

## **COURSE SYLLABUS**

<b>LAST REVIEW</b>	Fall 2022
<b>COURSE TITLE</b>	Transmission and Driveline 1
<b>COURSE NUMBER</b>	AUTT-0222
<b>DIVISION</b>	Career and Technical Education
<b>DEPARTMENT</b>	AUTT
<b>CIP CODE</b>	47.0604
<b>CREDIT HOURS</b>	4
<b>CONTACT HOURS/WEEK</b>	Class: 1.5                      Lab: 5
<b>PREREQUISITES</b>	AUTT-0103
<b>COREQUISITES</b>	None
<b>COURSE PLACEMENT</b>	None

### **COURSE DESCRIPTION**

In this course students will study and perform tasks from the National Automotive Technicians Education Foundation's (NATEF) Automobile Service Technology (AST) Program. This course is the part one of two of transmission and driveline service. These studies include elements from automatic transmission/transaxle, drive train diagnostics, manual transmission service, drive shaft and joint service, and differential case service. All students will successfully complete each element of personal safety training before working in the Automotive Laboratory.

### **PROGRAM ALIGNMENT**

This course is part of a program aligned through the Kansas Board of Regents and Technical Education Authority. For more information, please visit:

[https://kansasregents.org/workforce\\_development/program-alignment](https://kansasregents.org/workforce_development/program-alignment)

### **PROGRAM LEARNING OUTCOMES**

1. Demonstrate adherence to safety and pollution prevention standards according to OSHA and EPA regulations.
2. Demonstrate the ability to communicate effectively in workplace scenarios with an appropriate level of preparedness for daily tasks and assignments.
3. Demonstrate the ability to diagnose and repair mechanical and electrical damage according to Original Equipment Manufacturer (OEM) specifications and recommendations.

### **TEXTBOOKS**

<http://kckccbookstore.com/>

## **METHODS OF INSTRUCTION**

A variety of instructional methods may be used depending on content area. These include but are not limited to: lecture, multimedia, cooperative/collaborative learning, labs and demonstrations, projects and presentations, speeches, debates, panels, conferencing, performances, and learning experiences outside the classroom.

Methodology will be selected to best meet student needs.

## **COURSE OUTLINE**

- I. Transmission and Transaxle Diagnosis
  - A. Research service information
    1. Fluid type
    2. Fluid capacity
    3. Technical Service Bulletins (TSB)
    4. Pressures
    5. Pressure ports
  - B. Interpretation of transmission /transaxle concerns
    1. Differentiating between engine performance issues and transmission issues
    2. Test driving
    3. Shift charts
  - C. Testing
    1. Stall tests
    2. Pressure tests
    3. Shift points
    4. Lock up torque converter testing
    5. Utilizing gear reduction tests
- II. In Vehicle Maintenance and Repair
  - A. Adjustments
  - B. Solenoid service
  - C. Sensors
  - D. Relays
  - E. Switches
  - F. Electronic testing
- III. Off Vehicle Maintenance and Repair
  - A. Remove and replace transmission
  - B. Replace torque converter
  - C. Inspect engine core plugs
  - D. Inspect rear crankshaft seal
  - E. Inspect dowel pins and mating surfaces
  - F. Flushing oil cooler and lines
  - G. Inspection of converter flex plate
  - H. Inspect converter pilot
  - I. Check converter pump drive service, end play and pilot bore
- IV. Manual Transmission Diagnosis
  - A. Symptoms

1. Clutch noises
2. Binding
3. Slippage
4. Pulsation
5. Chatter
- B. Inspection
  1. Clutch pedal linkage
  2. Cables
  3. Automatic adjuster mechanisms
  4. Brackets
  5. Bushings
  6. Pivots
  7. Springs
- C. Clutch mechanism
- D. Pressure plate
- E. Disc
- F. Throw-out bearing
- G. Pilot bearing
- H. Hydraulic systems
  1. Bleed clutch hydraulic system
  2. Clutch piston types and replacement
- I. Fly wheel
  1. Runout
  2. Crankshaft end play
- V. Manual Transmission Service
  - A. Shift linkages
  - B. Brackets
  - C. Bushings
  - D. Cables
  - E. Pivots
  - F. Levers
- VI. Drive Shaft Service
  - A. Constant Velocity joints
    1. Noise
    2. Vibration
    3. Balance
    4. Phasing
    5. Shaft runout
    6. Driveline angles
  - B. U joint service
- VII. Differential Case and Shafts
  - A. Companion flange
  - B. Pinion seal
  - C. Companion flange runout

