

Course Outline for NAUT INTR
AUTOMOTIVE SERVICE AND INTRODUCTION

Effective: Fall 2020

I. CATALOG DESCRIPTION:
 NAUT INTR — Noncredit

Bumper-to-Bumper Automotive Knowledge. Starting with hazardous waste handling, tool identification, maintenance and lubrication, moving into engine mechanical, emissions controls, suspension systems, air conditioning, airbags and safety, transmissions, axles, and finishing off with the future of the automotive industry. This is an introductory class for people who want to know more about their vehicle or who are planning an automotive career.

Grading Methods:

Letter or P/NP

Discipline:

- Automotive Technology

Noncredit Category

J - Workforce Preparation

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| | MIN |
| Total Noncredit Hours: | 144.00 |

II. PREREQUISITE AND/OR ADVISORY SKILLS:

III. MEASURABLE OBJECTIVES:

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

- A. Utilize and apply hazardous waste handling;
- B. Identify and describe uses of automotive related tools;
- C. Describe the importance of preventative maintenance and inspection procedures as they relate to the automobile;
- D. Discuss four stroke engine cycle and identify engine parts;
- E. Perform basic engine teardown and reassembly;
- F. Apply Ohm's law, read basic schematics, test automotive electrical systems;
- G. Identify emissions components, understand 5 gas theory;
- H. Discuss heating and cooling systems, perform basic cooling systems tests;
- I. Identify air conditioning systems, understand cycles of refrigerant;
- J. Discuss braking systems, perform a brake inspection, identify parts;
- K. Differentiate between suspension and steering system types, inspect and qualify components;
- L. Identify different transmissions, understand theory of operation of both manual and automatic transmissions and fluid requirements;
- M. Restraints system identification, know safety concerns of each system and inspection of restraint systems;
- N. Theorize on the future of the automotive industry.

IV. CONTENT:

- A. Safety and Handling of hazardous waste materials
 - 1. Occupational Safety Health Administration (OSHA) Shop standards applied
 - 2. Industry safety standards applied
 - 3. Hazardous material handling; waste oil, as well as other chemicals related to the automobile
- B. Tool Identification
 - 1. Ratchets, Sockets, Wrenches, Screwdrivers
 - 2. Torque Wrenches
 - 3. Hammers, Pliers
 - 4. Specialty Tools
- C. Maintenance and inspection
 - 1. Manufacturing recommendations
 - 2. Periodic inspections for unusual conditions
 - 3. Component failure inspections
 - 4. Chassis lubrication
 - 5. Engine oil changes
 - a. Oil Types, Conventional and Synthetic
 - b. Oil change intervals
 - c. Theory
 - d. On car application
 - 6. Fluid inspection and service
 - a. Leaks
 - b. Power steering
 - c. Transmission

- d. Axles
- e. Washer
- f. Coolant/Antifreeze
- g. On car application
- D. Operational theory Four stroke Engine Cycle
 - 1. Intake
 - 2. Compression
 - 3. Power
 - 4. Exhaust
 - 5. Timing
 - a. Spark
 - b. Camshaft
- E. Gasoline Engine Component Identification and Teardown
 - 1. History of design and metallurgy of engines
 - 2. Engine Block components
 - 3. Cylinder Head components
 - 4. Intake, Exhaust and other major bolt on components
- F. Electrical Systems
 - 1. Ohms law Theory
 - 2. Electrical Schematic Icons and drawings
 - 3. Battery Basics
 - 4. Alternator/Generator Basics
 - 5. Starter Motor Basics
 - 6. Electrical Testing
 - a. Battery
 - 1. Theory
 - 2. On car application
 - b. Alternator
 - 1. Theory
 - 2. On car application
 - c. Starter
 - 1. Theory
 - 2. On car application
- G. Emissions Systems
 - 1. Parts Identification
 - 2. Parts Theory
 - 3. Reading Emissions Labels
 - 4. 5 gas Theory
 - 5. Smog Controls
 - a. California and Federal Requirements
 - b. History of the Smog Program
 - c. Government and Manufacturer laws and regulations
 - 6. Environmental Responsibilities
- H. Heating and Cooling
 - 1. History and current innovations of heating and cooling systems
 - 2. Parts Identification
 - 3. Heating Theory and operation
 - 4. Heating Systems Testing
 - a. Theory
 - b. On car application
 - 5. Coolant Systems Testing
 - a. Theory
 - b. On car application
- I. Air Conditioning Systems
 - 1. Environmental concerns
 - 2. Parts Identification
 - 3. Parts Theory
 - 4. On car Testing and inspection procedures and application
- J. Braking systems
 - 1. Base Systems
 - a. Brake systems history and improvements through time
 - b. Fluid differences and cautions
 - c. Parts Identification
 - d. Parts Theory
 - a. On car inspection procedures
 - 1. Government and Manufacturer laws and regulations
 - b. On car application
 - 2. Antilock Systems
 - a. Differences from base systems
 - b. Theory of operation
 - c. Parts Identification
- K. Steering and Suspension Systems
 - 1. Historical information and current technology
 - 2. Steering
 - a. Fluid usage current and historical
 - b. Different steering systems
 - c. Parts Identification
 - d. Parts theory
 - e. On car inspection procedures and application
 - 1. Government and Manufacturer laws and regulations
 - 3. Steering
 - a. Different suspension systems
 - b. Parts Identification
 - c. Parts theory
 - d. On car inspection procedures and application
- L. Transmissions and Axles
 - 1. History of the transmission
 - 2. Automatic Transmissions
 - a. Fluid Requirements
 - 1. On Car fluid checking

