

## FLORIDA STATE COLLEGE AT JACKSONVILLE

## COLLEGE CREDIT COURSE OUTLINE

COURSE NUMBER: AER 1398

COURSE TITLE: Manual Transmission and Transaxles

PREREQUISITE(S): AER 1081C

COREQUISITE(S): None

CREDIT HOURS: 4

CONTACT HOURS/WEEK: 6

CONTACT HOUR BREAKDOWN:

Lecture/Discussion:	4
Laboratory:	2
Other _____:	

FACULTY WORKLOAD POINTS: 5

STANDARDIZED CLASS SIZE ALLOCATION: 24

## CATALOG COURSE DESCRIPTION:

This course is designed to teach entry level skills in clutches, manual transmission, manual transaxles, drive axles and differentials. Topics include theory of operation, service and repair. Students enrolled in Dealer Specific programs (GM ASEP) will work with manufacturer supplied curriculum and vehicles. Both classroom lecture and laboratory will be provided.

SUGGESTED TEXT(S): Automotive Technology, 2nd e., Halderman

IMPLEMENTATION DATE: Spring Term, 1999

REVIEW OR MODIFICATION DATE: Fall Term, 2002 (20031)  
Fall Term 2005 (20061)  
Fall Term, 2008 (20091)

COURSE TOPICS	<u>CONTACT HOURS PER TOPIC</u>
I. Introduction	3
A. Tools	
B. Safety	
II. Clutches	10
A. Operation	
B. Clutch Service Safety Precautions	
C. Clutch Maintenance	
D. Clutch Problem Diagnosis	
E. Clutch Service	
III. Manual Transmissions and Transaxles	5
A. Transmission Versus Transaxle	
B. Transmission/Transaxle Design	
C. Synchronizers	
D. Gearshift Mechanisms	
E. Transmission Power Flow	
F. Five-Speed Overdrive	
G. Transaxle Power Flows	
H. Final Drive Gears and Overall Ratios	
IV. Five Speed Manual Transaxle	15
V. Manual Transmission	15
VI. Manual Transmission/Transaxle Service	5
A. Lubricant Check	
B. Diagnosing Problems	
C. Transmission/Transaxle Removal	
D. Cleaning and Inspection	
VII. Vibration Correction	7
VII. Drive Axles and Differentials	5
A. Front-Wheel-Drive (FWD) Axles	
B. Types of CV Joints	

## COURSE TOPICS (CONTINUED)

CONTACT HOURS  
PER TOPIC

C. CV Joint Service	
D. Operation of U-Joints	
E. Types of U-Joints	
F. Diagnosis of Drive Shaft and U-Joint Problems	
G. Differentials	
H. Limited Slip Differentials	
I. Axle Shafts	
J. Servicing the Differential	
K. Diagnosing Differential Noises	
IX. Rear Axle and Prop shaft	15
X. All Wheel Drive/Four Wheel Drive Systems	10
A. 4WD Versus AWD	
B. Four-Wheel-Drive System	
C. Locking/Unlocking Hubs	
D. Conventional 4WD Operating Modes	
E. 4WD Passenger Cars	
F. Servicing 4WD Vehicles	
G. All-Wheel-Drive Systems	

Total 90

PROGRAM TITLE: Automotive Service Management Technology

COURSE TITLE: Manual Transmission and Transaxles

CIP NUMBER: 0615.080300

LIST PERFORMANCE STANDARD ADDRESSED:

NUMBER(S): TITLES(S):

01.0 DEMONSTRATE AN UNDERSTANDING OF AUTOMOTIVE MECHANICS--The student will be able to:

- 01.22 Demonstrate an understanding of rear axle operation such as differential action; limited slip mechanisms; floating, non-floating and semi-floating.
- 01.23 Demonstrate an understanding of drive shaft operation, drive shaft construction and universal joint operation such as single joint, constant velocity, joint working angle, joint phasing, slip joint, spline output and spline drive shaft.
- 01.25 Demonstrate an understanding of clutch operation.
- 01.26 Demonstrate an understanding of clutch release mechanisms to include linkage and hydraulic.
- 01.27 Demonstrate an understanding of manual transmission operation such as torque multiplication, power flow, sliding gears, constant mesh gear, synchronizer action and shift mechanisms.

