

Las Positas College
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Course Outline for AUTO 72C
POWERTRAINS: MODS. FOR PERF.
Effective: Spring 2017

I. CATALOG DESCRIPTION:

AUTO 72C — POWERTRAINS: MODS. FOR PERF. — 4.00 units

An in-depth study of engine and transmission modification in order to gain performance. This class will explain the differences in laws governing fifty state vehicles and those registered in California. How to gain performance legally and the penalties of breaking the law is also covered. Students will know the benefit versus cost of bolt-on performance products and major engine or transmission modification. NOTE: Some modifications are intended for off-road applications only. Students are encouraged to enroll in Automotive Lab concurrently. Prerequisite: Automotive Technology 55 (completed with a grade of "C" or higher).

3.00 Units Lecture 1.00 Units Lab

Prerequisite

AUTO INTR - Automotive Service and Introduction
 with a minimum grade of C

Grading Methods:

Letter or P/NP

Discipline:

	MIN
Lecture Hours:	54.00
Lab Hours:	54.00
Total Hours:	108.00

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 1

III. PREREQUISITE AND/OR ADVISORY SKILLS:

Before entering the course a student should be able to:

A. AUTOINTR

IV. MEASURABLE OBJECTIVES:

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

- A. Demonstrate the basic safety procedures of handling hazardous waste materials.
- B. Operate a wide variety of precision measurement equipment.
- C. Explain four cycle engine theory and identify key components involved.
- D. Teardown typical engine assembly.
- E. Make measurements of engine components and compare to specifications.
- F. Explain the difference between 49 and 50 state legal.
- G. Interpret the Law as it applies to a personal vehicle and modification.
- H. Theorize possible horsepower outcomes for modifications.
 - I. Compare and Contrast Bolt-on Modifications.
- J. Major Powertrain Modifications
- K. Professionalism

V. CONTENT:

- A. Safety
 - 1. Tool usage and nomenclature
 - 2. Proper disposal procedures
 - 3. Environmentally conscious decisions
- 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 Teardown
 - 1. Removal and identification of external components
 - a. Special procedures
 - b. Loosening sequence
 - 2. Removal and identification of internal components
 - a. Special Procedures
 - 1. Loosening sequence
- E. Component measurement
 - 1. Specification lookup
 - 2. Comparison
 - a. Component diagnosis
 - 1. Failure analysis
- F. Modification Laws
 - 1. Federal Standards
 - 2. California Standards
- G. Federal and California Statues regarding punishment
 - 1. Fines and Jail time
 - 2. Environmental impact
- H. Horsepower and Torque
 - 1. Horse Power calculations
 - a. Curve Maps
 - b. Slope versus Incline
 - 2. Torque Calculations
 - a. Curve Maps
 - b. Slope versus Incline
 - 3. Changes from modifications
- I. Bolt on Modifications
 - 1. Removal and identification of factory parts
 - a. Special procedures
 - b. Specific design flaws and challenges
 - 2. Installation and identification of modification parts
 - a. Special procedures
 - b. Specific design and challenges
- J. Major Powertrain modifications
 - 1. Cost versus gain
 - 2. Comparison
 - a. Component diagnosis
 - b. Manufacturing Process
- K. Professionalism
 - 1. Safety glasses
 - 2. Working shop expectations
 - 3. Attitude
 - 4. Cleanliness
 - 5. Maintenance of work areas and tools

VI. METHODS OF INSTRUCTION:

- A. **Demonstration** -
- B. **Discussion** -
- C. **Lecture** -
- D. **Student Presentations** -
- E. **Guest Lecturers** -
- F. **Lab** - Group and individual laboratory activities

VII. TYPICAL ASSIGNMENTS:

1. Students are to complete section questions and exercises
2. Students must demonstrate ability to evaluate disassemble measure and reassemble engine, transmissions and transaxle units.

VIII. EVALUATION:

- A. **Methods**
 - 1. Exams/Tests
 - 2. Quizzes
 - 3. Lab Activities
- B. **Frequency**

IX. TYPICAL TEXTS:

1. Jeffrey J. Rehkopf, *A. Automotive Engine Repair and Rebuilding (Chek Chart.*, Prentice Hall, 2007.
2. Tom Birch, *1. Automatic Transmissions and Transaxles, 3/e. 0131197290.*, Prentice Hall, 2007.
3. Safety glasses
4. closed toe shoes
5. hop/safety clothing

X. OTHER MATERIALS REQUIRED OF STUDENTS: