

COURSE SYLLABUS

Course Title: AUMT 2313-271 Automotive Manual Drive Trains & Axles (3:1:8)

Semester/Year: Fall 2024

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Office Hours: Check posted hours after classes begin, or by appointment.

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I. GENERAL COURSE INFORMATION

- A. Course Description:** (3:1:8) - This course is a study of automotive clutches, clutch operation devices, standard transmissions, transaxles, and differentials with emphasis on the diagnosis and repair of transmissions and drivelines. Elements of the course may be taught manufacturer specific.
- B. Course Goals/Objectives:** Utilizing the appropriate safety procedures, the student will determine driveline problems by test-driving the vehicle; make positive diagnosis by disassembly and inspection; make proper repairs to clutches, transmissions, transaxles, and differentials; and make proper repairs to constant velocity joints and universal joints.
- C. Course Competencies:** A = 100-90 B = 89-80 C = 79-70 F = 69 or below.
- A grade of C or higher is required in AUMT 2413 in order to successfully complete this course.
- D. Academic Integrity:** It is the aim of the faculty of South Plains College to foster a spirit of complete honesty and a high standard of integrity. The attempt of any student to present as his own, any work which he has not honestly performed, is regarded by the faculty and administration as a most serious offense and renders the offender liable to serious consequences, possibly suspension. For further information concerning Cheating and Plagiarism, read the section on Academic Integrity in the SPC General Catalog. **If you have a question as to whether you may work with other students on any assignment, ASK YOUR INSTRUCTOR. On some assignments, working with others is encouraged.**

- E. SCANS and Foundation Skills:** Specific SCANS competencies and foundation skills applicable to this course are listed adjacent to each objective in the course objective table. They include: Foundation Skills (F): 1,2,3,4,5,6,8,9,10,11,12
Competencies (C) : 5,6,7,14,15,16,18,19,20

A complete list of SCANS competencies and foundation skills is attached at the end of this syllabus.

- F. Verification of Workplace Competencies-Technical Education Division.** The learning outcomes of this course will prepare the student to meet the competencies measured in a comprehensive elective course experience (Course # AUMT 1366, or AUMT 2366). In addition, the student will also be prepared to take the ASE Student Certification test for Manual Drive Trains & Axles.

II. SPECIFIC COURSE/INSTRUCTOR REQUIREMENTS

A. Textbook & Other Required Materials:

Halderman, James D. Automotive Technology Principles, Diagnosis, and Service, 6th Edition, Pearson Publishers, 2020 (with on-line curriculum)
8½ x 11 notebook for classroom note taking and assignments
Clear Safety Glasses.

Attendance Policy: Students are expected to attend all classes in order to be successful in a course. The student may be administratively withdrawn from the course when absences become excessive, **without notice. Excessive absences mean 4 (four) or more absences for any reason, there are no excused absences. Upon the 5th absence, each student will lose 10 points off of their current GPA, the 6th absence an additional 10 points, and the 7th absence an additional 10 points. Excessive absences cause you to miss key points of a class and show you are not reliable/dependable for employment. Two (2) tardies will count as one absence. Leaving class without notifying your instructor is considered an absence, regardless of the time you left.**

- C. Assignment Policy:** All assignments are due at the beginning of class on the due dates unless otherwise instructed. Assignments may include on-line or off-line review questions, short essay questions, and definitions. **Part of these assignments can be on-line through the on-line curriculum; you should log on to the on-line curriculum at the beginning of the semester in order to complete them on time. There will be no makeup assignments and no late assignments accepted.** The dates printed in this syllabus can change. Every effort will be made to inform the students of those changes, but the students are ultimately responsible for all assignments regardless of any changed dates. Please check the dates with your instructor throughout the course.

D. Grading Policy/ Procedure and/or Methods of Evaluation: All exams including the final exam are mandatory for effective student evaluation. Exams will be objective and will cover both theory and practical skills pertaining to all aspects of the material presented. Adequate study time should be set aside for exam reviews. **There will be No makeup exams - no exceptions. If a student's financial records are not clear at the time for finals, the student WILL NOT be allowed to take the final exam.**

You will be evaluated during this course by the following method:

Unit exams, written assignments, pop quizzes, and attendance = 25%

Unit skills tests/Lab sheets = 50% (approximately 4)

Final Exam = 25%

A unit skills test is a measure of how well you follow instructions, your safety in the shop, your use of tools, your cleanliness in the work area and your attention to detail while you perform diagnostics or repairs within a required time period. **If you're late for a skills test the following will happen; 0 to 5 minutes late = -10pts; more than 5 min. but less than 10 min. late = -20pts; more than 10 min. but less than 15 minutes late = -30pts. If you are more than 15 minutes late you will have earned a "0" for the test.**

A task sheet is used to plan and track students while they perform required skills in the shop. This is not used to average your grade, but it is a professional evaluation of how well you work independently and your level of expertise in completing assigned tasks. Prospective employers will want to see this during an interview, so please follow the shop and repair procedures to the best of your ability.

