine needed action. D.07.02
    03. Drain air reservoir/tanks; check for oil, water, and foreign material; determine needed action. D.07.03
    04. Inspect air compressor drive gear, belts and coupling; adjust or replace as needed. D.07.04
    05. Inspect air compressor inlet; inspect oil supply and coolant lines, fittings, and mounting brackets; repair or replace as needed. D.07.05
    06. Inspect and test air system pressure controls: governor, unloader assembly valves, filters, lines, hoses, and fittings; replace as needed. D.07.06
    07. Inspect air system lines, hoses, fittings, and couplings; repair or replace as needed. D.07.07
    08. Inspect and test air tank relief (safety) valves, one-way (single) check valves, two-way (double) check-valves, manual and automatic drain valves; replace as needed. D.07.08
    09. Inspect and clean air drier systems, filters, valves, heaters, wiring, and connectors; repair or replace as needed. D.07.09
    10. Inspect and test brake application (foot/treadle) valve, fittings, and mounts; check pedal operation; replace as needed. D.07.10
    11. Inspect and test stop light circuit switches, wiring, and connectors; repair or replace as needed. D.07.11
    12. Inspect and test hand brake (trailer) control valve, lines, fittings, and mountings; repair or replace as needed. D.07.12
    13. Inspect and test brake relay valve; replace as needed. D.07.13
    14. Inspect and test quick rele valves; replace as needed. D.07.14
    15. Inspect and test tractor protection valve; replace as needed. D.07.15
    16. Inspect and test emergency (spring) brake control/modulator valve(s); replace as needed (as applicable). D.07.16
    17. Inspect and test low pressure warning devices, wiring, and connectors; repair or replace as needed. D.07.17
    18. Inspect and test air pressure gauges, lines, and fittings; replace as needed. D.07.18
0. Diagnose and repair mechanical/foundation air brake systems.--The student will be able to: D.08.0

01. Identify and diagnose poor stopping, brake noise, premature wear, pulling, grabbing, or dragging problems caused by the foundation brake, slack adjuster, and brake chamber problems; determine needed action. D.08.01

02. Inspect and test service brake chambers, diaphragm, clamp, spring, pushrod, clevis, and mounting brackets; repair or replace as needed. D.08.02

03. Identify type, inspect and service slack adjusters; perform needed action. D.08.03

04. Inspect camshafts, tubes, rollers, bushings, seals, spacers, retainers, brake spiders, shields, anchor pins, and springs; replace as needed. D.08.04

05. Inspect, clean, and adjust air disc brake caliper assemblies; determine needed repairs. D.08.05

06. Inspect and measure brake shoes or pads; perform needed action. D.08.06

07. Inspect and measure brake drums or rotors; perform needed action. D.08.07

0. Diagnose and repair parking brakes.--The student will be able to: D.09.0

01. Inspect and test parking (spring) brake chamber diaphragm and seals; replace parking (spring) brake chamber; dispose of removed chambers in accordance with local regulations. D.09.01

02. Inspect and test parking (spring) brake check valves, lines, hoses, and fittings; replace as needed. D.09.02

03. Inspect and test parking (spring) brake application and rele valve; replace as needed. D.09.03

04. Manually rele (cage) and reset (uncage) parking (spring) brakes in accordance with manufacturers' recommendations. D.09.04

05. Identify and test anti compounding brake function. D.09.05

0. Diagnose and repair air and hydraulic antilock brake systems (ABS) and automatic traction control (ATC).--The student will be able to: D.10.0

01. Observe antilock brake system (ABS) warning light operation (includes trailer and dash mounted ABS warning light); determine needed action. D.10.01

02. Diagnose antilock brake system (ABS) electronic control(s) and components using self-diagnosis and/or electronic service tool(s); determine needed action. D.10.02

03. Identify poor stopping and wheel lock-up caused by failure of the antilock brake system (ABS); determine needed action. D.10.03

04. Test and check operation of antilock brake system (ABS) air, hydraulic, electrical, and mechanical components; perform needed action. D.10.04

05. Test antilock brake system (ABS) wheel speed sensors and circuits; adjust or replace as needed. D.10.05

06. Bleed the ABS hydraulic circuits according to manufacturers' procedures. D.10.06

07. Observe automatic traction control (ATC) warning light operation; determine needed action. D.10.07

08. Diagnose automatic traction control (ATC) electronic control(s) and components using self-diagnosis and/or specified test equipment (scan tool, PC computer); determine needed action. D.10.08

09. Verify power line carrier (PLC) operations. D.10.09

10. Diagnose, service, and adjust antilock brake system (ABS) wheel speed sensors and circuits following manufacturers' recommended procedures (including voltage output, resistance, shorts to voltage/ground, and frequency data). D.10.10

0. Diagnose and repair wheel bearings.--The student will be able to: D.11.0

    01. Clean, inspect, lubricate and replace wheel bearings and races/cups; replace seals and wear rings; inspect spindle/tube; inspect and replace retaining hardware; adjust wheel bearings. Verify end play with dial indicator method. D.11.01

    02. Identify, inspect or replace unitized/preset hub bearing assemblies. D.11.02

Diesel Preventative Maintenance Technician – Course Number: DIM0153

0. Inspect and service Engine Systems record findings.--The student will be able to: D.12.0
    01. Check engine starting/operation (including unusual noises, vibrations, exhaust smoke, etc.); record idle and governed rpm. D.12.01
    02. Inspect vibration damper. D.12.02
    03. Inspect belts, tensioners, and pulleys; check and adjust belt tension; check belt alignment. D.12.03
    04. Check engine oil level and condition; check dipstick seal. D.12.04
    05. Inspect engine mounts for looseness and deterioration. D.12.05
    06. Check engine for oil, coolant, air, fuel and exhaust leaks (Engine Off and Running). D.12.06
    07. Check engine compartment wiring harnesses, connectors, and seals for damage and proper routing. D.12.07
    08. Check electrical wiring, routing, and hold-down clamps, including Engine Control Module/Powertrain Control Module (ECM/PCM). D.12.08
0. Diagnose and repair Fuel System.--The student will be able to: D.13.0
    01. Check fuel tanks, mountings, lines, caps, and vents. D.13.01
    02. Drain water from fuel system. D.13.02
    03. Service water separator/fuel heater; replace fuel filter(s); prime and bleed fuel system. D.13.03
0. Diagnose and repair Air Induction and Exhaust System.--The student will be able to: D.14.0
    01. Check exhaust system mountings for looseness and damage. D.14.01
    02. Check engine exhaust system for leaks, proper routing, and damaged or missing components to include exhaust gas recirculation (EGR) system and after treatment devices, if equipped. D.14.02
    03. Check air induction system: piping, charge air cooler, hoses, clamps, and mountings; check for air restrictions and leaks. D.14.03
    04. Inspect turbocharger for leaks; check mountings and connections. D.14.04
    05. Check operation of engine compression/exhaust brake. D.14.05
    06. Service or replace air filter as needed; check and reset air filter restriction indicator. D.14.06
    07. Inspect and service crankc ventilation system. D.14.07
    08. Inspect diesel exhaust fluid (DEF) system, to include tanks, lines, gauge pump, and filter (if equipped). D.14.08
    09. Inspect selective catalyst reduction (SCR) system; including diesel exhaust fluid (DEF) for proper levels, leaks, mounting and connections (if equipped). D.14.09

0. Diagnose and repair Cooling System.--The student will be able to: D.15.0
    01. Check operation of fan clutch. D.15.01
    02. Inspect radiator (including air flow restriction, leaks, and damage) and mountings. D.15.02
    03. Inspect fan assembly and shroud. D.15.03
    04. Pressure test cooling system and radiator cap. D.15.04
    05. Inspect coolant hoses and clamps. D.15.05
    06. Inspect coolant recovery system. D.15.06
    07. Identify type of coolant and check for contamination, additive package concentration, aeration, and protection level (freeze point). D.15.07
    08. Service coolant filter (if equipped). D.15.08
    09. Inspect water pump. D.15.09
0. Diagnose and repair Lubrication System.--The student will be able to: D.16.0
    01. Change engine oil and filters; visually check oil for coolant or fuel contamination; inspect and clean magnetic drain plugs. D.16.01
    02. Take an engine oil sample for analysis. D.16.02
0. Diagnose and repair Instruments and control systems.--The student will be able to: D.17.0
    01. Inspect key condition and operation of ignition switch. D.17.01
    02. Check warning indicators. D.17.02
    03. Check instruments; record oil pressure and system voltage. D.17.03
    04. Check operation of electronic power take off (PTO) and engine idle speed controls (if applicable) D.17.04
    05. Check HVAC controls. D.17.05
    06. Check operation of all accessories. D.17.06
    07. Using electronic service tool(s) or on-board diagnostic system; retrieve engine monitoring information; check and record diagnostic codes and trip/operational data (including engine, transmission, ABS, and other systems). D.17.07
    08. Check mechanical and electronic speed controls (if equipped). D.17.08
0. Diagnose and repair Safety Equipment.--The student will be able to: D.18.0
    01. Check operation of electric/air horns and back-up warning devices. D.18.01
    02. Check condition of spare fuses, safety triangles, fire extinguisher, and all required decals. D.18.02
    03. Inspect seat belts and sleeper restraints. D.18.03
    04. Inspect wiper blades and arms. D.18.04
0. Diagnose and repair hardware.--The student will be able to: D.19.0
    01. Check operation of wiper and washer. D.19.01

02. Inspect windshield glass for cracks or discoloration; check sun visor. D.19.02
03. Check seat condition, operation, and mounting. D.19.03
04. Check door glass and window operation. D.19.04
05. Inspect steps, catwalks, and grab handles (if applicable). D.19.05
06. Inspect mirrors, mountings, brackets, and glass. D.19.06
07. Record all observed physical damage. D.19.07
08. Lubricate all cab and hood gre fittings. D.19.08
09. Inspect and lubricate door and hood hinges, latches, strikers, lock cylinders, safety latches, linkages, and cables. D.19.09
10. Inspect cab mountings, hinges, latches, linkages and ride height; service as needed. D.19.10

