

Las Positas College
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Course Outline for NAUT A8

ENGINE PERFORMANCE

Effective: Fall 2021

I. CATALOG DESCRIPTION:

NAUT A8 — Noncredit

Principals of automotive fuel induction, ignition and emission control systems, including inspection, diagnosis and repair of fuel and emission control systems/components governed by federal and state laws and standards. Electrical diagnosis of emission control systems. Relation of chassis and body systems to emissions. 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. Discuss four stroke engine cycle and identify engine parts;
5. Perform basic engine teardown and reassembly;
6. Apply Ohm's law, read basic schematics, test automotive electrical systems;
7. Identify emissions components, understand 5 gas theory;
8. Identify different transmissions, understand theory of operation of both manual and automatic transmissions and fluid requirements;

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;
4. Discuss four stroke engine cycle and identify engine parts;
5. Perform basic engine teardown and reassembly;
6. Apply Ohm's law, read basic schematics, test automotive electrical systems;
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- C. AUTOINTL
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. Discuss four stroke engine cycle and identify engine parts;
 5. Perform basic engine teardown and reassembly;
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 8. Identify different transmissions, understand theory of operation of both manual and automatic transmissions and fluid requirements;
- D. AUTOINTZ
1. Identify and describe uses of automotive related tools;
 2. Describe the importance of preventative maintenance and inspection procedures as they relate to the automobile;
 3. Discuss four stroke engine cycle and identify engine parts;
 4. Apply Ohm's law, read basic schematics, test automotive electrical systems;
 5. Identify emissions components, understand 5 gas theory;
 6. Identify different transmissions, understand theory of operation of both manual and automatic transmissions and fluid requirements;

III. MEASURABLE OBJECTIVES:

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

- A. Distinguish and explain the different types of fuel delivery systems;
- B. Distinguish and explain the different types of ignition systems
- C. Perform tests related to popular fuel systems used on current model cars;
- D. Perform tests related to popular ignition systems used on current model cars
- E. Formulate diagnostic patterns, and analyze gas readings to expedite proper repairs
- F. Manipulate and use hand held diagnostic test equipment
- G. Demonstrate proficient use of diagnostic information systems;
- H. Explain theory and functionality of carburetors, throttle body, and port injectors;
 1. Explain safety procedures and the handling of hazardous waste materials;
- J. Maintain a clean and professional environment.

IV. CONTENT:

- A. Different types of fuel delivery systems.
 1. Describe functionality of Carburetors
 2. Describe advantages of Fuel injectors
- B. Different types of ignition systems
 1. Describe functionality of a points ignition systems
 2. Describe functionality of a high energy ignition systems
 3. Describe functionality of a coil over plug ignition systems
- C. Fuel systems testing
 1. Perform pressure test
 2. Evaluate volume test and fuel composition
 3. Electronic pulse with modulation evaluation
 4. Volt drop and scope evaluation
- D. Ignition System Testing
 1. Ignition Scope theory
 2. Ignition Scope Usage
 3. Ignition Scope Reading and evaluation
- E. Diagnostic patterns, and analyze gas readings
 1. Execute diagnostic as described in service information systems
 2. Study and evaluate exhaust gas readings
- F. Diagnostic test equipment
 1. Identify proper tester for application
 2. Manipulate hand held scanners to retrieve diagnostic information.
- G. Diagnostic information systems
 1. Access and extract diagnostic information.
 2. Research labor time guides for work determined in diagnostics.
- H. Explain theory and functionality
 1. List theory of air fuel flow of a carburetor
 2. Explain advantages of port injectors and related equipment
- I. Diagnose various Engine Performance concerns
- J. Explain the difference in the three main automotive systems
- K. Handling of hazardous waste materials
 1. Storage and handling of gasoline
 2. Storage and handling of diesel fuel
- L. 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. Different types of fuel delivery systems.
 1. Describe functionality of Carburetors
 2. Describe advantages of Fuel injectors
- B. Different types of ignition systems
 1. Describe functionality of a points ignition systems
 2. Describe functionality of a high energy ignition systems
 3. Describe functionality of a coil over plug ignition systems
- C. Fuel systems testing
 1. Perform pressure test
 2. Evaluate volume test and fuel composition
 3. Electronic pulse with modulation evaluation
 4. Volt drop and scope evaluation

- D. Ignition System Testing
 - 1. Ignition Scope theory
 - 2. Ignition Scope Usage
 - 3. Ignition Scope Reading and evaluation
- E. Diagnostic patterns, and analyze gas readings
 - 1. Execute diagnostic as described in service information systems
 - 2. Study and evaluate exhaust gas readings
- F. Diagnostic test equipment
 - 1. Identify proper tester for application
 - 2. Manipulate hand held scanners to retrieve diagnostic information.
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- H. Explain theory and functionality
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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 scanner operation
- B. Lab based assignments
 - 1. Perform diagnosis of MIL
- C. Text reading assignments
 - 1. Read Chapter One

VIII. EVALUATION:

Methods/Frequency

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

IX. TYPICAL TEXTS:

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

X. OTHER MATERIALS REQUIRED OF STUDENTS:

- A. Safety Glasses