



Broward Community College

Course Outline

LAST REVIEW: 2005-2006

NEXT REVIEW: 2010-2011

STATUS: A

COURSE TITLE: Automotive Engine Repair

COMMON COURSE NUMBER: AER1198C

CREDIT HOURS: 4

CONTACT HOUR BREAKDOWN

(per 16 week term)

CLOCK HOURS:

Lecture: **48** Lab: **48**

(Voc. Course ONLY)

Clinic: Other: **89**

PREREQUISITE(S):

COREQUISITE(S):

PRE/COREQUISITE(S):

COURSE DESCRIPTION: A course designed to teach the principles and procedures necessary to completely rebuild an automotive engine and to provide the practical experience in engine diagnosis, removal, disassembly, rebuilding, and dynamic check out. Topics include engine diagnosis; engine removal; engine disassembly; engine rebuilding; piston, pin and rod service; engine assembly; engine installation; valve adjustment; in shop and road test procedures. Special emphasis will be given to safety procedures and the specific tools, fasteners, and equipment to be used.

General Education Requirements - Associate of Arts Degree, meets Area(s):

General Education Requirements - Associate in Science Degree, meets Area(s):

UNIT TITLES:

1. Power Plant Theory
2. Engine Types
3. Engine Overhaul

I. Course Overview:

Upon successful completion of this course, the students should be able to rebuild an automotive engine.

II. Units:

Unit 1. Power Plant Theory

General Outcome:

- 1.0 The students should be able to demonstrate an understanding of the operating principles of the internal combustion engine.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 1.1 Describe the process by which power is produced in a typical gasoline engine, including, air/fuel mixture, compression and ignition.
- 1.2 Describe the process by which engine power is harnessed, including the operation of the connecting rods, crankshaft and flywheel.
- 1.3 Describe the operation of the engine breathing system, including valves, lifters, pushrods and camshafts.
- 1.4 Describe the operation of the engine ignition system including the distributor, spark plugs and coil.
- 1.5 Describe the operation of the engine cooling system including radiator, thermostat and water pump.
- 1.6 Describe the operation of the engine lubricating system including the oil pump, oil filter and crank case vent.

Unit 2. Engine Types

General Outcome:

2.0 The students should be able to discuss the basic design characteristics of the various engine types.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 2.1 Identify engines according to cylinder number and arrangement, including 3, 4, 5, 6, 8, 10 and 12 cylinder, and inline, opposed, W and V type engines.
- 2.2 Identify engines according to valve train arrangement, including push-rod, overhead cam, double overhead cam, 4-stroke and 2-stroke designs.
- 2.3 Identify engines according to piston displacement and explain the concept and method of computing cylinder bore and stroke, and piston displacement.
- 2.4 Briefly describe the operation of other internal combustion engines, including diesel and rotary.
- 2.5 Briefly describe the operation of non-internal combustion engines, including steam, electric and Stirling power plants.
- 2.6 Identify and briefly describe intake systems, including turbo-charged (with and without inter-coolers), supercharged and variations of normally aspirated systems.

Unit 3. Engine Overhaul

General Outcome:

3.0 The students should be able to diagnose, remove, rebuild, and install automobile engines.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 3.1 Perform engine diagnostic procedures including compression tests, oil leak and burning analysis, and abnormal engine noise analysis.
- 3.2 Perform engine removal and complete disassembly using shop manuals and factory service bulletins.
- 3.3 Inspect engine parts for faults using appropriate measuring devices according to shop manuals and factory service bulletins.
- 3.4 Perform cylinder head and block service procedures including cleaning, measuring flatness on blocks and heads, rod alignment, piston ring replacement, valve guide reaming and valve seat re-facing, using shop manuals and factory service bulletins.
- 3.5 Perform cooling system, manifold, flywheel and engine bearing service using shop manuals and factory service bulletins.
- 3.6 Perform valve, valve lifter, camshaft and valve timing service using shop manuals and factory service bulletins.
- 3.7 Reinstall and evaluate the performance of a rebuilt engine using shop manuals and factory service bulletins for reference.