**AUTO 155 Course Outline as of Fall 2025**

# CATALOG INFORMATION

Dept and Nbr: AUTO 155 Title: AUTOMOTIVE DRIVE TRAIN
Full Title: Automotive Drive Train
Last Reviewed: 9/10/2018

| Units | | Course Hours per Week | | Nbr of Weeks | Course Hours Total | |
|---|---|---|---|---|---|---|
| Maximum | 6.00 | Lecture Scheduled | 4.00 | 17.5 | Lecture Scheduled | 70.00 |
| Minimum | 6.00 | Lab Scheduled | 7.00 | 6 | Lab Scheduled | 122.50 |
| | | Contact DHR | 0 | | Contact DHR | 0 |
| | | Contact Total | 11.00 | | Contact Total | 192.50 |
| | | Non-contact DHR | 0 | | Non-contact DHR | 0 |

Total Out of Class Hours: 140.00 Total Student Learning Hours: 332.50

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| Title 5 Category: | AA Degree Applicable |
| Grading: | Grade Only |
| Repeatability: | 00 - Two Repeats if Grade was D, F, NC, or NP |
| Also Listed As: | |
| Formerly: | AUTO 53 |

**Catalog Description:**
An in depth study of automotive drive train systems for the entry level auto student. Course covers theory, operation, diagnosis, service and overhaul of most automotive automatic and manual transmissions and trans axles, drive axles and all wheel drive systems. Diagnosis of modern drive train systems is emphasized. Instruction includes lecture and practical lab experience. Course prepares student for A2 and A3 ASE (Automotive Service Excellence) exams.

**Prerequisites/Corequisites:**

**Recommended Preparation:**
Course Eligibility for ENGL 100 or ESL 100 and Course Completion of AUTO 100

**Limits on Enrollment:**

**Schedule of Classes Information:**
Description: An in depth study of automotive drive train systems for the entry level auto student. Course covers theory, operation, diagnosis, service and overhaul of most automotive automatic and manual transmissions and trans axles, drive axles and all wheel drive systems. Diagnosis of

modern drive train systems is emphasized. Instruction includes lecture and practical lab experience. Course prepares student for A2 and A3 ASE (Automotive Service Excellence) exams. (Grade Only)
Prerequisites/Corequisites:
Recommended: Course Eligibility for ENGL 100 or ESL 100 and Course Completion of AUTO 100
Limits on Enrollment:
Transfer Credit:
Repeatability: Two Repeats if Grade was D, F, NC, or NP

## ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

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|---|---|---|---|
| **AS Degree:** | **Area** | Effective: | Inactive: |
| **CSU GE:** | **Transfer Area** | Effective: | Inactive: |
| **IGETC:** | **Transfer Area** | Effective: | Inactive: |

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| **CSU Transfer:** | Effective: | Inactive: |
| **UC Transfer:** | Effective: | Inactive: |

**CID:**

**Certificate/Major Applicable:**
Both Certificate and Major Applicable

## COURSE CONTENT

**Student Learning Outcomes:**
At the conclusion of this course, the student should be able to:
1. Demonstrate basic shop skills necessary to successfully complete the power train certificate and be prepared to take the A.S.E. (Automotive Service Excellence) A2 and A3 exams.
2. Inspect, evaluate, diagnose, and repair automotive drive train components.

**Objectives:**
At the conclusion of this course, the student should be able to:
1. Describe the theory and operation of automotive drive train components.
2. Inspect, evaluate and repair automotive drive train components.
3. Analyze engine performance, transmission gearing and final drive ratios for specific vehicle applications.
4. Evaluate, diagnose and repair hydraulic system failures.
5. Evaluate, diagnose and repair electronic transmission controls.
6. Diagnose a malfunction in the gear train based on transmission power flow.
7. Prepare to take the ASE A2 and A3 certification exams.

**Topics and Scope:**

I. Safety/Introduction
   A. FWD/RWD/AWD (four-wheel drive, rear-wheel drive, all-wheel drive)
   B. Engine torque output interpretation
   C. Gear ratio formulas - torque and speed calculation

D. Types of gears - effect on transmission construction
E. Types of bearings - load transfer
F. Radial and Thrust Loads
G. Causes of bearing failure

II. Clutches
A. Components
B. Clutch function - theory of operation - torque transfer variables
C. Linkages
D. Diagnosis of clutch failure
E. Clutch Service

III. Transmissions and Transaxles
A. Power flow - transmissions - analysis of drive ratios
B. Power flow - transaxles - evaluation of drive ratios
C. Synchronizer function
D. Transmission diagnosis - analysis of transmission failure
E. Noise diagnosis
F. Evolution of transmissions - evolution of transmission design

