



**COWLEY COLLEGE
& Area Vocational Technical School**

COURSE PROCEDURE FOR

**AUTOMOTIVE ENGINE REPAIR
AMS3156 5 Credit Hours**

Student Level:

This course is open to students on the college level in either the freshman or sophomore year and to area high school vocational students.

Catalog Description:

AMS 3156 - Automotive Engine Repair (5 hrs)

This course will enable the student to gain basic understanding and hands on experience utilizing industry standard procedures in the diagnosing and repair of automotive engine assemblies, as well as general automotive engine systems, cylinder head and valve train systems, engine block assembly, and lubrication and cooling systems.

Prerequisites:

None

Controlling Purpose:

This course is designed to help the student increase their knowledge concerning entry-level skills contained in the sequenced competencies, for success, after graduation from the Automotive Technology Program.

Learner Outcomes:

Upon completion of this course, the student will be able to identify the principles and procedures needed for diagnosis and repairing the automotive engine.

The learning outcomes and competencies detailed in this course outline or syllabus meet or exceed the learning outcomes and competencies specified by the Kansas Core Outcomes Groups project for this course as approved by the Kansas Board of Regents.

Units Outcomes and Criterion Based Evaluation Key for Core Content:

The following defines the minimum core content not including the final examination period. Instructors may add other content as time allows.

Evaluation Key:

- A = All major and minor goals have been achieved and the achievement level is considerably above the minimum required for doing more advanced work in the same field.
- B = All major goals have been achieved, but the student has failed to achieve some of the

less important goals. However, the student has progressed to the point where the goals of work at the next level can be easily achieved.

- C = All major goals have been achieved, but many of the minor goals have not been achieved. In this grade range, the minimum level of proficiency represents a person who has achieved the major goals to the minimum amount of preparation necessary for taking more advanced work in the same field, but without any major handicap of inadequacy in his background.
- D = A few of the major goals have been achieved, but the student's achievement is so limited that he is not well prepared to work at a more advanced level in the same field.
- F = Failing, will be computed in GPA and hours attempted.
- N = No instruction or training in this area.

UNIT 1: General Engine Diagnosis; Removal and Reinstallation (R&R)

Outcomes: The student will gain an understanding of general engine operation and diagnosis.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Identify and interpret engine concern; determine necessary action.
						Research applicable vehicle and service information, such as internal engine operation, vehicle service history, service precautions, and technical service bulletins.
						Locate and interpret vehicle and major component identification numbers (VIN, vehicle cert. labels, and calibration decals).
						Inspect engine assembly for fuel, oil, coolant and other leaks; determine necessary action.
						Diagnose engine noises and vibrations; determine necessary action.
						Diagnose the cause of excessive oil consumption, unusual engine exhaust color, odor, and sound; determine necessary action.
						Perform engine vacuum tests; determine necessary action.
						Perform cylinder power balance tests; determine necessary action.
						Perform cylinder compression tests; determine necessary action.
						Perform cylinder leakage tests; determine necessary action.
						Remove and reinstall engine in a late model front-wheel drive vehicle (OBDI or newer); reconnect all attaching components and restore the vehicle to running condition.
						Remove and reinstall engine in a late model rear-wheel drive vehicle (OBDI or newer); reconnect all attaching components and restore the vehicle to running condition.

UNIT 2: Cylinder head and Valve Train Diagnosis and Repair

Outcomes: The student will demonstrate an understanding of upper cylinder head operation and repair.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Remove cylinder head(s); visually inspect cylinder head(s) for cracks; check gasket surface areas for warpage and leakage; check passage condition.
						Install cylinder heads and gaskets; tighten according to Manufacturer's specifications and procedures.
						Inspect valve springs for squareness and free height comparison; determine necessary action.
						Replace valve stem seals on an assembled engine; inspect valve spring retainers, locks and valve grooves; determine necessary action.
						Inspect valve guides for wear, check valve stem-to-guide clearance; determine necessary action.
						Inspect valves and valve seats; determine necessary action.
						Check valve face-to-seat concentricity (runout); determine necessary action.
						Check valve spring assembled height and valve stem height; determine necessary action.
						Inspect pushrods, rocker arms, rocker arm pivots and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices); determine necessary action.
						Inspect hydraulic or mechanical lifters; determine necessary action.
						Adjust valves (mechanical or hydraulic lifters).
						Inspect camshaft drives (including gear wear and backlash, sprocket action and chain wear); determine necessary action.
						Inspect and replace timing belts (chains), overhead camdrive sprockets, and tensioners, check belt/chain tension; adjust as necessary.
						Inspect camshaft for runout, journal wear and lobe wear.
						Inspect camshaft bearing surface for wear, damage, out-of-round, and alignment; determine necessary action.
						Establish camshaft(s) timing and cam sensor indexing according to manufacturer's specifications and procedures.
						Remove cylinder head(s); visually inspect cylinder head(s) for cracks; check gasket surface areas for warpage and leakage; check passage condition.

