Syllabus for AT-30 Auto Trans & Transaxle

Course Information

Semester & Year: Fall 2021
Course ID & Section #: AT-30-E1628
Instructor's name: Ernest Shull
Day/Time of required meetings: Tuesday & Thursday 1:15PM to 5:35PM
Location: AT-128
Course units: 4

Instructor Contact Information

Office location AT-129A
Office hours: Monday & Wednesday 1:00PM to 2:00PM
Phone number: 707-476-4221
Email address: Ernest-Shull@redwoods.edu

Catalog Description

A course covering theory and principles related to both hydraulic and electronically actuated automatic transmissions/transaxles. Topics will include positive and variable displacement pumps, torque converters, torque converter clutches, hydraulic valves, electronic shift solenoids, governors, and common compound planetary gear arrangements. The laboratory portion of the course will focus on diagnostic and overhaul procedures, in-vehicle testing, and bench testing of various components. The course is designed in conjunction with Automotive Service Excellence (ASE) standards and subsequently will prepare the student for the ASE Automatic Transmission Certification Examination.

Course Student Learning Outcomes *(from course outline of record)*

1. Perform maintenance and adjustments on transmissions and transaxles.
2. Diagnose and repair in-vehicle transmission and transaxle problems.
3. Diagnose and repair off-vehicle transmission and transaxle problems.

Prerequisites/co-requisites/ recommended preparation

none

Accessibility

College of the Redwoods is committed to making reasonable accommodations for qualified students with disabilities. If you have a disability or believe you might benefit from disability-related services and accommodations, please contact your instructor or Disability Services and Programs for Students (DSPS). Students may make requests for alternative media by contacting DSPS based on their campus location:

- Eureka: 707-476-4280, student services building, 1st floor
- Del Norte: 707-465-2324, main building near library
- Klamath-Trinity: 530-625-4821 Ext 103

If you are taking online classes DSPS will email approved accommodations for distance education classes to your instructor. In the case of face-to-face instruction, please present your written accommodation request to your instructor at least one week before the needed accommodation so that necessary arrangements can be made. Last minute arrangements or post-test adjustments usually cannot be accommodated.

Student Support

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.

Evaluation & Grading Policy

[Should include info such as final grade calculations, rubrics, late assignment policy, and other grading practices]

Admissions deadlines & enrollment policies

Fall 2021 Dates

- *Classes begin: 8/21/21*
- *Last day to add a class: 8/27/21*
- *Last day to drop without a W and receive a refund: 9/03/21*
- *Labor Day Holiday (all campuses closed): 09/06/21*
- *Census date: 9/07/21 or 20% into class duration*
- *Last day to petition to graduate or apply for certificate: 10/28/21*
- *Last day for student-initiated W (no refund): 10/29/21*
- *Last day for faculty-initiated W (no refund): 10/29/21*
- *Veteran's Day (all campuses closed): 11/11/21*
- *Fall Break (no classes): 11/22/21 – 11/26/21*
- *Thanksgiving Holiday (all campuses closed): 11/24/21 – 11/26/21*
- *Final examinations: 12/11/21 – 12/17/21*
- *Last day to petition to file P/NP option: 12/17/21*
- *Semester ends: 12/17/21*
- *Grades available for transcript release: approximately 01/07/22*

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 College Catalog and on the College of the Redwoods website.

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. 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 College Catalog and on the College of the Redwoods website.

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.

Setting Your Preferred Name in Canvas

Students have the ability to have an alternate first name and pronouns to appear in Canvas. Contact Admissions & Records to request a change to your preferred first name and pronoun. 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.

Canvas Information

If using Canvas, include navigation instructions, tech support information, what Canvas is used for, and your expectation for how regularly students should check Canvas for your class.
Log into Canvas at https://redwoods.instructure.com
Password is your 8 digit birth date
For tech help, email its@redwoods.edu or call 707-476-4160
Canvas Help for students: https://webapps.redwoods.edu/tutorial/
Canvas online orientation workshop: Canvas Student Orientation Course (instructure.com)

Community College Student Health and Wellness

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 Health & Wellness website.

Wellness Central is a free online health and wellness resource that is available 24/7 in your space at your pace.

Students seeking to request a counseling appointment for academic advising or general counseling can email counseling@redwoods.edu.

