

# Syllabus for AT-14

## Course Information

Semester & Year: Spring 2025

Course ID & Section #: AT-14-E7629 Automotive Drivetrain & Manual Transmissions

Instructor's name: Anibal Florez

Day/Time of required meetings: Tuesdays and Thursdays at 8:15am – 12:35pm

Location: AT-128 and AT-129

Course units: 4

## Instructor Contact Information

Office location: AT-141 is my office.

Office hours: By appointment is preferred.

Phone number: 707-476-4373

Email address: Anibal-Florez@redwoods.edu

## Catalog Description

A course covering theory and principles of manual drivetrains and axles, clutches, drive shafts, half shafts, variable and constant velocity joints, differentials, rear wheel drive axle assemblies, all wheel drives, and four wheel drives. Gear types, ratios, compound ratios, and current noise, vibration, and harshness diagnostic routines will be discussed. Diagnosis, repair, overhaul, and adjustment procedures for common domestic, import, and light truck drivetrain components will be emphasized. The course is designed in conjunction with National Automotive Technicians Education Foundation (NATEF), standards and subsequently will prepare the student for the ASE Manual Drivetrain and Axle Certification Examination.

## Course Student Learning Outcomes

1. Perform general drivetrain diagnosis
2. Diagnose and repair clutches.
3. Diagnose and repair transmissions and transaxles.

## Textbook information

Title & Edition: Automotive Drivetrain & Manual Transmissions

Author: Keith Santini, Kirk VanGelder

ISBN: ISBN: 978-1-284-14526-7

# Educational Accessibility & Support

College of the Redwoods is committed to providing reasonable accommodations for qualified students who could benefit from additional educational support and services. You may qualify if you have a physical, mental, sensory, or intellectual condition which causes you to struggle academically, including but not limited to:

- Mental health conditions such as depression, anxiety, PTSD, or bipolar disorder
- Common ailments such as arthritis, asthma, diabetes, autoimmune disorders, and diseases
- Temporary impairments such as a broken bone, recovery from significant surgery, or a pregnancy-related disability
- Neurodevelopmental disorders such as a learning disability, intellectual disability, autism, acquired brain injury, or ADHD
- Vision, hearing, or mobility conditions

Available services include extended test time, quiet testing environments, academic assistance and tutoring through the [LIGHT Center](#), counseling and advising, alternate formats of course materials (e.g., audio books, braille, E-texts), assistive technology, learning disability assessments, approval for personal attendants, interpreters, priority registration, on-campus transportation, adaptive physical education and living skills courses, and more. If you believe you might benefit from disability- or health-related services and accommodations, please contact [Student Accessibility Support Services \(SASS\)](#). If you are unsure whether you qualify, please contact Student Accessibility Support Services (SASS) for a consultation: [sass@redwoods.edu](mailto:sass@redwoods.edu).

## SASS office locations and phone numbers

### Eureka campus

- Phone: 707-476-4280
- Location: Student Services building, first floor SS113

### Del Norte campus

- Phone: 707-465-2353
- Location: main building, near the Library

### Klamath-Trinity campus

- Phone: 707-476-4280

# Student Support Services

Good information and clear communication about your needs will help you be successful. Please let your instructor know about any specific challenges or technology limitations that might affect your participation in class. College of the Redwoods wants every student to be successful.

The following online resources are available to support your success as a student:

## [CR Online Learning Support](#)

Tech support, laptop loans, guides to using Canvas, installing Office 365 for free, and more.

## [Library Articles & Databases](#)

Find the best library databases for your research.

## [Online Tutoring Resources](#)

Participate in tutoring over Zoom.

To learn more about the resources available to you, click on a title bar below, or click the down arrow to expand them all.

Klamath-Trinity students can contact the CR Klamath-Trinity Office for specific information about student support services at 530-625-4821.

## Community College Student Health and Wellness

### National Suicide Prevention Lifeline

If you are in distress or are with someone at risk right now, call or text the National Suicide Prevention Lifeline.

