MARTIN COMMUNITY COLLEGE
COURSE SYLLABUS
Semester/Year: Spring 2011

COURSE NUMBER: AUT 221(01)

COURSE TITLE: **Auto Transm/Transxles**

CREDIT HOURS: 3

CONTACT HRS/WK: 5 (2 class, 3 lab)

PREREQUISITES: NONE

COREQUISITES: NONE

INSTRUCTOR: S. M. Denis

OFFICE NO: Building 3, Room 7

OFFICE/VIRTUAL HOURS: MF 3:00-3:50, TTH 2:00-2:50, F 11:00-2:50

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COURSE DESCRIPTION: This course covers operation, diagnosis, service, and repair of automatic transmissions/transaxles. Topics include hydraulic, pneumatic, mechanical, and electrical/electronic operation of automatic drive trains and the use of appropriate service tools and equipment. Upon completion, students should be able to explain operational theory, diagnose and repair automatic drive trains.

PROGRAM LEARNING OUTCOMES:

Upon successful program completion, the student shall be able to:

1. Inspect, diagnose, dissemble, repair, replace and service each of the major systems in various types of vehicles to a NATEF standard.
2. Perform tasks with accuracy, dependability, proficiency, and in a timely manner when servicing automotive systems
3. Discuss industry standards and employer/customer expectations for employees in the automotive industry workplace

COURSE LEARNING OUTCOMES:

Upon successful course completion, the student shall be able to:

1. Discuss the operation of automatic drive trains.
2. Select and use appropriate service tools and equipment.
3. Diagnose and repair automatic drive trains.

Other Outcomes:

II. **AUTOMATIC TRANSMISSION AND TRANSAXLE**

A. General Transmission and Transaxle Diagnosis

1. Identify and interpret transmission/transaxle concern; assure proper engine operation; determine necessary action. P-1

2. Research applicable vehicle and service information, such as transmission/transaxle system operation, vehicle service history, service precautions, and technical service bulletins. P-1

3. Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals). P-1

4. Diagnose fluid usage, level, and condition concerns; determine necessary action. P-1

5. Perform pressure tests; determine necessary action. P-1

6. Perform stall test; determine necessary action. P-2

7. Perform lock-up converter system tests; determine necessary action. P-1

8. Diagnose electronic, mechanical, hydraulic, vacuum control system concerns; determine necessary action. P-1

9. Diagnose noise and vibration concerns; determine necessary action. P-2

10. Diagnose transmission/transaxle gear reduction/multiplication concerns using driving, driven, and held member (power flow) principles. P-1

II. **AUTOMATIC TRANSMISSION AND TRANSAXLE**

B. Transmission and Transaxle Maintenance and Adjustment

1. Inspect, adjust or replace throttle valve (TV) linkages or cables; manual shift linkages or cables; transmission range sensor; check gear select indicator (as applicable). P-1

2. Service transmission; perform visual inspection; replace fluids and filters. P-1

II. **AUTOMATIC TRANSMISSION AND TRANSAXLE**

C. In-Vehicle Transmission and Transaxle Repair

1. Inspect, adjust or replace (as applicable) vacuum modulator; inspect and repair or replace lines and hoses. P-3

2. Inspect, repair, and replace governor assembly. P-3

3. Inspect and replace external seals and gaskets. P-2

4. Inspect extension housing, bushings and seals; perform necessary action. P-3

5. Inspect, leak test, flush, and replace cooler, lines, and fittings. P-2

6. Inspect and replace speedometer drive gear, driven gear, vehicle speed sensor (VSS), and retainers. P-2

7. Diagnose electronic transmission control systems using a scan tool; determine necessary action. P-1

8. Inspect, replace, and align powertrain mounts. P-2

II. **AUTOMATIC TRANSMISSION AND TRANSAXLE**

D. Off-Vehicle Transmission and Transaxle Repair

1. Removal, Disassembly, and Reinstallation

1. Remove and reinstall transmission and torque converter (rear-wheel drive). P-2

2. Remove and reinstall transaxle and torque converter assembly. P-1

3. Disassemble, clean, and inspect transmission/transaxle. P-1

4. Inspect, measure, clean, and replace valve body (includes surfaces and bores, springs, valves, sleeves, retainers, brackets, check-balls, screens, spacers, and gaskets). P-2