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 https://webadvisor.redwoods.edu and selecting 'Students' then 'Academic Profile' then 'Current Information Update.'

Please contact Public Safety at 707-476-4112 or security@redwoods.edu if you have any questions. For more information see the Redwoods Public Safety Page.

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.

Del Norte Campus Emergency Procedures

Please review the Crescent City campus emergency map for campus evacuation sites, including the closest site to this classroom (posted by the exit of each room). For more information, see the Redwoods Public Safety Page.

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 emergencies 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.

Student Support Services

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

- CR-Online (Comprehensive information for online students)
- Library Articles & Databases
- Canvas help and tutorials
- Online Student Handbook

Counseling offers assistance to students in need of professional counseling services such as crisis counseling.

Learning Resource Center includes the following resources for students

- Academic Support Center for instructional support, tutoring, learning resources, and proctored exams. Includes the Math Lab & Drop-in Writing Center
- Library Services to promote information literacy and provide organized information resources.
- Multicultural & Diversity Center

Special programs are also available for eligible students include

- Extended Opportunity Programs & Services (EOPS) provides services to eligible income disadvantaged students including: textbook award, career academic and personal counseling, school supplies, transportation assistance, tutoring, laptop, calculator and textbook loans, priority registration, graduation cap and gown, workshops, and more!
- The TRiO Student Success Program provides eligible students with a variety of services including trips to 4-year universities, career assessments, and peer mentoring. Students can apply for the program in Eureka or in Del Norte
- The Veteran's 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.
- Klamath-Trinity students can contact the CR KT Office for specific information about student support services at 530-625-4821

Course Evaluation

Course Points

All Labs will contribute to 500 points towards your final grade.

Tests and Homework will contribute towards the other 500 Points.

There are a total of 1000 Points in this course.

Chapter Quiz Assignment

Each student must answer the Chapter Quiz, multiple choice questions, for each chapter assigned.

Extra Credit

Each student may elect independently to read and report on a topic related to automatic transmissions/transaxles from a source other than the course text i.e. recognized 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.

Class participation and Attendance policy

Each student will spend time reading assigned material, preparing reports, and studying for tests as necessary outside of normal class time. Attendance is critical in this course. The student will be expected to participate in all lectures and lab activities involving this course. The student will be responsible for all material presented in this course regardless of class attendance. To get the maximum benefit from the ASE Certified training offered, students should come to class prepared, be attentive to all instruction, maintain a positive attitude, and actively participate in all lab activities. Students will be expected to adhere to College of the Redwoods Code of Conduct and Discipline. Policy prohibits cell phone and other personal electronic devices during class, please turn them off for class. College of the Redwoods complies with the Americans with Disabilities Act in making reasonable accommodations for qualified students with disabilities.

College Level Rigor

This is defined as a minimum of three hours of work per week per unit of credit, including class time. This is pro-rated for short-term and lab classes. College level rigor also requires that the scope and intensity for the course requires the student to study outside of class time.

Supplies

- Work attire is recommended. Supply your own coveralls, shop coat or work pants and shirt.

Course Requirements

- Textbook assignments or other pre-class work.
- Each student is responsible for cleaning the tools used and their work area.
- Each student is required to have their own safety glasses to be able to participate in lab activities. Safety glasses will always be worn in the lab.
- Regular attendance and readiness to work.
- Active participation in class and lab settings.

Degree/Certificate

An Associate of Science Degree in Automotive Technology is available as well as Certificate of Achievement and Certificate of Completion consult college catalog for specific requirements and/or

contact Counseling/Advising at 476-4150 to develop a student education plan. Note: It is the student's responsibility to submit the proper forms to the Admissions Office in order to petition for an AT degree and certificates required for graduation. Consult your course catalog for important deadlines or the Admissions Office for additional information.

Automotive Work Experience:

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

Information for this Class

Course Schedule

The class meets 2.25 lecture hours and 6.5 lab hours per week. The student will be provided with a course calendar. Laboratory activity sheets will be provided as necessary.

Attendance

The college assumes that students will attend every session of a class for which theyare registered. If, however, attendance is irregular, students may be dropped from class.

Excessive absence is defined as a total of absences which equal to two weeks in a 16 week semester. For a class meeting twice per week, like this one, that would equate to 4 absences. For attendance purpose, the college regards a laboratory session as the equivalent of one class meeting. To be counted as present you must be in lecture and in lab for the entire class period.