- b. Operational Theory
 - c. Gears sets
 - d. Clutches, Bands and Sprags
 - e. Torque Converters
- 3. Manual Transmissions
 - a. Fluid Requirements
 - b. Operational Theory
 - c. Clutch
 - d. Gears
- 4. Front and Rear Axles
 - a. Fluid Requirements
 - b. Operational Theory
 - c. Ring Gear
 - d. Pinion Gear
 - e. Propshafts
- 5. Transfer Cases
 - a. Fluid Requirements
 - b. Electronic and Manual
 - c. Operational Theory
 - d. Clutches
 - e. Gears
- M. Safety Restraints
 - 1. Seat Belts
 - a. Installation Concerns
 - b. Inspection and Replacement
 - 2. Airbags
 - a. History of Airbags and current technology
 - b. Parts Identification
 - 3. Parts Theory
 - 4. Inspection and Replacement
 - 5. Current Government Regulations
 - 6. Airbag deployment demonstration
- N. Automotive Industry Future
 - 1. Environmental Concerns
 - 2. Oil Supply Concerns
 - a. Middle East Stability
 - b. How much is left?
 - 3. Electronic Integration
 - a. Computers
 - b. Steering
 - c. Braking
 - d. Parking
 - e. Heads up Displays
 - f. Navigation
 - g. Entertainment Systems
 - h. Communication Systems
 - i. Optical Systems
 - 4. Alternative Fuels
 - a. CNG
 - b. Propane
 - c. Bio-Diesel
 - d. E85
 - e. Hydrogen
 - 5. Hybrids
 - a. Gasoline/Electric
 - b. Diesel/Electric
 - c. Hydrogen/Electric

V. METHODS OF INSTRUCTION:

- A. **Discussion** - Group discussions
- B. **Lecture** -
- C. Mockup parts from automobiles
- D. **Lab** - Student Hands-on laboratory activities and assignments
- E. **Audio-visual Activity** - Audio and Visual Material PowerPoint presentations
- F. **Discussion** -

VI. TYPICAL ASSIGNMENTS:

- A. Read X chapter and answer ASE style questions
- B. Apply lecture in lab by evaluating vehicles in lab setting
- C. Evaluate and discuss Fluke 87 readings with class
- D. Repair and confirm basic automotive maintenance issues

VII. EVALUATION:

Methods/Frequency

- A. Exams/Tests
 - At least two. Midterm and Comprehensive Final
- B. Quizzes
 - Weekly
- C. Group Projects
 - Weekly
- D. Class Participation
 - Daily
- E. Class Work
 - Daily
- F. Home Work
 - Weekly
- G. Lab Activities
 - Weekly

VIII. TYPICAL TEXTS:

1. Giles, Tim. *Automotive Service*. 5 ed., Cengage, 2015.
2. Halderman, James. *Automotive Maintenance and Light Repair*. 6 ed., Pearson, 2020.
3. Duffy, James. *Modern Automotive Technology*. 9 ed., Goodheart-Wilcox Publishing, 2017.

IX. OTHER MATERIALS REQUIRED OF STUDENTS:

- A. Safety glasses