

## CUYAMACA COLLEGE OFFICIAL COURSE OUTLINE

### **AUTOMOTIVE TECHNOLOGY 160 – AIR CONDITIONING AND HEATING SYSTEMS**

2 hours lecture, 3 hours laboratory, 3 units

#### **Catalog Description**

Study of refrigeration principles with emphasis on servicing, diagnosing, testing and repair or replacement of components. Emphasis on practical experience performing actual repairs. Students will be required to complete associated tasks in the shop as specified by NATEF (National Automotive Training Educational Foundation). Preparation for ASE A-7 Certification and EPA-approved CFC Technician Certification.

#### **Prerequisite**

None

#### **Course Objectives**

Students will be able to:

- 1) Distinguish between safe and unsafe working conditions
- 2) Evaluate air conditioning and heating systems for proper operation
- 3) Evaluate diagnosis systems in need of repair by applying theory of operation principles
- 4) Evaluate air conditioning systems by comparing high and low side gauge readings to ambient temperatures
- 5) Demonstrate the knowledge and ability to perform actual repairs to prescribed industry standards

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

- 1) Basic hand tool set
- 2) Approved safety goggles (must have shielded vents)
- 3) Specialized air conditioning tools
- 4) Notebook, required textbook

#### **Minimum Instructional Facilities**

- 1) Auto tech lab (6 bays)
- 2) Complete air conditioning and heating service equipment center
- 3) Various training aides
- 4) Automotive transparencies, PowerPoint presentations, CD/DVD videos
- 5) VCR/monitor
- 6) SMART classroom

#### **Course Content**

- 1) Lecture:
  - a. Introduction and safety
  - b. Principles of refrigeration
  - c. Refrigerants
  - d. Electrical controls
  - e. Moisture removal
  - f. Service valves
  - g. Manifold gauge set
  - h. Leak detectors
  - i. Receiver driers
  - j. Thermatic expansion valves and related refrigerant control techniques
  - k. Temperature pressure relationships
  - l. System diagnosis
  - m. Electronic/automatic temperature control systems
  - n. Environmental concerns regarding CFCs
  - o. Recovery of CFCs from air conditioning systems

- 2) Lab:
  - a. Introduction and safety
  - b. Laboratory procedures
  - c. System diagnosis
  - d. Diagnose and repair electronic/automatic temperature control systems
  - e. Leak testing
  - f. Pressure checks
  - g. Evacuating system
  - h. Compressor repair
  - i. Clutch repair
  - j. Checking and adding oil
  - k. Testing various regulator valves
  - l. Component replacement
  - m. Vacuum controls
  - n. Recovery of CFCs from air conditioning systems

**Method of Instruction**

- 1) Lecture and demonstration
- 2) Individual assistance

**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: Dwiggin, Automotive Air Conditioning. 8<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) Understand nomenclature and operational theory of automotive air conditioning systems
- 2) Ability to diagnose automotive air conditioning and heating system components (HVAC)
- 3) Ability to diagnose HVAC systems using standard pressure charts and standard gauge set
- 4) Ability to remove and replace HVAC system components
- 5) Ability to recover refrigerant, evacuate and recharge HVAC system
- 6) Ability to find refrigerant leaks using dye and electronic detector methods
- 7) Ability to diagnose and repair HVAC controls and ducting