UNIT 3: Engine Block Assembly Diagnosis and Repair

Outcomes: The student will demonstrate an understanding of engine block components, operation and repair.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Disassemble engine block; clean and prepare components for inspection and reassembly.
						Inspect engine block for visible cracks, passage condition, core and gallery plug condition, and surface warpage; determine necessary action.
						Inspect internal and external threads; restore as needed (includes installing thread inserts.)
						Inspect and measure cylinder walls for damage, wear, and ridges; determine necessary action.
						Deglaze and clean cylinder walls.
						Inspect and measure camshaft bearings for wear, damage, out-of-round, and alignment; determine necessary action.
						Inspect crankshaft for end play, straightness, journal damage, keyway damage, thrust flange and sealing surface condition, and visual surface cracks; check oil passage condition; measure journal wear; check crankshaft sensor reluctor ring (where applicable); determine necessary action.
						Inspect and measure main and connecting rod bearings for damage, clearance, and end play; determine necessary action (includes the proper selection of bearings).
						Identify piston and bearing wear patterns that indicate connecting rod alignment and main bearing bore problems; inspect rod alignment and bearing bore condition.
						Inspect and measure pistons; determine necessary action.
						Remove and replace piston pin.
						Inspect, measure, and install piston rings.
						Inspect auxiliary (balance, intermediate, idler, counterbalance or silencer) shaft(s); inspect shaft(s) and support bearings for damage and wear; determine necessary action; reinstall and time.
						Inspect or replace crankshaft vibration damper (harmonic balancer).
						Assemble the engine using gaskets, seals, and formed-in-place (tube-applied) sealants, thread sealers, etc. according to manufacturer's specifications.

UNIT 4: Lubrication and Cooling Systems Diagnosis and Repair

Outcomes: The student will demonstrate an understanding of repair-function of the coolant and lubrication system.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Perform oil pressure tests; determine necessary action.
						Inspect oil pump gears or rotors, housing, pressure relief devices, and pump drive; perform necessary action.
						Perform cooling system, cap, and recovery system tests (pressure, combustion leakage, and temperature); determine necessary action.
						Inspect, replace, and adjust drive belts, tensioners, and pulleys; check pulley and belt alignment.
						Inspect and replace engine cooling and heater system hoses.
						Inspect, test, and replace thermostat and housing.
						Test coolant; drain and recover coolant; flush and refill cooling system with recommended coolant; bleed air as required.
						Inspect, test, remove, and replace water pump.
						Remove and replace radiator.
						Inspect, and test fan(s) (electrical or mechanical), fan clutch, fan shroud, and air dams.
						Inspect auxiliary oil coolers; determine necessary action.
						Inspect, test, and replace oil temperature and pressure switches and sensors.
						Perform oil and filter change.

Projects Required:

As assigned.

Textbook:

Contact Bookstore for current textbook.

Materials/Equipment Required:

Students are required to furnish their own Personal Protection Equipment i.e. Safety Glasses.

Attendance Policy:

Students should adhere to the attendance policy outlined by the instructor in the course syllabus.

Grading Policy:

The grading policy will be outlined by the instructor in the course syllabus.

Maximum class size:

Based on classroom occupancy

Course Time Frame:

The U.S. Department of Education, Higher Learning Commission, and the Kansas Board of Regents define credit hour and have specific regulations that the college must follow when developing, teaching, and assessing the educational aspects of the college. A credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally-established equivalency that reasonably approximates not less than one hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work for approximately fifteen weeks for one semester hour of credit or an equivalent amount of work over a different amount of time. The number of semester hours of credit allowed for each distance education or blended hybrid courses shall be assigned by the college based on the amount of time needed to achieve the same course outcomes in a purely face-to-face format.

Refer to the following policies:

[402.00 Academic Code of Conduct](#)

[263.00 Student Appeal of Course Grades](#)

[403.00 Student Code of Conduct](#)

Disability Services Program:

Cowley College, in recognition of state and federal laws, will accommodate a student with a documented disability. If a student has a disability, which may impact work in this class which requires accommodations, contact the Disability Services Coordinator.