0. Diagnose and repair Heating, Ventilation, and Air Conditioning (HVAC).--The student will be able to: D.20.0
    01. Inspect A/C condenser and lines for condition and visible leaks; check mountings. D.20.01
    02. Inspect A/C compressor and lines for condition and visible leaks; check mountings. D.20.02
    03. Check A/C system condition and operation; check A/C monitoring system, if applicable. D.20.03
    04. Check HVAC air inlet filters and ducts; service as needed. D.20.04
0. Diagnose and repair Electrical/Electronic battery and starting systems.--The student will be able to: D.21.0
    01. Inspect battery box(es), cover(s), and mountings. D.21.01
    02. Inspect battery hold-downs, connections, cables, and cable routing; service as needed. D.21.02
    03. Identify type of battery 9Flooded cell, AGM, etc.). D.21.03
    04. Check/record battery state-of-charge (open circuit voltage) and condition. D.21.04
    05. Perform battery test (load and/or capacitance). D.21.05
    06. Inspect starter, mounting, and connections. D.21.06
    07. Engage starter; check for unusual noises, starter drag, and starting difficulty. D.21.07
0. Diagnose and repair Electrical/Electronic charging systems.--The student will be able to: D.22.0
    01. Inspect alternator, mountings, cable, wiring, and wiring routing; determine needed action. D.22.01
    02. Perform alternator output tests. D.22.02
0. Diagnose and repair Electrical/Electronic lighting systems.--The student will be able to: D.23.0

01. Check operation of interior lights; determine needed action. D.23.01

02. Check all exterior lights, lenses, reflectors, and conspicuity tape; check headlight alignment; determine needed action. D.23.02

03. Inspect and test tractor-to-trailer multi-wire connector(s), cable(s), and holder(s); determine needed action. D.23.03

0. Diagnose and repair Air brake systems.--The student will be able to: D.24.0

01. Check operation of parking brake. D.24.01

02. Record air governor cut-in and cut-out setting (psi). D.24.02

03. Check operation of air reservoir/tank drain valves; drain air tanks and check for contamination. D.24.03

04. Check air system for leaks (brakes reled). D.24.04

05. Check air system for leaks (brakes applied). D.24.05

06. Test one-way and double-check valves. D.24.06

07. Check low air pressure warning devices. D.24.07

08. Check emergency (spring) brake control/modulator valve, if applicable. D.24.08

09. Check tractor protection valve. D.24.09

10. Test air pressure build-up time. D.24.10

11. Inspect coupling air lines, holders, and glad-hands. D.24.11

12. Check brake chambers and air lines for secure mounting and damage. D.24.12

13. Check operation of air drier. D.24.13

14. Inspect and record brake shoe/pad condition, thickness, and contamination. D.24.14

15. Inspect and record condition of brake drums/rotors. D.24.15

16. Check antilock brake system wiring, connectors, seals, and harnesses for damage and proper routing D.24.16

17. Check operation and adjustment of brake automatic slack adjusters (ASA); check and record push rod stroke. D.24.17

18. Lubricate all brake component gre fittings. D.24.18

19. Check condition and operation of hand brake (trailer) control valve, if applicable. D.24.19

20. Perform antilock brake system (ABS) operational system self-test. D.24.20

21. Check condition of pressure relief (safety) valves. D.24.21

0. Diagnose and repair Hydraulic brake systems.--The student will be able to: D.25.0

01. Check master cylinder fluid level and condition. D.25.01

02. Inspect brake lines, fittings, flexible hoses, and valves for leaks and damage. D.25.02

03. Check parking brake operation; inspect parking brake application and holding devices; adjust as needed. D.25.03
04. Check operation of hydraulic system: pedal travel, pedal effort, pedal feel. D.25.04
05. Inspect calipers for leakage, binding and damage. D.25.05
06. Inspect brake assist system (booster), hoses and control valves; check for leaks. D.25.06
07. Inspect and record brake lining/pad condition, thickness, and contamination. D.25.07
08. Inspect and record condition of brake rotors. D.25.08
09. Check antilock brake system wiring, connectors, seals, and harnesses for damage and proper routing. D.25.09
10. Check drum brakes for proper adjustment. D.25.10

0. Inspect, service and record Drive Train systems.--The student will be able to: D.26.0
    01. Check operation of clutch, clutch brake, and gearshift. D.26.01
    02. Check clutch linkage/cable for looseness or binding, if applicable. D.26.02
    03. Check hydraulic clutch slave and master cylinders, lines, fittings, and hoses, if applicable. D.26.03
    04. Check clutch adjustment; adjust as needed. D.26.04
    05. Check transmission c, seals, filter, hoses, lines and cooler for cracks and leaks. D.26.05
    06. Inspect transmission breather. D.26.06
    07. Inspect transmission mounts. D.26.07
    08. Check transmission oil levels, condition, determine proper type; service as needed. D.26.08
    09. Inspect U-joints, yokes, driveshafts, boots/seals, center bearings, and mounting hardware for looseness, damage, and proper phasing. D.26.09
    10. Inspect axle housing(s) for cracks and leaks. D.26.10
    11. Inspect axle breather(s). D.26.11
    12. Lubricate all drivetrain gre fittings. D.26.12
    13. Check drive axle(s) oil level, condition, determine proper type; service as needed. D.26.13
    14. Change drive axle(s) oil and filter/screen, if applicable; check and clean magnetic plugs. D.26.14
    15. Check transmission wiring, connectors, seals, and harnesses for damage and proper routing. D.26.15
    16. Change transmission oil and filter, if applicable; check and clean magnetic plugs. D.26.16
    17. Check inter-axle differential lock operation. D.26.17

18. Check transmission range shift operation. D.26.18

0. Diagnose and repair Suspension and steering systems.--The student will be able to: D.27.0

    01. Check steering wheel operation for free play and binding. D.27.01

    02. Check power steering pump, mounting, and hoses for leaks, condition, and routing; check fluid level. D.27.02

    03. Change power steering fluid and filter. D.27.03

    04. Inspect steering gear for leaks and secure mounting. D.27.04

    05. Inspect steering shaft U-joints, pinch bolts, splines, pitman arm-to-steering sector shaft, tie rod ends, and linkages. D.27.05

    06. Check kingpins for wear. D.27.06

    07. Check wheel bearings for looseness and noise; adjust as necessary. D.27.07

    08. Check oil level and condition in all non-drive hubs; check for leaks. D.27.08

    09. Inspect springs, pins, hangers, shackles, spring U-bolts, and insulators. D.27.09

    10. Inspect shock absorbers for leaks and secure mounting. D.27.10

    11. Inspect air suspension springs, mounts, hoses, valves, linkage, and fittings for leaks and damage. D.27.11

    12. Check and record suspension ride height. D.27.12

    13. Lubricate all suspension and steering gre fittings. D.27.13

    14. Check axle locating components (radius, torque, and/or track rods). D.27.14

0. Diagnose and repair Tires and wheels.--The student will be able to: D.28.0

    01. Inspect tires for wear patterns and proper mounting. D.28.01

    02. Inspect tires for cuts, cracks, bulges, and sidewall damage. D.28.02

    03. Inspect valve caps and stems; determine needed action. D.28.03

    04. Measure and record tread depth; probe for imbedded debris. Check tire matching (diameter and tread) on single and dual tire applications. D.28.04

    05. Check and record air pressure; adjust air pressure in accordance with manufacturers' specifications. D.28.05

    06. Check wheel mounting hardware condition; determine needed action. D.28.06

    07. Inspect wheel/rims for proper application, load range and design; ensure dual rims are properly clocked to access valve stems; determine needed action. D.28.07

    08. Re-torque lugs in accordance with manufacturer's specifications. D.28.08

0. Diagnose and repair Frame and fifth wheel.--The student will be able to: D.29.0

    01. Inspect fifth wheel mounting, bolts, air lines, and locks. D.29.01

    02. Test operation of fifth wheel locking device; adjust if necessary. D.29.02

    03. Check quarter fenders, mud flaps, and brackets. D.29.03

04. Check pintle hook assembly and mounting; if applicable. D.29.04
05. Lubricate all fifth wheel gre fittings and plate; if applicable D.29.05
06. Inspect frame and frame members for cracks and damage. D.29.06

Global Logistics and Supply Chain Technology (T300100)

Packer – Course Number: TRA0180

0. Demonstrate an understanding of global logistics and supply chain.--The student will be able to: GL.01.0
    01. Discuss the history, career fields, and benefits of the global supply chain industry. GL.01.01
    02. Describe principal elements of the logistics environment and logistics systems. GL.01.02
    03. Explore career pathways within global logistics and supply chain. GL.01.03
    04. Explain ways in which handling of product throughout supply chain logistics affects company's viability and profitability. GL.01.04
    05. Define basic principles of cost effectiveness throughout supply chain logistics. GL.01.05
    06. Define basic principles of just-in-time purchasing and inventory control. GL.01.06
    07. Identify major security requirements applicable to the logistics environment. GL.01.07
    08. Cite examples of environmental and financial impacts of logistics activities. GL.01.08
    09. Describe the alignment between the supply chain strategy and business strategy. GL.01.09
    10. Define basic principles of customs, free trade and international issues in Supply Chain Management, including foreign trade zones and why they exist. GL.01.10
    11. Describe factors in the marketplace that can impact decision making. GL.01.11
    12. Identify local chambers of commerce as well as industry professional associations. GL.01.12
0. Demonstrate an understanding of transportation systems.--The student will be able to: GL.02.0
    01. Identify various transportation modes, and what authority (local or national) regulates each one. GL.02.01
    02. Describe and contrast the different modes of transportation and their advantages/disadvantages. GL.02.02
    03. List the main considerations in determining the best mode. GL.02.03
    04. Explain how to use the information on performance and costs for mode selection to enhance rapid decision making. GL.02.04
    05. Give examples of transportation documentation, dispatch, routing and tracking. GL.02.05
    06. Describe and assess global freight transportation systems. GL.02.06
    07. Describe the government's involvement in transportation and explain freight transportation laws, regulations, and policies. GL.02.07

08. Determine which transportation method is most appropriate for various situations. GL.02.08

0. Demonstrate professional communication skills.--The student will be able to: GL.03.0

01. Show effective methods for communications between shifts. GL.03.01
02. Identify effective communications to both internal and external customers. GL.03.02
03. Identify ways to elicit clear statements of customer requirements and specifications. GL.03.03
04. Provide examples of effective written communications in logistics/supply chain workplace. GL.03.04
05. Provide examples of effective oral communications in logistics/supply chain workplace. GL.03.05
06. Demonstrate an understanding of teamwork and good professional workplace behavior to solve problems. GL.03.06
07. Describe a high-performance team. GL.03.07
08. List characteristics of an effective team member. GL.03.08
09. Explain ways to set team goals. GL.03.09
10. Identify use of team environment to solve problems and resolve conflicts. GL.03.10
11. Describe typical requirements for good workplace conduct. GL.03.11
12. Demonstrate understanding of social media platforms. GL.03.12
13. Read and comprehend technical and non-technical reading assignments related to course content, including, books, magazines and electronic sources. GL.03.13
14. Use listening, speaking, telecommunication and nonverbal skills and strategies to communicate effectively with supervisors, co-workers, and customers. GL.03.14
15. Apply the writing process to the creation of appropriate documents following designated business formats. (e.g., note taking, research, MLA/APA) GL.03.15
16. Demonstrate an awareness of project management concepts and tools. (e.g., timelines, deadlines, resource allocation, time management, delegation of tasks, collaboration) GL.03.16