Special Requirements: A student's conduct is expected to follow the guidelines stated in the college catalogue and student handbook, any deviation will result in immediate disciplinary action. No smoking, chewing, or dipping is permitted in the building or outside the back doors of the shop and food and drinks are not allowed in any classroom, lab, or shop. All these activities will be limited to break time in designated areas only. Breaks will be limited to 20 minutes. Do not park on the back lot unless preauthorized by your instructor, unauthorized vehicles can be towed at the owner's expense.

Dress Code: The Automotive Program requires you to dress appropriately. Flip flops or opened toed shoes are not allowed in the shop, proper foot attire should be worn to protect your feet, leather work boots are recommended. Jeans/ pants will be worn so that neither one falls to your thighs or knees, belts must hold them at your waist line. Safety glasses will be worn at all times in the shop. If a student fails to comply with the above dress code, he or she, will be sent home and given an absence for that day.

Foundation Skills	COURSE OBJECTIVES	Competencies
	VII. Course Objectives	
	Upon completion of this course, students will be able to:	
F1,2,5,6,10	<ul style="list-style-type: none"> Understand the operation of the components making up the drive train. 	C5,7,15
F1-5,8-12	<ul style="list-style-type: none"> Explain how gear ratios relate to torque and how to compute gear ratios. 	C5,7,15
F1,2,5,6,8,12	<ul style="list-style-type: none"> Identify various types of clutch assemblies and discuss how they operate. 	C5,7,15
F1-5, 8-12	<ul style="list-style-type: none"> Adjust the clutch linkage on a vehicle remove and replace a clutch, pressure plate assembly, release bearing and pilot bearing. 	C5,7,15,16,18,19
F1-5,8-12	<ul style="list-style-type: none"> Check and correct clutch housing alignment. 	C5,7,15,16,18,19
F1-5,8-12	<ul style="list-style-type: none"> Diagnose problems associated with clutch operation. 	C5,7,15,16,18,19
F1,2,5,6,8	<ul style="list-style-type: none"> Discuss the purpose and operation of a typical manual transmission or transaxle. 	C5,7,15,16,18,19
F1,2,5,6,8	<ul style="list-style-type: none"> Discuss the importance of using the proper lubricants in manual transmission or transaxle. 	C5,7,15
F1,2,5,6,8-12	<ul style="list-style-type: none"> List and discuss possible sources of leaks on a manual transmission or drive axle. 	C5,7,15
F1-5,8-12	<ul style="list-style-type: none"> Remove, adjust, repair and reinstall a manual transmission. 	C5,7,15,16
F1,2,5,8,12	<ul style="list-style-type: none"> Identify and discuss the different types of joints in a driveline. 	C5,7,15,16,18-20
F1-5,8-12	<ul style="list-style-type: none"> Remove, inspect, and replace different types of driveline joints. 	C5,7,15
F1,2,5,8,12	<ul style="list-style-type: none"> Identify and discuss different types of differentials and how they operate. 	C5,7,15,16,18-20
F1-5,8-12	<ul style="list-style-type: none"> Diagnose problems in the differential. 	C5,7,15
F1-5,8-12	<ul style="list-style-type: none"> Remove, inspect, repair and reinstall differentials. 	C5-7,14,16,18-20
		C5-7,15,16,18-20

