SOUTHWEST TECH

SOUTHWEST TECHNICAL COLLEGE

TEAU 1340 - Manual Drive Trains and Axles (3 Credits)

Course Description

Manual Drive Trains is an-in depth clinical based course that conforms to the ASE/NATEF standards. Throughout the course, you will concentrate on topics such as safety concerns when working on drive train components, power flow through a gear set, clutch diagnosis and operation, manual gearbox diagnosis, removal and rebuilding procedures for manual transmissions, 4-wheel drive systems. When you have completed this course, you will be prepared to take the certification exam in ASE (Automotive Service Excellence) Automotive Manual Drive Train Systems.

Course Objectives

- Demonstrate a working knowledge of manual drivetrains and axle systems.
- Diagnose, remove, repair, and replace manual transmission and components.
- Remove driveshafts, replace universal joints and repair four-wheel drive systems.
- Diagnose and repair electronically controlled transmission systems.

Course Outline

- Manual Drivetrain and Axle Theories
- Clutches
- Manual Transmissions, Transaxles, and Drive Axles
- Drive Shafts, Universal Joints, and Drive Axles
- Four-Wheel Drive Systems
- Advanced Four-Wheel Drive Systems
- Drivetrain Electrical and Electronic Systems
- Electronically-Controlled and Automatic Trans

Textbook & Reading Materials

Cengage Unlimited (1 year subscription), Cengage

Assignments and Assessments

Orientation
Orientation Acknowledgement
Remind Txt Group
STECH Auto Student Information Sheet
STECH COVID-19 Policies and Procedures Agreement Review
STECH Auto Right -to-Know agreement
SWAM 2820 Manual Drive Trains and Axles Course Syllabus Review
SWAM 2820 Manual Drive Trains and Axles Lab Assignment Checklist Review
SWAM 2820 Manual Drive Trains and Axles Competency Profile and Task List Review
Cleaning Expectations
Southwest Technical College Automotive Video Playlist
Student Tool and Equipment Use Waiver
Automotive Student OE Inst ructions
Cell Phone
Instructions
Digital Lab Explanation
Module Breakdown
Module 1 Labs
Module 2 Labs
Module 3 Labs
Module 4 Labs
Module 5 Labs
Module 6 Labs
Module 7 Labs
Module 8 Labs
Cleaning Lab Module
Fillable Repair Order Document
Cleaning Lab 1
Cleaning Lab 2
Cleaning Lab 3
Cleaning Lab 4
Cleaning Lab 5
CM CH 1 Reading: Intro to Manual Drive Trains and Axles
CM CH 1 Labeling Activity 1-1: Clutch Parts ID
CM CH 1 Labeling Activity 1-2: Axle and Bearing ID
CM CH 1 Video 1-1 Questions: Types of Gears
CM Chapter 1 Fill-in-t he-Blank Questions: Int ro to Manual Drive Trains
CM Chapter 1 Multiple-Choice Questions: Intro to Manual Drive Trains
CM CH 2 Reading: Drivetrain Theory
