

## CUYAMACA COLLEGE OFFICIAL COURSE OUTLINE

### **AUTOMOTIVE TECHNOLOGY 123 – ENGINE PERFORMANCE II – FUEL SYSTEMS**

3 hours lecture, 6 hours laboratory, 5 units

#### **Catalog Description**

Second in a three course series dealing with engine performance. Emphasizes the use of computers for the control of fuel and air delivery to the engine. Topics include: input and output devices, basic computer operation, closed loop fuel control, computer-assisted carburetion, computer-controlled fuel injection, turbochargers and superchargers, scan tool diagnostics, digital lab scope diagnostics, OBD II diagnostic. Students will be required to complete associated tasks in the shop as specified by NATEF (National Automotive Training Educational Foundation). Final preparation for ASE Engine Performance (A-8) Certification.

#### **Recommended Preparation**

AUTO 120

#### **Entrance Skills**

Without the following skills, competencies and/or knowledge, any student entering this course will be highly unlikely to succeed:

- 1) Familiar with basic electrical laws of physics including Ohms law
- 2) Understand causes and types of automotive emissions
- 3) Understand theory and basic repair practices of the inductive discharge ignition systems
- 4) Ability to perform basic mechanical engine diagnostic tests including:
  - a. Compression test
  - b. Cylinder leakage test
  - c. Vacuum gauge analysis tests
  - d. Cylinder power balance test
- 5) Ability to diagnose ignition systems utilizing an automotive ignition oscilloscope (scope)
- 6) Familiar with basic use of Digital Volt Ohm Meter (DVOM)
- 7) Basic understanding of scan tool operation
- 8) Understanding of basic engine operating principles

#### **Course Objectives**

Students will be able to:

- 1) Acquire safe working habits
- 2) Relate theory of computer control systems to actual repairs
- 3) Independently demonstrate ability to perform computer system and fuel system service using related diagnostic equipment

#### **Special Materials Required of Student**

- 1) Basic hand tool set
- 2) Approved safety glasses
- 3) 10 MEG OHM impedance digital VOM
- 4) Notebook, required textbook
- 5) Scientific calculator

#### **Minimum Instructional Facilities**

- 1) Auto tech lab (6 bays)
- 2) Complete tune-up and diagnostic center
- 3) Specialized computer and fuel injection test equipment
- 4) Various computer and FI equipped vehicles and test stands
- 5) Automotive transparencies, PowerPoint presentations, CD/DVD videos
- 6) VCR/monitor
- 7) SMART classroom

**Course Content**

- 1) Lecture
  - a. Review of automotive emissions
  - b. Basic electronics
  - c. Introduction to solid state electronics
  - d. Voltage and resistance measurements (using DVOM)
  - e. Microprocessors, computers and logic systems
  - f. Input devices
  - g. Output devices
  - h. Computer-assisted carburetion systems
  - i. Computer-controlled fuel injection systems
  - j. Turbochargers and superchargers
  - k. Variable timing and induction systems
  - l. Scan tools
  - m. Digital lab scopes
- 2) Lab
  - a. Introduction and safety
  - b. Voltage drop and resistance measuring
  - c. Locating and testing various sensors on vehicles
  - d. Adjusting computer carburetors to specification
  - e. Diagnosing computer-related malfunctions
  - f. Servicing fuel injection systems
  - g. Diagnosing and repairing turbocharger and supercharger systems
  - h. Diagnosing and repairing variable timing and induction systems
  - i. Scan tool diagnostics
  - j. Digital lab scope diagnostics
  - k. OBD II diagnostics

**Method of Instruction**

- 1) Lecture and demonstration
- 2) Individual assistance
- 3) Small group discussion

**Method of Evaluation**

A grading system will be established by the instructor and implemented uniformly. Grades will be based on demonstrated proficiency in subject matter determined by multiple measurements for evaluation, one of which must be essay exams, skills demonstration or, where appropriate, the symbol system.

- 1) Quizzes and written exams
- 2) Observation of student work
- 3) Inspection of work completed
- 4) Hands-on performance exam

**Texts and References**

- 1) Required: King, Computerized Engine Controls. 5<sup>th</sup> edition. Delmar, 2002.
- 2) Supplemental: None

**Exit Skills**

Students having successfully completed this course exit with the following skills, competencies and/or knowledge:

- 1) Basic understanding of electronics and solid state electronics
- 2) Basic understanding of microprocessors, computers and logic systems
- 3) Understanding of computer input and output devices
- 4) Understand the operation of computer control of carburetor and fuel injection systems
- 5) Understanding of turbochargers and superchargers
- 6) Ability to diagnose basic computer-related malfunctions
- 7) Ability to diagnose computer input and output systems with scan tool, Digital Storage Oscilloscope (DSO) and Digital Volt Ohm Meter (DVOM)
- 8) Ability to service and troubleshoot fuel injection systems