IV. Front and Rear Drivelines
A. Drive shaft construction
B. U-joint (universal joint) speed changes - analysis of variable velocity units
C. Angles-phasing of U-joints - operating angle measurements and limits
D. U-joint inspection and service
E. Axle shaft construction
F. Types of CV (constant velocity) joints
G. Axle inspection - failure analysis
H. Axle replacement procedure

V. Final Drive Assemblies
A. Types of final drives
B. Characteristics of high ratios - effect on vehicle performance and economy
C. Characteristics of low ratios - effect on vehicle performance andeconomy
D. Determining final drive ratios
E. Hypoid gear types: hunting and non-hunting
F. Hypoid gear setup procedure and evaluation
G. Differential operation
H. Traction control operating characteristics
I. Axle types and retention

VI. All Wheel Drive (AWD) Systems - Traction Variables
A. AWD terms
B. Full time AWD operating systems
C. Part time AWD operating systems
D. Transfer case types
E. Transfer case operation and torque transfer to drive axles
F. Transfer case service - failure analysis
G. Types of front hubs and axles
H. Front hub service

VII. Introduction to Automatics
A. Advantages of automatics
B. Theory of and operation
C. Classifying automatics
D. Hydraulic shift timing controls
E. Electronic shift timing controls
F. Common models

VIII. Planetary Gear Sets
- A. Simple planetary gear set components and operating theory
- B. Inputs, outputs and held members
- C. Gear ratio calculation - torque speed changes
- D. Ratios used in automotive applications
- E. Compound planetary gearset theory of operation

IX. Hydraulics
- A. Basic hydraulic operating theory
- B. Force and pressure definitions
- C. Pascal's law
- D. Pressure and force calculations
- E. Types and operation of pumps
- F. Pressure regulation - evaluation of regular circuits
- G. Spool valve parts and operation
- H. Throttle and modulator valves
- I. Governor operation
- J. Engine load and road speed evaluation

X. Torque Converters
- A. Engine torque curves
- B. Parts of converter
- C. Rotary, vortex flow - analysis of hydraulic torque transfer
- D. Stator operation
- E. Stall speeds
- F. Engine and converter matching - analysis of engine torque and converter interaction
- G. Lock-up converters
- H. Lock-up function
- I. Lock-up conditions

XI. Apply Devices
- A. Types of apply devices - torque transfer variables
- B. Clutch pack overhaul
- C. Clutch pack clearance - evaluation and correction
- D. Band and servo overhaul
- E. Band adjustments and inspection
- F. Types of one-way clutches
- G. Operation of one-way clutches

XII. Fluids - Power Flow
- A. Types of fluid - characteristics of fluid
- B. Low fluid level problems
- C. High fluid level problems
- D. Transmission service procedures
- E. Trans fluid temperature and service life - oil analysis
- F. Oil cooler types - theory of heat transfer
- G. Oil cooler circuits
- H. End play controls - evaluation and correction
- I. Selective thrusts
- J. Bushings: inspection and replacement
- K. Seal ring replacement - analysis of seal integrity
- L. Piston seal replacement
- M. Transmission power flow

XIII. Electronics
- A. Basic computer operation
- B. Input sensors and testing

C. Actuator function and testing
D. Computer diagnosis
E. Code retrieval
F. OBD II (On Board Diagnostics) code definitions
G. Default gear diagnosis

All topics are covered in the lecture and lab portions of the course.

**Assignment:**

Lecture-related Assignments:
1. Reading assignment: 20-30 pages weekly
2. Weekly objective quizzes covering inspection, evaluation and repair of drive train components
3. Homework problems, lab worksheets
4. Midterm and weekly quizzes
5. Final exam

Lab-related Assignments:
1. Dissemble, inspect and reassemble listed components (skill demonstrations and performance exam)

**Methods of Evaluation/Basis of Grade:**

**Writing:** Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

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| None, This is a degree applicable course but assessment tools based on writing are not included because problem solving assessments and skill demonstrations are more appropriate for this course. | Writing<br>0 - 0% |

**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

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| Homework problems, lab worksheets | Problem solving<br>5 - 20% |

**Skill Demonstrations:** All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

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| Performance exams, disassembly, inspection, reassembly | Skill Demonstrations<br>35 - 50% |

**Exams:** All forms of formal testing, other than skill performance exams.

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| Multiple choice, true/false, matching items, completion | Exams<br>35 - 50% |

**Other:** Includes any assessment tools that do not logically fit into the above categories.

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| Participation and attendance | Other Category<br>10 - 15% |

**Representative Textbooks and Materials:**
Today's Technician: Manual Transmissions and Transaxles. 6th ed. Erjavec, Jack and Ronan, Mike. Delmar Cengage. 2016
Today's Technician: Automatic Transmissions and Transaxles. 6th ed. Erjavec, Jack and Pickerill, Ken. Delmar Cengage. 2016