

**Course Outline for NAUT A4
 SUSPENSION AND STEERING**

Effective: Fall 2021

I. CATALOG DESCRIPTION:
 NAUT A4 — Noncredit

Diagnosis, evaluation, testing, adjustment, alignment and repair of steering and suspension systems. Including all common automotive steering and suspension systems both car and truck. Future systems will also be covered. 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:	144.00

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. Discuss braking systems, perform a brake inspection, identify parts;
6. Differentiate between suspension and steering system types, inspect and qualify components;

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. 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. Apply Ohm's law, read basic schematics, test automotive electrical systems;

5. Discuss braking systems, perform a brake inspection, identify parts;
 6. Differentiate between suspension and steering system types, inspect and qualify components;
- 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. Apply Ohm's law, read basic schematics, test automotive electrical systems;
 4. Discuss braking systems, perform a brake inspection, identify parts;
 5. Differentiate between suspension and steering system types, inspect and qualify components;

III. MEASURABLE OBJECTIVES:

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

- A. Understand 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. Understand 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. Understand heating and cooling systems, perform basic cooling systems tests;
 - I. Identify air conditioning systems, understand cycles of refrigerant;
- J. Understand 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. Fundamentals and theory of automotive steering and suspension systems
 1. System geometry and alignment specifications
 2. Fundamental principals of electrical flow, and component operation
- B. Applied principal competencies
 1. Perform alignment
 2. Diagnosis vibration, electrical, and mechanical concerns
- C. Electronic components
 1. Identify and list functionality of electronic components
 2. Test and verify functionality of components
 3. Demonstrate use of a scanner, and volt/ohm testers
- D. Alignments
 1. Perform two wheel alignments
 2. Perform four-wheel alignments
 3. Conduct toe only adjustments
 4. Check cradle adjustments
- E. Tire and wheel problems
 1. Check radial and lateral variations on both tires and wheels
 2. Make bearing pre-load adjustments
 3. Perform vibration correction tests to isolate customer concerns
- F. Vibration concerns
 1. Perform vibration correction tests
 2. Isolate vibrations
 3. Identify type, frequency, and order of vibrations
- G. McPherson strut and "A" –Arm type suspension systems
 1. Identify types of suspensions
 2. Perform adjustments pertaining to type of system
 3. Describe safety precautions and warning
 4. List benefits for each type system
- H. Electronic Theory
 - I. Electrical Steering systems
 - J. Electrical Suspension systems
- K. 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. Fundamentals and theory of automotive steering and suspension systems
 1. System geometry and alignment specifications
 2. Fundamental principals of electrical flow, and component operation
- B. Applied principal competencies
 1. Perform alignment
 2. Diagnosis vibration, electrical, and mechanical concerns
- C. Electronic components
 1. Identify and list functionality of electronic components
 2. Test and verify functionality of components
 3. Demonstrate use of a scanner, and volt/ohm testers
- D. Alignments
 1. Perform two wheel alignments
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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 Alignment procedures
- B. Lab based assignments
 1. Perform 4-wheel alignment on 3 vehicles
- C. Text based 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 Suspension and Steering*. 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