
COURSE PREFIX / NO: AUT 107
COURSE TITLE: ADVANCED ENGINE REPAIR
LEC HRS / WEEK: 2.0
LAB HRS / WEEK: 6.0
CREDIT HRS / SEMESTER: 4.0

[Distance Learning Attendance/VA Statement](#)
[Textbook Information](#)

COURSE DESCRIPTION

This course includes an advanced application of engine fundamentals, including engine removal, internal diagnosis and repair procedures, engine assembly and installation procedures.

COURSE COMPETENCIES

Upon successful completion of this course, the student should be competent to perform the following tasks:

Module 1 General Engine Diagnosis; Removal and Installation

1. Complete work order to include customer information, vehicle information, customer concern, related service history, cause, and correction. (A1-P1)
2. Identify and interpret engine concern; determine necessary action. (A2-P1)
3. Research applicable vehicle and service information, such as internal engine operation, vehicle service history, service precautions, and technical service bulletins. (A3-P1)
4. Locate and interpret vehicle and major component identification numbers (VIN, vehicle certifications labels, and calibration decals). (A4-P1)
5. Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action. (A4-P1)
6. Diagnose engine noises and vibrations; determine necessary action. (A6-P2)
7. Diagnose the cause of excessive oil consumption, unusual engine exhaust color, odor, and sound; determine necessary action. (A7-P2)
8. Perform engine vacuum test; determine necessary action. (A8-P1)
9. Perform cylinder balance test; determine necessary action. (A9-P1)
10. Perform cylinder cranking compression test; determine necessary action. (A10-P1)
11. Perform cylinder leakage test; determine necessary action. (A11-P1)
12. Remove and reinstall engine in a front-wheel or rear wheel drive vehicle (OBD1 or newer); reconnect all attaching components and restore the vehicle to running condition. (A12-P2)
13. Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns with an oscilloscope and engine diagnostic equipment; determine necessary action.
14. Install engine covers using gaskets, seals and sealers as required. (A13-P1)

Module 2 Cylinder Head and Valve Train Diagnosis and Repair

1. Inspect pushrods, rocker arms, rocker arm pivots, and shaft for wear, bending, cracks, looseness, and blocked oil passages; perform necessary action. (B9-P2)
2. Inspect hydraulic or mechanical lifters; determine necessary action. (B10-P2)
3. Inspect camshaft drives (including gear wear and backlash, sprocket and chain wear); determine necessary action. (B12-P2)
4. Inspect camshaft for runout, journal wear, and lobe wear. (B14-P2)
5. Establish camshaft(s) timing and cam sensor indexing according to manufacturer's specifications and procedure. (B16-P1)

Module 3 Engine Block Assembly Diagnosis and Repair

1. Disassemble engine block; clean and prepare components for inspection and reassembly. (C1-P2)
2. Deglaze and clean cylinder walls. (C5-P2)
3. Inspect main and connecting rod bearings for damage and wear; determine necessary action. (C8-P2)
4. Identify piston and bearing wear patterns that indicate connecting rod alignment and main bearing bore problems; determine necessary action. (C9-P3)
5. Inspect and measure pistons; determine necessary action. (C10-P2)
6. Assemble engine block assembly. (C15-P1)
7. Inspect auxiliary (balance, intermediate, idler, counter balance or silencer) shaft(s); inspect shaft(s) and support bearings for damage and wear; determine necessary action; reinstall and time. (C13-P2)
8. Inspect or replace crankshaft vibration damper (harmonic balancer). (C14-P3)
9. Prime engine lubrication system.

Module 4 Lubrication and Cooling Systems Diagnosis and Repair

1. Test coolant; drain and recover coolant; flush and recover cooling system with recommended coolant; bleed air as required. (D7-P1)
2. Inspect, and test fan(s) (electrical and mechanical), fan clutch, fan shroud, and air dams. (D10-P1)

Module 5 Fuel, Air induction, and Exhaust Systems Diagnosis and Repair

1. Inspect the integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shield(s); perform necessary action.
2. Perform exhaust system back-pressure test; determine necessary action.
3. Test the operation of turbocharger/supercharger systems; determine necessary action.