0. Demonstrate customer service skills.--The student will be able to: GL.04.0

01. Exhibit acceptable workplace dress or attire, including safety clothing requirements where applicable. GL.04.01
02. Exhibit punctuality, initiative, courtesy, loyalty, and honesty. GL.04.02
03. Use a personality inventory for personal improvement. GL.04.03
04. Exhibit the ability to get along with others. GL.04.04

05. Discuss the importance of human relations. GL.04.05
06. Develop and demonstrate the unique human relations skills needed for successful entry and progress in the customer service occupations or marketing occupations selected as a career objective. GL.04.06
07. Differentiate between an acceptable and an unacceptable code of business ethical conduct. GL.04.07
08. Compare and contrast various international business customs. GL.04.08

Material Handler – Course Number: TRA0181

0. Demonstrate knowledge and skill of information technology applications related to logistics and supply chain management.--The student will be able to: GL.05.0
    01. Describe the impact of technology on society. GL.05.01
    02. Develop keyboarding skills to enter and manipulate text and data. GL.05.02
    03. Explain main uses of computer systems by front-line workers. GL.05.03
    04. Identify technologies used to capture and store logistics information. GL.05.04
    05. Explain the concepts and use of various information technologies in logistics. GL.05.05
    06. Research, describe, access, and evaluate Internet-based business models. GL.05.06
    07. Describe and use current and emerging computer technologies and software to perform business tasks. GL.05.07
    08. Identify and describe types of file systems and classify common file extensions based on software application programs. GL.05.08
    09. Use reference materials. (e.g. on-line help, tutorials, manuals, vendor bulletin boards) GL.05.09
    10. Demonstrate basic computer file management skills and file naming conventions to accurately organize files into hierarchies by labeling file folders for easy accessibility. GL.05.10
    11. Describe and understand the general architecture of a microcomputer system. GL.05.11
    12. Discuss the process of troubleshooting problems with computer hardware, input and output devices. GL.05.12
    13. Differentiate between diagnosing and troubleshooting. GL.05.13
    14. Explain the need for and use of peripherals. GL.05.14
    15. Describe ethical issues and problems associated with computers and information systems, including federal laws against anti-piracy with computers and PC software security protection. GL.05.15
    16. Demonstrate proficiency with file management and structure. (e.g., folder creation file creation, backup copy, delete, open, save) GL.05.16
    17. Compare and contrast various computer operating systems. GL.05.17
    18. Select and apply an information technology application for procurement, acquisition, logistics, and supply chain management. GL.05.18
0. Demonstrate knowledge and skill of common software applications.--The student will be able to: GL.06.0
    01. Compare and contrast the appropriate use of various software applications. (e.g., word processing, desktop publishing, graphics design, web browser, e-mail, presentation, database, scheduling, financial management, Java applet, music) GL.06.01

02. Demonstrate the use of various software applications. (e.g., word processing, desktop publishing, graphics design, web browser, e-mail, presentation, database, scheduling, financial management, Java applet, music) GL.06.02

0. Demonstrate knowledge and skill in using technology to enhance the effectiveness of communication skills utilizing word processing applications.--The student will be able to: GL.07.0

    01. Select and use word processing software and accompanying features to enhance written business communications. GL.07.01

    02. Share and maintain documents by applying different views and protection to a document and manage document versions. GL.07.02

    03. Share and save a document and apply a template. (e.g., pdf, html, blog, hyperlinks) GL.07.03

    04. Format content to a document by applying font, paragraph attributes, indent and tab settings to text and paragraphs. GL.07.04

    05. Apply spacing settings to text and paragraphs. GL.07.05

    06. Navigate and search through a document, create and manipulate tables. GL.07.06

    07. Apply page layout and reusable content by editing and manipulating page setup settings and applying themes. GL.07.07

    08. Create and manipulate page backgrounds, headers and footers. GL.07.08

    09. Use image design theory and software to create illustrations, shapes, and graphics and include a selection in a document. GL.07.09

    10. Insert and format graphic images. GL.07.10

    11. Apply and manipulate text boxes. GL.07.11

    12. Proofread documents by validating content through the use of spell and grammar check. GL.07.12

    13. Configure autocorrect settings, insert and modify comments in a document. GL.07.13

    14. Apply references and hyperlinks, create end and footnotes, and create a table of contents in a document. GL.07.14

    15. Perform various mail merge options, macros and tracking revisions GL.07.15

0. Demonstrate knowledge and skill in using technology to enhance communication skills utilizing presentation applications.--The student will be able to: GL.08.0

    01. Manage and configure the presentation software environment, including: adjusting views, manipulating window, configuring toolbar and file options. GL.08.01

    02. Create slide presentations utilizing various project development elements, including: adding and removing slides, slide layouts, format slide design, insert or format placeholders. GL.08.02

03. Locate, create and incorporate graphical and multimedia elements, including: shapes, graphics, images, bullets, hyperlinks, video, and audio into a slide presentation appropriate for the project. GL.08.03

04. Explore and apply design and color theory to create dynamic and appealing visuals. GL.08.04

05. Create and manipulate graphical and multimedia elements to improve or develop new contacts appropriate for the project, including: creation of images, color selections, tone, hue and contrast. GL.08.05

06. Demonstrate various business-related elements that can be created, embedded and manipulated in a slide presentation, including: charts, graphs, tables, spreadsheets, flowcharts, and organizational charts. GL.08.06

07. Apply slide transitions and create custom animations to slide presentations appropriate for the target audience. GL.08.07

08. Demonstrate different delivery methods for slide presentations, including: packaging for CD delivery, video projection – on mouse click, rehearsed timings, printing options - outlines, handouts, slides and notes. GL.08.08

0. Demonstrate knowledge and skill in using technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.--The student will be able to: GL.09.0

    01. Manage the worksheet environment by navigating through and printing a worksheet. GL.09.01

    02. Personalize the environment by manipulating the ribbon tabs, group settings, importing data/database, manipulating properties, files and folders. GL.09.02

    03. Create cell data, apply auto fill and hyperlinks. GL.09.03

    04. Format cells and worksheets by applying cell formats, merging and splitting cells, create row and column titles, hide and unhide column titles, rows and columns. GL.09.04

    05. Manipulate page set up options. GL.09.05

    06. Create and apply cell styles. GL.09.06

    07. Manage worksheets and workbooks by creating and formatting worksheets and manipulating views/themes. GL.09.07

    08. Apply formulas and functions by creating formulas, enforcing precedence and cell formula references. GL.09.08

    09. Apply conditional formula logic, name and cell ranges. GL.09.09

    10. Demonstrate data visually by creating and modifying charts and images. (e.g., pivot tables) GL.09.10

    11. Share worksheet data through email, changing file type and different versions. (e.g., mail merge) GL.09.11

    12. Analyze and organize data through filters, sorting and applying conditional formatting. (e.g., macros) GL.09.12

    13. Create different forms for inputting data into a database application. GL.09.13

14. Interpret queries for specialized reports using a database application. GL.09.14
15. Interpret data on line graphs, pie charts, diagrams, and tables commonly used in spreadsheet software applications that incorporate industry data. GL.09.15

0. Demonstrate knowledge and skill in using technology to enhance communication skills utilizing electronic mail.--The student will be able to: GL.10.0
    01. Describe and perform e-mail capabilities and functions. GL.10.01
    02. Create and send messages, manage signature and automated messages. GL.10.02
    03. Save, send, schedule, and manage junk mail, e-mail and spam. GL.10.03
    04. Configure message sensitivity, security and delivery options. GL.10.04
    05. Use the Internet to perform e-mail activities, including: attaching external files, saving e-mail attachments, viewing mailbox details, establishing appointments, creating contact groups, and sending a meeting to a contact group to communicate in the workplace. GL.10.05
    06. Manage tasks and organize information. (e.g., forward e-mail) GL.10.06
0. Demonstrate proficiency using computer networks, internet, and online databases to facilitate collaborative communication.--The student will be able to: GL.11.0
    01. Demonstrate how to connect to the Internet and use appropriate Internet protocol. GL.11.01
    02. Identify and describe web terminology, addresses and how browsers work. GL.11.02
    03. Demonstrate proficiency using basic features of GUI browsers, including: bookmarks, basic configurations, e-mail configurations, and address books. GL.11.03
    04. Describe appropriate browser security configurations. GL.11.04
    05. Describe information technology terminology, including Internet, intranet, ethics, copyright laws, and regulatory control. GL.11.05
    06. Demonstrate proficiency using search engines and search tools. GL.11.06
    07. Use various web tools, including: downloading files, transfer of files, telnet, PDF, plug-ins, cloud-based storage, and data compression. GL.11.07
    08. Identify and use Boolean search strategies. GL.11.08
    09. Understand and apply level one Universal Resource Locator (URL) and associated protocols (e.g., .com, .org, .edu, .gov, .net, etc.) GL.11.09
    10. Explain the need for web-based applications. (dangers of piracy, copyright, plagiarism) GL.11.10
    11. Describe appropriate use of social networking sites and applications, blogs and collaborative tools for file sharing. GL.11.11
    12. Describe web applications, including sharing photos and video clips, messaging, chatting and collaborating. GL.11.12

0. Develop an awareness of emerging technologies.--The student will be able to: GL.12.0

    01. Compare and contrast emerging technologies and describe how they impact business in the global marketplace. (e.g., wireless, wireless web, cell phones, portables/handhelds, smart appliances, home networks, peer-to-peer, robotics, unmanned aerial systems, etc.) GL.12.01

0. Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.--The student will be able to: GL.13.0

    01. Analyze personal skills and aptitudes in comparison with various business related job and career options. GL.13.01

    02. Use career resources to develop an information base that reflects local and global business related occupations and opportunities for continuing education and workplace experience. GL.13.02

