

Department:

Automotive Collision and Refinishing Technology

Course Description:

Through a classroom and/or lab/shop learning and assessment activities, in this course students will: determine how to diagnose steering and suspension; diagnose electrical concerns; complete headlamp and fog/driving lamp assemblies and repairs; demonstrate self-grounding procedures for handling electronic components; determine diagnosis, inspection and service needs for brake system hydraulic service and repair needs for collision damaged cooling system components; distinguish between the under car components and systems; and determine the diagnosis, inspection and service requirements of active and passive restraint systems.

Course Competencies:

The learning outcomes and competencies detailed in this syllabus meet or exceed the learning outcomes and competencies specified by the Postsecondary Technical Education Authority (TEA) for this course as approved by the Kansas Board of Regents.

Upon completion of the course, the student should be able to:

1. Determine how to diagnose steering and suspension
 - a. Identify one time use fasteners. HP-I
 - b. Remove, replace, inspect or adjust power steering pump, pulleys, belts, hoses, fittings and pump mounts. HP-G
 - c. Inspect and adjust (where applicable) steering linkage geometry (attitude/parallelism). HP-G
 - d. Inspect and replace pitman arm. HP-G
 - e. Inspect and replace relay (center link/intermediate) rod. HP-G
 - f. Inspect, remove and replace idler arm and mountings. HP-G
 - g. Inspect, remove and replace tie rod sleeves, clamps, and tie rod ends. HP-G
 - h. Inspect, remove and replace steering linkage damper. HP-G
 - i. Inspect, remove and replace upper and lower control arms. HP-G
 - j. Inspect, remove and replace upper and lower control arm bushings, shafts, and rebound bumpers. HP-G
 - k. Inspect, remove and replace upper and lower ball joints. HP-G
 - l. Inspect, remove and replace steering knuckle/spindle/hub assemblies (including bearings, races, seals, etc.). HP-G
 - m. Inspect, remove and replace front suspension system coil springs and spring insulators (silencers). HP-G
 - n. Inspect, remove, replace, and adjust suspension system torsion bars, and inspect mounts. HP-G
 - o. Inspect, remove and replace stabilizer bar bushings, brackets, and links. HP-G

- p. Inspect, remove and replace MacPherson strut cartridge or assembly, upper bearing, and mount. HP-G
 - q. Inspect, remove, and replace rear suspension system transverse links, control arms, stabilizer bars, bushings, and mounts. HP-G
 - r. Inspect, remove, and replace suspension system leaf spring(s), leaf spring insulators (silencers), shackles, brackets, bushings, and mounts. HP-G
 - s. Inspect axle assembly for damage and misalignment. HP-G
 - t. Inspect, remove and replace shock absorbers. HP-G
 - u. Diagnose, inspect, adjust, repair or replace active suspension systems and associated lines and fittings. HP-G
 - v. Inspect, remove, replace, and align front and rear frame (cradles/sub). HP-G
 - w. Inspect, remove and replace steering shaft U-joint(s), flexible coupling(s), collapsible columns, and steering wheels. HP-G
 - x. Identify toe-out-on-turns (turning radius) related problems; determine needed repairs. HP-I
 - y. Identify thrust angle related problems; determine needed repairs. HP-I
 - z. Check for front wheel setback; determine needed repairs. HP-I
 - aa. Inspect tires, identify direction of rotation and location; check and adjust air pressure. HP-I
 - bb. Identify SAI (steering axis inclination), included angle, and KPI (king pin inclination) related problems; determine needed repairs. HP-I
 - cc. Reinstall wheels and torque lug nuts. HP-I
2. Diagnose electrical concerns
 - a. Inspect, clean, and replace battery. HP-I
 - b. Inspect, test, and replace fusible links, circuit breakers, and fuses. HP-I
 - c. Perform slow/fast battery charge. HP-I
 - d. Check operation of exterior lighting; determine needed repairs. HP-I
 - e. Inspect, remove and replace power seat, motors, linkages, cables, etc. HP-G
 - f. Inspect, remove and replace components of electric door and hatch/trunk lock. HP-G
 - g. Inspect, remove and replace components of keyless lock/unlock devices and alarm systems. HP-G
 - h. Inspect, remove and replace components of electrical sunroof and convertible top. HP-G
 - i. Dispose of batteries and battery acid according to local, state, and federal requirements. HP-G
 3. Complete headlamp and fog/driving lamp assemblies and repairs
 - a. Aim headlamp assemblies and fog/driving lamps; determine needed repairs. HP-I
 4. Demonstrate self-grounding procedures for handling electronic components
 - a. Demonstrate the proper self-grounding procedures for handling electronic components. HP-I
 5. Determine diagnosis, inspection and service needs for brake system hydraulic components
 - a. Identify, handle, store, and install appropriate brake fluids; dispose of in accordance with federal, state, and local regulations. HP-G
 - b. Reinstall wheel and torque lug nuts. HP-I
 - c. Check parking brake system operation. HP-I
 - d. Identify the proper procedures for handling brake dust. HP-G
 - e. Check for bent or damaged brake system components. HP-G
 6. Examine components of heating and air conditioning systems