	VIII. Content Outline	
	Unit 1: Power Train Components and Clutch Service	
	Unit Objectives:	C5-7,15
F1,2,5,6,8-12	Upon completion of this unit, the student will be able to:	C5-7,15
F1-6,8-12	<ul style="list-style-type: none"> Identify the components of the power train and discuss the operation of each. 	C5-7,15
F1,2,5,6,8	<ul style="list-style-type: none"> Explain how gear ratios relate to torque and how to compute gear ratios. 	C5-7,15
F1,2,5,6,8,12	<ul style="list-style-type: none"> Distinguish differences between a front wheel drive power train and a rear-wheel-drive power train. 	C5-7,15,16,18-20
F1-6,8-12	<ul style="list-style-type: none"> Discuss how various types of clutches operate and distinguish how they differ in construction. 	C5-7,15,16,18-20
F1-6,8-12	<ul style="list-style-type: none"> Diagnose clutch problems- determine needed repairs. 	C5-7,15,16,18-20
F1-6,8-12	<ul style="list-style-type: none"> Inspect, adjust, and replace clutch mechanical controls. 	C5-7,15,16,18-20
F1-6,8-12	<ul style="list-style-type: none"> Inspect, adjust, and replace clutch hydraulic system controls. 	C5-7,15,16,18-20
F1-6,8-12	<ul style="list-style-type: none"> Remove, repair, reinstall, and adjust various clutch assemblies. 	C5-7,15,16,18-20
	<ul style="list-style-type: none"> Inspect, service, or replace flywheel ring gear. 	C5-7,15,16,18-20
	<ul style="list-style-type: none"> Inspect mating surfaces of the engine block, clutch housing, or transmission case for needed repairs. 	C5-7,15,16,18-20

	<p>Unit 2: Manual Transmission/Transaxle Operation, Diagnosis, and Repair</p> <p>Unit Objectives:</p> <p>Upon completion of this unit, students will be able to:</p> <ul style="list-style-type: none"> • Discuss the purpose and determine the operation of typical manual transmissions and transaxles. • Discuss the importance of road testing a vehicle with the customer. • Distinguish the differences between three-speed, four-speed, and five-speed transmissions. • Discuss the different jobs of gear lubricant and the importance of using proper gear lube. • Diagnose transmission/transaxle noises, shifting, and fluid leakage problems; determine needed repairs. • Inspect, adjust, or replace column or floor shift levers and linkages. • Inspect, adjust, or replace transmission/transaxle shift cover assemblies. • Disassemble, clean, inspect, repair or replace transmission/transaxle sealing surfaces, gaskets, and seals. • Disassemble, clean, inspect, repair or replace transmission/transaxle internal shafts, gears, synchronizers, bearings, and bushings. • Reassemble transmission/transaxle and properly adjust endplay and bearing preload on all shafts and gears. • Diagnose transaxle/differential case assembly noises and vibration; determine needed repairs. • Remove, inspect, and repair a transaxle final drive/differential case. 	
F1,2,5,6,8,12		C5-7,15
F1,2,5,6,8,12		C5-7,15
F1,2,5,6,8,12		C5-7,15
F1,2,5,6,8,12		C5-7,15
F1-6,8-12		C5-7,15,16, 18-20
F1-6,8-12		C5-7,15,16, 18-20
F1-6,8-12		C5-7,15,16, 18-20
F1-6,8-12		C5-7,15,16, 18-20
F1-6,8-12		C5-7,15,16, 18-20
F1-6,8-12		C5-7,15,16, 18-20
F1-6,8-12		C5-7,15,16, 18-20
F1-6,8-12		C5-7,15,16, 18-20
F1-6,8-12		C5-7,15,16, 18-20

	<p>Unit 3: Differential and Drive Axles</p> <p>Unit Objectives:</p> <p>Upon completion of this unit, the student will be able to:</p>	
F1,2,5,6,8,12 F1,2,5,6,8,12 F1-6,8-12	<ul style="list-style-type: none"> • Explain the operation and construction of a differential. • Explain the difference between full floating and semi-floating axles. • Diagnose noises, vibrations, and fluid leakage problems; determine needed repair. 	C5-7,15 C5-7,15 C5-7,15,16, 18-20
F1-6,8-12 F1-6,8-12 F1-6,8-12	<ul style="list-style-type: none"> • Inspect and replace companion flange and pinion seal. • Inspect ring gear and measure run out; determine needed repair. • Remove, inspect, and replace pinion gear, spacers, sleeves, and bearings. 	C5-7,15,16, 18-20 C5-7,15,16, 18-20
F1-6,8-12 F1-6,8-12 F1-6,8-12	<ul style="list-style-type: none"> • Measure and adjust pinion depth. • Measure and adjust pinion bearing preload. • Measure and adjust side bearing preload and backlash on a carrier assembly. 	C5-7,15,16, 18-20 C5-7,15,16, 18-20
F1-6,8-12	<ul style="list-style-type: none"> • Check ring and pinion tooth contact pattern; make needed adjustments. 	C5-7,15,16, 18-20
F1-6,8-12	<ul style="list-style-type: none"> • Disassemble, inspect, measure, adjust or replace differential case assembly. 	C5-7,15,16, 18-20
F1-6,8-12 F1-6,8-12 F1-6,8-12	<ul style="list-style-type: none"> • Inspect and replace differential side bearings. • Repair and install case assembly; measure run out; repair as needed. • Diagnose rear axle shaft for noise, vibration, or leaks; determine needed repairs. 	C5-7,15,16, 18-20 C5-7,15,16, 18-20
F1-6,8-12 F1-6,8-12	<ul style="list-style-type: none"> • Inspect and replace rear axle shaft wheel studs. • Remove, inspect, and replace rear axle shafts, seals, bearings, and retainers. 	C5-7,15,16, 18-20 C5-7,15,16, 18-20
F1-6,8-12	<ul style="list-style-type: none"> • Measure rear axle flange run out and shaft endplay; determine needed repairs. 	C5-7,15,16

