

**Course Outline for NAUT SDR
SPECIFIED DIAGNOSTIC AND REPAIR**

Effective: Fall 2020

I. CATALOG DESCRIPTION:
NAUT SDR — Noncredit

This is a Bureau of Automotive Repair approved alternative to the ASE A6, A8 and L1 certification required for obtaining and maintaining smog technician licenses. This course will follow BAR guidelines for smog license prep. Student may or may not qualify for license exam after taking this class. For more information see www.smogcheck.ca.gov

Grading Methods:

Letter or P/NP

Discipline:

- Automotive Technology

Noncredit Category

J - Workforce Preparation

	MIN
Total Noncredit Hours:	126.00

II. PREREQUISITE AND/OR ADVISORY SKILLS:

III. MEASURABLE OBJECTIVES:

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

- A. Explain and apply fuel management theory, testing, and diagnosis including computerized controls;
- B. Explain and apply ignition theory, testing and diagnosis including use of an ignition scope and diagnosis of emissions problems caused by the ignition system;
- C. Explain and apply on board computer theory, testing, and diagnosis including demonstrated use of a scan tool and diagnostic trouble code deciphering.
- D. Thoroughly understand and explain four cycle engine basics: compression, ignition, fuel, air, and vacuum;
- E. Use an emissions gas analyzer, scanner, and Digital Storage Oscilloscope and apply test results to aid in diagnosing a vehicle;
- F. Explain the function of sensors and actuators and their interaction with the computer as well as proper diagnostic procedures for each
- G. Explain and demonstrate the theory and proper diagnostic procedures for understanding of how long and short term fuel trim work;
- H. Correctly diagnose emissions control system failures
 - 1. Retrieve, interpret, and apply diagnostic trouble codes
- J. Explain and apply four cycle engine theory including compression, air, fuel, ignition, vacuum, and the interaction between them
- K. Diagnose and repair automotive battery, starting, and charging systems using meters, test lights, and logic probes;
- L. Diagnose open, short, and grounded circuits;
- M. Explain Ohm's Law and apply in lab exercises;
- N. Perform a voltage drop test;
- O. Read and utilize a wiring diagram including standard industry symbol identification;
- P. Successfully apply diagnostic flow charts in order to achieve accurate diagnostic results of electronic components.
- Q. Use common industry terminology and abbreviations related to the course material

IV. CONTENT:

- A. Use of meters, test lights, and logic probes in diagnosing battery, starting, and charging systems
- B. Circuit Problems
 - 1. Opens, causes and corrections
 - 2. Shorts, causes and corrections
 - 3. Grounds, causes and corrections
- C. Intermittent electrical problems
 - 1. Diagnostic Strategy
 - 2. Collection Information
 - 3. Attacking problem
- D. Ohm's Law and electrical theory
 - 1. Ohms Law
 - 2. Computing Ohms Law
 - 3. Using Ohms Law in stock vehicles
 - 4. Using Ohms Law with aftermarket accessories
- E. Voltage drops
 - 1. What do they mean?
 - 2. Better than Ohms?
- F. Wiring diagrams
 - 1. Schematic Icons

- 2. Reading Charts
- G. Diagnostic Flow Charts
- H. Four cycle engine basics: compression, ignition, fuel, air, and vacuum
- I. Operation of diagnostic tools: DSO, scanner, and emissions analyzer
- J. Function of sensors and actuators, their interaction with the PCM, and their effect on drivability and emissions
- K. Theory and diagnostic procedures for injected and carbureted fuel control systems
- L. OBD II diagnostics and diagnostic trouble codes
- M. Industry and BAR terminology, abbreviations, standards, and procedures
- N. Fuel management theory, testing, and diagnosis
- O. Ignition theory, testing, and diagnosis
- P. On board computer theory, testing, and diagnosis

V. METHODS OF INSTRUCTION:

- A. **Lecture** -
- B. **Lab** - Hands-On lab Exercises
- C. **Audio-visual Activity** -
- D. **Discussion** -

VI. TYPICAL ASSIGNMENTS:

- A. Read each chapter in the text and be prepared to seek clarification and ask questions in class
- B. Orally discuss the material covered in each chapter
- C. Complete the review questions and related lab exercises for each chapter
 - 1. Explain how the computer is used to control the a alternator
 - 2. Why do voltage regulators include temperature compensation
- D. Complete lab activity worksheets for diagnosis and debugging using electrical/electronic diagnostic equipment. Show competence when entering data into California smog equipment
 - 1. Charging voltage check
 - 2. Lighting system troubleshooting

VII. EVALUATION:

Methods/Frequency

- A. Exams/Tests
 - Comprehensive from State
- B. Class Participation
 - daily
- C. Lab Activities
 - daily

VIII. TYPICAL TEXTS:

- 1. Halderman, James. *ASE Test Preparation and Study Guide*. 2 ed., Pearson, 2017.
- 2. State of California. https://www.bar.ca.gov/pdf/2017_Smog_Check_Manual.pdf. 2017 ed., State of California, 2017.
- 3. Halderman, James. *Automotive Maintenance and Light Repair*. 1 ed., Pearson, 2014.
- 4. Giles, Tim. *Automotive Service*. 5 ed., Cengage, 2015.
- 5. www.dca.ca.gov
- 6. www.smogcheck.ca.gov
- 7. www.arb.ca.gov

IX. OTHER MATERIALS REQUIRED OF STUDENTS:

- A. Internet access
- B. Safety Glasses