- D. Axle shafts
- E. Shaft seals and bearings
- F. Shaft end play
- G. Shaft runout
- H. Gear lash

VIII. Four Wheel Drive

- A. Shift controls
- B. Hub locks
- C. Vacuum lockouts
- D. Bushings
- E. Tire circumference issues
- F. Final drive ratios

**COURSE LEARNING OUTCOMES AND COMPETENCIES**

Upon successful completion of this course, the student will:

- A. Describe general: transmission and transaxle diagnosis.
  - 1. Research applicable vehicle and service information, fluid type, vehicle service history, service precautions, and technical service bulletins.
  - 2. Identify and interpret transmission/transaxle concern, differentiate between engine performance and transmission/transaxle concerns; determine necessary action.
  - 3. Perform stall test; determine necessary action.
  - 4. Perform lock-up converter system tests; determine necessary action.
  - 5. Diagnose transmission/transaxle gear reduction/multiplication concerns using driving, driven, and held member (power flow) principles.
- B. Describe in-vehicle transmission/transaxle maintenance and repair.
  - 6. Inspect, test, adjust, repair, or replace electrical/electronic components and circuits including computers, solenoids, sensors, relays, terminals, connectors, switches, and harnesses.
- C. Describe off-vehicle transmission and transaxle repair.
  - 7. Remove and reinstall transmission/transaxle and torque converter; inspect engine core plugs, rear crankshaft seal, dowel pins, dowel pin holes, and mating surfaces.
  - 8. Inspect, leak test, and flush or replace transmission/transaxle oil cooler, lines, and fittings.
  - 9. Inspect converter flex (drive) plate, converter attaching bolts, converter pilot, converter pump drive surfaces, converter end play, and crankshaft pilot bore.
- D. Describe general drive train diagnosis.
  - 10. Diagnose clutch noise, binding, slippage, pulsation, and chatter; determine necessary action.
  - 11. Inspect clutch pedal linkage, cables, automatic adjuster mechanisms, brackets,

- bushings, pivots, and springs; perform necessary action.
12. Inspect and replace clutch pressure plate assembly, clutch disc, release (throw-out) bearing and linkage, and pilot bearing/bushing (as applicable).
  13. Bleed clutch hydraulic system.
  14. Inspect flywheel and ring gear for wear and cracks; determine necessary action.
  15. Measure flywheel runout and crankshaft end play; determine necessary action.
- E. Describe manual transmission service.
16. Inspect, adjust, and reinstall shift linkages, brackets, bushings, cables, pivots, and levers.
- F. Describe drive shaft and half shaft, universal and constant-velocity joints.
17. Diagnose constant-velocity (CV) joint noise and vibration concerns; determine necessary action.
  18. Diagnose universal joint noise and vibration concerns; perform necessary action.
  19. Check shaft balance and phasing; measure shaft runout; measure and adjust driveline angles.
- G. Describe differential case and axle service.
20. Inspect and replace companion flange and pinion seal; measure companion flange runout.
  21. Remove and replace drive axle shafts.
  22. Inspect and replace drive axle shaft seals, bearings, and retainers.
  23. Measure drive axle flange runout and shaft end play; determine necessary action.
- H. Describe four wheel drive or all-wheel drive service.
24. Inspect, adjust, and repair shifting controls (mechanical, electrical, and vacuum), bushings, mounts, levers, and brackets.
  25. Identify concerns related to variations in tire circumference and/or final drive ratios.

### **ASSESSMENT OF COURSE LEARNING OUTCOMES AND COMPETENCIES**

Student progress is evaluated through both formative and summative assessment methods. Specific details may be found in the instructor's course information document.

### **COLLEGE POLICIES AND PROCEDURES**

*Student Handbook*

<https://www.kckcc.edu/files/docs/student-resources/student-handbook-and-code-of-conduct.pdf>

*College Catalog*

<https://www.kckcc.edu/academics/catalog/index.html>

*College Policies and Statements*

<https://www.kckcc.edu/about/policies-statements/index.html>

*Accessibility and Accommodations*

<https://www.kckcc.edu/academics/resources/student-accessibility-support-services/index.html>.