<p>F1,2,5,6,8,12</p> <p>F1-6,8-12</p> <p>F1-6,8-12</p> <p>F1-6,8-12</p> <p>F1-6,8-12</p> <p>F1-6,8-12</p>	<p>Unit 4: Drive Line Construction, Operation, Diagnosis and Repair Unit Objectives: Upon completion of this unit, students will be able to:</p> <ul style="list-style-type: none"> • Explain the operation and construction of a front and rear wheel drive shaft. • Diagnose FWD shaft, CV joint noises and vibration; determine needed repair. • Diagnose RWD shaft, U-joint noises and vibration; determine needed repair. • Inspect or service FWD and RWD shaft yokes, boots, and U- joints or CV joints. • Inspect, service, and replace center support bearings. • Check shaft balance and run-out; determine needed repair. 	<p>C5-7,15</p> <p>C5-7,15,16, 18-20</p> <p>C5-7,15,16, 18-20</p> <p>C5-7,15,16, 18-20</p> <p>C5-7,15,16, 18-20</p> <p>C5-7,15,16, 18-20</p>
<p>F1-6,8-12</p> <p>F1-6,8-12</p> <p>F1-6,8-12</p> <p>F1-6,8-12</p> <p>F1-6,8-12</p> <p>F1-6,8-12</p>	<p>Unit 5: Four-Wheel Drive Component Diagnosis and Repair Unit Objectives: Upon completion of this unit, students will be able to:</p> <ul style="list-style-type: none"> • Diagnose four-wheel drive assembly problems; determine needed repairs. • Inspect, adjust, and repair transfer case. • Inspect, service, and replace front-drive shafts and universal joints. • Inspect, service, and replace front-drive axle knuckles and shafts. • Inspect, service, and replace front-wheel bearings and locking hubs. • Inspect front axle seals and vents. 	<p>C5-7,15,16, 18-20</p> <p>C5-7,15,16, 18-20</p> <p>C5-7,15,16, 18-20</p> <p>C5-7,15,16, 18-20</p> <p>C5-7,15,16, 18-20</p> <p>C5-7,15,16, 18-20</p> <p>C5-7,15,16, 18-20</p>

AUMT 2413
Automotive Drive Train & Axles
Assignment and Exam Schedule

Unit 1 August 26th - Sept. 11th **Power Train and Clutch's**

September 2nd Labor Day Holiday

Assignment: In textbook read Chapters 6 and 126. Be prepared to discuss in class. Participate in all lab projects. Complete the online assignments for chapters 6, 126, by the due date.

Unit 1 Assignment Due: September 11th

Unit 1 Written Exam: September 11th (on-line)

Unit 1 Skills Exam September 11th

Unit 2 September 12th – October 2th **Manual Transmission Diagnosis & Repair**

Assignment: In textbook read Chapter 127 and be prepared to discuss in class. Participate in all lab projects. Complete the online assignments for chapter 127 by the due date.

Unit 2 Assignment Due: October 2th

Unit 2 Written Exam: October 2th (on-line)

Unit 2 Skills Exam October 2th

Unit 3 October 3rd – October 23th **Differentials and Drive Axles**

Assignment: Read Chapter 130 and be prepared to discuss in class. Participate in all lab projects. Complete the online assignments for chapter 130 by the due date.

You also need to have a thorough understanding of the terms: bearing preload, gear tooth contact pattern, and backlash.

Unit 3 Assignment Due: October 23rd

Unit 3 Written Exam October 23rd (on-line)

Unit 3 Skills Exam October 23rd

Unit 4 October 24th – November 13th **Drive Shafts and CV Joints**

Assignment: Read Chapters 128,129,132 and be prepared to discuss in class. Participate in all lab projects. Complete the online assignments for chapters 128, 129,132 by the due date.