**Call the National Suicide Prevention Lifeline**  
1-800-273-TALK (8255)

**Text the National Suicide Prevention Lifeline**  
741-741

### Timely Care

When you're not feeling well physically or distressed mentally, Timely Care can offer the help you're looking for in just a few quick taps. Students can schedule an appointment anytime via phone, video, and chat. [Log in or set up an account with Timely Care.](#)

### Mental Health Counseling

Students should text, email, or fax Shawna Bell directly for scheduling and/or services.

- Text: 707-496-2856
- Email: shawnabmft@gmail.com
- Fax and voicemail: 707-237-2318

### Wellness Central

Resources, tools, and trainings regarding health, mental health, wellness, basic needs and more designed for California community college students, faculty and staff are available on the California Community Colleges [Wellness Central](#).

## Counseling

[Counseling and Advising](#) can assist students in need of academic advising and professional counseling services. Call, email or stop by one of our offices to make an appointment!

### Counseling and Advising office locations and contact info

#### Eureka campus

- Phone: 707-476-4150
- Location: Student Services Building, first floor
- Email: [counseling@redwood.edu](mailto:counseling@redwood.edu)
- Hours: Monday through Friday, 9am to 4pm. Summer hours may vary

### Del Norte campus

- Phone: 707-476-2300
- Location: Main Building, next to the library
- Hours: Summer hours may vary

### Klamath-Trinity campus

- Phone: 530-625-4821
- Email: [KT-staff@redwoods.edu](mailto:KT-staff@redwoods.edu)
- Hours: Summer hours may vary

## Basic Needs Center

[Basic Needs Center](#) provides for the health and safety of students by providing access to healthy food, financial resources, and referrals to safe and secure housing. [Submit a request for services and information](#).

### Basic Needs Center contact info

- Phone: 707-476-4153
- Email: [the-grove@redwoods.edu](mailto:the-grove@redwoods.edu)

## Learning Resource Center

The Learning Resource Center includes the following resources for students:

### Library Services

[Introduction - Library Services for Students - LibGuides at College of the Redwoods](#) promotes information literacy and provides organized information resources.

### Multicultural and Equity Center (MCE)

The [Multicultural and Equity Center](#) is a dynamic and inclusive place that supports all students in their academic and personal journeys at the college. We do this by creating community, home away from home, and a safe place for cultural expression, cross-cultural learning, access to college and dignity resources, and social justice work opportunities. The MEC is committed to retention and student success by offering activities related to leadership development, student connectedness and student equity. We are a student-centered program that fosters respect for all people.

### Academic Support Center

The [Academic Support Center](#) offers tutoring and test proctoring for CR students.

### Student Tech Help

Technical [Support](#) provides students with assistance around a variety of tech problems.

## Extended Opportunity Programs and Services (EOPS)

[EOPS/CARE](#) (EOPS) provides services to eligible income disadvantaged students including: textbook awards, grants, career academic and personal counseling, transportation assistance, tutoring, laptop, calculator and textbook loans, priority registration, graduation cap and gown, workshops, and more!

## TRiO Student Success Program

The TRiO Student Support Services Program provides eligible students with a variety of services including academic advising, career assessments, assistance with transfer, and peer mentoring. Students can apply for the program with the [Eureka TRiO office](#) or the [Del Norte TRiO office](#).

## Veterans Resource Center

The [Veterans Resource Center](#) supports and facilitates academic success for Active Duty Military, Veterans and Dependents attending CR through relational advising, mentorship, transitional assistance, and coordination of military and Veteran-specific resources.

## CalWORKS

California Work Opportunity & Responsibility to Kids ([CalWorks](#)) provides supportive services to student parents with children under the age of 18, who are receiving cash assistance (TANF benefits), to become self-sufficient. Services include: transportation assistance, basic student supplies, tutoring, priority registration, laptop and calculator loans, career, academic, and personal counseling, and more!

