

**NOVA COLLEGE-WIDE COURSE CONTENT SUMMARY
AUT 226 - ADVANCED ASM EMISSIONS DIAGNOSTICS (2 CR.)**

Course Description

Presents logical diagnostic strategies to identify and correct vehicle HC, CO, and Nox emissions failures. Specifically addresses the technologies and techniques required for successful diagnosis and repair of vehicles failing Acceleration Simulation Mode (ASM) and Two-Speed Idle Mode Tests. Current ASM diagnostic equipment will be introduced discussed, and usage demonstrated. Lecture 2 hours per week.

General Course Purpose

This course is designed to provide practicing automotive technicians with advanced level training in the diagnosis and repair of vehicles failing the Virginia Enhanced I/M Emissions Test. The student will become acquainted with current Virginia DEQ's Air Check Virginia Emission Program regulations. Operation and diagnosis of complex engine subsystems, such as computer controlled fuel systems and computer controlled ignition systems, will be studied and discussed. Advanced diagnostic techniques, including oscilloscope waveform and 5-gas analysis, will be presented. Through instruction in complex emission control systems operation, application and use of current industry test equipment, and the application of a logical, systematic diagnostic approach, the student will be equipped to determine the causes of ASM and OBD test failures and their correction.

Course Prerequisites/Corequisites

The ability to read, write, and speak the English language.

Course Objectives

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

- Describe the most significant features of State Enhanced I/M Program regulations and the Federal Clean Air Act Amendment, regarding vehicle emissions and their reduction
- Explain advanced electronic concepts and their relationship to engine management system operation
- Identify wiring diagram symbols and utilize complex wiring schematics as part of fault diagnosis
- Explain computer controlled ignition system operation and apply appropriate diagnostic procedures
- Explain the operation of various types of electronic fuel injection systems
- Identify defective electronic components, using waveform analysis and oscilloscope waveform "libraries"
- Describe the use of diagnostic and repair strategies, including "base-lining", how to access required service information, test data interpretation, flow-chart usage, intermittent fault diagnosis and repair verification
- Explain the basic operating characteristics of On-Board Diagnostics systems
- Explain diagnosis and repair procedures for vehicles that fail OBD computer testing
- Interpret ASM and Two-Speed Idle Mode test data
- Describe the proper application and use of advanced test equipment, such as OBD computer scanner, an oscilloscope, digital multi-meters and 5-gas analyzers
- Explain current methods of Evaporative Emission Control systems, purge and pressure testing
- Describe specific documentation of emissions related repairs for Air Check Virginia Program

Major Topics to be Included

- Virginia DEQ regulations, Air Check Virginia's Vehicle Emission inspection program
- Advanced electronic/electrical system operation, testing, diagnosis and repair
- Oscilloscope waveform analysis and emission failure case studies
- Emission system testing, diagnosis and repair strategies and techniques
- Demonstration exercises and analysis of ASM test failures using 5-gas analysis
- Repair verification and documentation
- On board diagnostic computer systems