TOPIC / CONTENT OUTLINE

Module 1 General Engine Diagnosis; Removal and Installation

1. Engine rebuilding tools
2. Correct diagnosis of engine noises and vibrations
3. Correct diagnosis of engine leaks
4. Correct diagnosis of engine odors and smoke
5. Correct procedure for testing poor engine performance

6. Engine installation
7. Engine removal

Module 2 Cylinder Head and Valve Train Diagnosis and Repair

1. Identify valve train components
2. Inspect valve train components for wear
3. Inspect cylinder heads for cracks and warp age
4. Valve train operation and adjustment
5. Camshaft timing

Module 3 Engine Block Assembly Diagnosis and Repair

1. Using a ridge reamer
2. Using a cylinder hone
3. Measuring clearances
4. Inspecting engine parts for wear patterns
5. Using correct gaskets and sealers
6. Prime oiling system

Module 4 Lubrication and Cooling Systems Diagnosis and Repair

1. Cooling system operation
2. Pressure testing system
3. Parts inspection
4. Testing coolant
5. Sending units and pressure switches

METHODS OF INSTRUCTION

This course consists of two hours of classroom instruction and six hours of lab instruction. The classroom instruction includes lectures, discussions, problem solving sessions, and tests. The lectures are given while drawing on the blackboard, using overhead projections, videotapes, demonstrations, and other multimedia methods. The laboratory instruction includes proper safety procedures, instructions on the proper use of lab equipment, proper diagnosis of emission related problems, and hands on experience with live repair projects.

COURSE REQUIREMENTS

Students are responsible for attaining competencies through completion of the following course requirements:

ATTENDANCE

Students will be bound by the policies stated in the York Technical College Student Handbook. Students must attend 90% of the hours assigned the class for a semester to receive credit for the course. In case a student does miss a class, the student is responsible for obtaining the material that was covered during the absence. If a student is aware that a class will be missed, then the student should notify the instructor at the earliest possible date. Students with unexcused absences during tests will be allowed to make up tests at the discretion of the

instructor. The student has the burden to be sure that some arrangement has been made with the instructor for taking a make-up test.

ACADEMIC HONESTY

York Technical College adheres to the South Carolina Tech Student code, approved by the State Board for Technical and Comprehensive Education on March 13, 1974(revised last April, 25 1984). Copies of this code are available in the Library and from Student Services. Any student involved in cheating or any other academic dishonesty will be given a grade of zero and will be subject to further disciplinary action. See the student handbook section "Student Life" subheading "Student Conduct" for further details.

PARTICIPATION IN CLASS

Students will be expected to participate in class discussions, to demonstrate problem solving techniques, to complete tests, homework, lab experiments, lab reports and other assigned work.

EVALUATION STRATEGIES / GRADING

The grading scale will be as follows:

Grade Points	
A	90-100
B	80-89
C	70-79
D	60-69
F	00-59

EVALUATION METHOD

Tests may be written or oral and may contain questions that are true or false, short answer, multiple choice, fill in the blank and/or problems. Students should refer to the instructor for the number of tests to be given and the material to be covered on each test. Each test will be of equal weight unless otherwise indicated by the instructor. Lab grades will be based on the completion of the Course Competencies, team work, safety, class participation, and housekeeping.

Final grades will be determined as follows:

Module 1	Test	8.25%
Module 1	Lab	16.75%
Module 2	Test	8.25%
Module 2	Lab	16.75%
Module 3	Test	8.25%
Module 3	Lab	16.75%
Module 4	Test	8.25%
Module 4	Lab	<u>16.75%</u>
Total Grade		100.00%

ENTRY-LEVEL SKILLS

Students should demonstrate hand eye coordination, manual dexterity, and be able to work in an industrial environment.

PREREQUISITE

AUT-105

CO-REQUISITE

RDG 100

Disabilities Statement: Any student who feels s/he may need an accommodation based on the impact of a disability should contact the Special Resources Offices (SR) at 803-327-8007 in the 300 area of Student Services. The SRO coordinates reasonable accommodations for students with documented disabilities.