## Spring 2025 Dates

Date	To Remember
January 17	Last day to register for classes (day before the first class meeting)
January 18	Classes begin
January 20	Martin Luther King's Birthday (All Campuses Closed)
January 24	Last Day to add a class
January 31	Last Day to Drop & Receive a Refund
February 2	Last Day to Drop w/out a "W"
February 3	Census Date (20% of class)
February 14	Lincoln's Birthday (All Campuses Closed)
February 17	President's Day (All Campuses Closed)
March 6	Last Day to Petition to Graduate & Petition for Certificate
March 17 - 22	Spring Break (No Classes)

March 28	Last Day for Student/Faculty Withdrawal
March 31	Cesar Chavez Day (All Campuses Closed)
May 10 - 16	Final Examinations
May 16	Last Day to File P/NP Option
May 16	Semester Ends
May 23	Grades Due
May 30	Grades Available for Transcript Release

## Academic dishonesty

In the academic community, the high value placed on truth implies a corresponding intolerance of scholastic dishonesty. In cases involving academic dishonesty, determination of the grade and of the student's status in the course is left primarily to the discretion of the faculty member. In such cases, where the instructor determines that a student has demonstrated academic dishonesty, the student may receive a failing grade for the assignment and/or exam and may be reported to the Chief Student Services Officer or designee. The Student Code of Conduct ([AP 5500](#)) is available on the College of the Redwoods website. Additional information about the rights and responsibilities of students, Board policies, and administrative procedures is located in the [2024-2025 College Catalog](#) and [CR Board and Administrative Policies](#).

## Disruptive Behavior

Student behavior or speech that disrupts the instructional setting will not be tolerated. Disruptive conduct may include, but is not limited to: unwarranted interruptions; failure to adhere to instructor's directions; vulgar or obscene language; slurs or other forms of intimidation; and physically or verbally abusive behavior. In such cases where the instructor determines that a student has disrupted the educational process, a disruptive student may be temporarily removed from class. In addition, the student may be reported to the Chief Student Services Officer or designee. Additional information about the rights and responsibilities of students, Board policies, and administrative procedures is located in the [2024-2025 College Catalog](#) and [CR Board and Administrative Policies](#).

## Inclusive Language in the Classroom

College of the Redwoods aspires to create a learning environment in which all people feel comfortable in contributing their perspectives to classroom discussions. It therefore encourages instructors and students to use language that is inclusive and respectful.

## Canvas Information

- Log into Canvas at [My CR Portal](#)
- For help logging in to Canvas and general tech help, visit [Canvas Support Home](#)
- Once you're logged in to Canvas, you click on the Help icon on the left menu
- Canvas online orientation workshop: [Canvas Student Orientation Course](#)

## Setting Your Preferred Name and Pronouns in Canvas

Students have the ability to display personal pronouns and an alternate first name in Canvas. Students may change their pronouns on their own in Canvas (Account :: Settings :: Edit Settings). To request a change to your preferred list name, contact [Admissions and Records](#). Your Preferred Name will only be listed in Canvas; this does not change your legal name in our records. See the [Student Information Update form-2022.pdf](#).

## Emergency Procedures / Everbridge

College of the Redwoods has implemented an emergency alert system called Everbridge. In the event of an emergency on campus you will receive an alert through your personal email and/or phones. Registration is not necessary in order to receive emergency alerts. Check to make sure your contact information is up-to-date by logging into [WebAdvisor](#) and selecting 'Students' then 'Academic Profile' then 'Current Information Update.'

Please contact Public Safety at 707-476-4112 or [campus-safety@redwoods.edu](mailto:campus-safety@redwoods.edu) if you have any questions. For more information visit [Campus Safety](#). Please review the [EurekaEmergencyMap\\_S24.pdf](#) for campus evacuation sites, including the closet site to this classroom (posted by the exit of each room).

In an emergency that requires an evacuation of the building anywhere in the District:

- Be aware of all marked exits from your area and building
- Once outside, move to the nearest evacuation point outside your building
- Keep streets and walkways clear for emergency vehicles and personnel

Do not leave campus, unless it has been deemed safe by the campus authorities.

To learn more about campus-specific Emergency Procedures, click on a title bar below, or click the down arrow to expand them all.

### Eureka Campus Emergency Procedures

Please review the [campus emergency map](#) for evacuation sites, including the closest site to this classroom (posted by the exit of each room). For more information on Public Safety go to the [Redwoods Public Safety Page](#). It is the responsibility of College of the Redwoods to protect life and property from the effects of emergency situations within its own jurisdiction.

