AUMT 1305: Introduction to Automotive Technology

SEMESTER HOURS:
3

TEXTBOOK
Automotive Technology
A systems Approach

COURSE DESCRIPTION:
An introduction to the automotive industry including automotive history, safety practices, shop equipment and tools, vehicle subsystems, service publications, fasteners, professional responsibilities, and automotive maintenance.

COURSE LEARNING OUTCOMES:
Utilizing appropriate safety procedures, the student will demonstrate familiarity with historical development and career information on the automotive industry; demonstrate safe, professional, and responsible work practices; identify and demonstrate the proper use of shop equipment and tools; identify and describe functions of vehicle subsystems; demonstrate the use of service publications; identify various automotive fasteners used in industry; and perform automotive maintenance.

PERFORMANCE OBJECTIVES:
By the end of the course, the student will develop entry level skills and knowledge necessary to perform the following tasks.

1. Demonstrate knowledge of correct safety procedures in the automotive lab in accordance with shop safety and dress code standards.

2. Demonstrate knowledge of proper procedures involving the operation and the cleaning of the Automotive Lab to the standards of the Instructor and the Industrial Division.

3. Acquire acceptable work skills and attitudes according to Industrial Division standards which will increase the students chances of securing gainful employment in the Automotive industry.

4. Identify all hand and power tools used by craftsmen of the field that are needed to properly perform automobile repairs.

5. Identify and accurately implement automotive nomenclature and trade terms.
that are used by automotive manufacturers and craftsmen in the field.

6. Accurately measure tolerances to compare with manufacturer's recommended specifications using various measuring devices.

7. Display the ability to distinguish and implement the various types of automotive fasteners with respect to size, type, grade, and application using shop manual procedures and manufacturer's specifications.

8. Be aware of the different job opportunities available within the automobile repair industry on the local, state, and national level.

9. Properly road test an automobile according to the standards set forth by the instructor.

COURSE OUTLINE:

The Auto Industry
I. The technology Boom
   A. On-Board Diagnostics
   B. I/M (Inspection/Maintenance)
   C. The Need for Quality Service
      1. Diagnostic Skills
   D. The Need for On-Going Service
      1. Preventive maintenance (PM)
      2. Warranties
      3. Increased vehicle age
      4. Residual value
      5. Emissions and fuel requirements
   E. Career Opportunities
      1. Dealerships
      2. Independent service shops
      3. Franchise repair shops
      4. Store-associated shops
      5. Fleet service and maintenance

II. Job classifications
    A. Service Technician
    B. Shop Foreman
    C. Service Advisor
    D. Service Manager
    E. Parts Counterperson
    F. Parts Manager

III. Related Career Opportunities
    A. Parts Distribution
B. Marketing and sales
C. Other opportunities

IV. Working as an automotive technician
A. Compensation
   1. Hourly
   2. Flatrate
B. Employer-Employee Relationships
C. Employer Obligations
   1. Instruction and supervision
   2. Clean and safe place to work
   3. Wages
   4. Fringe Benefits
   5. Opportunity and fair treatment
D. Employee Obligations
   1. Regular attendance
   2. Follow directions
   3. Responsibility
   4. Loyalty
   5. “Getting along”
   6. Customer relations

V. Training for a Career in Automotive Service
A. Schools
B. Secondary
C. Post-Secondary
D. Vocational Schools
E. Technical and Community Colleges
F. Manufacturer-School Programs
G. Life Long Learning

VI. ASE Certification
A. Certification Areas for Automotive Technicians
   1. Engine Repair
   2. Automatic Transmissions/Transaxles
   3. Manual Transmissions/Transaxles
   4. Suspension and Steering
   5. Brakes
   6. Electrical Systems
   7. Heating and Air Conditioning
   8. Engine performance
B. Requirements for Certification
   1. Two year work experience or one year in an approved program and one year work.
   2. Basic technical knowledge
   3. Repair knowledge and skill
   4. Testing and diagnostic knowledge and skill