    03. Demonstrate job-seeking skills required for entry-level employment. (e.g., resume, cover letter, thank you letter, online/hard copy application, company research, mock interview, and follow-up call) GL.13.03

    04. Design, initiate, refine and implement a plan to facilitate growth and skill development related to anticipated job requirements and career expectations. GL.13.04

    05. Demonstrate an awareness of specific job requirements and career paths (e.g., requirements, characteristics needed) in business environments. GL.13.05

    06. Demonstrate an awareness of the potential impact of local and global trends on career plans and life goals. GL.13.06

    07. Describe the importance of building community and mentor relationships in a variety of professional and workplace situations. GL.13.07

    08. Simulate work-based projects in an information technology environment. GL.13.08

0. Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.--The student will be able to: GL.14.0

    01. Demonstrate awareness of the following workplace essentials: Quality customer service; business ethics; confidentiality of information; copyright violations; accepted workplace rules, regulations, policies, procedures, processes, and workplace safety, and appropriate attire and grooming. GL.14.01

    02. Demonstrate ways of accepting constructive criticism on team projects within the workplace. GL.14.02

    03. Apply appropriate strategies to manage and resolve conflicts in work situations. GL.14.03

    04. Demonstrate human relations, personal and interpersonal skills appropriate for the workplace, including: responsibility, dependability, punctuality, integrity, positive attitude, initiative, respect for self and others, and professional dress. GL.14.04

05. Demonstrate awareness of international business cultures. GL.14.05

Information Technology Assistant - Course Number: OTA0040

0. Demonstrate knowledge, skill, and application of information technology to accomplish job objectives and enhance workplace performance. The student will be able to: ITA.01.0
    01. Develop keyboarding skills to enter and manipulate text and data. ITA.01.01
    02. Describe and use current computer technology and software to perform personal and business related tasks in the workplace (e.g., e-mail, digital calendars, meetings, appointments). ITA.01.02
    03. Differentiate between types of file systems and classify common file extensions based on software application programs used in the workplace environment. ITA.01.03
    04. Utilize the Internet to find reliable resources and reference materials (e.g., on-line help, tutorials, manuals). ITA.01.04
    05. Apply research strategies to use and evaluate electronic research technologies for valid and reliable information. ITA.01.05
    06. Demonstrate basic computer file management skills (e.g., naming, saving, retrieving, and organizing). ITA.01.06
    07. Analyze the process of troubleshooting problems with computer hardware peripherals, including input and output devices. ITA.01.07
    08. Describe ethical issues and problems associated with computers and information technology (e.g., fair use, privacy, public domain, copyright, piracy, plagiarism). ITA.01.08
    09. Explain the history and purpose of various operating systems (e.g., DOS, Windows, Mac, and Unix/Linux). ITA.01.09
0. Develop an awareness of microcomputers. The student will be able to: ITA.02.0
    01. Explain the general architecture of a microcomputer system. ITA.02.01
    02. Explain the need for and demonstrate proficiency using common peripherals (e.g., printers, mouse, keyboard, external hard drive, flash drive). ITA.02.02
    03. Examine the concepts of computer maintenance and upgrades. ITA.02.03
0. Demonstrate an understanding of networks. The student will be able to: ITA.03.0
    01. Differentiate between types of networks and how they work (e.g., clients, servers, Wi-Fi, teleconference) ITA.03.01
    02. Identify security needs within a network environment (e.g., antivirus software, passwords). ITA.03.02
    03. Distinguish between intranets, extranets and how they relate to the Internet. ITA.03.03
    04. Demonstrate basic understanding of cloud computing. ITA.03.04
0. Use word processing applications to enhance the effectiveness of various types of documents and communication. The student will be able to: ITA.04.0

01. Select and use word processing software and accompanying features to create and enhance various written business communications (e.g., memos, reports, block business letters). ITA.04.01
02. Save and export documents in various formats (e.g., pdf, html, blog, hyperlinks). ITA.04.02
03. Format text content in a document (e.g., font, paragraph attributes, spacing, text styles, text boxes). ITA.04.03
04. Manipulate page layout and reusable content (e.g., page setup, themes, templates, page backgrounds, headers and footers). ITA.04.04
05. Perform various image-editing tasks using word-processing software to create and format images, illustrations, shapes, etc. ITA.04.05
06. Proofread and revise documents by validating content through the use of word processing tools (e.g. spell check, thesaurus, find/replace, autocorrect settings). ITA.04.06
07. Insert citations and hyperlinks, create end and footnotes, and create a table of contents in a document. ITA.04.07
08. Perform various mail merge options, macros and tracking revisions. ITA.04.08
09. Demonstrate an understanding of fonts (serif and sans serif) and font styles (bold, italic, etc.) ITA.04.09

0. Use presentation applications to enhance communication skills. The student will be able to: ITA.05.0
    01. Manage and configure the presentation software environment (e.g., adjusting views, manipulating slide settings, configuring toolbar and file options). ITA.05.01
    02. Use presentation software to format and edit slides (e.g., adding and removing slides, slide layouts, format slide design, insert or format placeholders). ITA.05.02
    03. Locate, create and incorporate graphical and multimedia elements, including: shapes, graphics, images, bullets, hyperlinks, video, and audio into a slide presentation. ITA.05.03
    04. Enhance overall visual presentation by applying font selection, design themes, color schemes, templates, etc. ITA.05.04
    05. Create and manipulate graphical and multimedia elements using additional styles and effects (e.g., color selections, tone, contrast, shadows, picture styles). ITA.05.05
    06. Demonstrate various business-related elements that can be created, embedded and manipulated in a slide presentation, including: charts, graphs, tables, media, spreadsheets, and illustrations. ITA.05.06
    07. Customize presentation settings by using appropriate slide transitions and animations (e.g., on click, rehearsed timings) ITA.05.07
    08. Demonstrate different delivery methods for slide presentations, including: online delivery and sharing, video projection, printing options. ITA.05.08

0. Use spreadsheet applications to enhance communication skills. The student will be able to: ITA.06.0

    01. Manipulate the worksheet by using the ribbon tabs, group settings, importing data/database, manipulating properties, files and folders. ITA.06.01

    02. Create cell data and apply auto fill. ITA.06.02

    03. Format cells and worksheets (e.g., by applying and manipulating cell formats, styles, merging and splitting cells, create row and column titles, hide and unhide column titles, rows and columns, page setup options, and manipulating views/themes). ITA.06.03

    04. Create and analyze formulas and functions (e.g., apply conditional formula logic, name and cell ranges). ITA.06.04

    05. Create and modify charts and images. (e.g., pivot tables) ITA.06.05

    06. Share worksheet data through various system (e.g., email, external media, cloud storage, mail merge). ITA.06.06

    07. Analyze and organize data through filters, sorting and applying conditional formatting. (e.g., macros) ITA.06.07

    08. Interpret data on line graphs, pie charts, diagrams, and tables. ITA.06.08

0. Use database applications to store and organize data. The student will be able to: ITA.07.0

    01. Create different forms for inputting data into a database application. ITA.07.01

    02. Interpret queries for specialized reports using a database application. ITA.07.02

    03. Create and modify a database by importing data from other sources ITA.07.03

    04. Create and manage database tables by hiding fields, importing data, adding total rows ITA.07.04

    05. Modify queries by renaming, adding/removing fields, sorting, formatting, and adding calculated fields ITA.07.05

    06. Create and format reports with multiple columns, calculated fields and images. ITA.07.06

0. Use electronic mail to enhance communication skills. The student will be able to: ITA.08.0

    01. Describe and perform e-mail capabilities and functions (e.g., create, send, & forward messages, organize email folders, manage signature and automated messages, configure message sensitivity, security and delivery options). ITA.08.01

    02. Perform e-mail activities (e.g., attach external files, save e-mail attachments, view mailbox details, schedule appointments, create contact groups). ITA.08.02

    03. Demonstrate an understanding of the ethical issues associated with electronic correspondences (e.g., employer's ownership of email, public access of

government email, appropriate uses in the workplace, phishing attacks, permanence of electronic communications on the internet). ITA.08.03

04. Describe the need for and appropriate use of electronic mailing list software applications (e.g., listserv) ITA.08.04

0. Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals. The student will be able to: ITA.09.0

    01. Analyze personal skills and aptitudes in comparison with various business related job and career options. (i.e., hard and soft skills) ITA.09.01

    02. Use career resources to develop and analyze occupations and opportunities for internships, continuing education and on-the-job training. ITA.09.02

    03. Exhibit job-seeking skills required for entry-level employment, including resume, online job search, cover letter, online/hard copy application, mock interview, interview thank you letter, and follow-up call. ITA.09.03

    04. Design, implement, and evaluate a plan to facilitate growth and skill development related to anticipated job requirements and career expectations. ITA.09.04

    05. Demonstrate an awareness of specific job requirements and career paths (e.g., education, certifications, skills, previous experience) in business environments. ITA.09.05

    06. Demonstrate an awareness of the potential impact of local and global trends on career plans and life goals. ITA.09.06

    07. Describe the importance of building community and mentor relationships in a variety of professional and workplace situations. ITA.09.07

    08. Simulate work-based projects in an information technology environment ITA.09.08

0. Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance. The student will be able to: ITA.10.0

    01. Demonstrate awareness of the following workplace essentials: quality customer service; business ethics; confidentiality of information; copyright violations; accepted workplace rules, regulations, policies, procedures, processes, and workplace safety, and appropriate attire and grooming. ITA.10.01

    02. Demonstrate ways of accepting and providing constructive criticism to enhance team projects. ITA.10.02

    03. Apply appropriate strategies to manage and resolve conflicts in work situations. ITA.10.03

    04. Demonstrate personal and interpersonal skills appropriate for the workplace (e.g., responsibility, dependability, punctuality, integrity, positive attitude, initiative, respect for self and others, and professional dress). ITA.10.04

0. Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication. The student will

be able to: ITA.11.0

01. Demonstrate how to connect to the Internet and identify and describe web terminology, addresses and how browsers work. ITA.11.01
02. Demonstrate proficiency using basic features of GUI (Graphical User Interface) browsers, including: bookmarks, basic configurations, e-mail configurations, and address books. ITA.11.02
03. Describe appropriate browser security configurations ITA.11.03
04. Describe information technology terminology, including Internet, intranet, ethics, copyright laws, and regulatory control. ITA.11.04
05. Demonstrate proficiency using search engines and search tools (e.g., Boolean search strategies) ITA.11.05
06. Use various web tools, including: downloading files, transfer of files, extensions, PDF, plug-ins, and data compression. ITA.11.06
07. Differentiate between different domain extensions (e.g., .com, .org, .gov, .edu, etc.) ITA.11.07