Unit 4 Assignment Due: November 13th

Unit 4 Written Exam: November 13th (on-line)

Unit 4 Skills Exam November 13th

Thanksgiving Holiday November 27nd – 30th

Unit 5 November 14th – December 4th **Four-Wheel Drive and All-Wheel Drive**

Unit 5 Assignment: There is no written assignment with this unit.

Assignment: Read Chapter 131 in the Manual. Complete the online work for chapter 131. All material will be covered in the lab where applicable.

The Final Exam is scheduled for Dec. 9th at 6:30pm it will be a comprehensive online exam. Please allow yourself adequate study time.

SCANS COMPETENCIES

- C-1 **TIME** - Selects goal - relevant activities, ranks them, allocates time, prepares and follows schedules.
- C-2 **MONEY** - Uses or prepares budgets, makes forecasts, keeps records and makes adjustments to meet objectives.
- C-3 **MATERIALS AND FACILITIES** - Acquires, stores, allocates, and uses materials or space efficiently.
- C-4 **HUMAN RESOURCES** - Assesses skills and distributes work accordingly, evaluates performances and provides feedback.

INFORMATION - Acquires and Uses Information

- C-5 Acquires and evaluates information.
- C-6 Organizes and maintains information.
- C-7 Interprets and communicates information.
- C-8 Uses computers to process information.

INTERPERSONAL—Works With Others

- C-9 Participates as members of a team and contributes to group effort.
- C-10 Teaches others new skills.
- C-11 Serves Clients/Customers—works to satisfy customer’s expectations.
- C-12 Exercises Leadership—communicates ideas to justify position, persuades and convinces others, responsibly challenges existing procedures and policies.
- C-13 Negotiates—works toward agreements involving exchanges of resources; resolves divergent interests.
- C-14 Works With Diversity—works well with men and women from diverse backgrounds.

SYSTEMS—Understands Complex Interrelationships

- C-15 Understands Systems—knows how social, organizational, and technological systems work and operates effectively with them.
- C-16 Monitors and Corrects Performance—distinguishes trends, predicts impacts on system operations, diagnoses systems performance and corrects malfunctions.
- C-17 Improves or Designs Systems—suggests modifications to existing systems and develops new or alternative systems to improve performance.

TECHNOLOGY—Works With a Variety of Technologies

- C-18 Selects Technology—chooses procedures, tools, or equipment, including computers and related technologies.
- C-19 Applies Technology to Task—understands overall intent and proper procedures for setup and operation of equipment.
 - C-20 Maintains and Troubleshoots Equipment—prevents, identifies, or solves problems with equipment, including computers and other technologies.

FOUNDATION SKILLS

BASIC SKILLS—Reads, Writes, Performs Arithmetic and Mathematical Operations, Listens and Speaks

- F-1 Reading—locates, understands, and interprets written information in prose and in documents such as manuals, graphs, and schedules.
- F-2 Writing—communicates thoughts, ideas, information and messages in writing and creates documents such as letters, directions, manuals, reports, graphs, and flow charts.
- F-3 Arithmetic—performs basic computations; uses basic numerical concepts such as whole numbers, etc.
- F-4 Mathematics—approaches practical problems by choosing appropriately from a variety of mathematical techniques.
- F-5 Listening—receives, attends to, interprets, and responds to verbal messages and other cues.
- F-6 Speaking—organizes ideas and communicates orally.

THINKING SKILLS—Thinks Creatively, Makes Decisions, Solves Problems, Visualizes and Knows How to Learn and Reason

- F-7 Creative Thinking—generates new ideas.
- F-8 Decision-Making—specifies goals and constraints, generates alternatives, considers risks, evaluates and chooses best alternative.
- F-9 Problem Solving—recognizes problems, devises and implements plan of action.
- F-10 Seeing Things in the Mind’s Eye—organizes and processes symbols, pictures, graphs, objects, and other information.
- F-11 Knowing How to Learn—uses efficient learning techniques to acquire and apply new knowledge and skills.
- F-12 Reasoning—discovers a rule or principle underlying the relationship between two or more objects and applies it when solving a problem.

PERSONAL QUALITIES—Displays Responsibility, Self-Esteem, Sociability, Self-Management, Integrity and Honesty

- F-13 Responsibility—exerts a high level of effort and perseveres towards goal attainment.
- F-14 Self-Esteem—believes in own self-worth and maintains a positive view of self.
- F-15 Sociability—demonstrates understanding, friendliness, adaptability, empathy and polite-ness in group settings.
- F-16 Self-Management—assesses self accurately, sets personal goals, monitors progress and exhibits self-control.
- F-17 Integrity/Honesty—chooses ethical courses of action.

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