

DIXIE STATE COLLEGE
Automotive Technology Department
Manual Transmission and Drive Train.
AUTO 1430-01, CRN 20959
Course Syllabus. Spring 2009

PRE-REQUISITES: None

CREDIT HOURS: 6 credits

INSTRUCTOR: Bill Schouten. Office TE 109. Phone: 652-7859
Email: schouten@dixie.edu. Office hours: M,T,W,R 7:00-8:00 am. Also W 1:00-2:00 pm.

CLASS SCHEDULE: Jan. 5 to May 30, 2009, MTWR 8:00-9:50 am. 4 hours lecture, 4 hours lab per week

COURSE DESCRIPTION:

This course is designed for students interested in gaining knowledge in automotive manual drive systems. It includes diagnosis and repair of manual transmissions, differential, transfer case and drive line per ASE requirements. It will also cover transaxle systems as it applies to hybrid vehicle technology. Course content includes lecture, lab and visual aids about manual drive train systems. Upon completion of this course a student should be able to pass the ASE test for the subject and have entry level job skills. NOTE: The required lab work will be dictated by the attached NATEF task list.

TEXT: Modern Automotive Technology
James E. Duffy. Current edition.

REQUIRED MATERIAL:

Students must provide their own basic hand tools (see hand out). Special tools will be provided by the college. Safety glasses or goggles as well as coveralls or other protective clothing must be provided by the student.

SAFETY REQUIREMENTS:

Students must complete safety and tool use chapters before beginning live work. All lab work complies with OSHA and EPA safety standards. Students are required to read and comply with posted safety rules.

ATTENDANCE AND GRADING:

This is a performance-based class. Students must be in attendance in order to perform. Grades are in direct relation to standards of performance.

Grades will be based on the following:

Attendance (54 @ 10 ea.)	540 points
Job Sheets: (3 @ 25 ea.)	75 points
Work Book: (4 @ 50 ea.)	250 points
Task list, Shop R.O.'s:	500 points
Chapter quizzes:	200 points
Mid-term:	200 points
<u>Final:</u>	<u>200 points</u>
Total points:	1965

To get the 500 points for the shop R.O. work you will need to turn in Repair Orders for work done. You may provide the vehicles for lab work on your own. Otherwise the college will provide vehicles. Typical lab work will include the items on the NATEF task list including the replacement of 2 clutch assemblies. One rear wheel drive and one front wheel drive. This would account for about 500 points. Additional repair orders may be assigned during the semester per the NATEF task list. As you have questions, please ask the instructor.

If you are a student with a medical, psychological or learning disability condition you may request reasonable academic accommodation due to this condition. You must provide an official request of accommodation to the college Disability Resource Center. The resource center will determine the accommodation appropriate for the student. This must be done within the first two weeks of class. The resource center will advise the student about the necessary documentation required for this purpose. Please call 435-652-7516 for an appointment. The disability resource office is in the Student Services Center, room 201 of the Edith Whitehead building.

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Time lines, due dates, subject matter, etc.

Chapter quiz will be given on Monday or Tuesday. Job/Lab sheets and Work Book sheets are due to be turned in the LAST day of the week. Note: NO LATE WORK ACCEPTED. NO MAKE-UP QUIZ. The due dates are drop dead dates.

<u>Week of:</u>	<u>Lecture</u>	<u>Chapter quiz</u>	<u>Lab/Job sheets</u>	<u>Work book</u>
Jan 5	5			
Jan 12	9, 53	5	1	
Jan 19 (Mon. holiday)	54, 55	9, 53	2	
Jan 26	56, 59	54, 55		53, 54
Feb 2	60, 61	56, 59		55, 56
Feb 9	62, 63	60, 61	25	59, 60
Feb 16	64	62, 63		61, 62
Feb 23	Mid term. Ch. 5, 9, 53, 54, 55, 56		64	63, 64
Mar 2	Hybrid technology		15, 17	
Mar 9				
Mar 16	Spring break all week! (Have fun but don't be stooooopid!)			
Mar 23				
Mar 30	How's your lab projects coming?			
April 6				
April 13	Wind down lab work.			
April 20	Shop clean-up. Review for final. Test on ch. 59, 60, 61, 62, 63, 64			
April 27	Finals all week.			

