

**Course Outline for AUTO A7**

**AUTOMOTIVE HEATING AND AIR CONDITIONING**

**Effective: Fall 2016**

**I. CATALOG DESCRIPTION:**

AUTO A7 — AUTOMOTIVE HEATING AND AIR CONDITIONING — 4.00 units

Diagnosing, evaluation, testing, adjustment, and repair of heating, ventilation and air conditioning (HVAC). Includes heat and energy, psychometrics, air flow, refrigerant recycling, equipment and controls. Student will be prepared to pass a nationally recognized HAVC certificate program, required by all California HVAC repair shops. Students are strongly recommended to enroll in Automotive Lab concurrently. Prerequisite: Automotive Technology INTRO (may be taken concurrently).

2.00 Units Lecture 2.00 Units Lab

**Prerequisite**

AUTO INTR - Automotive Service and Introduction with a minimum grade of c (May be taken concurrently)

**Strongly Recommended**

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**Grading Methods:**

Letter or P/NP

**Discipline:**

	<u>MIN</u>
<b>Lecture Hours:</b>	36.00
<b>Lab Hours:</b>	108.00
<b>Total Hours:</b>	144.00

**II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 1**

**III. PREREQUISITE AND/OR ADVISORY SKILLS:**

**Before entering the course a student should be able to:**

**A. AUTOINTR**

1. apply Ohm's law, read basic schematics, test automotive electrical systems;
2. discuss heating and cooling systems, perform basic cooling systems tests;
3. identify air conditioning systems, understand cycles of refrigerant;
4. theorize on the future of the automotive industry.

**IV. MEASURABLE OBJECTIVES:**

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

- A. obtain and interpret Service Information, Tools, Safety;
- B. diagnose the causes of HAVC system concerns resulting from malfunctions in the computerized HVAC control system with or without diagnostic trouble codes;
- C. chart, inspect, and test computerized HVAC control system sensors, HVAC control module, actuators, and circuits using a digital-multi-meter (DMM) on board diagnostic scan tool, and perform necessary action;
- D. access and use service information to perform step-by-step diagnosis;
- E. evaluate and adjust HVAC system controls;
- F. assess cooling system performance;
- G. outline common repairs to the engine cooling systems;
- H. perform Air conditioning (AC) evacuation and recharge;
  - I. diagnose malfunctions of vacuum and motor driven mode door;
- J. pass HVAC certification test;
- K. outline hazardous waste handling;
- L. distinguish safe shop environment.

**V. CONTENT:**

- A. Service Information, Tools and Safety
  - 1. Interpretation of information
    - a. Factory set procedures
    - b. Develop own diagnostic procedures
- B. Environmental and Hazardous Materials
- C. Heating and Air Conditioning Principles
- D. HVAC Parts and Operation
- E. A/C Compressors and Clutches
- F. Refrigerant and Oil Types and Handling
- G. A/C System Components and Operation
- H. Air Flow Management System
  - I. HVAC Electrical Circuits and Schematics
- J. Advanced Electrical HVAC systems
- K. Engine Cooling System Parts and Operation
- L. Heater System Operation and Diagnosis
- M. Automatic Temperature Control Systems
- N. Hybrid Electric Vehicle HVAC Systems
- O. Maintenance and Light Repair HVAC Inspection
- P. Refrigerant Recovery, Recycling and Handling
- Q. A/C System Diagnosis and Service
- R. Nationally Recognized HVAC Certification Test
  - 1. IMACA
  - 2. ASE

#### VI. METHODS OF INSTRUCTION:

- A. **Lecture** -
- B. **Lab** - Student Hands-on laboratory activities and assignments
- C. **Audio-visual Activity** - PowerPoint presentations, Mockup parts from automotive

#### VII. TYPICAL ASSIGNMENTS:

- A. Lecture based assignments
  - 1. Text reading
  - 2. Oral presentation
  - 3. Class discussion
- B. Lab based assignments:
  - 1. Completion of applied activities
  - 2. Lab activity worksheet
  - 3. Diagnosis and debugging
  - 4. Student Lab work sheets with emphasis on Hands-on applications
  - 5. Review of Lab sheets in both Lab and class settings
- C. Text reading assignments
  - 1. Class discussions of reading assignments
  - 2. Demonstrations pertaining to reading assignments

#### VIII. EVALUATION:

- A. **Methods**
  - 1. Exams/Tests
  - 2. Quizzes
  - 3. Class Work
  - 4. Home Work
  - 5. Lab Activities
- B. **Frequency**
  - 1. Minimum of two tests, Midterm and Final
  - 2. Weekly quizzes
  - 3. Bi-weekly group project/lab assignments
  - 4. Weekly homework
  - 5. Weekly/bi-weekly lab activities

#### IX. TYPICAL TEXTS:

- 1. Halderman, James. *Automotive Heating and Air conditioning*. 7 ed., Prentice Hall, 2015.
- 2. Johanson, chris. *Auto Heating and Air Conditioning*. 4 ed., Goodheart-Wilcox, 2015.
- 3. Gilles, Tim. *Automotive Service*. 5 ed., Cengage, 2015.

#### X. OTHER MATERIALS REQUIRED OF STUDENTS:

- A. Safety Glasses