08.0 DEMONSTRATE PROFICIENCY IN SERVICING MANUAL DRIVE TRAINS AND AXLES—The student will be able to:

- 08.01 Diagnose drive line problems.
- 08.02 Diagnose and performance test manual transmission problems.
- 08.03 Inspect drive shafts, universal joints and center bearings.
- 08.04 Lubricate universal joints. (ASE)
- 08.05 Remove and replace transmission mounts. (ASE)
- 08.06 Remove and replace transmissions.
- 08.07 Adjust shift linkage. (ASE)
- 08.08 Adjust clutches. (ASE)
- 08.09 Remove and replace extension housing seals and bushings. (ASE)
- 08.10 Remove and replace clutches, release bearings, linkage and pilot bearings.
- 08.11 Rebuild or replace clutch master and slave cylinders. (ASE)
- 08.12 Remove and replace universal joints. (ASE)
- 08.13 Remove and replace speedometer gears and service speedometer cables.(ASE)
- 08.14 Remove and replace drive axle bearings and seals. (ASE)
- 08.15 Service and repair differentials. (ASE)
- 08.16 Remove and replace trans-axle assemblies.
- 08.17 Adjust trans-axle shifting controls.
- 08.18 Inspect, remove, replace and lubricate front drive axle flexible joints and boots.
- 08.19 Inspect, remove and replace constant-velocity universal joints.
- 08.20 Service manual transmissions to include overdrives. (ASE)
- 08.21 Overhaul trans-axle assemblies. (ASE)



**Florida State College  
At Jacksonville**

**Course Learning Outcomes & Assessment**

NOTE: Use either the Tab key or mouse click to move from field to field. The box will expand to accommodate your entry.

<i>Section 1</i> COURSE PREFIX AND NUMBER: <b><u>AER 1398</u></b>	SEMESTER CREDIT HOURS: <b><u>4.0</u></b>
COURSE TITLE: <b><u>Manual Transmissions and Transaxles</u></b>	

<i>Section 2</i> TYPE OF COURSE: (Click on the box to check all that apply)		
<input type="checkbox"/> AA Elective	<input checked="" type="checkbox"/> AS Required Professional Course	<input type="checkbox"/> College Prep
<input type="checkbox"/> AS Professional Elective	<input checked="" type="checkbox"/> AAS Required Professional Course	<input type="checkbox"/> Technical Certificate
<input type="checkbox"/> Other _____	<input type="checkbox"/> PSAV	<input type="checkbox"/>
Apprenticeship		
<input type="checkbox"/> General Education: (For General Education courses, you must also complete Section 3 and Section 7)		

<i>Section 3 (If applicable)</i> INDICATE BELOW THE DISCIPLINE AREA FOR GENERAL EDUCATION COURSES:		
<input type="checkbox"/> Communications	<input type="checkbox"/> Social & Behavioral Sciences	<input type="checkbox"/> Mathematics
<input type="checkbox"/> Natural Sciences	<input type="checkbox"/> Humanities	

<i>Section 4</i> INTELLECTUAL COMPETENCIES:					
<input checked="" type="checkbox"/> Reading	<input checked="" type="checkbox"/> Speaking	<input checked="" type="checkbox"/> Critical Analysis	<input type="checkbox"/> Quantitative Skills	<input type="checkbox"/> Scientific Method of Inquiry	
<input checked="" type="checkbox"/> Writing	<input checked="" type="checkbox"/> Listening	<input checked="" type="checkbox"/> Information Literacy	<input type="checkbox"/> Ethical Judgment	<input checked="" type="checkbox"/> Working Collaboratively	

	LEARNING OUTCOMES	METHOD OF ASSESSMENT
•	<u>DEMONSTRATE AN UNDERSTANDING OF AUTOMOTIVE MECHANICS – see attached framework</u>	Written test, NATEF Authentic Task Observation (NATO)
•	<u>DEMONSTRATE PROFICIENCY IN SERVICING MANUAL DRIVE TRAINS AND AXLES – see attached framework</u>	Written test, NATEF Authentic Task Observation (NATO)
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<i>Section 6</i> Name of Person Completing This Form: <u>Paul Soar</u>		Date: <u>11/10/2007</u>
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