Note: Each spring semester we host the annual Dixie State College high school trouble shooting contest. We will assign a week for this contest event. You will be a part of this. You will set up the stations for the contest on Mon. & Tues. Dry run Wed. and judge the contest on Thurs. This is a lot of fun and a great learning experience.

The following is required of all automotive students in any automotive class.

1. Each student is required to provide their own safety glasses or goggles and protective clothing.
2. If you are working on a non-school owned vehicle, the vehicle owner must provide all parts, chemicals and incidentals required for the repair.
3. No labor fees can be charged for work performed in the auto shop.
4. The student is required to provide their own basic hand tools. The tools must include at a minimum a 3/8" and 1/4" drive socket set in both metric and standard configuration. Also required is a Phillips and flat screw driver set, pliers set, ball peen hammer etc.
5. View and understand a safety presentation and sign this sheet that you have read and understand shop safety policies.
6. **Any** vehicle in the shop must have a repair order, filled out by the student and signed by the instructor, on the vehicle at all times.

I understand and will comply with the above statements.

Name: _____ Date: _____

DIXIE STATE COLLEGE

2008-2009 ACADEMIC CALENDAR

S	Start of Class	CD	Career Day	<i>Note: Faculty & Staff Workshops take place August 17th thru August 22, 2008.</i>
L	Last Day of Class	R	Reading Day	
H	Holiday	F	Final Exams	
SB	Semester Break*	SB	Spring Break	
B	Block Classes Begin	G	Graduation	

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August	24	25	S	27	28	29	30
September	31		2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
October	28	29	30	1	2	3	4
	5	B	7	8	9	10	11
	12	13	14	15			18
	19	20	21	22	23	24	25
	26	27	28	29	30	31	1
November	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17		19	20	21	22
	23	24	25				29
December	30	1	2	3	4	5	6
	7	8	9	10	11	L	13
	14	F	F	F	F	F	20

January	4	S	6	7	8	9	10
	11	12	13	14	15	16	17
	18	H	20	21	22	23	24
	25	26	27	28	29	30	31
February	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	H	B	18	19	20	21
	22	23	24	25	26	27	28
March	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	SB	SB	SB	SB	SB	21
	22	23	24	25	26	27	28
April	29	30	31	1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	L	F	25
May	26	F	F	F	F	G	2

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NATEF TASK LIST

MANUAL DRIVE TRAIN AND AXLES

A. Clutch Diagnoses and Repair

1. Diagnose clutch noise, binding, slippage, pulsation, and chatter; determine necessary action. P-1
2. Inspect clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; perform necessary action. P-1
3. Inspect hydraulic clutch slave and master cylinders, lines, and hoses; perform necessary action. P-1
4. Inspect release (throw-out) bearing, lever, and pivot; perform necessary action. P-1
5. Inspect and replace clutch pressure plate assembly and clutch disc. P-1
6. Inspect, remove or replace crankshaft pilot bearing or bushing (as applicable). P-1
7. Inspect flywheel and ring gear for wear and cracks, measure runout; determine necessary action. P-1
8. Inspect engine block, clutch (bell) housing, and transmission/transaxle case mating surfaces; determine necessary action. P-3
9. Measure flywheel-to-block runout and crankshaft endplay; determine necessary action. P-3