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 so that you can master the course content.

Course Attendance Policy

Attendance will be taken promptly at the start of each class session and you will be marked present if you are in your seat at that time. Students arriving within the first five minutes will be marked tardy all others will be marked absent. Additionally, students leaving lab early will be marked absent that day. ***Students who accumulate 4 absences during the first 10 weeks of class will be dropped from the class by the instructor.***

Get the Most Out of This Program

- This program belongs to *you* and *your* success rests largely with *you*.
- Enter a discussion *enthusiastically*.
- Give freely of your experience.

- Confine your discussion to the problem.
- Share what you think
- One person should talk at a time (avoid private conversation while someone else is speaking).
- Listen attentively to the discussion.
- Be patient with other members.
- Learn to appreciate the other person's point of view.
- Be here on time and be ready to learn.

Tips for Students

Recently 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:

- Education, Education, Education – Continue your education and develop strong math, reading, study skills and computer skills. A strong background in electronics is essential.
- Take advantage of on-the-job training, co-op or apprenticeship opportunities – Get all the training you can and start in a work environment that caters to service and excellence.
- 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.
- 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.
- 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.*
- 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.*
- 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.*
- 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 – that's the goal anyway!
- 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.*
- 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.*

Course Objectives

For every task in Automatic Transmission and Transaxle, the following safety requirement must be strictly enforced:

Comply 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.

AUTOMATIC TRANSMISSION AND TRANSAXLE

A. General: Transmission and Transaxle Diagnosis

1. Identify and interpret transmission/transaxle concern, differentiate between engine performance and transmission/transaxle concerns; determine necessary action. P-1
2. Research applicable vehicle and service information fluid type, vehicle service history, service precautions, and technical service bulletins. P-1
3. Diagnose fluid loss and condition concerns; determine necessary action. P-1
4. Check fluid level in a transmission or a transaxle equipped with a dip-stick. P-1
5. Check fluid level in a transmission or a transaxle not equipped with a dip-stick. P-1
6. Perform pressure tests (including transmissions/transaxles equipped with electronic pressure control); determine necessary action. P-1
7. Diagnose noise and vibration concerns; determine necessary action. P-2
8. Perform stall test; determine necessary action. P-3
9. Perform lock-up converter system tests; determine necessary action. P-3
10. Diagnose transmission/transaxle gear reduction/multiplication concerns using driving, driven, and held member (power flow) principles. P-1
11. Diagnose electronic transmission/transaxle control systems using appropriate test equipment and service information. P-1
12. Diagnose pressure concerns in a transmission using hydraulic principles (Pascal's Law). P-2

AUTOMATIC TRANSMISSION AND TRANSAXLE

B. In-Vehicle Transmission/Transaxle Maintenance and Repair

1. Inspect, adjust, and replace external manual valve shift linkage, transmission range sensor/switch, and park/neutral position switch. P-2
2. Inspect for leakage; replace external seals, gaskets, and bushings. P-2
3. Inspect, test, adjust, repair, or replace electrical/electronic components and circuits including computers, solenoids, sensors, relays, terminals, connectors, switches, and harnesses. P-1
4. Drain and replace fluid and filter(s). P-1
5. Inspect, replace and align powertrain mounts. P-2