CM CH 2 Labeling Activity 2-1: Gears and Torque Multiplication ID #1
CM CH 2 Labeling Activity 2-2: Gears and Torque Multiplication ID #2
CM CH 2 Labeling Activity 2-3: Transmission Gear Ratios ID
Setting up a Dial Indicator Simulation
CM CH 2 Fill-in-the-Blank Questions: Drivetrain Theory
CM CH 2 Multiple-Choice Questions: Drivetrain Theory
SM CH 2 Reading: Special Tools and Procedures
SM CH 2 Labeling Activity 2-4: Micrometer Parts ID
SM CH 2 Labeling Activity 2-5: Dial Indicator Parts ID
SM CH 2 Photo Sequence 2 - Setting Up a Dial Indicator
SM Chapter 2 ASE-Style Review Questions: Special Tools and Procedures
MDT LAB 1 Identify and interpret dr ive t rain concerns, determine necessary action
MDT LAB 2 Identify and interpret dr ive t rain concerns, determine necessary action
MDT LAB 3 Research applicable vehicle and service information, fluid type, vehicle service
history, service precautions, and technical service bulletins
MDT LAB 4 Check fluid condition; check for leaks; determine necessary action
MDT LAB 5 Check fluid condition; check for leaks; determine necessary action
MDT LAB 6 Drain and refill manual t ransmission/ transaxle and final drive unit
MDT LAB 7 Complete work order to include customer information, vehicle identifying
Checkpoint Meeting Module 1
End Module 1
CM CH 3 Reading: Clutches
How a Clutch Operates Simulation
How a Dual Clutch Transmission Operates Simulation
CM CH :3 Labeling Activity :3-1: Clutch Assembly Parts ID
CM CH 3 Labeling Activity 3-2: Hydraulic Clutch Linkage ID
CM CH 3 Video 3-1 Questions: Single Clutch
CM CH 3 Video 3-2 Questions: Throw Out Bearings
CM CH 3 Video 3-3 Questions: Clutch Linkages
CM Chapter 3 Fill-in-the-Blank Questions: Clutches
CM Chapter 3 Multiple-Choice Questions: Clutches
SM CH 3 Reading: Clutch Service
SM CH 3 Photo Sequence 3 - Bleeding a Hydraulic Clutch
SM CH 3 Photo Sequence 4 - Installing and Aligning a Clutch Disc
SM CH 3 Video 3-4 and Questiorns: Check Clutch
SM CH 3 ASE-Style Review Questions: Clutch Service
SM CH 3 ASE Challenge Questions: Clutch Service
MDT LAB 8 Diagnose clutch noise, binding, slippage, pulsation, and chatter; determine necessary action
MDT LAB 9 Inspect clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; perform necessary action
MDT LAB 10 Inspect clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and sprin gs; perform necessary action
MDT LAB 11 Inspect and replace clutch pressure plate assembly, clutch disc, release (throw-out) bearing and linkage, and pilot bearing/bushing (as applicable)
MDT LAB 12 Inspect and replace clutch pressure plate assembly, clutch disc, release (throw-out) bearing and linkage, and pilot bearing/bushing (as applicable)