0. Develop awareness of computer languages, web-based & software applications, and emerging technologies. The student will be able to: ITA.12.0
    01. Compare and contrast the appropriate use of various software applications. (e.g., word processing, desktop publishing, graphic design, web browser, e-mail, presentation, database, scheduling, financial management, Java applet, music) ITA.12.01
    02. Explain and describe the need for web-based applications (e.g., sharing photos and video clips, messaging, chatting and collaborating. ITA.12.02
    03. Express an understanding of basic terminology used in programming (e.g., algorithm, binary, code, block-based, objects, functions) ITA.12.03
    04. Compare and contrast emerging technologies and describe how they impact business in the global marketplace (e.g., wireless network, tablets, cell phones, satellite technology, nanotechnology, smart devices, home networks). ITA.12.04
0. Demonstrate an understanding of basic html by creating a simple web page. The student will be able to: ITA.13.0
    01. Create a basic web page. ITA.13.01
    02. Use basic storyboarding techniques. ITA.13.02
    03. Use basic functions of WYSIWYG editors. ITA.13.03
    04. Use basic functions of HTML, DHTML, and XML editors and converters. ITA.13.04
    05. Enhance web pages through the addition of images and graphics. ITA.13.05
0. Demonstrate comprehension and communication skills. The student will be able to: ITA.14.0
    01. Read and comprehend technical and non-technical reading assignments related to course content (e.g., manuals, books, magazines, electronic

sources). ITA.14.01

02. Use verbal and nonverbal skills to communicate effectively with supervisors, co-workers, and customers. ITA.14.02

03. Demonstrate an understanding of the writing process to create business documents (e.g., research methods, paper formatting (MLA/APA)) ITA.14.03

04. Demonstrate an awareness of project management concepts and tools (e.g., timelines, deadlines, resource allocation, time management, delegation of tasks, collaboration). ITA.14.04

0. Use social media to enhance online communication and develop an awareness of a digital footprint. The student will be able to: ITA.15.0

01. Create and develop a professional social media presence (e.g., LinkedIn) to connect with potential employers, follower influencers, enhance networking opportunities, develop soft skills through written communication, and establish a professional business image. ITA.15.01

02. Cultivate and manage awareness of digital identity and reputation. ITA.15.02

03. Develop awareness of the permanence of actions and social awareness in the digital world. ITA.15.03

Shipping, Receiving and Traffic Clerk – Course Number: TRA0182

0. Demonstrate an understanding of warehouse operations.--The student will be able to: GL.29.0
    01. Identify and discuss the characteristics, purpose and importance of warehouse operations and supply chain management. GL.29.01
    02. Define material handling logistics as it applies to the warehousing function. GL.29.02
    03. Describe procedures for using computerized warehouse data. GL.29.03
    04. Define movement in a warehouse and explain the concept of movement and the vital role that efficient movement of materials plays in the total functionality of the warehouse. GL.29.04
    05. Define movement in a warehouse and identify the various locations within the warehouse where planned efficient movement of materials takes place. GL.29.05
    06. Explain channels of distribution. GL.29.06
    07. Discuss safety regulatory requirements and procedures. GL.29.07
    08. Explain the importance of storage in a warehouse. GL.29.08
    09. Define control as it applies to warehousing. GL.29.09
    10. Explain the relationship between physical structure and protection. GL.29.10
    11. Identify various types of equipment available to enhance the efficient movement of materials within a warehouse. GL.29.11
    12. Identify the various types of loading docks and cross docking. GL.29.12
    13. Define the term "peaks and valleys" as it applies to warehouse activity. GL.29.13
    14. Explain the importance of staging and JIT. GL.29.14
    15. Identify the primary types of hand-operated pieces of warehouse equipment. GL.29.15
    16. Identify the important characteristics of industrial trucks. GL.29.16
    17. Explain the concept of "balancing" as it applies to counterbalanced lift trucks. GL.29.17
    18. Define the term narrow aisle as it applies to fork trucks. GL.29.18
    19. Identify warehouse documents (e.g., pick tickets, special orders, inventory forms). GL.29.19
    20. Display and interpret inventory screens, receive, inspect, and stock inventory. GL.29.20
0. Demonstrate an understanding of storage and control operations.--The student will be able to: GL.30.0
    01. Explain the concepts involved in determining the best method for storage and the equipment needed to facilitate a cost effective and efficient

warehouse. GL.30.01

02. Identify the factors that are involved with the calculating and estimating of the storage area needed for retention of materials in a warehouse. GL.30.02
03. Identify the possibilities and combinations of systems and equipment that can be used for storage areas in a warehouse. GL.30.03
04. Define the following storage related terms: Size, Volume, Density, Pallet, and Case. GL.30.04
05. Define the terms packaging, SKU, stacking frame, term "Logistics Execution Systems" (LES), signage and signposting, "real time" and barcoding. GL.30.05
06. Explain how the volume of materials, space usage, and control affect the design of storage space in a warehouse design. GL.30.06
07. Explain various inventory control methods and their importance. GL.30.07
08. Identify and analyze various warehouse storage systems. GL.30.08
09. Identify the two key issues in planning block stacking. GL.30.09
10. Identify the basic configuration for pallet rack. GL.30.10
11. Explain the concept of control in the broadest possible context and the importance of keeping track of materials and goods. GL.30.11
12. Identify the various types of technologies developed over the years to keep track of goods within the warehouse. GL.30.12
13. Identify various labeling and packaging schemes available for securing and tracking the movement of items through a warehouse. GL.30.13
14. Define the components of an LES. GL.30.14
15. Explain the importance of addresses in signage. GL.30.15
16. Define information-filled labeling. GL.30.16
17. Identify key magnetic devices used in automatic data capture. GL.30.17
18. Define radio frequency identification (RFID). GL.30.18
19. Explain the importance of automation in warehousing. GL.30.19
20. Identify the value of emerging technologies related to warehouse operations. GL.30.20

0. Demonstrate an understanding of protection skills.--The student will be able to: GL.31.0

01. Identify the role that protection plays in the total concept of "warehousing". GL.31.01
02. Identify the various forms of unit load formation equipment that is used for protecting materials. GL.31.02
03. Identify the types of load containment materials which include the machinery that dispenses them. GL.31.03
04. Situations where they are most advantageously used. GL.31.04

05. Explain the following: the need and means for protecting warehouse personnel and materials as they go about their duties. GL.31.05

06. Identify the advantages and disadvantages of open-air or soft-wall warehousing for protection of warehoused items. GL.31.06

07. Compliance issues. GL.31.07

0. Demonstrate economics.--The student will be able to: GL.32.0

01. Demonstrate understanding of goals, resources and structure of an organization. GL.32.01

02. Understand the concepts and contributions of entrepreneurship. GL.32.02

03. Compare and contrast the advantages and disadvantages of the various forms of business ownership. GL.32.03

04. Understand economic principles affecting business cycles and the workforce. GL.32.04

05. Analyze possible solutions to specific business problems. GL.32.05

06. Apply economic decisions related to personal financial affairs, the successful operation of organizations and within a global economy. GL.32.06

07. Understand the role of a consumer, producer, saver and investor in the market system. GL.32.07

08. Understand the concepts and laws pertaining to customs and free trade. GL.32.08

Logistics Technician – Course Number: TRA0183

0. Demonstrate an understanding of career readiness.--The student will be able to: GL.33.0
    01. Explain the importance of life-long learning. GL.33.01
    02. Evaluate/research occupational interests. GL.33.02
    03. Demonstrate attitudes/ethics needed for career success. GL.33.03
    04. Assess personal strengths, talents, values and interests to appropriate jobs and careers to maximize career potential. GL.33.04
    05. Use a variety of research tools (e.g., computer-assisted programs, newspapers, books, industry tours, job shadows, career fairs and the Internet) in the career exploration process. GL.33.05
    06. Evaluate postsecondary training opportunities related to career interests, including certification, licensing, apprenticeships, college and military options. GL.33.06
    07. Relate and identify career interests and transferable skills necessary for opportunities in the global workforce. GL.33.07
    08. Develop an individual career plan and portfolio. GL.33.08
    09. Analyze needs of business and industry on labor and economic trends. GL.33.09
    10. Describe the changing roles including non-traditional occupations in the workplace. GL.33.10
0. Demonstrate employability skills.--The student will be able to: GL.34.0
    01. Identify and utilize resources used in a job search (e.g., newspaper, Internet, networking). GL.34.01
    02. Discuss importance of drug tests and criminal background checks in identifying possible employment options. GL.34.02
    03. Identify steps in the job application process including arranging for references and proper documentation. GL.34.03
    04. Identify procedures and complete documents required when applying for a job (e.g., application, W-4, I-9). GL.34.04
    05. Prepare a resume (electronic and traditional), cover letter, letter of application, follow-up letter, acceptance/rejection letter, and letter of resignation. GL.34.05
    06. Demonstrate appropriate dress and grooming for employment. GL.34.06
    07. Demonstrate effective interviewing skills (e.g., behavioral). GL.34.07
    08. Describe methods for handling illegal interview and application questions. GL.34.08
    09. Discuss state and federal labor laws regulating the workplace (e.g., Child Labor Law, sexual harassment, EEOC, ADA, FMLA). GL.34.09

10. Identify positive work attitudes and behaviors such as honesty, compassion, respect, responsibility, fairness, trustworthiness, and caring. GL.34.10
11. Describe importance of producing quality work and meeting performance standards. GL.34.11
12. Identify personal and business ethics (e.g., preventing theft, pilfering, and unauthorized discounting). GL.34.12
13. Demonstrate orderly and systematic behavior by creating and maintaining a personal planner. GL.34.13
14. Identify qualities typically required for promotion (e.g., productivity, dependability, responsibility). GL.34.14
15. Identify how to prepare for job separation and re-employment. GL.34.15
16. Create and maintain a career portfolio (e.g., resume, letters of recommendation, awards, evidence of participation in school/community/volunteer activities, employer evaluations). GL.34.16