AUTOMATIC TRANSMISSION AND TRANSAXLE

C. Off-Vehicle Transmission and Transaxle Repair

1. Remove and reinstall transmission/transaxle and torque converter; inspect engine core plugs, rear crankshaft seal, dowel pins, dowel pin holes, and mating surfaces. P-1
2. Inspect, leak test, and flush or replace transmission/transaxle oil cooler, lines, and fittings. P-1
3. Inspect converter flex (drive) plate, converter attaching bolts, converter pilot, converter pump drive surfaces, converter end play, and crankshaft pilot bore. P-2
4. Describe the operational characteristics of a continuously variable transmission (CVT). P-3
5. Describe the operational characteristics of a hybrid vehicle drive train. P-3
6. Disassemble, clean, and inspect transmission/transaxle. P-2
7. Inspect, measure, clean, and replace valve body (includes surfaces, bores, springs, valves, sleeves, retainers, brackets, check valves/balls, screens, spacers, and gaskets). P-2
8. Inspect servo and accumulator bores, pistons, seals, pins, springs, and retainers; determine necessary action. P-2
9. Assemble transmission/transaxle. P-2
10. Inspect, measure, and reseal oil pump assembly and components. P-2
11. Measure transmission/transaxle end play or preload; determine necessary action. P-1
12. Inspect, measure, and replace thrust washers and bearings. P-2
13. Inspect oil delivery circuits, including seal rings, ring grooves, and sealing surface areas, feed pipes, orifices, and check valves/balls. P-2
14. Inspect bushings; determine necessary action. P-2
15. Inspect and measure planetary gear assembly components; determine necessary action. P-2
16. Inspect case bores, passages, bushings, vents, and mating surfaces; determine necessary action. P-2
17. Diagnose and inspect transaxle drive, link chains, sprockets, gears, bearings, and bushings; perform necessary action. P-2
18. Inspect measure, repair, adjust or replace transaxle final drive components. P-2
19. Inspect clutch drum, piston, check-balls, springs, retainers, seals, and friction and pressure plates, bands and drums; determine necessary action. P-2
20. Measure clutch pack clearance; determine necessary action. P-1
21. Air test operation of clutch and servo assemblies. P-1
22. Inspect roller and sprag clutch, races, rollers, sprags, springs, cages, retainers; determine necessary action. P-1

Class schedule

Date	*Assigned Reading*	*Theory*	*Lab Assignment*
8/24	*Chapters 2 & 3*	*Shop Safety/Tools*	*Tour/Haz-Mat*
8/26	*Chapter 6*	*Automatic Trans Fundamentals*	*Transmission I.D.*
8/31	*Chapter 7*	*Transmission Components*	*Transmission Inspections*
9/2	*Chapter 8*	*Hydraulic Fundamentals*	*Transmission Pressure Tests*
9/7	*Chapter 9*	*Torque Converters*	*Filter Change*
9/9	*Chapter 10*	*Hydraulically Controlled Transmission*	*Transmission Flushes*
9/14	*Chapter 11*	*Electronically Controlled Transmission*	*Electrical Diagnostics*
9/16	*Chapter 13*	*Transmission Removal/**Test 1 Canvas***	*R&R Transaxle*
9/21		*Lab Day*	*R&R Transaxle*
9/23	*Chapter 19*	*Transmission Reinstallation*	*R&R Transaxle*
9/28		*LAB DAY*	*R&R Transaxle*
9/30		*LAB DAY*	*R&R Transaxle*
10/5	*Chapter 12*	*In Vehicle Transmission Repairs*	*Seal Service*
10/7	*Chapter 20*	*Dual Clutch Transmissions*	*Power Flow Diagnostics*
10/12		*Scan Tool Usage*	*Scan Tools*
10/14	*Chapter 21*	*CVT Transaxles*	
10/19	*Chapter 22*	*Hybrid Vehicles*	*Hybrids*
10/21		*Planetary Gear Sets*	*Example Teardown*
10/26	*Chapter 23*	*Honda Transmissions/ **Test 2 Canvas***	*Honda Teardown*
10/28	*Chapter 23*	*Honda Transmission*	*Honda Teardown*
11/2	*Chapter 14*	*Transmission Disassembly*	*4T65E Teardown*
11/4	*Chapter 14*	*Transmission Disassembly*	*4T65E Teardown*
11/9	*Chapter 16*	*Gear Train Rebuilding*	*4T65E Gear Train*
11/11	***Holiday***	***No Class***	*4T65E Gear Train*
11/16	*Chapter 15*	*Hydraulic System Rebuilding*	*4T65E Clutches*
11/18	*Chapter 17*	*Valve Body & Electric/**Test 3 Canvas***	*4T65E Valve Body*
11/23	***Fall Break***	***No Class***	
11/25	***Fall Break***	***No Class***	
11/30	*Chapter 27*	*Ford 6R60*	*4T65E Valve Body*
12/2	*Chapter 24*	*4T65E Speed Rally*	*Identify Components*
12/7	*Chapter 25*	*4T65E Speed Rally*	*Identify Components*
12/9		***Make Up Day***	
12/14	***FINAL EXAM***	***COMPREHENSIVE***	***Online Canvas***