MDT LAB 13 Check and adjust clutch master cylinder fluid level; check for leaks
MDT LAB 14 Inspect flywheel and ring gear for wear and cracks; determine necessary action
MDT LAB 15 Check and adjust clutch master cylinder fluid level; check for leaks
MDT LAB 16 Inspect flywheel and ring gear for wear and cracks; determine necessary action
MDT LAB 17 Inspect flywheel and ring gear for wear and cracks; determine necessary action
Checkpoint Meeting Module 2
End Module 2
CM CH 4 Reading: Manual Transmissions and Transaxles
CM CH 4 Labeling Activity 4-1: Synchronizer Parts Identification
CM CH 4 Labeling Activity 4-2: Transmission Parts Identification
Video 4-1 and Questions: Synchronizer Operation #1
Video 4-2 and Questions: Synchronizer Operation #2
Video 4-3 and Questions: Transmission Power Flow
Video 4-4 and Questions: Transaxle Power Flow
Gear Ratios Explained Simulation
CM CH 4 Fill-in-the-Blank Questions: Manual Transmissions and Transaxles
CM CH 4 Multiple-Choice Questions: Manual Transmissions and Transaxles
SM CH 4 Reading: Manual Transmissions/ Transaxles Servicing
SM CH 4 Labeling Activity 4-3: Synchronizer Parts Identification
SM CH 4 Video 4-5 and Questiorns: Manual Transmissions
SM CH 4 ASE-Style Review Questions: Transmsission & Transaxle Service
SM CH 4 ASE Challenge Questions: Transmsission & Transaxle Service
MDT LAB 18 Inspect, adjust, and install shift linkages, brackets, bushings, cables, pivots, and levers
MDT LAB 19 Inspect, adjust, and install shift linkages, brackets, bushings, cables, pivots, and levers
MDT LAB 20 Diagnose noise concerns through the application of transmission / transaxle power-flow principles
MDT LAB 21 Diagnose hard shifting and jumping out of gear concerns; determine necessary action
MDT LAB 22 Diagnose transaxle fin.al drive assembly noise and vibration concerns; determine necessary action
Checkpoint Meeting Module 3
End Module 3
CM CH 5 Reading: Front Drive Axles
CM CH 5 Labeling Activity 5-1: CV Axle Parts Identification
CM CH 5 Labeling Activity 5-2: FWD Wheel Bearing & Hub Parts Identification
CM CH 5 Video 5-1 and Questions: Front Wheel Drive Axles
CM CH 5 Video 5-2 and Questions: CV Joints
How a Constant Velocity Joint-Axle Works on a FWD Simulation
CM CH 5 Fill-in-the-Blank Questions: Front Drive Axles
CM CH 5 Multiple-Choice Questions: Front Drive Axles
SM CH 5 Reading: Front Drive Axle Service
SM CH 5 Labeling Activity 5-4: Outer CV Joint Parts Identification
SM CH 5 Photo Sequence 9 - Removing and Installing Drive Axles
SM CH 5 ASE-Style Review Questions: Front Drive Axle Service
SM CH 5 ASE Challenge Questions: Front Drive Axle Service
CM CH 6 Reading: Drive Shaft & Universal Joints
CM CH 6 Labeling Activity 6-1: RWD Drivetrain Parts Identification
CM CH 6 Labeling Activity 6-2: RWD Coil Spring Suspension Identification
CM CH 6 Fill-in-the-Blank Questions: Drive Shaft & Universal Joints
CM CH 6 Multiple-Choice Questions: Drive Shaft & Universal Joints
SM CH 6 Reading: Servicing Drive Shafts & Universal Joints
SM CH 6 Photo Sequence 13 - U-Joint Service with Special Tool
SM CH 6 ASE Challenge Questions: Servicing Drive Shafts & Universal Joints
Chapter 7 Power Point Overview: Differentials & Drive Axles; Differentials & Drive Axles Service
CM CH 7 Reading: Differentials & Drive Axles
How a Rear Differential Works Simulation
CM CH 7 Labeling Activity 7-1: Planetary Gears Identification
CM CH 7 Labeling Activity 7-2: Differential Parts Identification
CM CH 7 Video 7-1 and Questions: Differential and Drive Axles
CM CH 7 Video 7-2 and Questions: Differential Components
CM CH 7 Video 7-3 and Questions: Limited Slip Differentia ls
CM CH 7 Video 7-4 and Questions: Drive Axles and Bearings
CM CH 7 Fill-in-the-Blank Questions: Differentials & Drive Axles
CM CH 7 Multiple-Choice Questions: Differentia ls & Drive Axles
SM CH 7 Reading: Differential Diagnosis and Service
SM CH 7 Labeling Activity 7-3: Gear Contact Patterns
SM CH 7 Photo Sequence 20 The Assembly of an Integral carrier-Type Final Drive Unit
SM CH 7 Photo Sequence 21 Measuring and Adjusting Backlash and Side Bearing Preload
Measuring Backlash on a Differential Assembly Simulation
SM CH 7 ASE-Style Review Questions: Differential Diagnosis and Service
SM CH 7 ASE Challenge Questions: Differential Diagnosis and Service
MDT LAB 23 Diagnose constant -velocity (CV) joint noise and vibration concerns;