0. Demonstrate competencies in a specific career.--The student will able to: GL.35.0
    01. Demonstrate job performance skills as outlined in the training plan GL.35.01
    02. Exhibit effective workplace safety practices including use of protective devices GL.35.02
    03. Display an acceptable level of productivity and quality control GL.35.03
    04. Demonstrate effective written and oral communication and listening skills when interacting with customers, co-workers, and managers GL.35.04
    05. Demonstrate decision making and problem solving processes and techniques used in the workplace. GL.35.05
    06. Demonstrate acceptable work habits and conduct in the workplace as defined by company policy GL.35.06
    07. Demonstrate an understanding of the company's vision and mission statements. GL.35.07
    08. Demonstrate an understanding of the company's goals and objectives GL.35.08
    09. Demonstrate familiarity with the company's products and services GL.35.09
    10. Demonstrate the ability to identify authority, rights, and responsibilities of both employers and employees GL.35.10
0. Demonstrate career acquisition.--The student will be able to: GL.36.0
    01. Participate in work-based learning opportunities such as: mentoring, cooperative work, job shadows, apprenticeships and internships. GL.36.01
    02. Demonstrate effective oral and written communication skills necessary for employment. GL.36.02
    03. Demonstrate job search skills using a variety of resources. GL.36.03
    04. Apply the decision-making process to the various stages of the work life cycle. GL.36.04

05. Identify and demonstrate employability skills including job search, selection, the interviewing process, proper dress and presentation. GL.36.05

06. Compare and contrast compensation packages that include varying levels of wages and benefits. GL.36.06

0. Demonstrate career retention.--The student will be able to: GL.37.0

01. Demonstrate positive personal qualities and self-management skills (i.e. time management, organization, punctuality and attendance). GL.37.01

02. Describe how productivity, work ethic and quality affect job stability. GL.37.02

03. Demonstrate communication team-building and leadership skills. GL.37.03

04. Demonstrate personal health and workplace safety procedures. GL.37.04

05. Identify biases, harassment and discriminatory behaviors impacting job success and advancement. GL.37.05

06. Acknowledge and respond to constructive criticism and employment evaluation. GL.37.06

07. Understand the importance of following company policy and procedures and the legal ramifications of labor laws impacting employment. GL.37.07

08. Understand the role of compromise in conflict resolution. GL.37.08

0. Demonstrate integrated learning and life skills.--The student will be able to: GL.38.0

01. Demonstrate the integration and application of academic and occupational skills in school, work and personal lives. GL.38.01

02. Use communication, mathematical and technical skills to compare compute, and analyze complex information. GL.38.02

03. Discuss how personal choices, experiences, technology, education/training and other factors correlate with earning a living. GL.38.03

04. Discuss how income from employment is affected by factors such as supply and demand, geographic location, level of education, type of industry, union membership, productivity skill level and work ethic. GL.38.04

05. Compare and contract strategies for personal finance and risk management. GL.38.05

06. Demonstrate the ability to set, monitor and achieve clearly defined goals. GL.38.06

0. Demonstrate technology and information.--The students will be able to: GL.39.0

01. Apply knowledge of technology to identify and solve problems. GL.39.01

02. Identify and evaluate how information technology developments have changed the way people work. GL.39.02

03. Select, apply and troubleshoot software and hardware as they apply to a variety of work applications. GL.39.03

04. Describe how new developments in varied fields or technology affect the job market and the level of worker's responsibilities. GL.39.04

05. Analyze the ethical issues surrounding access, privacy and confidentiality of information in emerging technologies. GL.39.05
06. Explore current and future positions and career paths in field of technology. GL.39.06
07. Identify job tasks that presently are and will be in the future performed in the specified occupation (training plan). GL.39.07
08. Create a training plan indicating competencies mastered. GL.39.08
09. Maintain a record of employment hours and wages for auditing and budgetary purposes (e.g., time cards, budget sheets). GL.39.09
10. Maintain an up-to-date, signed training agreement. GL.39.10

Marine Service Technologies (T400210)

Marine Rigger - Course Number: MTE0003

0. Demonstrate an understanding of workplace safety and workplace organization.--The student will be able to: MS.01.0
    01. Identify safety requirements for manual, electrical-powered, and pneumatic tools. MS.01.01
    02. Demonstrate, apply, and provide evidence of safely using manual, electrical-powered, and pneumatic tools. MS.01.02
    03. Identify safety requirements for operation of automated machines and equipment. MS.01.03
    04. Demonstrate, apply, and provide evidence of safely operating automated machines and equipment. MS.01.04
    05. Identify threaded fasteners by size, type, thread series, thread classes, material hardness and compatibility. MS.01.05
    06. Read, interpret, and apply service manuals. MS.01.06
    07. Identify the safe use of paints, chemicals, fiberglass, and compounds MS.01.07
    08. Demonstrate, apply, and provide evidence of safely using paints, chemicals, fiberglass, and compounds. MS.01.08
    09. Identify the safe use of electrical connectors and cords. MS.01.09
    10. Demonstrate, apply, and provide evidence of safely using electrical connectors and cords. MS.01.10
    11. Identify, demonstrate, apply, and provide evidence of understanding of shop safety rules on an ongoing basis. MS.01.11
    12. Demonstrate and identify the proper procedures for extinguishing class A, B, and C type fires. MS.01.12
    13. Identify various workplace injuries related to the marine industry. MS.01.13
    14. Demonstrate and practice knowledge of first aid and first response procedures appropriate for this course. MS.01.14
    15. Identify and apply safety procedures in case of smoke or chemical inhalation. MS.01.15
    16. Demonstrate and apply material handling techniques to safely move materials. MS.01.16
    17. Demonstrate and apply proper techniques for lifting loads. MS.01.17
    18. Research and identify Occupational Safety Health Administration (OSHA) safety standards related to the marine industry. MS.01.18
    19. Demonstrate, apply, and provide evidence of understanding Occupational Safety Health Administration (OSHA) safety standards related to the marine industry. MS.01.19
    20. Demonstrate knowledge of safety requirements for material handling equipment such as rigging, ladders, and scaffolds related to the marine industry. MS.01.20

21. Demonstrate knowledge of National Institute of Occupational Safety and Health (NIOSH), Environmental Protection Agency (EPA) and other regulatory agencies recommendations, guidelines and best practices. MS.01.21
22. Describe "Right-to-Know" Law as recorded in (29 CFR-1910.1200) MS.01.22
23. Locate Safety Data Sheets (SDS). MS.01.23
24. Demonstrate understanding and knowledge of using and applying the information located on Safety Data Sheets (SDS). MS.01.24
25. Proactively respond to a safety concern and then document occurrences. MS.01.25
26. Identify and report unsafe conditions. MS.01.26
27. Determine the appropriate corrective action after an unsafe condition is identified. MS.01.27
28. Demonstrate knowledge of various emergency alarms and procedures. MS.01.28
29. Demonstrate knowledge and apply clean-up procedures for spills. MS.01.29
30. Identify and apply procedures for handling hazardous material. MS.01.30
31. Perform safety and environmental inspections. MS.01.31
32. Perform leak checks to determine if toxic or hazardous material is escaping from a piece of equipment. MS.01.32
33. Demonstrate knowledge of proper and safe installation techniques as described in manuals, checklists, and regulations. MS.01.33
34. Demonstrate and apply proper equipment shutdown procedures. MS.01.34
35. Identify, select, and use personal protective equipment (PPE). MS.01.35
36. Identify, demonstrate, and apply ergonomic work techniques. MS.01.36
37. Train other students to use and apply safety skills outlined in this standard. MS.01.37

0. Adjust and repair trailers.--The student will be able to: MS.02.0
    01. Make boat to trailer adjustments. MS.02.01
    02. Remove and replace lighting systems. MS.02.02
    03. Remove, inspect, repack, and replace wheel bearings and springs. MS.02.03
    04. Remove and replace brakes. MS.02.04
    05. Check lug nuts on trailer for correct torque. MS.02.05
0. Use marine woods, metals, and fiberglass.--The student will be able to: MS.03.0
    01. Explain the hazards of a marine environment to woods, metals and fiberglass. MS.03.01
    02. Explain a galvanic series. MS.03.02
    03. Explain the theory for using given materials in boat repair activities. MS.03.03

0. Maintain and repair basic two-stroke cycle outboard engines.--The student will be able to: MS.04.0
    01. Explain the basic principles of the operation of two-stroke cycle internal combustion engines. MS.04.01
    02. Identify types of two-stroke cycle engines. MS.04.02
    03. Locate engine serial and model numbers. MS.04.03
    04. Set up and use precision measurement tools. MS.04.04
    05. Drill and remove broken studs and install helicoils. MS.04.05
    06. Demonstrate appropriate heating techniques and skills. MS.04.06
    07. Identify engine assemblies and systems. MS.04.07
    08. Disassemble engines. MS.04.08
    09. Remove, clean and inspect heads for cracks, warpage and damaged spark plug threads. MS.04.09
    10. Diagnose head problems by use of the visual inspection method. MS.04.10
    11. Diagnose head problems by use of the compression tester method. MS.04.11
    12. Diagnose head problems by use of the stethoscope method. MS.04.12
    13. Remove, clean and inspect piston rods and assemblies. MS.04.13
    14. Measure out-of-round of pistons and cylinders. MS.04.14
    15. Hone cylinders. MS.04.15
    16. Check the total bearing surface of connecting rod bearings. MS.04.16
    17. Measure piston skirts and ring grooves. MS.04.17
    18. Measure the piston ring gap in cylinder bores. MS.04.18
    19. Install piston pins according to manufacturer's specifications. MS.04.19
    20. Check rod and piston assembly alignment. MS.04.20
    21. Install rings on pistons. MS.04.21
    22. Install piston rod assemblies. MS.04.22
    23. Measure and check crankshafts with a micrometer. MS.04.23
    24. Check needle bearings. MS.04.24
    25. Inspect crankshafts and install seal. MS.04.25
    26. Inspect, clean and/or replace reed valves. MS.04.26
    27. Reassemble engines. MS.04.27
0. Maintain and repair fuel systems on boats.--The student will be able to: MS.05.0
    01. Identify and locate fuel system components (fuel tanks, lines, filters, etc.). MS.05.01
    02. Sketch and label the parts of total fuel systems. MS.05.02
    03. Service fuel lines and primer bulbs (vacuum test). MS.05.03

