

Las Positas College
 3000 Campus Hill Drive
 Livermore, CA 94551-7650
 (925) 424-1000
 (925) 443-0742 (Fax)

Course Outline for NAUT CA3
CONCEPTS OF MANUAL DRIVE TRAIN AND AXLES
Effective: Fall 2021

I. CATALOG DESCRIPTION:
 NAUT CA3 — Noncredit

This class is lecture only and non-credit. An in-depth study of rear axle, front axle, and transfer cases: mechanical, measurement, and assembly. Including theory, teardown, qualifying, and rebuilding.

Grading Methods:
 Pass/No Pass

Discipline:
 • Automotive Technology

Noncredit Category
 I - Short-Term Vocational

	MIN
Total Noncredit Hours:	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 rear axle gear theory;
- C. Explain front axle gear theory;
- D. Explain transfer case gear and power flow theory;
- E. Qualify new and used rear axle components.

IV. CONTENT:

- A. Safety
- B. Powertrain evolution
 - 1. The first axle assemblies
 - 2. Current axle assemblies
 - a. Internal design improvements
 - 3. Environmental decisions driving design
- C. Measurement tools
 - 1. Micrometer
 - a. Vernier
 - b. Caliper
 - 2. Dial bore gauge
 - 3. Snap gauges
 - 4. Straight edge
 - 5. Feeler gauges
 - 6. Hole gauges
- D. Rear Axle theory
 - 1. Gear Design
 - a. Straight Cut
 - b. Hypoid Cut
 - c. Diagonal Cut
 - d. Street vs. racing
 - 2. Pinion Design
 - 3. Ring Gear Design
 - 4. Locking/Non-Locking Design
 - 5. Full/Free Floating Design
- E. Front Axle theory
 - 1. Gear Design
 - a. Straight Cut
 - b. Hypoid Cut
 - c. Diagonal Cut
 - d. Street vs. racing
 - 2. Pinion Design
 - 3. Ring Gear Design
 - 4. Locking/Non-Locking Design

- F. Transfer Case theory
 - 1. Gear Design
 - a. Straight Cut
 - b. Hypoid Cut
 - c. Diagonal Cut
 - d. Street vs. Off Road
 - 2. Drive Chain Design
 - 3. Active/Passive Design
 - 4. 4wd Hi/4WD Lo Design and usage
- G. Two speed axles
- H. Electrical theory and application to axles
- I. Professionalism

V. METHODS OF INSTRUCTION:

- A. **Lecture** -

VI. TYPICAL ASSIGNMENTS:

- A. Lecture based assignments
 - 1. Lecture on pinion depth measurements
- B. Text based assignments
 - 1. Read Chapter One

VII. EVALUATION:

Methods/Frequency

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

VIII. TYPICAL TEXTS:

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

IX. OTHER MATERIALS REQUIRED OF STUDENTS:

- A. Computer with internet access