determine necessary action
MDT LAB 24 Diagnose constant -velocity (CV) joint noise and vibration concerns;
determine necessary action
MDT LAB 25 Diagnose universal joint noise and vibration concerns: determine necessary
action
MDT LAB 26 Inspect, remove, and replace front wheel drive (FWD) bearings, hubs, and
seals
MDT LAB 27 Inspect, service, and replace shafts, yokes, boots, and universal/CV joints
MDT LAB 28 Check shaft balance and phasing; measure shaft runout ; measure and adjust
driveline angles
MDT LAB 29 Clean and inspect differential housing; check for leaks; inspect housing vent
MDT LAB 30 Check and adjust diffe rential housing fluid level
MDT LAB 31 Drain and refill differential housing
MDT LAB 32 Diagnose noise and vibration concerns; determine necessary action
MDT LAB 33 Inspect and replace companion flange and pinion seal; measure companion flange runout
MDT LAB 34 Diagnose noise, slippage, and chatter concerns; determine necessary action
MDT LAB 35 Inspect and replace drive axle wheel studs
MDT LAB 36 Remove and replace drive axle shafts
MDT LAB 37 Inspect and replace drive axle shaft seals, bearings, and retainers
MDT LAB 38 Measure drive axle flange runout and shaft end play; determine necessary action
MDT LAB 39 Diagnose drive axle shafts, bearings, and seals for noise, vibration, and fluid leakage concerns, determine necessary action
Checkpoint Meeting Module 4
End Module 4
CM CH 8 Reading: Four-Wheel-Drive Systems
CM CH 8 Labeling Activity 8-1: 4WD Drivetrain Component Identification
CM CH 8 Labeling Activity 8-2: Transf er Case Component Identification
CM CH 8 Video 8-1 Questions: Four-Wheel-Drive Systems
CM CH 8 Video 8-2 Questions: 4WD Systems Components
CM CH 8 Video 8-3 Questions: Transfer Case Designs
CM CH 8 Fill-in-the-Blank Questions: Four-Wheel-Drive Systems
CM CH 8 Multiple-Choice Questions: Four-Wheel-Drive Systems
SM CH 8 Reading: Servicing Four-Wheel-Drive Systems
SM CH 8 Labeling Activity 8-3: Transfer Case Parts Identification
SM CH 8 Labeling Activity 8-4: 4WD Front Hub Parts Identiification
SM CH 8 Photo Sequence 24 - Assembling a Warner 13-50 Transfer Case
SM CH 8 ASE-Style Review Questions: Servicing Four-Wheel-Drive Systems
SM CH 8 ASE Challenge Questions: Servicing Four-Wheel-Drive Systems
MDT LAB 40 Inspect, adjust, and repair shifting controls (mechanical, electrical, and vacuum), bushings, mounts, levers, and brackets
MDT LAB 41 Inspect front-wheel bearings and locking hubs; perform necessary action(s)
MDT LAB 43 Identify concerns related to variation in tire circumference and/or final drive ratios
MDT LAB 44 Diagnose noise, vibration, and unusual steering concern; determine necessary action
MDT LAB 45 Diagnose, test, adj ust, and replace electrical/elect ronic components of fourwheel drive systems
Checkpoint Meeting Module 5
End Module 5
CM CH 9 Reading: Advanced 4WD Systems
CM CH 9 Labeling Activity 9-1: Viscous Clutch Parts Identification
CM CH 9 Labeling Activity 9-2: Hydraulic Clutch Control Circuit
CM CH 9 Fill-in-the-Blank Questions: Advanced 4WD Systems
CM CH 9 Multiple-Choice Questions: Advanced 4WD Systems
SM CH 9 Reading: Diagnosing 4WD and AWD Control Systems
SM CH 9 Labeling Activity 9-3: Differential Parts Identification
SM CH 9 Photo Sequence 25 - Diagnosis with a Scan Tool
SM CH 9 ASE-Style Review Questions: Diagnosing 4WD and AWD Control Systems
SM CH 9 ASE Challenge Questions: Diagnosing 4WD and AWD Control Systems
MDT LAB 46 Describe the operation and service of a system that uses a dual mass flywheel
MDT LAB 47 Measure rotating torque on a limited slip differential; determine needed
MDT LAB 48 Disassemble, inspect, service, and reassemble a four wheel drive transfer case and components
MDT LAB 49 Disassemble, inspect, service, and reassemble a limited-slip rear wheel drive rear axle / differential assembly
MDT LAB 50 Ensure vehicle is prepared to return to customer per school/company policy
MDT LAB 51 Disassemble, inspect, service, and reassemble a rear wheel drive manual transmission
MDT LAB 52 Disassemble, inspect, service, and reassemble a rear wheel drive manual transmission
Checkpoint Meeting Module 6
End Module 6
CM CH 10 Reading: Drivetrain Electrical and Electronic Systems
Using the Voltmeter Simulation