04. Describe or demonstrate the process for removing, cleaning, inspecting and installing fuel tanks. MS.05.04

05. Locate and identify fuel pumps and test the vacuum and pressure. MS.05.05

06. Determine and make appropriate fuel oil mixtures. MS.05.06

0. Maintain and repair electrical systems.--The student will be able to: MS.06.0

01. Locate and match electrical units by their symbols on a wiring diagram. MS.06.01

02. Set up and use voltmeters, ammeters and ohmmeters. MS.06.02

03. Locate and identify electrical circuit components. MS.06.03

04. Sketch a typical circuit using a single wire system. MS.06.04

05. Test storage batteries using proper industry recognized battery testing equipment. MS.06.05

06. Charge storage batteries. MS.06.06

07. Remove and replace batteries and service battery boxes. MS.06.07

08. Repair damaged wire and electrical harnesses. MS.06.08

09. Diagnose circuit troubles using continuity or a test light and low reading voltmeters to record voltage drop. MS.06.09

10. Sketch and label typical fuel gauge systems. MS.06.10

11. Remove and replace gauges or indicating lights. MS.06.11

12. Remove and replace fuel-sending units. MS.06.12

13. Diagnose gages and accessory system troubles using voltmeters, ammeters or detached sending units. MS.06.13

14. Sketch typical circuits such as those for auto bilge pumps or navigation lights. MS.06.14

15. Locate opens, shorts and grounds. MS.06.15

16. Demonstrate proficiency in applying industry standard wire terminal practices. MS.06.16

17. Demonstrate proper installation of 2 position and 3 position battery switches. MS.06.17

18. Demonstrate correct procedure for connecting batteries in series and parallel. MS.06.18

19. Check alternator output voltage with engine running compare with specifications. MS.06.19

0. Prepare delivery checklist.--The student will be able to: MS.07.0

01. Make center line measurements for outboard motor installation. MS.07.01

02. Locate manufacturers' I.D. plates. MS.07.02

03. Mount control boxes at the helm. MS.07.03

04. Place wiring and cables in a neat and orderly manner. MS.07.04

05. Adjust the control cables from the engine to the control box. MS.07.05
06. Center the steering cable to the engine. MS.07.06
07. Find suitable locations for accessories and mount them to the boat. MS.07.07
08. Lubricate shafts, install propellers and fasten both securely. MS.07.08
09. Check for proper levels. MS.07.09
10. Check manufacturers' specifications. MS.07.10
11. Describe how to or test-run boats. MS.07.11
12. Recheck work completed. MS.07.12
13. Demonstrate proper procedures for checking oil level capacity. MS.07.13
14. Install or connect drain plugs, petcocks, hose clamps, hoses, etc. MS.07.14
15. Remove and replace running lights. MS.07.15
16. Troubleshoot lighting systems and accessories. MS.07.16
17. Check and adjust throttles, cables, horns, lights and tachometers. MS.07.17
18. Check steering system for proper operation. MS.07.18

0. Maintain and repair outboard capacitor discharge ignition systems.--The student will be able to: MS.08.0
    01. Sketch and label electrical symbols. MS.08.01
    02. Set up and use ohmmeters. MS.08.02
    03. Set up and use a DVA tester or equivalent. MS.08.03
    04. Set up and use spark testers. MS.08.04
    05. Set up and use timing lights. MS.08.05
    06. Set up and use multi-meter. MS.08.06
    07. Locate and identify parts of capacitor discharge ignition systems. MS.08.07
    08. Locate and match electrical units by their symbols on a wiring diagram. MS.08.08
    09. Sketch and label complete C/D ignition systems. MS.08.09
    10. Check coil resistance, shorts and grounds with an ohmmeter. MS.08.10
    11. Check stator windings with an ohmmeter. MS.08.11
    12. Check sensor coils, charge coils, ignition coils and shorts to ground with a DVA tester or equivalent. MS.08.12
    13. Check power packs with an ohmmeter and a DVA tester or equivalent. MS.08.13
0. Maintain and repair outboard fuel systems.--The student will be able to: MS.09.0
    01. Identify the major types of carburetors. MS.09.01
    02. Check and adjust throttle. MS.09.02
    03. Identify and service different types of EFI/DFI systems. MS.09.03

04. Identify air cleaners. MS.09.04
05. Identify basic carburetor circuits (chokes, floats, fuel inlets; idle, intermediate and high speeds; mains, etc.) MS.09.05
06. Diagnose carburetor problems. MS.09.06
07. Remove, clean, overhaul, replace and make final adjustments to carburetors. MS.09.07
08. Diagnose exhaust problems such as back pressure. MS.09.08

0. Parts specialist and computer skills to industry standards.--The student will be able to: MS.10.0
    01. Identify the skills needed to be a service writer. MS.10.01
    02. Identify the skills needed to be a parts specialist. MS.10.02
    03. Demonstrate appropriate computer skills. MS.10.03
    04. Demonstrate knowledge of different parts and accessories. MS.10.04

Outboard Engine Technician - Course Number: MTE0090

0. Maintain and repair basic four-stroke cycle outboard engines.--The student will be able to: MS.11.0
    01. Explain the basic principles of the operation of four-stroke cycle internal combustion engines. MS.11.01
    02. Identify types of four-stroke cycle engines. MS.11.02
    03. Locate engine serial and model numbers. MS.11.03
    04. Identify engine assemblies and systems. MS.11.04
    05. Diagnose valve and head problems by use of the visual inspection method. MS.11.05
    06. Diagnose valve and head problems by use of the compression tester method. MS.11.06
    07. Disassemble engines and inspect parts. MS.11.07
    08. Clean and inspect heads for cracks, warpage and damaged spark plug threads. MS.11.08
    09. Inspect valves for warpage, burns, cracks, stem wear, tip wear and margin. MS.11.09
    10. Adjust valves. MS.11.10
    11. Remove and inspect camshafts and lifters. MS.11.11
    12. Clean and inspect lifters for wear. MS.11.12
    13. Time valve drive assemblies. MS.11.13
    14. Reassemble engines. MS.11.14
    15. Inspect oil seals. MS.11.15
    16. Inspect/replace timing belt/chain. MS.11.16
0. Maintain and repair outboard charging systems.--The student will be able to: MS.12.0
    01. Sketch and label the units of complete charging circuits. MS.12.01
    02. Disassemble charging systems and identify the components. MS.12.02
    03. Perform stator and rectifier testing on charging systems. MS.12.03
    04. Reassemble and test charging systems. MS.12.04
    05. Set up and use ohmmeters. MS.12.05
    06. Reassemble and test complete units. MS.12.06
0. Maintain and repair outboard battery/EFI ignition systems.--The student will be able to: MS.13.0
    01. Locate and identify parts of battery ignition systems. MS.13.01
    02. Locate and match electrical units by their symbols on a wiring diagram. MS.13.02

03. Sketch and label complete battery ignition systems. MS.13.03
04. Check coil resistance with an ohmmeter. MS.13.04
05. Set up and use test equipment. MS.13.05
06. Set timing using timing light. MS.13.06
07. Clean and re-gap spark plugs. MS.13.07

0. Maintain and repair outboard cranking systems.--The student will be able to: MS.14.0
    01. Disassemble recoil starters. MS.14.01
    02. Inspect components of recoil starters. MS.14.02
    03. Reassemble recoil starters. MS.14.03
    04. Identify components of electrical starting systems. MS.14.04
    05. Bench test switches. MS.14.05
    06. Troubleshoot starting systems using multi-meter. MS.14.06
    07. Locate opens, short and grounds. MS.14.07
0. Maintain and repair outboard lubrication systems.--The student will be able to: MS.15.0
    01. Identify the types and functions of lubrication systems. MS.15.01
    02. Explain the principles of lubrication systems. MS.15.02
    03. Identify and locate components of lubrication systems. MS.15.03
    04. Check engines for oil leaks. MS.15.04
    05. Change engine oil and filters. MS.15.05
    06. Check engine oil pressure and level. MS.15.06
    07. Recognize and use only recommended oil. MS.15.07
    08. Inspect and service oil metering systems. MS.15.08
0. Maintain and repair outboard cooling systems.--The student will be able to: MS.16.0
    01. Explain the principles of cooling systems. MS.16.01
    02. Trace water flow through cooling systems. MS.16.02
    03. Disassemble, examine for problems and reassemble water pumps. MS.16.03
    04. Remove, check and replace thermostats. MS.16.04
    05. Service poppet valves. MS.16.05
    06. Service or replace thermostat and thermostat housings. MS.16.06
0. Maintain and repair outboard lower gear cases.--The student will be able to: MS.17.0
    01. Remove and replace lower gear cases. MS.17.01
    02. Identify the components of lower gear case. MS.17.02
    03. Refill lower gear cases with specified oil. MS.17.03

