MARTIN COMMUNITY COLLEGE
COURSE SYLLABUS
Semester/Year: Spring 2011

COURSE NUMBER: AUT 181-01

COURSE TITLE: Engine Performance I

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

PHONE NO: (252)789-0263

FAX: (252)792-0826

E-MAIL: sdenis@martincc.edu

COURSE DESCRIPTION:
This course covers the introduction, theory of operation, and basic diagnostic procedures required to restore engine performance to vehicles equipped with complex engine control systems. Topics include an overview of engine operation, ignitions components and systems, fuel delivery, injection components and systems and emission control devices. Upon completion, students should be able to describe operation of and diagnose/repair basic ignition, fuel ignition and emission related drivability problems using appropriate test equipment/service information

PROGRAM LEARNING OUTCOMES:
Upon successful program completion, the student shall be able to:
1. Inspect, diagnose, dissemble, repair, replace and service each of the basic systems in various types of vehicles to a NATEF (National Automotive Technician Education Foundation) standard.
2. Inspect, diagnose, dissemble, repair, replace and service each of the advanced systems in various types of vehicles to a NATEF (National Automotive Technician Education Foundation) standard.
3. Demonstrate knowledge and understanding of automotive systems to a level at, or above that required for ASE (National Institute for Automotive Service Excellence) certification in general automotive service.

COURSE LEARNING OUTCOMES:
Upon successful course completion, the student shall be able to:
1. Discuss complex engine control systems.
2. Explain theory of operation, and basic diagnostic procedures for engine performance systems.
3. Diagnose/repair basic ignition, fuel ignition and emission related drivability problems.

NATEF OBJECTIVES:
A. General Engine Diagnosis
1. Identify and interpret engine performance concern; determine necessary action. P-1
2. Research applicable vehicle and service information, such as engine management 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
7. Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action. P-1
8. Perform cylinder power balance test; determine necessary action. P-1
9. Perform cylinder compression tests; determine necessary action. P-1
11. Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns with an oscilloscope and/or engine diagnostic equipment; determine necessary action. P-1

VIII. ENGINE PERFORMANCE

B. Computerized Engine Controls Diagnosis and Repair

1. Retrieve and record stored OBD I diagnostic trouble codes; clear codes. P-2
2. Retrieve and record stored OBD II diagnostic trouble codes; clear codes. P-1
3. Diagnose the causes of emissions or driveability concerns resulting from malfunctions in the computerized engine control system with stored diagnostic trouble codes. P-1
4. Diagnose emissions or driveability concerns resulting from malfunctions in the computerized engine control system with no stored diagnostic trouble codes; determine necessary action. P-1
7 Obtain and interpret scan tool data. P-1
8. Access and use service information to perform step-by-step diagnosis. P-1

VIII. ENGINE PERFORMANCE

C. Ignition System Diagnosis and Repair

1. Diagnose ignition system related problems such as no-starting, hard starting, engine misfire, poor driveability, spark knock, power loss, poor mileage, and emissions concerns on vehicles with electronic ignition (distributorless) systems; determine necessary action. P-1
2. Diagnose ignition system related problems such as no-starting, hard starting, engine misfire, poor driveability, spark knock, power loss, poor mileage, and emissions concerns on vehicles with distributor ignition (DI) systems; determine necessary action. P-1
3. Inspect and test ignition primary circuit wiring and solid state components; perform necessary action. P-2
4. Inspect, test and service distributor. P-3
5. Inspect and test ignition system secondary circuit wiring and components; perform necessary action. P-2
6. Inspect and test ignition coil(s); perform necessary action. P-1
7. Check and adjust ignition system timing and timing advance/retard (where applicable). P-3
8. Inspect and test ignition system pick-up sensor or triggering devices; perform necessary action P-1

VIII. ENGINE PERFORMANCE

D. Fuel, Air Induction, and Exhaust Systems Diagnosis and Repair

1. Diagnose hot or cold no-starting, hard starting, poor driveability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems on vehicles with carburetor-type fuel systems; determine necessary action. P-3
2. Diagnose hot or cold no-starting, hard starting, poor driveability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems on vehicles with injection-type fuel systems; determine necessary action. P-1
3. Check fuel for contaminants and quality; determine necessary action. P-3
4. Inspect and test mechanical and electrical fuel pumps and pump control systems for pressure, regulation and volume; perform necessary action. P-1
5. Replace fuel filters. P-1
6. Inspect and test cold enrichment system and components; perform necessary action. P-3
7. Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air. P-2
8. Inspect and test fuel injectors. P-2
9. Check idle speed and fuel mixture. P-2
10. Adjust idle speed and fuel mixture. P-3
11. Inspect the integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shield(s); perform necessary action. P-2

VIII. ENGINE PERFORMANCE

E. Emissions Control Systems Diagnosis and Repair
1. Positive Crankcase Ventilation
1. Diagnose oil leaks, emissions, and driveability problems resulting from malfunctions in the positive crankcase ventilation (PCV) system; determine necessary action. P-2
2. Inspect, test and service positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action. P-2

2. Exhaust Gas Recirculation
1. Diagnose emissions and driveability problems caused by malfunctions in the exhaust gas recirculation (EGR) system; determine necessary action. P-1

3. Exhaust Gas Treatment
4. Inspect and test catalytic converter performance. P-1

4. Intake Air Temperature Controls
1. Diagnose emissions and driveability problems resulting from malfunctions in the intake air temperature control system; determine necessary action. P-3
2. Inspect and test components of intake air temperature control system; perform necessary action. P-3

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%**

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

COURSE OUTLINE:
Week 1: Basic Ignition Systems Chap37
Week 2: Primary Circuits Chap37
Week 3: Secondary Circuits Chap37
Week 4: Electronic Ignition Chap37
Week 5: Ignition timing Chap37
Week 6: Distributorless Ignition Chap37
Week 7: Spark plugs Chap38
Week 8: Ignition System service Chap38
Week 9: Oscilloscopes Chap38
Week 10: Oscilloscope tests Chap38
Week 11: Diagnostic instruments Chap38
Week 12: Fuel System fundamentals Chap 40
Week 13: Carburetion/Electronic Carburetors Chap 40
Week 14: Fuel Injection Fundamentals Chap 40
Week 15: Self Diagnostics Chap 40
Week 16: Review and Lab 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 discretion, 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.
Rev. 9 Jan 2011

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.

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 1/2	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 1/4 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, 1/2 Drive	Sears 9-44809
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, 1/2 Drive 3”	Sears 9-44133
Extension, 1/2 Drive 6”	Sears 9-44131
Extension, 1/2 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 w/ Min-Max feature (Fluke 88 preferred)	Sears 34-82139