Voltage Drop Testing Simulation
Using an Ohmmeter Simulation
Reading Wiring Diagrams Simulation
CM CH 10 Labeling Activity 10-1: Simple Circuit Diagram
CM CH 10 Labeling Activity 10-2,: Clutch Switch Parts Identification
CM CH 10 Fill-in-the-Blank Questions: Drivetrain Electrical and Electronic Systems
CM CH 10 Multiple-Choice Questions: Drivetrain Electrical and Electronic Systems
SM CH 10 Reading: Servicing Drivetrain Elect rical Systems
SM CH 10 Photo Sequence 26 - Voltage Drop Test to Locate High Circuit Resistance
SM CH 10 ASE-Style Review Questions: Servicing Drivetrain Electrical Systems
SM CH 10 ASE Challenge Questions: Servicing Drivetrain Electrical Systems
MDT LAB 53 Disassemble, inspect, service, and reassemble a rear wheel drive manual transmission
MDT LAB 54 Disassemble, inspect, service, and reassemble a rear wheel drive manual transmission
MDT LAB 55 Disassemble, inspect, service, and reassemble a four wheel drive transfer case and components
MDT LAB 56 Disassemble, inspect, service, and reassemble a rear wheel drive rear axle/ differential assembly
Checkpoint Meeting Module 7
End Module 7
CM CH 11 Reading: Electronically Controlled and Automated Transmissions
CM CH 11 Labeling Activity 11-1: Hybrid Vehcile Component Identification
CM CH 11 Labeling Activity 11-2,: Advanced Transfer Case Parts Identification
CM CH 11 Fill-in-the-Blank Questions: Electronically Controlled and Automated Transmissions
CM CH 11 Multiple-Choice Questions: Elect ronically Controlled and Automated Transmissions
SM CH 11 Reading: Diagnosing Advanced Elect ronic Systems
SM CH 11 Labeling Activity 11-3:
SM CH 11 Photo Sequence 27 - Flashing a PCM or BCM
SM CH 11 ASE-Style Review Questions: Diagnosing Advanced Electronic Systems
SM CH 11 ASE Challenge Questions: Diagnosing Advanced Electronic Systems
MDT LAB 57 Describe the operational characteristics of an electronically-controlled manual transmission/transaxle
MDT LAB 58 Disassemble, inspect, service, and reassemble a rear wheel drive rear axle/ differential assembly
MDT LAB 59 Disassemble, inspect, service, and reassemble the front axle/ differential assembly of a four wheel drive vehicle
MDT LAB 60 Disassemble, inspect, service, and reassemble the front axle/ differential assembly of a four wheel drive vehicle
Checkpoint Meeting Module 8
End Module 8
End of Course Survey
Student Feedback
Manual Drive Trains and Axles Competency Profi le (2021)
Manual Transmissions & Transaxles Review
Manual Transmissions & Transaxles Final Exam

