

**Course Outline for NAUT CA1**  
**CONCEPTS OF ENGINE REPAIR**  
**Effective: Fall 2021**

**I. CATALOG DESCRIPTION:**  
 NAUT CA1 — Noncredit

This class is lecture only and non-credit. An in depth study of engines: mechanical, measurement, and assembly. A study of the above mentioned components including theory, teardown, evaluate, qualifying, and rebuilding. This class' emphasis is on engines.

**Grading Methods:**  
 Pass/No Pass

**Discipline:**  
 • Automotive Technology

**Noncredit Category**  
 J - Workforce Preparation

	<b>MIN</b>
<b>Total Noncredit Hours:</b>	36.00

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

**III. MEASURABLE OBJECTIVES:**

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

- A. Explain the history of powertrain evolution.
- B. Explain four cycle engine theory and identify key components involved.
- C. Demonstrate Ohms Law in practice, series, parallel circuits.

**IV. CONTENT:**

- A. Powertrain evolution
  - 1. The first four cycle engines
  - 2. Current engines
  - 3. Horsepower and emission trade offs
  - 4. Environmental decisions driving design
  - 5. The first automatic transmissions
  - 6. Current automatic transmissions
    - a. More gear ratios
    - b. Different fluids
    - c. Internal design improvements
- B. Measurement tools
  - 1. Micrometer
    - a. Vernier
    - b. Caliper
  - 2. Dial bore gauge
  - 3. Snap gauges
  - 4. Straight edge
  - 5. Feeler gauges
  - 6. Hole gauges
- C. Four cycle engine theory
  - 1. Intake, compression, power, exhaust
    - a. 360 degrees in one degree intervals
    - b. Valve overlap
    - c. Timing concerns and tricks
    - d. Street vs. racing
  - 2. DOHV vs. OHV vs. Valve in block design
    - a. Pros and cons of each
    - b. Current technology
  - 3. Key Valve train components
  - 4. Key bottom end components
  - 5. Camshaft timing
    - a. Static camshaft
    - b. Dynamic camshaft
    - c. Electronic valves
  - 6. Crankshaft design and balance

- 7. Cylinder head design
  - a. Single valve
  - b. Multiple valve
- D. Engine rebuilding
  - 1. Manufacturer Procedures
    - a. Component sequence
    - b. Torque specifications
    - c. Tightening sequences
    - d. Special concerns
      - 1. Assembly lube
      - 2. Gaskets and sealers
  - 2. Dynamic engine torque
  - 3. Proper engine timing
    - a. Camshaft to crankshaft
    - b. Crankshaft to balance shaft
- E. Ohm's Law
  - 1. Series Circuits
  - 2. Parallel Circuits
  - 3. Voltage Drop
  - 4. Resistance
  - 5. Amperage draw
- F. Professionalism

V. METHODS OF INSTRUCTION:

- A. **Lecture** -

VI. TYPICAL ASSIGNMENTS:

- A. Lecture based assignments
  - 1. Lecture on Engine Construction
- B. Text reading assignments
  - 1. Read Chapter One in text

VII. EVALUATION:

**Methods/Frequency**

- A. Exams/Tests
  - monthly
- B. Quizzes
  - weekly

VIII. TYPICAL TEXTS:

- 1. Johanson, Chris. *Auto Engine Repair*. 5 ed., Goodheart Wilcox, 2021.
- 2. Duffy, James. *Modern Automotive Technology*. 9 ed., Goodheat Wilcox, 2020.

IX. OTHER MATERIALS REQUIRED OF STUDENTS:

- A. Computer with internet access