VII. Service Technician Society
A. SAE-Based Information
B. Students Can Enroll

Working Safely
I. Personal safety
   A. Eye Protection
   B. Eye Flushing
   C. Clothing
   D. Hair and Jewelry
   E. Shoes
   F. Gloves
   G. Ear Protection
   H. Respiratory Protection
   I. Lifting and Carrying
   J. Professional Behavior

II. Tool and Equipment Safety
   A. Hand Tool Safety
   B. Power Tool Safety
   C. Electrical Tool Safety
   D. Compressed Air Equipment or Pneumatic Tool Safety
   E. Lift Safety
   F. Jack and Jack Stand Safety
   G. Chain Hoists and Crane Safety
   H. Cleaning Equipment Safety
      1. Chemical cleaning
      2. Thermal cleaning
      3. Abrasive cleaning
   I. Vehicle Operation

III. Work Area Safety
   A. Flammables
   B. Volatile Liquids
   C. Fire Extinguishers (PASS)
      1. Pull the pin
      2. Aim the nozzle at the base of the fire
      3. Squeeze the handle
      4. Sweep the entire width of the fire

IV. Manufacturer's Warnings and Government Regulations
   A. Chemical Hazards
   B. Hazardous Waste
   C. Physical Hazards
   D. Ergonomic Hazards

V. OSHA
   A. Right-To-Know Law
      1. Material Safety Data Sheets MSDS
VI. Guidelines for Handling Shop Wastes
   A. Oil
   B. Oil Filters
   C. Batteries
   D. Metal Residue from Machining
   E. Refrigerants
   F. Solvents
   G. Containers
   H. Other Solids
      I. Liquid Recycling
   J. Shop Towels/Rags
   K. Hiring a Hauler
   L. Waste Storage

VII. Asbestos

(Automotive systems
I. Modern Power Plants

III. Design evolution
   A. Unitized Construction or Unibody
   B. Body-Over-Frame Construction

III. Body Shapes
   A. Sedan
   B. Convertibles
   C. Liftback or Hatchback
   D. Station Wagon
   E. Pickups
   F. Vans
   G. Sport Utility Vehicles (SUVs)
   H. Aerodynamics
      1. Vehicle form
      2. Air drag reduction
      3. Air dams
      4. Spoilers
      5. Wings

IV. The Electronic Revolution
   A. Computers
   B. Engines
   C. Miller-Stroke
   D. Stirling engine
   E. Hydrogen Fuel Cell
   F. Hybrid
   H. Solar and/or Battery
V. The Basic Engine
   A. Cylinder Block
   B. Cylinder Head
      1. Combustion chamber
      2. Ports
   C. Piston
   D. Connecting Rods and Crankshaft
   E. Valve Train
   F. Manifolds
      1. Intake manifold
      2. Exhaust manifold

VI. Engine Systems
   A. Lubrication System
      1. Oil pan
      2. Oil pump
   B. Cooling System
      1. Water Pump
      2. Water Jackets
      3. Radiator
      4. Pressure Cap
      5. Thermostat
   C. Fuel and Air Systems
      1. Stores the fuel for later use
      2. Collects and cleans the outside air
      3. Delivers fuel
      4. Regulates the fuel/air ratio
   D. Emission Control System
      1. Hydrocarbons (HC)
      2. Carbon monoxide (CO)
      3. Oxides of nitrogen (Nox)
      4. Positive crankcase ventilation (PCV)
      5. Evaporative emission control
      6. Exhaust gas re-circulation (EGR)
      7. Catalytic converter
      8. Air injection
   E. Exhaust System
      1. Exhaust manifold and gasket
      2. Exhaust pipe, seal, and connector pipe
      3. Intermediate pipes
      4. Catalytic converter(s)
      5. Muffler
      6. Resonator
      7. Tailpipe
      8. Heat shields
      9. Clamps, gaskets, and hangers
   F. Electrical and Electronic Systems
      1. Ignition system
a. Crankshaft position sensor  
b. Distributor  
c. Spark plug  
2. Starting and charging systems  
a. Solenoid  
b. Starter motor  
c. AC generator  
G. Electronic Engine Controls  
1. Input sensors  
2. Microprocessor  
3. Output devises  