Subject to change. Please consult your Canvas course for the most current instructions and updates.

Classroom Hours

Mo, Tu, W, Th
8:00 AM - 12:00 PM
1:00 PM - 5:00 PM

Friday
8:00 AM - 12:00 PM

For a full list of course hours visit: Course Schedule

Instructor Contact Information

Cody Dawson — cdawson@stech.edu
Shad Esplin — sesplin@stech.edu
Dallin Robinson — drobinson@stech.edu
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Office Hours: By appointment

Email is the preferred method of communication; you will receive a response within 24 hours during regular business hours.

Canvas Information

Canvas is the where course content, grades, and communication will reside for this course.

- stech.instructure.com
- For Canvas passwords or any other computer-related technical support contact Student Services.
- For regular Hours and Weekdays call (435) 586 - 2899.
- For after Hours & Weekends call (435) 865 - 3929 (Leave a message if no response).

Course Policies

Class attendance is required, this is not an online course. Attendance is required during your scheduled time.
Grade Scale — A: 100 - 90%, B: 89 - 80%, F: 79% or lower.
Cell phones for many have become a distraction. When you are in class or lab we encourage you to keep your cell phones put away in a secure location. If you use ear buds we ask that you only use one so you can still hear the things going on around you. If you are using your phone for things other than school related items, instructors will ask you to put them away. Please follow the direction of your instructors. Those who have been asked to refrain from using your cell phone and fail to do so will be asked to meet with the Director of Transportation and student services will be notified.
The program is designed to provide the student with as much hands-on work as possible. In the automotive industry you may be required to lift heavy objects and stand for hours at a time to complete work required. Technicians deal with chemicals and materials which require caution, these will be identified in the Right to Know Agreement provided to you. You will also be required to use computers to track and complete work.

High School Power School Grades: Quarter student grades will be determined by student progress percentage. Faculty will use the higher percentage of either 1) quarter progress, or 2) cumulative progress for the current training plan year. The progress percentage will be used with the grading scale to determine the minimum grade. High School Grade Scale: The following grading scale will be used to determine a letter grade from the progress percentage:

- A : 94 - 100%
- A- : 90 - 93%
- B+ : 87 - 89%
- B : 83 - 86%
- B- : 80 - 82%
- C+ : 77 - 79%
- C : 73 - 76%
- C- : 70 - 72%
- D+ : 67 - 69%
- D : 63 - 66%
- D- : 60 - 62%
- F : 0 - 59%

Additional Information

InformaCast Statement: Southwest Tech uses InformaCast to ensure the safety and well-being of our students. In times of emergency, such as weather closures and delays, this app allows us to promptly deliver notifications directly to your mobile devices. To stay informed and receive real-time updates, we encourage all students to sign up for notifications. Your safety is our priority, and staying connected ensures a swift response to any unforeseen circumstances. More information and directions for signing up are available at: https://stech.edu/emergency-notifications/

Internet Acceptable Use Policy: The student is expected to review and follow the Southwest Technical College Internet Safety Policy at: https://stech.edu/students/policies/

Student Code of Conduct Policy: The student is expected to review and follow the Southwest Technical College Student Code of Conduct Policy at: https://stech.edu/students/policies/

Accommodations: Students with medical, psychological, learning, or other disabilities desiring accommodations or services under ADA, must contact the Student Services Office. Student Services determines eligibility for and authorizes the provision of these accommodations and services. Students must voluntarily disclose that they have a disability, request an accommodation, and provide documentation of their disability. Students with disabilities may apply for accommodations, based on an eligible disability, through the Student Services office located at 757 W. 800 S., Cedar City, UT 84720, and by phone at (435) 586-2899. No diagnostic services are currently available through Southwest Technical College.

Safety and Building Maintenance: The College has developed and follows a variety of plans to ensure the safe and effective operation of its facilities and programs. The following plans are available online:
1) Facilities Operations and Maintenance Plan; 2) Technical Infrastructure Plan; and 3) Health and Safety Plan.

Withdrawals and Refunds: Please refer to the Southwest Technical College Refund Policy at:
https://stech.edu/students/policies/

Any high school or adult student, who declares a technical training objective is eligible for admission at Southwest Technical College (Southwest Tech). Program-specific admissions requirements may exist and will be listed on the Southwest Tech website. A high school diploma or equivalent is not required for admission but is mandatory for students seeking Title IV Federal Financial Aid.

Non-Discriminatory Policy: Southwest Technical College affirms its commitment to promote the goals of fairness and equity in all aspects of the educational enterprise, and bases its policies on the idea of global human dignity.

Southwest Tech is committed to a policy of nondiscrimination. No otherwise qualified person may be excluded from participation in or be subjected to discrimination in any course, program or activity because of race, age, color, religion, sex, pregnancy, national origin or disability. Southwest Technical College does not discriminate on the basis of sex in the education programs or activities that it operates, as required by Title IX and 34 CFR part 106. The requirement not to discriminate in education programs or activities extends to admission and employment. Inquiries about Title IX and its regulations to STECH may be referred to the Title IX Coordinator, to the Department of Education, and/or to the Office for Civil rights.

If you believe you have experienced discrimination or harassment on our campus, please contact the Title IX Coordinator, Cory Estes: cestes@stech.edu, (435) 865-3938.

For special accommodations, please contact the ADA Coordinator, Cyndie Tracy: ctracy@stech.edu, (435) 865-3944.
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