In the event of an emergency:

1. Evaluate the impact the emergency has on your activity/operation and take appropriate action.
2. Dial 911, to notify local agency support such as law enforcement or fire services.
3. Notify Public Safety 707-476-4111 and inform them of the situation, with as much relevant information as possible.
4. Public Safety shall relay threat information, warnings, and alerts through the Everbridge emergency alert system, Public address system, and when possible, updates on the college website, to ensure the school community is notified.
5. Follow established procedures for the specific emergency as outlined in the College of the Redwoods Emergency Procedure Booklet, (evacuation to a safe zone, shelter in place, lockdown, assist others if possible, cooperate with First Responders, etc.).

6. If safe to do so, notify key administrators, departments, and personnel.
7. Do not leave campus, unless it is necessary to preserve life and/or has been deemed safe by the person in command.

## **Communication Guidelines**

- Response times to emails and messages – in general I will reply within a couple of business days.
- My general availability – Email and phone anytime to schedule.
  - I prefer emails but you can call my office anytime. Emails are usually the better way.
  - Please try to schedule an office visit. However, you are always welcomed to stop by.
- Please make use of my office hours. Come on by! Even if its outside of the office hour scheduled.
- Timeline for offering substantive feedback on assignments – in general about a week.
- Expectations for how students should engage with each other – You are all peers taking part in the same automotive program. Each of you have different skill sets and knowledge. Everyone, including me, will benefit from open and honest communication that is respectful and encouraging. We are all in this together, let us bring each other up.

## **Instructor Expectations of Students**

Your commitment will require at least as much time as you dedicate to a traditional class. A typical three credit hour class will require about nine hours per week of your time. You will need to carefully read the textbook chapters, participate in activities, and participate in online discussions if any, complete quizzes and tests including the final exam. Conscientiousness, attention to details, and skills in reading and writing are critical for success.

## **Student Expectations of Instructor**

I will access the class website regularly and respond to posted questions and messages. Additionally, I read every discussion forum post and occasionally participate. There is also regular instructor-based communication with weekly announcements, lectures, evaluative feedback to your discussion posts, completed labs, homework, answer questions and or email/message students who fall behind.

## **Supplies**

1. Each student is required to purchase in advance and have available a #2 pencil or pen.
2. Safety glasses are required for all lab activities. Students are required to purchase OSHA/ANSI approved safety glasses and wear them at all times when working in the lab.
3. Work attire is recommended. Supply your own coveralls, shop coat or work pants, shirt and closed toed shoes.
4. Class textbook(s).
5. Each student should be prepared to supply any additional personal protective equipment not furnished by the college.
6. 882-E long scantron forms.

## **Course Requirements**

1. Complete the assignments & tests– Read assigned chapters prior to coming to class.
2. Access to the internet to actively participate in online assignments.
3. Regular attendance.



4. Actively participate in shop assignments while striving for improvement.
5. Refrain from using personal electronic devices unless it pertains to the class.
6. Must use safety glasses.
7. Everyone will comply with the latest COVID-19 Social Distancing and Safety Guidelines.
8. No student parking allowed in the automotive compound unless otherwise discussed.

## **Degree/Certificate**

An Associate of Science Degree in Automotive Technology is available as well as two types Certificates of Achievement. For more information consult the college catalog for specific requirements and/or contact Counseling/Advising at 476-4150 to develop a student education plan.

## **Automotive Work Experience**

Additional units are available for working in the field. Contact the Work Experience Coordinator at 476-4341

## **Course Evaluation**

Your performance objectives, exams, and laboratory activities will be translated to points and points to grades. There are 1000 possible points, and the following distribution will guarantee the following:

- 1000 - 900 = A, A-
- 899 - 800 = B-, B, B+
- 799 - 700 = C, C+
- 699 - 600 = D
- 599 - 500 = F

## **Course Schedule**

This course is scheduled to meet twice a week.

During each of those 4.25 we will carry out specific shop activities related to the textbook material.

It is important that each student do the scheduled reading before coming to class. There is a lecture each day and the shop time that follows the lecture is to reinforce the concepts and theories that each student is responsible for studying ahead of class time.

## **Attendance**

The college assumes that students will attend every session of a class for which they are registered. If, however, attendance is irregular, students may be dropped from a class. Excessive absence is defined as a total of absences which equal two weeks in a 16 week semester, for a class meeting twice per week that would equate to 4 absences. For attendance purpose, the college regards a laboratory session as the equivalent of one class meeting.

