J. Sargeant Reynolds Community College
Course Content Summary

Course Prefix and Number: AUT 255 **Credits: 5**

Course Title: Advanced Automotive Engine Performance Diagnostics

Course Description:

Introduces advanced engine performance concepts, including theory and practical application. Covers vehicle communications, scan-tool diagnostics, advanced engine mechanical tests, and diagnosing and repairing complex vehicle drivability issues. Provides preparation for the Automotive Service Excellence (ASE) A8 Engine Performance Certification examination. Lecture 2 hours. Laboratory 6 hours. Total 8 hours per week. 5 credits

General Course Purpose:

This course provides training in advanced-level engine performance diagnostic practices and applications. The initial focus will be on engine emissions systems with continued training on diagnosing drivability-related concerns, with and without diagnostics trouble codes (DTC). Using advanced diagnostic equipment is explored in this course.

Course Prerequisites and Co-requisites:

Prerequisite: AUT 155 and AUT 197

Student Learning Outcomes:
Upon completing the course, the student will be able to

- Discuss the operational characteristics and benefits of on board diagnostics (OBD) II modes, monitors, and drive cycles.
- Develop and deploy diagnostic strategies for the common emissions control devices
- Interpret fuel trim during diagnosis of drivability faults
- Diagnose single cylinder and multiple cylinder misfire codes
- Develop and deploy diagnostic strategies for no-DTC related failures

Major Topics to Be Included:

- OBDII
  - Modes
  - Drive Cycles
  - Readiness Monitors
- Emissions Control Devices for Handling Hydrocarbons (HC) and Carbon Monoxide (CO) Gasses
  - Positive crankcase ventilation (PCV)
  - Catalytic converter
  - Evaporative emissions
  - Secondary air injection
- Emissions Control Devices For Handling Oxides of Nitrogen (NOx) Gasses
  - Exhaust gas recirculation (EGR)
  - Variable valve timing
- Fuel Trim Diagnosis
  - Air/Fuel Ratio (AFR) and Oxygen (O2) sensor operation and diagnosis

- Misfire Diagnosis
    - Single cylinder
    - Multiple cylinder
- No-DTC Drivability
    - Volume efficiency

Effective Date/Updated: January 19, 2023