

Las Positas College
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**Course Outline for NAUT A6
 ELECTRICAL/ELECTRONIC SYSTEMS**

Effective: Fall 2021

**I. CATALOG DESCRIPTION:
 NAUT A6 — Noncredit**

Automotive electrical/electronic systems, including electrical circuits, Ohm's Law, battery, starting, charging, ignition, fuel, accessories, brakes, chassis, suspension, steering, HVAC, and wiring systems. Emphasis on diagnosis of electrical troubles, assembly, repair of components, and diagnostic equipment usage. Students are strongly recommended to enroll in Automotive Lab concurrently.

Prerequisite

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

NAUT INTR - Automotive Service and Introduction
 with a minimum grade of C
 (May be taken concurrently)
 or

AUTO INTL - Automotive Service and Introduction Hands-On Lab
 with a minimum grade of C
 (May be taken concurrently)
 and

AUTO INTZ - Automotive Service and Introduction Lecture
 with a minimum grade of C
 (May be taken concurrently)

Grading Methods:

Pass/No Pass

Discipline:

- Automotive Technology

Noncredit Category

J - Workforce Preparation

	MIN
Total Noncredit Hours:	162.00

II. PREREQUISITE AND/OR ADVISORY SKILLS:

Before entering the course a student should be able to:

A. AUTOINTR

1. Utilize and apply hazardous waste handling;
2. Identify and describe uses of automotive related tools;
3. Describe the importance of preventative maintenance and inspection procedures as they relate to the automobile;
4. Apply Ohm's law, read basic schematics, test automotive electrical systems;
5. Identify emissions components, understand 5 gas theory;
6. Discuss heating and cooling systems, perform basic cooling systems tests;
7. Identify air conditioning systems, understand cycles of refrigerant;
8. Discuss braking systems, perform a brake inspection, identify parts;
9. Differentiate between suspension and steering system types, inspect and qualify components;
10. Identify different transmissions, understand theory of operation of both manual and automatic transmissions and fluid requirements;
11. Restraints system identification, know safety concerns of each system and inspection of restraint systems;

B. NAUTINTR

1. Utilize and apply hazardous waste handling;
2. Identify and describe uses of automotive related tools;
3. Describe the importance of preventative maintenance and inspection procedures as they relate to the automobile;
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III. MEASURABLE OBJECTIVES:

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

- A. Diagnose and repair basic automotive battery, starting, charging systems;
- B. Use electrical test equipment for accurate diagnosis of electrical systems and sub-systems;
- C. Use problem-solving skills to categorize systems faults in automotive circuits and make needed repairs;
- D. Identify types of ignition systems;
- E. Describe and evaluate fuel control circuits for proper operation;
- F. Explain the fundamentals of electronic and electrical theories;
- G. Conduct circuit and wire repairs;
- H. Demonstrate safe and appropriate hazardous material handling;
- I. Maintain a clean and professional environment.

IV. CONTENT:

- A. Diagnosing and repair:
 1. Outline and perform procedures for the testing of batteries, charging systems, starting systems
 2. Categorize type of problem, isolate cause and make needed repairs
- B. Electrical test equipment
 1. Digital volt meters, for diagnosing electrical and electronic components and systems
 2. Volt Amp Tester (VAT), for diagnosing Batteries, Charging systems, starting systems
- C. Problem solving
 1. Classify type of electrical faults
 2. Evaluate needed diagnostic procedure
 3. Research proper diagnostic path as outlined by the manufacture or industry standards and make needed repairs
 4. Perform needed test to confirm repairs
- D. Identifying types of ignition systems
 1. Standard, electronic, high energy, distributor, non-distributor
 2. Safety precautions while diagnosing
 3. Identify circuitry, current theory and concepts
- E. Fuel control: operation and evaluation
 1. Identify type of controller
 2. Describe trigger mechanism
 3. Categorize type of injectors used
 4. Evaluate proper operation of system
 5. Perform pressure checks
 6. Explain scanner readings, meter readings and scope readings
- F. Fundamentals of electronics and electrical theory
 1. Explain Ohm's Law
 2. Perform Electrical Conversion factors
 3. Demonstrate a working knowledge of meter usage
 4. Research and list manufactures specifications
 5. Identify proper diagnostic steps for a proper conclusion for repairs needed
- G. Diagnosis of connected system
 1. Brakes and ABS system
 2. Steering
 3. Suspension
 4. HVAC
- H. Circuit and wire repairs
 1. Lay out and perform solder repairs
 2. Lay out and perform splice repairs
 3. Lay out and perform terminal and connector repairs
 4. Produce sound diagnostic approach to identify faults
- I. Hazardous material handling
 1. Explain safety precautions concerning battery acid (electrolyte) hazards
 2. List steps to help someone that has been exposed to battery acid (electrolyte)

- J. Professional environment
 1. Safety glasses (Clear lens) worn in all Laboratory areas
 2. No loose clothing (Coveralls strongly recommended)
 3. Long Hair secured
 4. No open toe shoes (safety shoes recommended)
 5. Work areas maintained; clean free of debris and spills

V. LAB CONTENT:

- A. Diagnosing and repair:
 1. Outline and perform procedures for the testing of batteries, charging systems, starting systems
 2. Categorize type of problem, isolate cause and make needed repairs
- B. Electrical test equipment
 1. Digital volt meters, for diagnosing electrical and electronic components and systems
 2. Volt Amp Tester (VAT), for diagnosing Batteries, Charging systems, starting systems
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 1. Classify type of electrical faults
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VI. METHODS OF INSTRUCTION:

- A. **Lab** - Student Hands-on laboratory activities and assignments
- B. **Lecture** -

VII. TYPICAL ASSIGNMENTS:

- A. Lecture based assignments
 1. Lecture on Ohm's law
- B. Text reading
 1. Read Chapter One
- C. Lab based assignments
 1. Perform Voltage drop on starter circuit

VIII. EVALUATION:

Methods/Frequency

- A. Exams/Tests
monthly
- B. Quizzes
weekly
- C. Lab Activities
weekly

IX. TYPICAL TEXTS:

1. Duffy, James. *Modern Automotive Technology*. 9 ed., Goodheart-Wilcox, 2020.
2. Johanson, Chris. *Automotive Electricity and Electronics*. 5 ed., Goodheart Wilcox, 2021.

X. OTHER MATERIALS REQUIRED OF STUDENTS:

- A. Safety Glasses