Veterans and financial aid recipients should remember that should they drop below the number of units required of them by the Veterans Administration or financial aid office for any reason during the semester, including being dropped from a class for excessive absences, they will lose part of the government assistance allowances and may be required to repay funds already disbursed.

In any event if an attendance problem does develop, work with the instructor to resolve it. The purpose here is to see what we can do together to keep you in the class in order to help you master the course content.

## Course Attendance Policy

Attendance will be taken at the start of each class session. **Students who accumulate 5 absences during the first 10 weeks of class will be dropped from this class by the instructor, no exceptions.**

Punctuality is essential in the workplace and is considered respectful of fellow students and instructors. Excessive tardiness can affect your score as well. Less time present means you have less time to complete tasks.

Students who have experienced extenuating circumstances can complete & submit the **Excused Withdrawal Petition** to request an Excused Withdrawal (EW) grade instead of the current Withdrawal (W) or non-passing (D, F & NP) grades. The EW Petition is available from the Admissions and Records Forms Webpage. Supporting documentation is required.

## Tips for Students

ASE-Certified Master Technicians were surveyed for their advice to students who want to become automotive service professional. Although the survey was especially for students, the tips that were suggested are applicable to all automotive technicians, from the newest to the most experienced. The following is a compilation of the responses:

- 1 Education, Education, Education – Continue your education and develop strong math, reading, study skills and computer skills. **A strong background in electronics is beneficial.**
- 2 Take advantage of on-the-job training, apprenticeship opportunities – Get all the training you can and start in a work environment that caters to service and excellence.
- 3 Keep abreast of new technology – Make a commitment to life-long learning. There is a constant change in technology so take advantage of additional training whenever it is available.
- 4 Learn a systems approach – Vehicles today are complex, so it is necessary to understand the interaction of electrical and mechanical components within the total system. Learn how to understand the whole system and you can apply this knowledge across the spectrum of vehicles.
- 5 Develop good communication skills – learn not only the professional and technical skills but also communication and people skills. Your credibility is linked to your perceived competence.
- 6 Keep a positive attitude – Develop a positive outlook so that you perform proper repairs. Apply yourself – you get exactly as much out of your job as you put into it.
- 7 Take pride in your work – Work on every car as if it were your own. Whatever you do – do it well, it's your signature.
- 8 Be honest and ethical – Stay focused on what is most important, practice good work ethics, be dependable and honest, and fix it right the first time.
- 9 Cultivate professionalism in yourself and others – Act professionally, take pride in your appearance as well as in the shop area. Be a positive role model for others. Show up for work every day and always be on time.
- 10 Become ASE certified – Certification gives you an edge when you are seeking employment. Your confidence, sense of self-worth, and ability to get a job almost anywhere are improved once you become certified. ASE certification shows your employer that you have proven your technical expertise and that you are among the group of the very best technicians.

## Learning Outcomes

The college strives for continual improvement in instruction through assessment of learning outcomes. These outcomes are assessed in various ways throughout the course and upon completion of the program. Please participate to the fullest of your ability in this effort to make this course and this program successful.

## Program Learning Outcomes

1. Perform common service and repair tasks identified by the National Automotive Technicians Education Foundation (NATEF)/ Automotive Service Excellence (ASE).
2. Locate industry-standard diagnostic information to localize complex automotive problems.
3. Successfully perform the entry level skills and tasks required for service and repair of automotive systems.

## Course Objectives

For every task, the following safety requirements must be strictly enforced:

Compliance with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment, proper ventilation, and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

Upon successful completion of this course the student should be familiar with the following tasks:

### A. General

1. Research vehicle service information such as fluid type, vehicle service history, service precautions, technical service bulletins, and recalls including xEVs and vehicles equipped with advanced driver assistance systems (ADAS). P-1
2. Identify manual drive train and axles components and configurations. P-1
3. Retrieve and record on-board diagnostics, DTCs, monitor status, and freeze frame data; clear codes and data when directed. P-1
4. Check fluid condition; check for leaks; determine needed action. P-2
5. Drain and refill manual transmission/transaxle; use proper fluid type per manufacturer specification. P-2
6. Diagnose drive train concerns; determine needed action. P-2

