



**COWLEY COLLEGE  
& Area Vocational Technical School**

**COURSE PROCEDURE FOR**

**MANUAL TRANSMISSIONS  
AMS3148 4 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 3148 - MANUAL TRANSMISSIONS (4 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 manual transmission and transaxle systems. Topics presented throughout the course cover diagnoses, removal, repair, and installation of manual transmissions and transaxles.

**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 repair of the manual transmission systems.

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.

<b>UNIT 1: General Drive Train Diagnosis</b>						
Outcomes: The student will gain a broad understanding of the general drive train.						
A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Identify and interpret drive train concern; determine necessary action.
						Research applicable vehicle and service information, such as drive train system operation, vehicle service history, service precautions, and technical service bulletins.
						Locate and interpret vehicle and major component identification numbers (VIN, vehicle cert. labels, calibration decals).
						Diagnose fluid usage, level, and condition concerns; determine necessary action.
						Drain and fill manual transmission/transaxle and final drive unit

## UNIT 2: Clutch Diagnosis and Repair

Outcomes: The student will gain an understanding of the clutch system, components, diagnosis, and repair.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Diagnose clutch noise, binding, slippage, pulsation, and chatter;
						Inspect clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; perform necessary action.
						Inspect hydraulic clutch slave and master cylinders, lines, hoses; determine necessary action.
						Inspect release (throw-out) bearing, lever, and pivot; determine necessary action.
						Inspect and replace clutch pressure plate assembly and clutch disc.
						Bleed clutch hydraulic system.
						Inspect, remove or replace pivot bearing or bushing (as applicable).
						Inspect flywheel and ring gear for wear and cracks; determine necessary action.
						Inspect engine block, clutch (bell) housing, transmission/transaxle case mating surfaces, and alignment dowels; determine necessary action.
						Measure flywheel runout and crankshaft endplay; determine necessary action.

### UNIT 3: Transmission/Transaxle Diagnosis and Repair

Outcomes: The student will gain an understanding of the transmission/transaxle, components, diagnosis, and repair.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Remove and reinstall transmission/transaxle.
						Disassemble, clean, and reassemble transmission/transaxle components.
						Inspect transmission/transaxle case, extension housing, case mating surfaces, bores, bushings, and vents; perform necessary action.
						Diagnose noise, hard shifting, jumping out of gear, and fluid leakage concerns; determine necessary action.
						Inspect, adjust, and reinstall shift linkages, brackets, bushings, cables, pivots, and levers.
						Inspect and reinstall power-train mounts.
						Inspect and replace gaskets, seals, and sealants; inspect sealing surfaces.
						Remove and replace transaxle final drive.
						Inspect, adjust, and reinstall shift cover, forks, levers, grommets, shafts, sleeves, detent mechanism, interlocks, and springs.
						Measure endplay or preload (shim or spacer selection procedure) on transmission/transaxle shafts; perform necessary action.
						Inspect and reinstall speedometer drive gear, driven gear, vehicle speed sensor (VSS), and retainers.
						Diagnose transaxle final drive assembly noise and vibration concerns; determine necessary action.
						Remove, inspect, measure, adjust, and reinstall transaxle final drive pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case assembly.
						Inspect lubrication devices (oil pump or slingers); perform necessary action.
						Inspect, test, and replace transmission/transaxle sensors and switches.

**UNIT 4: Drive Shaft and Half Shaft, Universal and Constant-Velocity (CV) Joint Diagnosis and Repair**

Outcomes: The student will gain information about the CV joint, diagnosis and common repair techniques.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Diagnose CV joint noise and vibration concerns; determine necessary action.
						Diagnose universal joint noise and vibration concerns; perform necessary action.
						Replace front wheel drive (FWD) front wheel bearing.
						Inspect, service, and replace shafts, yokes, boots, and CV joints.
						Inspect, service, and replace shaft center support bearing.
						Check shaft balance; measure shaft runout; measure and adjust driveline angles.

**UNIT 5: Diagnose CV joint noise and vibration concerns; determine necessary action.**

Outcomes: The student will demonstrate and understanding and ability to diagnose noise and vibration issues related to the CV joint.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Diagnose universal joint noise and vibration concerns; perform necessary action.
						Replace front wheel drive (FWD) front wheel bearing.
						Inspect, service, and replace shafts, yokes, boots, and CV joints.
						Inspect, service, and replace shaft center support bearing.
						Check shaft balance; measure shaft runout; measure and adjust driveline angles.
						Diagnose CV joint noise and vibration concerns; determine necessary action.
						Diagnose universal joint noise and vibration concerns; perform necessary action.
						Replace front wheel drive (FWD) front wheel bearing.
						Inspect, service, and replace shafts, yokes, boots, and CV joints.
						Inspect, service, and replace shaft center support bearing.
						Check shaft balance; measure shaft run-out; measure and adjust driveline angles.

**UNIT 6: Limited Shift Differential**

Outcomes: The student will gain an understanding and ability to diagnose and repair issues related to the limited shift differential.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Diagnose noise, slippage, and chatter concerns; determine necessary action.
						Inspect and flush differential housing; refill with correct lubricant.
						Inspect and reinstall clutch (cone or plate) components.
						Measure rotating torque; determine necessary action.

**UNIT 7: Drive Axle Shaft**

Outcomes: The student will gain an understanding of the function of the drive axle shift along with diagnosis and repair of problem states.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Diagnose drive axle shafts, bearings, and seals for noise, vibration, and fluid leakage concerns; determine necessary action.
						Inspect and replace drive axle shaft wheel studs.
						Remove and replace drive axle shafts.
						Inspect and replace drive axle shaft seals, bearings, and retainers.
						Measure drive axle flange run-out and shaft endplay; determine necessary action.

## UNIT 8: Four-Wheel Drive/All-Wheel Drive Diagnosis and Repair

Outcomes: The student will demonstrate an understanding of the four-wheel drive and all-wheel drive mechanisms, to include diagnosis and repair.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Diagnose noise, vibration, and unusual steering concerns; determine necessary action.
						Inspect, adjust, and repair shifting controls (mechanical, electrical, and vacuum), bushings, mounts, levers, and brackets.
						Remove and reinstall transfer case.
						Disassemble, service, and reassemble transfer case and components.
						Inspect front-wheel bearings and locking hubs; perform necessary action.
						Check drive assembly seals and vents; check lube level.
						Diagnose test, adjust and replace electrical/electronic components of four-wheel drive systems.

### **Projects Required:**

As assigned

### **Textbook:**

Contact Bookstore for current textbook.

### **Materials/Equipment Required:**

Students are required to furnish their own Personal Protection Equipment ie 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

Rev: 06/01/2016

DISCLAIMER: THIS INFORMATION IS SUBJECT TO CHANGE. FOR THE OFFICIAL COURSE PROCEDURE CONTACT ACADEMIC AFFAIRS.

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.