

Lassen Community College Course Outline

AT-72 Engine Repair and Machining-Short Block

4.0 Units

I. Catalog Description

This course is designed to prepare the student with basic, through increasingly advanced, skills in overhaul procedures for the owner or rebuilder. Safety, basic hand tools, engine removal and replacement, cleaning techniques, disassembly and assembly of engine components, measuring, diagnosis of oil consumption and poor performance with corrective measures will be covered. Emphasis will be on gasoline engine overhaul as it relates to home, small farm shop, and commercial shop. This course conforms to ASE Education Foundation standards. This course has been approved for hybrid delivery.

Recommended Preparation: English 105 or equivalent multiple measures placement

34 Hours Lecture, 102 Hours Lab, 68 outside-of-class hours, 204 total student learning hours

Scheduled: Fall even

II. Coding Information

Repeatability: Not Repeatable. Take 1 Time

Grading Option: Graded or Pass/No Pass

Credit Type: Credit - Degree Applicable

TOP Code: 094800

III. Course Objectives

A. Course Student Learning Outcomes

Upon completion of this course the student will be able to:

1. Diagnose, disassemble, initiate corrective measures, and reassemble an automotive engine short block to manufactures' specifications at a beginner level at a beginner level.
2. Perform machining and balancing procedures commonly performed on cylinders, blocks, pistons and connecting rods at a beginner level.

IV. Course Content

A. Safety exam

1. Shop safety and routines
2. Vehicle identifying information, customer concern, related service history, cause, and correction.
3. Identify and interpret engine short block concern; determine necessary action.

B. Engine operation theory

1. Engine classification
2. Engine construction and theory of operation
3. Part nomenclature

C. Engine systems

1. Cooling system
2. Lubrication systems
3. Intake and exhaust systems
4. Turbo and supercharging systems

- D. Engine condition diagnosis
 - 1. Smoke from engine or exhaust
 - 2. Fluid leaks
 - 3. Engine noise diagnosis
 - 4. Oil pressure testing
 - 5. Compression testing
 - 6. Cylinder balance testing
 - 7. Vacuum testing
- E. Engine disassembly, cleaning, and inspection
 - 1. Engine removal and replacement techniques
 - 2. Disassembly and part organization
 - 3. Cleaning methods
 - 4. Cylinder, block and piston inspection and measurement
 - 5. Crankshaft and connecting rod measurement and inspection
 - 6. Camshaft and timing components inspection
- F. Measuring ferrous metal parts subject to fatigue with metal-crack detector and/or dye penetrant
 - 1. Magnaflux theory
 - 2. Aluminum crack detection
 - 3. Critical components
- G. Engine machining
 - 1. Block angle relationship
 - 2. Surfacing techniques and critical measurements
 - 3. Cylinder reboring
 - 4. Cylinder wall repair/and distortion
 - 5. Main and cam bore alignment
 - 6. Align honing
 - 7. Power cylinder honing
 - 8. Reconditioning piston and rod assembly
- H. Engine Balancing
 - 1. Static out-of-balance
 - 2. Dynamic out-of-balance
 - 3. Plane separation balancing
 - 4. Piston/rod assembly weight
 - 5. RPM determination
 - 6. Bob-weight formulas
 - 7. Crankshaft balancing
 - 8. Piston/rod assembly balancing
 - 9. Flywheel/clutch assembly
- I. Engine assembly
 - 1. Block final cleaning and preparation
 - 2. Cam bearing installation
 - 3. Crankshaft and bearing installation
 - 4. Cam and timing components installation
 - 5. Piston and rod assembly installation
 - 6. Turning torque
- J. Starting up and adjusting all engine components.
 - 1. Pump pressurization
 - 2. Minor tune-up
 - 3. Noise limits

V. Assignments

A. Appropriate Readings

1. Industry materials as furnished by the instructor
2. Manufacturers bulletins
3. Current professional manuals

B. Writing Assignments

Typical writing assignments may include:

1. Providing written answers to assigned questions
2. Performing mathematical calculations as assigned
3. Maintaining a notebook of class assignments/activities
4. Maintain a record of completed assignments/activities

C. Expected Outside Assignments

Appropriate outside assignments may include:

1. Researching appropriate readings
2. Preparing written assignments
3. Studying as needed for successful classroom performance

D. Specific Assignments that Demonstrate Critical Thinking

Students will perform analysis and evaluation of readings and/or classroom materials and utilize this analysis in classroom discussion, writing assignments, and in performing laboratory activities. Students must select and use appropriate methods and materials needed to complete laboratory assignments.

VI. Methods of Evaluation

Traditional Classroom Instruction

Term paper (topic choice, thesis statement, outline, bibliography, rough draft, final draft), homework, classroom discussion, essay, journals, lab demonstrations and activities, multiple choice quizzes, and participation.

Hybrid Evaluation

All quizzes and exams will be administered during the in person class time. Students will be expected to complete online assignments and activities equivalent to in class assignments and activities for the online portion of the course. Electronic communication, both synchronous and asynchronous (chat/forum) will be evaluated for participation and to maintain effective communication between instructor and students.

VII. Methods of Delivery

Check those delivery methods for which, this course has been separately approved by the Curriculum/Academic Standards Committee.

Traditional Classroom Delivery Correspondence Delivery

Online Delivery

Hybrid Delivery

Traditional Classroom Delivery:

The appropriate method of instruction will be determined by the instructor and may include:

1. Lecture with or without various audio/visual aids.

2. Group problem solving, discussion, debate, and/or critique.
3. Demonstration
4. Computer-assisted/other self-paced instruction.
5. Field trips or field assignments.
6. Laboratory assignments utilizing planned activities or "live" work.

Hybrid Delivery:

Hybrid modality may involve face to face instruction mixed with online instruction. A minimum of 1/3 of instruction, including 100% labs, will be provided face to face. The remaining hours will be taught online through a technology platform as adopted by the district.

VIII. Representative Texts and Supplies

Goodnight and VanGelder; *Master Automotive Technician Series Automotive Engine Repair*, 2017, Jones & Bartlett, ISBN 9781284101980

Appropriate Shop Clothing, proper footwear, and safety glasses.

Industry materials as furnished by the instructor

IX. Discipline/s Assignment

Automotive Technology

X. Course Status

Current Status: Active

Original Approval Date: 6/1/1990

Board Approval: 03/12/2013

Chancellors' Approval: 05/01/2013

Revised By: Chad Lewis

Curriculum/Academic Standards Committee Revision Date: 11/7/2023