04. Determine propeller pitch diameter and hub type. MS.17.04

0. Assemble and maintain outboard lower units and housing assemblies.--The student will be able to: MS.18.0

    01. Disassemble and reassemble steering handle groups. MS.18.01

    02. Understand the process for disassembling and assembling exhaust housings and water tube assemblies. MS.18.02

    03. Understand the process for replacing motor mounts and shock absorbers. MS.18.03

    04. Lubricate all fittings. MS.18.04

    05. Pressure and vacuum test gear cases. MS.18.05

    06. Understand the process for removing and servicing cylinders and rams. MS.18.06

    07. Adjust the trim and tilt. MS.18.07

    08. Determine the differences between mechanical, electrical and hydraulic shifting units. MS.18.08

    09. Explain the shifting theory of the lower unit. MS.18.09

    10. Perform correct procedure for filling trim and tilt with hydraulic oil. MS.18.10

0. Demonstrate employability skills.--The student will be able to: MS.19.0

    01. Conduct a job search using periodicals and the internet. MS.19.01

    02. Secure information about a job. MS.19.02

    03. Identify documents that may be required when applying for a job interview. MS.19.03

    04. Complete a job application form correctly. MS.19.04

    05. Demonstrate competence in job interview techniques. MS.19.05

    06. Identify or demonstrate appropriate responses to criticism from employer, supervisor or other employees. MS.19.06

    07. Identify acceptable work habits. MS.19.07

    08. Demonstrate knowledge of how to make appropriate job changes. MS.19.08

    09. Demonstrate acceptable employee health habits. MS.19.09

    10. Describe "Right-to-Know" Law as recorded in (29 CFR-1910.1200). MS.19.10

0. Demonstrate an understanding of entrepreneurship.--The student will be able to: MS.20.0

    01. Define entrepreneurship. MS.20.01

    02. Describe the importance of entrepreneurship to the American economy. MS.20.02

    03. List the advantages and disadvantages of business ownership. MS.20.03

    04. Identify and explain the risks involved in ownership of a business. MS.20.04

05. Identify and explain the necessary personal characteristics of a successful entrepreneur. MS.20.05

06. Identify and explain the business skills needed to operate a small business efficiently and effectively. MS.20.06

07. Identify and explain the various types of business structures, e.g. sole proprietor, S-Corporation, etc. MS.20.07

Outboard Engine Diagnostics Technician - Course Number: MTE0074

0. Apply basic computer skills.--The student will be able to: MS.21.0
    01. Identify and apply the proper procedures for turning on, and turning off a computer. MS.21.01
    02. Identify and apply the proper procedures for logging on, and logging off a computer. MS.21.02
    03. Demonstrate knowledge of properly using and navigating operating systems. MS.21.03
    04. Identify and properly use various peripheral devices. (e.g., printers, scanners, external storage devices) MS.21.04
    05. Demonstrate and apply the process for locating, copying, pasting, saving, and backing up a file and folder MS.21.05
    06. Demonstrate the process for opening and saving a file using program specific extensions. (e.g., .docx, .pdf, .txt) MS.21.06
    07. Identify and apply the proper procedures for securely uploading and downloading files over external and internal networks. MS.21.07
    08. Demonstrate the proper procedures for using and navigating e-mail programs. MS.21.08
    09. Create and send electronic messages using proper e-mail communication etiquette. MS.21.09
    10. Show understanding for properly attaching a file within an e-mail message. MS.21.10
0. Troubleshoot and solve problems with outboard engines using industry recognized computer-based diagnostic equipment.--The student will be able to: MS.22.0
    01. Demonstrate and understand the proper procedures for connecting diagnostic equipment to an outboard engine. MS.22.01
    02. Identify and demonstrate the proper procedures for opening and closing diagnostic programs. MS.22.02
    03. Use multiple research techniques to identify faults and data to be used to solve outboard engine trouble. MS.22.03
    04. Formulate a plan to repair outboard engines given the data found. MS.22.04
    05. Download, save, and print output data from an outboard engine. MS.22.05
0. Set up electric and digital control box, and gauges.--The student will be able to: MS.23.0
    01. Assign position to outboard engines. MS.23.01
    02. Set up trim and tilt limits. MS.23.02
    03. Set up digital gauges. MS.23.03

Inboard Gas Engine Technician - Course Number: MTE0092

0. Maintain and repair basic four-stroke cycle inboard gas engines.--The student will be able to: MS.24.0
    01. Diagnose valve and head problems by use of the visual inspection method. MS.24.01
    02. Diagnose valve and head problems by use of the compression tester method. MS.24.02
    03. Disassemble engines and inspect parts. MS.24.03
    04. Clean and inspect heads for cracks, warpage and damaged spark plug threads. MS.24.04
    05. Inspect valves for warpage, burns, cracks, stem wear, tip wear and margin. MS.24.05
    06. Adjust valves. MS.24.06
    07. Understand the process for removing and inspecting camshafts and lifters. MS.24.07
    08. Understand the process for cleaning and inspecting lifters for wear. MS.24.08
    09. Time valve drive assemblies. MS.24.09
    10. Understand the process for removing pistons from rod assemblies. MS.24.10
    11. Understand the process for measuring out-of-round and cylinder taper with a dial bore gage or micrometer. MS.24.11
    12. Understand the process for checking piston pins and bosses for wear. MS.24.12
    13. Understand the process for measuring piston ring lands width, out-of-round and taper. MS.24.13
    14. Understand the process for measuring the piston ring gap in cylinder bores. MS.24.14
    15. Understand the process for installing and fitting piston pins. MS.24.15
    16. Understand the process for checking rod and piston assembly alignment. MS.24.16
    17. Understand the process for removing and replacing rod bearings. MS.24.17
    18. Hone and clean cylinders. MS.24.18
    19. Install rings on pistons. MS.24.19
    20. Measure and check crankshafts with a micrometer. MS.24.20
    21. Check for end play. MS.24.21
    22. Understand the process for checking bearing bores with a telescoping gage. MS.24.22
    23. Reassemble engines. MS.24.23
    24. Install oil seals. MS.24.24
    25. Inspect/replace timing belt/chain. MS.24.25

0. Maintain and repair inboard fuel systems.--The student will be able to: MS.25.0
    01. Identify and locate fuel system components (fuel tanks, lines, filters, etc.). MS.25.01
    02. Sketch and label typical fuel gauge systems. MS.25.02
    03. Sketch and label the parts of total fuel systems. MS.25.03
    04. Remove and replace fuel gauges. MS.25.04
    05. Service fuel lines. MS.25.05
    06. Remove and replace fuel-sending units. MS.25.06
    07. Describe or demonstrate the process for removing, cleaning, inspecting and installing fuel tanks. MS.25.07
    08. Vacuum test fuel system. MS.25.08
    09. Remove, replace service and check the pressure of fuel pumps. MS.25.09
    10. Remove, clean and replace in-line filters. MS.25.10
    11. Identify the major types of carburetors. MS.25.11
    12. Check and adjust throttle linkages. MS.25.12
    13. Identify and service different types of EFI systems. MS.25.13
    14. Identify and understand different types of Vapor Separator Tank (VST) systems. MS.25.14
    15. Remove, service, and replace flame arrestors. MS.25.15
0. Maintain and repair inboard gas cooling systems.--The student will be able to: MS.26.0
    01. Explain the principles of cooling systems, including fresh water cooling systems. MS.26.01
    02. Trace water flow through cooling systems. MS.26.02
    03. Disassemble and reassemble water pumps. MS.26.03
    04. Remove, check and replace thermostats. MS.26.04
    05. Check thermostat pressure relief systems. MS.26.05
    06. Service manifolds, risers and thermostat housings. MS.26.06
0. Maintain and repair inboard gas lubrication systems.--The student will be able to: MS.27.0
    01. Identify the types and functions of lubrication systems. MS.27.01
    02. Explain the principles of lubrication systems. MS.27.02
    03. Identify and locate components of lubrication systems. MS.27.03
    04. Check engines for oil leaks. MS.27.04
    05. Change engine oil and filters. MS.27.05
    06. Check engine oil pressure and level. MS.27.06

07. Recognize and use only recommended oil. MS.27.07

0. Maintain and repair electronic ignition systems.--The student will be able to: MS.28.0

    01. Locate and match electrical units by their symbols on a wiring diagram. MS.28.01

    02. Sketch and label complete battery ignition systems. MS.28.02

    03. Set up and use test equipment. MS.28.03

    04. Set timing using a timing light MS.28.04

0. Maintain and repair capacitor discharge ignition systems.--The student will be able to: MS.29.0

    01. Sketch and label electrical symbols. MS.29.01

    02. Set up and use multi-meters. MS.29.02

    03. Set up and use appropriate test equipment. MS.29.03

    04. Set up and use spark testers. MS.29.04

    05. Set up and use timing lights. MS.29.05

    06. Locate and identify parts of capacitor discharge ignition systems. MS.29.06

    07. Locate and match electrical units by their symbols on a wiring diagram. MS.29.07

    08. Check coil resistance, shorts and grounds with an ohmmeter. MS.29.08

    09. Check sensor coils, charge coils, ignition coils and shorts to ground with appropriate test equipment. MS.29.09

Drive Train Technician - Course Number: MTE0093

0. Maintain and repair stern drive upper gear case.--The student will be able to: MS.30.0
    01. Identify components of upper gear case. MS.30.01
    02. Use the proper oil to refill upper and lower gear cases. MS.30.02
    03. Check manufacturers' installation procedures for stern drive units. MS.30.03
0. Maintain and repair stern drive lower gear cases.--The student will be able to: MS.31.0
    01. Identify components of lower gear case. MS.31.01
    02. Remove and replace lower gear cases. MS.31.02
    03. Refill lower gear cases with specified oil. MS.31.03
    04. Determine propeller pitch, diameter and hub type. MS.31.04
0. Maintain and repair stern drive intermediate housings.--The student will be able to: MS.32.0
    01. Check engine alignment. MS.32.01
    02. Check electrical components with proper test equipment. MS.32.02
    03. Understand the process for removing and replace "U" joints. MS.32.03
    04. Identify components of transom plates. MS.32.04
    05. Service, install, and adjust trim and tilt systems. MS.32.05
0. Maintain and repair inboard gas transmissions.--The student will be able to: MS.33.0
    01. Remove and replace transmissions. MS.33.01
    02. Drain transmissions. MS.33.02
    03. Determine capacity using the transmission service manuals. MS.33.03
    04. Refill transmissions according to manufacturers' specifications. MS.33.04

Inboard Diesel Technician - Course Number: MTE0056

0. Maintain and repair inboard diesel fuel systems.--The student will be able to: MS.34.0
    01. Identify and locate fuel system components (fuel tanks, lines, filters, etc.). MS.34.01
    02. Sketch and label the parts of total fuel systems. MS.34.02
    03. Service fuel lines. MS.34.03
    04. Describe or demonstrate the process for removing, cleaning, inspecting and installing fuel tanks. MS.34.04
    05. Identify and locate fuel control devices. MS.34.05
    06. Remove, clean and replace in-line filters. MS.34.06
    07. Check and adjust throttle and governor linkages. MS.34.07
    08. Check fuel systems for leaks. MS.34.08
    09. Bleed systems for starting. MS.34.09
    10. Set the injection pump angle (timing). MS.34.10
    11. Check or replace glow plugs. MS.34.11
    12. Check; stop solenoids. MS.34.12
0. Maintain and repair inboard diesel cooling systems.--The student will be able to: MS.35.0
    01. Disassemble and reassemble water pumps. MS.35.01
    02. Remove, check and replace thermostats. MS.35.02
    03. Use thermostat pressure relief systems. MS.35.03
    04. Service manifolds, risers and thermostat housings. MS.35.04
    05. Service water-cooling systems for diesel engines. MS.35.05
0. Maintain and repair inboard diesel lubrication systems.--The student will be able to: MS.36.0
    01. Identify the types and functions of lubrication systems. MS.36.01
    02. Explain the principles of lubrication systems. MS.36.02
    03. Identify and locate components of lubrication systems. MS.36.03
    04. Check engines for oil leaks. MS.36.04
    05. Change engine oil and filters. MS.36.05
    06. Check engine oil pressure and level. MS.36.06
    07. Recognize and use only recommended oil. MS.36.07
0. Maintain and repair inboard diesel charging systems.--The student will be able to: MS.37.0
    01. Inspect, remove and replace alternator belts. MS.37.01

02. Check the output of charging systems. MS.37.02

03. Analyze malfunctions. MS.37.03