5. Inspect servo bore, piston, seals, pin, spring, and retainers; determine necessary action. P-3

6. Inspect accumulator bore, piston, seals, spring, and retainer; determine necessary action. P-3

7. Assemble transmission/transaxle. P-1

2. Oil Pump and Converter

1. Inspect converter flex plate, attaching parts, pilot, pump drive, and seal areas. P-2

2. Measure torque converter endplay and check for interference; check stator clutch. P-2

3. Inspect, measure, and reseal oil pump assembly and components. P-1

3. Gear Train, Shafts, Bushings and Case

1. Measure endplay or preload; determine necessary action. P-1

2. Inspect, measure, and replace thrust washers and bearings. P-2

3. Inspect oil delivery seal rings, ring grooves, and sealing surface areas. P-2

4. Inspect bushings; determine necessary action. P-2

5. Inspect and measure planetary gear assembly (includes sun, ring gear, thrust washers, planetary gears, and carrier assembly); determine necessary action. P-2

6. Inspect case bores, passages, bushings, vents, and mating surfaces; determine necessary action. P-2

7. Inspect transaxle drive, link chains, sprockets, gears, bearings, and bushings; perform necessary action. P-2

8. Inspect, measure, repair, adjust or replace transaxle final drive components. P-2

9. Inspect and reinstall parking pawl, shaft, spring, and retainer; determine necessary action. P-3

4. Friction and Reaction Units

1. Inspect clutch drum, piston, check-balls, springs, retainers, seals, and friction and pressure plates; determine necessary action. P-2

2. Measure clutch pack clearance; determine necessary action. P-1

3. Air test operation of clutch and servo assemblies. P-1

4. Inspect roller and sprag clutch, races, rollers, sprags, springs, cages, and retainers; replace as needed. P-1

5. Inspect bands and drums; determine necessary action. P-2

REQUIRED TEXTBOOKS
Text: Gilles. (2008) Automotive service : Inspection maintenance repair. (3rd ed.) Clifton Park: Thompson Delmar. ISBN: 1-4180-3758-3.
Worktext: Hadfield. (2008) Automotive job sheets for NATEF task mastery. (1st ed.) Clifton Park: Thompson Delmar. ISBN: 1-4180-7302-1

SUPPLEMENTAL RESOURCES:
Required Supplies: Approved Safety Glasses
NOTE: SAFETY GLASSES ARE REQUIRED TO BE WORN AT ALL TIMES WHILE IN THE SHOP AREA AND IN THE OUTSIDE WORK AREA
Basic Tool Set (See Attached)
Reference Materials: Information on Shop-Key, Internet, video/DVD information from manufactures

LEARNING/TEACHING METHODS
Lecture, video tapes/DVD's, textbooks and various manufacturers' specifications and repair manuals, **outside reading assignments,** hands-on lab

ASSESMENTS/METHODS OF EVALUATION:
Grading will be based on a minimum of four (4) tests, a final exam and lab work and outside reading assignment.

Classroom	**20%**
Shop	**20%**
Tests	**20%**
Outside Reading Assignments	**15%**
Final Exam	**25%**

(Determined by quality of work done, quantity of work and dependability in completing job tasks.)

A=90-100 B=80-89 C=70-79 D=60-69 F=59 and below

COURSE OUTLINE:

Week 1. **Hydraulics CHAPTER 73**
Week 2. **Fluid Couplings CHAPTER 73**
Week 3. **Torque Converters CHAPTER 73**
Week 4. **Transmission Pumps CHAPTER 73**
Week 5. **Planetary Gears CHAPTER 73**
Week 6. **Automatic Transmission Service CHAPTER 74**
Week 7. **Bands CHAPTER 74**
Week 8. **Automatic Transmission Valves CHAPTER 74**
Week 9. **Automatic Transmission Switches CHAPTER 74**
Week 10. **Power Flows CHAPTER 74**
Week 11. **In-The-Car Adjustments CHAPTER 74**
Week 12. **Pressure Checks CHAPTER 74**
Week 13. **Transaxles CHAPTER 74**
Week 14. **Lubricants CHAPTER 74**
Week 15. **Use of Manuals and Safety Solvents CHAPTER 10**
Week 16. **Review and Clean up**

STUDENT ATTENDANCE POLICY:
Martin Community College recognizes that academic success is tied to regular attendance and completion of assigned work and tasks in a timely manner. Students are expected to attend a minimum of 80 percent of the total hours in this course, which includes classes, labs. Students must be present in at least one class during the first ten percent (10%) of a course in order to be considered enrolled in the class. If a student has not attended at least one class by the ten percent census date, the instructor will administratively withdraw the student.