### B. Clutch

1. Check and adjust clutch primary cylinder fluid level; check for leaks; use proper fluid type per manufacturer specification. P-2
2. Diagnose clutch noise, binding, slippage, pulsation, and chatter; determine needed action. P-3
3. Inspect clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; determine needed action. P-3
4. Inspect clutch pressure plate assembly, clutch disc, release (throw-out) bearing, linkage, and pilot bearing/bushing (as applicable). P-2
5. Bleed clutch hydraulic system. P-2
6. Inspect flywheel and ring gear for wear, cracks, and discoloration; determine needed action. P-2
7. Measure flywheel runout and crankshaft end play; determine needed action. P-2
8. Describe the operation and service of a system that uses a dual mass flywheel. P-3

### C. Transmission/Transaxle

1. Inspect, adjust, lubricate, and/or replace shift linkages, brackets, bushings, cables, pivots, and levers. P-2
2. Diagnose noise concerns through the application of transmission/transaxle powerflow principles; determine needed action. P-2
3. Diagnose hard shifting and jumping out of gear concerns; determine needed action. P-2
4. Diagnose transaxle final drive assembly noise and vibration concerns; determine needed action. P-2

5. Disassemble, inspect, clean, and reassemble internal transmission/transaxle components. P-3

#### **D. Drive Shaft and Half Shaft, Universal and Constant-Velocity (CV) Joints (Front, Rear, All and Four-wheel Drive)**

1. Inspect and/or remove/replace bearings, hubs, and seals. P-1

2. Inspect and/or service/replace shafts, yokes, boots, and universal/CV joints. P-1

3. Diagnose constant-velocity (CV) joint noise and vibration concerns; determine needed action. P-1

4. Diagnose universal joint noise and vibration concerns; determine needed action. P-1

5. Check shaft balance and phasing; measure shaft runout; measure and adjust driveline angles; determine needed action. P-2

#### **E.1 Ring and Pinion Gears and Differential Case Assembly**

1. Inspect differential housing; check for leaks; inspect housing vent. P-1

2. Check and adjust differential housing fluid level; use proper fluid type per manufacturer specification. P-1

3. Drain and refill differential housing; use proper fluid type per manufacturer specification. P-1

4. Inspect and replace companion flange and/or pinion seal; measure companion flange runout. P-2

5. Inspect ring gear and measure runout; determine needed action. P-2

6. Diagnose noise and vibration concerns; determine needed action. P-2

7. Remove, inspect, reinstall or replace drive pinion and ring gear, spacers, sleeves, and bearings. P-2

8. Measure and adjust drive pinion depth. P-2

9. Measure and adjust drive pinion bearing preload. P-2

10. 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). P-2

11. Check ring and pinion tooth contact patterns; determine needed action. P-2

12. Disassemble, inspect, measure, adjust, and/or replace differential pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case. P-2

13. Reassemble and reinstall differential case assembly; measure runout; determine needed action. P-2

#### **E.2 Drive Axles**

1. Inspect and replace drive axle wheel studs. P-2

2. Remove and replace drive axle shafts. P-1

3. Inspect and replace drive axle shaft seals, bearings, and retainers. P-2

4. Measure drive axle flange runout and shaft end play; determine needed action. P-2

5. Diagnose drive axle shafts, bearings, and seals for noise, vibration, and fluid leakage concerns; determine needed action. P-2

#### **E.3 Limited Slip Differential**

1. Diagnose noise, slippage, and chatter concerns including electronically controlled systems; determine needed action. P-3

2. Measure rotating torque; determine needed action. P-3

#### **F. Four-wheel Drive/All-wheel Drive**

1. Identify concerns related to variations in tire circumference and/or final drive ratios. P-1

2. Check for leaks at drive assembly and transfer case seals; check vents; check fluid level; use proper fluid type per manufacturer specification. P-2

3. Inspect, adjust, and repair shifting controls (mechanical, electrical, and vacuum), bushings, mounts, levers, and brackets. P-2

4. Inspect axle locking mechanisms; determine needed action(s). P-3

5. Diagnose noise, vibration, and unusual steering concerns; determine needed action. P-2

6. Diagnose, test, adjust, and/or replace electrical/electronic components of four-wheel drive/all-wheel drive systems. P-2