- a. Identify and comply with environmental concerns relating to refrigerants and coolants. HP-G
 - b. Locate and identify A/C system service ports. HP-I
7. Determine the inspection, service and repair needs for collision damaged cooling system components
 - a. Check engine cooling and heater system hoses and belts; determine needed repairs. HP-I
 - b. Inspect, test, remove, and replace radiator, pressure cap, coolant recovery system, and water pump. HP-G
8. Distinguish between the under car components and systems
 - a. Inspect, remove and replace drive shafts and universal joints. HP-G
 - b. Inspect, remove and replace half shafts and axle constant velocity (CV) joints. HP-G
 - c. Inspect, remove and replace exhaust pipes, mufflers, converters, resonators, tail pipes, and heat shields. HP-G
 - d. Inspect, remove and replace fuel tank, fuel tank filter, fuel cap, fuel filler hose, and inertia switch; inspect and replace fuel lines and hoses; check fuel for contaminants. HP-G
9. Determine the diagnosis, inspection and service requirements of active and passive restraint systems
 - a. Inspect, remove, and replace seatbelt and shoulder harness assembly and components. HP-G
 - b. Inspect restraint system mounting areas for damage; repair as needed. HP-G
 - c. Verify proper operation of seatbelt. HP-G
 - d. Deactivate and reactivate Supplemental Restraint System (SRS). HP-G
 - e. Inspect, remove and replace Supplemental Restraint Systems (SRS) sensors and wiring; ensure sensor orientation. HP-G
 - f. Verify that Supplemental Restraint System (SRS) is operational. HP-I

Course Content:

- A. Steering and Suspension
- B. Electrical Concerns
- C. Headlamp and Fog/Driving Lamp Assembly and Repair
- D. Self-Grounding for Electronic Components
- E. Brake System Hydraulic Components
- F. Heating and Air Conditioning System Components
- G. Inspection and Service Collision Damage to Cooling System Components
- H. Under Car Components and Systems
- I. Diagnose, Inspect, and Service Active and Passive Restraint Systems

Learning Assessments:

Assessments may include quizzes, tests, project work, demonstrated competence, instructor observation, weekly assignments and/or written papers.

Instructional Materials:

Textbook: Duffy, J.E. (2015). *Auto Body Repair Technology*. (6th ed.). Boston, MA: Cengage Learning. ISBN: 9781133702856.

Textbook: Duffy, J.E. (2015). *Tech Manual for Duffy's Auto Body Repair Technology*. (6th ed.). Boston, MA: Cengage Learning. SBN: 9781133702863.

Guidelines for Requesting Accommodations Based on Documented Disability or Medical Condition

It is the intention of Highland Community College to work toward full compliance with the Americans with Disabilities Act, to make instructional programs accessible to all people, and to provide reasonable accommodations according to the law.

Students should understand that it is their responsibility to self-identify their need(s) for accommodation and that they must provide current, comprehensive diagnosis of a specific disability or medical condition from a qualified professional in order to receive services. Documentation must include specific recommendations for accommodation(s). Documentation should be provided in a timely manner prior to or early in the semester so that the requested accommodation can be considered and, if warranted, arranged.

In order to begin the process all students **must** complete the "Disabilities Self-Identification Form" on our [Disability Services website](#).

This form can also be accessed at the Highland Community College homepage under Students Services/Student Resources/Disability Service or by contacting the Disabilities Coordinator.

A Note on Harassment, Discrimination and Sexual Misconduct

Highland Community College seeks to assure all community members learn and work in a welcoming and inclusive environment. Title VII, Title IX, and College policy prohibit harassment, discrimination and sexual misconduct. Highland Community College encourages anyone experiencing harassment, discrimination or sexual misconduct to talk to report to the Vice President for Student Services, the Human Resources Director or complete an [online report](#) about what happened so that they can get the support they need and Highland Community College can respond appropriately.

There are both confidential and non-confidential resources and reporting options available to you. Highland Community College is legally obligated to respond to reports of sexual misconduct, and therefore we cannot guarantee the confidentiality of a report, unless made to a confidential resource. Responses may vary from support services to formal investigations. As a faculty member, I am required to report incidents of sexual misconduct and thus cannot guarantee confidentiality. I must provide our Title IX coordinator with relevant details such as the names of those involved in the incident. For more information about policies and resources or reporting options, please review our [Equity Grievance Policy](#).