B. Transmission/Transaxle Diagnoses and Repair

10. Remove and reinstall transmission/transaxle. P-2
11. Disassemble, clean, and reassemble transmission/transaxle components. P-2
12. Inspect transmission/transaxle case, extension housing, case mating surfaces, bores, bushings, and vents; perform necessary action. P-3
13. Diagnose noise, hard shifting, jumping out of gear, and fluid leakage concerns; determine necessary action. P-3
14. Inspect, adjust, and reinstall shift linkages, brackets, bushings, cables, pivots, and levers. P-3
15. Inspect and reinstall powertrain mounts. P-3
16. Inspect and replace gaskets, seals, and sealants; inspect sealing surfaces. P-2
17. Remove and replace transaxle final drive. P-3
18. Inspect, adjust, and reinstall shift cover, forks, levers, grommets, shafts, sleeves, detent mechanism, interlocks, and springs. P-2
19. Measure endplay or preload (shim or spacer selection procedure) on transmission/transaxle shafts; perform necessary action. P-1
20. Inspect and reinstall synchronizer hub, sleeve, keys (inserts), springs, and blocking rings. P-2
21. Inspect and reinstall speedometer drive gear, driven gear, vehicle speed sensor (VSS), and retainers. P-2
22. Diagnose transaxle final drive assembly noise and vibration concerns; determine necessary action. P-3
23. Remove, inspect, measure, adjust, and reinstall transaxle final drive pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case assembly. P-2
24. Inspect lubrication devices (oil pump or slingers); perform necessary action. P-3
25. Inspect, test, and replace transmission/transaxle sensors and switches. P-1

C. Drive shaft and Half Shaft, Universal and Constant-Velocity (CV) Joint Diagnosis and Repair

- 26. Diagnose constant-velocity (CV) joint noise and vibration concerns; determine necessary action. P-2
- 27. Diagnose universal joint noise and vibration concerns; perform necessary action. P-2
- 28. Replace front wheel drive (FWD) front wheel bearing. P-2
- 29. Inspect, service, and replace shafts, yokes, boots, and CV joints. P-1
- 30. Inspect, service, and replace shaft center support bearings. P-3
- 31. Check shaft balance; measure shaft runout; measure and adjust driveline angles. P-3

D. Drive Axle Diagnosis and Repair

Ring and Pinion Gears and Differential Case Assembly

- 32. Diagnose noise and vibration concerns; determine necessary action. P-2
- 33. Diagnose fluid leakage concerns; determine necessary action. P-2
- 34. Inspect and replace companion flange and pinion seal; measure companion flange runout. P-2
- 35. Inspect ring gear and measure runout; determine necessary action. P-2
- 36. Remove, inspect, and reinstall drive pinion and ring gear, spacers, sleeves, and bearings. P-2
- 37. Measure and adjust drive pinion depth. P-2
- 38. Measure and adjust drive pinion bearing preload. P-1
- 39. 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
- 40. Check ring and pinion tooth contact patterns; perform necessary action. P-1
- 41. Disassemble, inspect, measure, and adjust or replace differential pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case. P-2
- 42. Reassemble and reinstall differential case assembly; measure runout; determine necessary action. P-2

Limited Slip Differential

- 43. Diagnose noise, slippage, and chatter concerns; determine necessary action. P-3
- 44. Inspect and flush differential housing; refill with correct lubricant. P-2
- 45. Inspect and reinstall clutch (cone or plate) components. P-3
- 46. Measure rotating torque; determine necessary action. P-3

Drive Axle Shaft

- 47. Diagnose drive axle shafts, bearings, and seals for noise, vibration, and fluid leakage concerns; determine necessary action. P-2
- 48. Inspect and replace drive axle shaft wheel studs. P-3
- 49. Remove and replace drive axle shafts. P-1
- 50. Inspect and replace drive axle shaft seals, bearings, and retainers. P-2
- 51. Measure drive axle flange runout and shaft endplay; determine necessary action. P-2

E. Four wheel Drive/All wheel Drive Component Diagnosis and Repair

- 52. Diagnose noise, vibration, and unusual steering concerns; determine necessary action. P-3

- 53. Inspect, adjust, and repair shifting controls (mechanical, electrical, and vacuum), bushings, mounts, levers, and brackets. P-3
- 54. Remove and reinstall transfer case. P-3
- 55. Disassemble, service, and reassemble transfer case and components. P-3
- 56. Inspect front-wheel bearings and locking hubs; perform necessary action. P-3
- 57. Check drive assembly seals and vents; check lube level. P-3
- 58. Diagnose, test, adjust, and replace electrical/electronic components of four-wheel drive systems. P-3

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