7. Disassemble, service, and reassemble transfer case and components. P-3

# AT 14

## Course Grading System

### Theory Portion

Test I Powertrain Basics	60 points
Test II FWD & RWD Shafts, Joints, & Service	60 points
Test III Clutches & Clutch Service	60 points
Test IV Manual Transmissions & Transaxles	60 points
Test V RWD Axle Assemblies	60 points
Assignments	100 points
Final Exam Comprehensive	<u>100 points</u>
<b>Total lecture Points</b>	<b>500 points</b>

### Extra Credit

Each student may elect independently to read and report on a topic related to manual transmissions from a source other than the course text i.e. trade publications, library reference material, magazines, newspaper articles, etc... The report must be no less than one page typed and no longer than three pages typed. You must properly cite your references on a separate page. You may earn up to 50 points per report and you may turn in a maximum of 1 report per semester. Please inform the instructor of your topic prior to doing this assignment.

There are additional Ford and Subaru options for extra credit work. Ask you instructor.

### Laboratory Portion

Includes proper documentation on a Repair Order (RO)

Diagnose: half-shaft, run out, and balance problems, remove and reinstall, replace cv joint and boot, and lube properly. Measure drive-shaft runout, check balance, R&R U-joint, measure driveline angles, R&R driveshaft.	100 points
Remove transmission/transaxle R&R and inspect clutch, flywheel, bell housing, and crankshaft endplay; Reinstall transmission/transaxle.	125 points
Disassemble, inspect, measure clearances, adjust, clean, and identify components; determine necessary action and reassemble a manual transmission.	100 points
Disassemble, inspect, measure clearances, adjust, clean, and identify components; determine necessary action and reassemble a manual transaxle.	75 points
Disassemble RWD axle assembly, inspect, clean, measure runout, adjust backlash and pinion depth as necessary and reassemble.	<u>100 points</u>
<b>Total Possible Lab Points</b>	<b>500 points</b>

## Calendar

	Topic or Focus/Shop Lab	Text Chapters
1/21	Orientation & Shop Safety	
1/23	Drivetrain Fundamentals & Drivetrain types	Ch 1, 2, 3
1/28	Drivetrain Fundamentals & Drivetrain types	Ch 1, 2, 3
1/30	Drivetrain Fundamentals & Drivetrain types	Ch 1, 2, 3
2/4	<b>Test I</b>	
2/6	FWD Axle      Service	Ch 5
2/11	FWD Axle      Service	Ch 5
2/13	RWD Drive Shaft      Service	Ch 5
2/18	RWD Drive Shaft      Service	Ch 5
2/20	RWD/FWD Open Lab/Review Day	
2/25	<b>Field Trip (TBD)</b>	
2/27	<b>Test II</b>	
3/4	Clutches Service & Trans R&R	Ch 6, 7
3/6	Clutches Service & Trans R&R	Ch 6, 7
3/11	Clutches Service & Trans R&R	Ch 6, 7
3/13	Clutches Service & Trans R&R	Ch 6, 7
3/18	<b>Spring Break</b>	
3/120	<b>Spring Break</b>	
3/25	Clutch job wrap up and review	Ch 6, 7
3/27	<b>Test III</b>	
4/1	RWD Transmission      Service & Disassembly	Ch 4, 12, 13
4/3	RWD Transmission      Service & Disassembly	Ch 4, 12, 13
4/8	<b>No Class for us!</b>	
4/10	<b>No Class for us!</b>	
4/15	RWD Transmission      Service & Disassembly	Ch 4, 12, 13
4/17	RWD Transmission      Service & Disassembly	Ch 4, 12, 13
4/22	FWD Transaxle      Service & Disassembly	Ch 4, 12, 14
4/24	<b>Test IV</b>	
4/29	RWD Axles      Service & Disassembly	Ch 8, 9
5/1	RWD Axles      Service & Disassembly	Ch 8, 9
5/6	RWD Axles      Service & Disassembly	Ch 8, 9
5/8	<b>Test V</b>	
5/13	<b>Comprehensive Final Starting at 8:30am</b>	