COURSE SYLLABUS

LAST REVIEW	Fall 2022
COURSE TITLE	Transmission and Driveline 2
COURSE NUMBER	AUTT-0223
DIVISION	Career and Technical Education
DEPARTMENT	AUTT
CIP CODE	47.0604
CREDIT HOURS	5
CONTACT HOURS/WEEK	Class: 2 Lab: 6
PREREQUISITES	AUTT-0103; AUTT-0222
COREQUISITES	None
COURSE PLACEMENT	None

COURSE DESCRIPTION
In this course students will study and perform tasks from the National Automotive Technicians Education Foundation's (NATEF) Master Automobile Service Technician (MAST) Program. This course is a collection of the advanced service procedures for on and off vehicle repair of automatic transmissions, manual transmission, axle, differential, and some four wheel drive 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

PROGRAM LEARNING OUTCOMES
1 Demonstrate proper safety practices in an automotive shop environment.
2. Demonstrate workplace skills associated with a professional automotive shop.
3. Describe the advanced elements of automotive technology including service information, tools, equipment, and maintenance procedures.

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. Automatic Transmission Diagnosis
    A. Symptom charts
    B. Noise and vibration concerns
  C. Electronic transmission control systems with scan tool
  D. Pressure testing

II. Automatic Transmission and Transaxle Off Vehicle Repair
  A. Disassembly
  B. Valve body
    1. Inspection
    2. Clean
    3. Measure
    4. Bores
    5. Springs
    6. valves/balls
    7. Screens spacers
    8. Gaskets and torque
  C. Components
    1. Servos
    2. Accumulator
    3. Bores
    4. Pistons
    5. Seals
    6. Springs
    7. Retainers
  D. Transmission assembly
  E. Oil pump
    1. Measure
    2. Pressure test
  F. Thrust washers
  G. Bearings
  H. Endplay
  I. Fluid delivery
  J. Seal rings and groves
  K. Feed pipes
  L. Check valves
  M. Bushings
  N. Planetary gears
  O. Passages, vents
  P. Mating surfaces
  Q. Link chains

R. Sprockets
S. Bearings and bushings
T. Final drive components
U. Clutch service
    1. Drum
    2. Piston
    3. Check balls
    4. Springs
    5. Retainers
    6. Seals
    7. Friction and pressure plates
    8. Pack clearance
V. Bands and drums
W. Roller and sprag clutches

III. Manual Drive Train and Axles
A. Noise concerns
B. Powerflow principles
C. Hard shifting and jumping out of gear
D. Final drive assembly noise and vibration
E. Cleaning
F. Reassembling components

IV. Ring and Pinion
    A. Noise and vibration
B. Ring gear runout
C. Removal
D. Inspection
E. Installation
F. Spacers
G. Sleeves
H. Pinion gears
    1. Depth
    2. Bearing preload
    3. Side bearing preload
    4. Haft
    5. Side bearings
    6. Thrust washers
I. Ring and pinion gear backlash
J. Ring and pinion tooth contact patterns
K. Limited slip differential
    1. Slippage
    2. Leakage
    3. Chatter
    4. Rotating torque

V. Drive Axles

A. Axle shafts
B. Bearings
C. Seals
D. noise
E. Vibration
F. Fluid leakage

VI. Four-Wheel Drive/All-Wheel Drive
A. Vibration
B. Steering concerns
C. Electrical/electronic/vacuum components of four wheel drive
D. Disassemble transfer case
E. Components of transfer case
F. Reassembly

COURSE LEARNING OUTCOMES AND COMPETENCIES
Upon successful completion of this course, the student will:

A. Describe automatic transmission and transaxle diagnosis.
1. Perform pressure tests (including transmissions/transaxles equipped with electronic pressure control); determine necessary action.
2. Diagnose noise and vibration concerns; determine necessary action.
3. Diagnose electronic transmission/transaxle control systems using appropriate test equipment and service information.

B. Describe automatic transmission and transaxle off vehicle maintenance and repair.
4. Disassemble, clean, and inspect transmission/transaxle.
5. Inspect, measure, clean, and replace valve body (includes surfaces, bores, springs, valves, sleeves, retainers, brackets, check valves/balls, screens, spacers, and gaskets).
6. Inspect servo and accumulator bores, pistons, seals, pins, springs, and retainers; determine necessary action.
7. Assemble transmission/transaxle.
8. Inspect, measure, and reseal oil pump assembly and components.
9. Measure transmission/transaxle end play or preload; determine necessary action.
10. Inspect, measure, and replace thrust washers and bearings.
11. Inspect oil delivery circuits, including seal rings, ring grooves, and sealing surface areas, feed pipes, orifices, and check valves/balls.
12. Inspect bushings; determine necessary action.
13. Inspect and measure planetary gear assembly components; determine necessary action.
14. Inspect case bores, passages, bushings, vents, and mating surfaces; determine necessary action.
15. Diagnose and inspect transaxle drive, link chains, sprockets, gears, bearings, and bushings; perform necessary action.

16. Inspect measure, repair, adjust or replace transaxle final drive components.
17. Inspect clutch drum, piston, check-balls, springs, retainers, seals, and friction and pressure plates, bands and drums; determine necessary action.
18. Measure clutch pack clearance; determine necessary action.
19. Air test operation of clutch and servo assemblies.
20. Inspect roller and sprag clutch, races, rollers, sprags, springs, cages, retainers; determine necessary action.

C. Describe manual drive train and axles.
21. Diagnose noise concerns through the application of transmission/transaxle powerflow principles.
22. Diagnose hard shifting and jumping out of gear concerns; determine necessary action.
23. Diagnose transaxle final drive assembly noise and vibration concerns; determine necessary action.
24. Disassemble, inspect clean, and reassemble internal transmission/transaxle components.

D. Describe ring and Pinion gears and differential case assembly.
25. Diagnose noise and vibration concerns; determine necessary action.
26. Inspect ring gear and measure runout; determine necessary action.
27. Remove, inspect, and reinstall drive pinion and ring gear, spacers, sleeves, and bearings.
28. Measure and adjust drive pinion depth.
29. Measure and adjust drive pinion bearing preload.
30. Measure and adjust side bearing preload and ring and pinion gear total backlash and backlash variation on a differential carrier assembly (threaded cup or shim types).
31. Check ring and pinion tooth contact patterns; perform necessary action.
32. Disassemble, inspect, measure, and adjust or replace differential pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case.
33. Reassemble and reinstall differential case assembly; measure runout; determine necessary action.

E. Describe limited slip differential.
34. Diagnose noise, slippage, and chatter concerns; determine necessary action.
35. Measure rotating torque; determine necessary action.

F. Describe drive axles.
36. Diagnose drive axle shafts, bearings, and seals for noise, vibration, and fluid leakage concerns; determine necessary action.

G. Describe four-wheel drive/all-wheel drive component diagnosis and repair.
37. Diagnose noise, vibration, and unusual steering concerns; determine necessary

action.
38. Diagnose, test, adjust, and replace electrical/electronic components of four-wheel drive systems.
39. Disassemble, service, and reassemble transfer case and components.

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.