Students who miss more than six contiguous contact hours or fail to attend the required percentage of total hours without a justifiable absence and verifiable contact with the instructor may be administratively withdrawn from the class and given a grade of "WF." The "WF" will be equivalent to an "F" when calculated into the student's GPA. An absence MAY, the instructor's sole discression, be considered justifiable if proper, verifiable documentation of medical emergency is supplied. Verifiable contact will consist exclusively of a email to the instructor with an instructor reply and/or a registered/return-receipt letter to the instructor. Students may remove a "WF" by submitting appropriate paperwork for an official withdrawal by the last day to officially withdraw without receiving an "F." The last day to officially withdraw without receiving an "F" is published in the academic calendar for each academic year.

Make-up work will be allowed only with written prior approval of the instructor.

Habitual tardiness and/or early departure in a course will be considered in computing class attendance. A student will be considered tardy if they are not in their seat and prepared for work at the published class starting time. Students will be considered absent if not present when the roll is taken. Students may enter the classroom after the after the published class starting time if they can do so without disruption. It is the student's responsibility at the end of class or first break to make the instructor aware of their presence and arrival time. Students failing to do this will be considered absent for the entire class period. Early departure will be considered any time the student is absent from class for more than 5 minutes per class hour without direct

instructor permission. Students departing more than 5 minutes before the published class ending time without prior instructor approval will be considered absent for the entire class period.

Students will be counted absent from the date they register for each course.

Note: Under DVA regulations, the enrollment of veterans or dependents will be terminated or adjusted if they are administratively withdrawn or if they officially withdraw.

If an instructor fails to report for a class within 15 minutes of the scheduled beginning time and has not left instructions, those students present should sign a sheet before leaving and designate a student to submit it to the Dean of Academic Affairs and Student Services

REQUEST FOR EXCUSED ABSENCES FOR RELIGIOUS OBSERVANCES*

***In compliance with G.S. 115D-5, MCC policy permits a student to be excused, with the opportunity to make-up any test or other missed work, a minimum of two excused absences per academic year for religious observances required by the student's faith. The policy limits the excused absences to a maximum of two days per academic year.**

Students who wish to be excused for a Religious Observance required by their faith must complete and submit a request form to the instructor(s) prior to the census date of each class. The ***Request for Excused Absences for Religious Observances*** form can be picked up from Student Services. This does not supersede the college-wide attendance policy as outlined in the college catalog or syllabus, with the exception of a reasonable accommodation for the make-up of missed course work.

COURSE POLICIES:

All persons will have and wear safety glasses at all times in shop or lab areas. Failure to adhere to safety glasses rules will result in removal from the lab area and may result in disciplinary action.

The shop area is defined as Rm 10A, 10B, 10C and the area the area enclosed by the chain link fence outside the lab bay doors of building 3

Students are permitted, when entering the lab, to do so, at their own risk, without glasses if they are going directly to their tool box/work station to retrieve their glasses. "Passing though" to classrooms or hallways by employing the lab area while not wearing safety glasses is not allowed. This includes entry to the lab/class area from the parking area via the fence gate.

1. Eating /Drinking not allowed in classroom or Laboratory.
2. Work-style pants are recommended or proper fitting jeans that meet the following requirements (length above the shoes, jeans above the hip with belt/suspenders). No oversized pants/jeans will be permitted. **Shorts are not allowed**. Labcoats/Aprons are highly recommended to prevent damage to regular clothing.
3. We suggest that you refrain from wearing necklaces, rings, or bracelets of any kind as these items may pose a safety hazard. Likewise, facial jewelry can compound injury and wearing of same is discouraged in the lab
4. All belts will be of the type that does not have an exposed buckle. No keys, chains or wallets hanging out of pockets.

5. Hats are permitted in the shop area only! If a hat has a brim, it must be worn with it facing forward.

6. Students must wear leather or composite work boots or shoes. We highly recommend those with steel toes, oil resistant soles. No open toed shoes are permitted.

7. Other appearance issues not directly covered by these rules will be considered on a case-by-case basis. MCC staff will decide what is safe and professional in appearance and what is not.

Any Student Not Following These Guidelines Will Be Dismissed From Class and Attendance Credit for That Day Will Not Be Given. No Excuses Will Be Considered.

Students must have their tools required for class available to them at class time.

No Tools, No Lab Credit.

If you cannot reach your instructor, you may contact Dr. Phyllis Broughton, Dean of Academic Affairs and Student Services at (252)789-0246 or (252)789-0247 by phone, pbroughton@martincc.edu by e-mail, or in person at her office in Building 2, Room 33.

To access the Martin Community College Career Catalog for policies and curriculum requirements, please go online to www.martincc.edu.

If you have a need for a disability-related accommodation, please notify the Student Services counselor at (252) 789-0293.

Revised: 9 January 2011

Recommended Minimum Tool List

MARTIN COMMUNITY COLLEGE
AUTOMOTIVE SYSTEMS TECHNOLOGY

DISCRIPTION	"SUCH AS"
Tool Chest, 8 Drawer	Sears 9-65248
½" Drive Torque Wrench 20-150 lb/ft	Sears 9-44595
Telescoping Inspection Mirror	Sears 9-40931
Brake Retainer Spring tool	Sears 9-47761
Magnetic Pick-up tool	Sears 9-0413
12 volt test light	KD Tools #126
Flashlight, 2 AA, Focusable beam	Mag Instruments "Mini-mag"
10" Mill Bastard file	Sears 9-31257
File handle	
16 oz Ball Peen hammer	Sears 9-38465
16 oz Rubber Mallet	Sears 9-45787
Scratch Awl	Sears 941028
1 inch Gasket Scraper	Sears 9-43292
12 in. square frame hacksaw	Klein 701-S
2, 12 in 24TPI hacksaw blades	Sears 9-36046
2, 12 in 32 TPI hacksaw blades	Sears 9-36049
25 in Pry Bar	Sears 9-43277
TORX™ Screwdrivers T10,T15,T20,T27,T30	Sears 9-4140
Screwdriver, Slotted 1/8 x 4	Sears 9-41589
Screwdriver, Slotted 3/16/ x 4	Sears 9-41581
Screwdriver, Slotted ¼ x 4	Sears 9-41583
Screwdriver, Slotted ¼ x 6	Sears 9-41584
Screwdriver, Slotted 3/16 x 8	Sears 9-41248
Screwdriver, Slotted 3/8 x 8	Sears 9- 41852
Screwdriver, Phillips #1 x3	Sears 9-41294
Screwdriver, Phillips #2 x 4	Sears 9-41295
Screwdriver, Phillips #1 x 1 ½	Sears 9-418.55
Screwdriver, Phillips #2 x 1.5	Sears 9-04118
Screwdriver, Phillips #2 x 8	Sears 9-41296
Screwdriver, Phillips # 3 x 6	Sears 9-41297
Wrench set, Combination, SAE ¼ in. to 15/16 in	Sears 9- 46893
Wrench set, Combination, METRIC 7mm to 17mm	Sears 9- 46894
Socket set, 3/8 Drive 6 pt. SAE 5/16-11/16	Sears 9-34437
Socket set, 3/8 Drive 6 pt. Metric 8-17 mm	Sears 9-34441
Socket set, 3/8 Drive 6 pt. SAE deep 5/16-11/16	Sears 9-34439
Socket set, 3/8 Drive 6 pt. Metric deep 8-17 mm	Sears 9-34443
Ratchet, 3/8 Drive	Sears 9-44808
Ratchet, ½ Drive	Sears 9-44809

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Extension, 3/8 Drive 3”	Sears 9-44264
Extension, 3/8 Drive 6”	Sears 9-44261
Extension, 3/8 Drive 10”	Sears 9-44262
Extension, ½ Drive 3”	Sears 9-44133
Extension, ½ Drive 6”	Sears 9-44131
Extension, ½ Drive 10”	Sears 9-44132
Flex Handle, 10 inch 3/8 Drive	Sears 9-44363
Flex Handle,18 inch, ½ Drive	Sears 9-44202
Spark Plug Socket 5/8	Sears 9-43324
Spark Plug Socket 13/16	Sears 9-43325
Universal Joint, 3/8 drive	Sears 9-4435
Universal Joint, ½ drive	Sears 9-4425
Pliers, Diagonal Side cutting	Sears 9-45075
Pliers, Long nose	Sears 9-45102
Pliers, Tongue and groove	Sears 9-45381
Pliers, Slip Joint	Sears 9-45378
Feeler Gauge set	Sears 9-40811
Steel Rule, 6 inch 1/64 graduation	
Brass Drift, 7 inch	
Center punch	Sears 9-42862
Flare Nut Wrench set SAE	Sears 9-44565
Flare Nut Wrench set Metric	Sears 9-44566
Adjustable wrench, 10in.	Sears 9-44604
Digital Volt-Ohm Meter (Fluke 88 preferred)	Sears 34-82139