VII. Drivetrain  
A. Clutch  
B. Manual Transmission  
C. Automatic Transmission  
D. Driveline  
E. Differential  
F. Driving Axles  
G. Transaxle  
H. Four-Wheel-  

VIII. Running Gear  
A. Suspension System  
1. Springs  
2. Torsion Bars  
3. Shock Absorbers  
B. Steering System  
1. Rack-and-Pinion  
2. Recirculating Ball  
3. Steering Gears  
C. Brakes  
1. Master Cylinder  
2. Disc Brakes  
3. Drum Brakes  
4. Brake Booster  
5. Antilock Brake System (ABS)  
D. Wheels and Tires  

IX. Preventive Maintenance  
A. Typical PM Services  
1. Engine oil  
2. Cooling system  
3. Drive belts and battery  
4. Transmission fluid  
5. Power steering fluid  
6. Brake fluid  
7. Windshield washer fluid  
8. Windshield wipers
9. Tires
B. Additional PM Checks

(Shop Tools)
I. Measuring systems
   A. Linear Measurement
   B. Square Measurements
   C. Volume Measurements
   D. Weight Measurements
   E. Temperature Measurements
   F. Pressure Measurements
   G. Torque Measurements

II. Fasteners
   A. Bolts
   B. Cap Screws
   C. Studs
   D. Nuts
   E. Setscrews
   F. Bolt Identification
      1. Bolt diameter
      2. Bolt shank
      3. Thread pitch
      4. Grade marks
   G. Tightening Bolts
   H. Washers

III. Measuring Tools
   A. Machinists Rule
   B. Vernier Caliper
   C. Dial Caliper
   D. Micrometers
   E. Reading a Micrometer
   F. Using an Outside Micrometer
   G. Reading an Inside Micrometer
   H. Reading a Depth Gauge
   I. Telescoping Gauge
   J. Small Hole Gauge
   K. Feeler Gauge
   L. Screw Pitch Gauge
   M. Dial Indicator
   N. Torque Indicating Wrench
      1. Beam type
      2. “Click” type
      3. Dial indicator type

IV. Hand Tools
A. Wrenches
   1. Open-end
   2. Box-end
   3. Combination
   4. Socket
   5. Allen
B. Screwdrivers
   1. Standard
   2. Phillips
   3. Pozidrive
   4. Torx
   5. Clutch Driver
   6. Scrulox
C. Pliers
   1. Combination
   2. Adjustable
   3. Needle Nose
   4. Locking
   5. Diagonal Cutting
   6. Snap or Lock Ring
   7. Retaining Ring
D. Hammers
E. Taps and Dies
F. Chisels and Punches
G. Removers
   1. Extractors
H. Hacksaws
I. Files
J. Tubing Tools
K. Gear and Bearing Pullers

V. Power Tools
   A. Impact Wrenches
   B. Air Ratchet
   C. Air Drill
   D. Air Chisel or Hammer
   E. Blowgun
   F. Bench Grinder
   G. Trouble Light
   H. Presses

VI. Service Manuals
   A. Auto Manufacturer's Manuals
   B. Aftermarket Supplier's Guides and Catalogs
   C. General and Specialty Repair manuals
   D. Flat Rate Manuals
   E. Computer Based Information
   F. Hotline Services
TEACHING METHODS:
1. Lecture
2. Discussion
3. Audio Visual Aids
4. Hand Outs
5. Hands On (Lab)

EVALUATION METHODS:
1. Written Exams
2. Classroom Participation
3. Lab Work
4. Safety Practices

GRADING PROCEDURES:
1. Classroom (Test and Participation) 20%
2. Lab Project Completion and Safety 50%
3. Final Exam 30%

ATTENDANCE POLICY:
Fall and Spring Semesters: One letter grade will be lost for each two absences.
Summer Semester: One letter grade will be lost for each absence.

REFERENCE MATERIAL:
1. Automotive Technology
2. College Library
3. Shop Publications
4. LAC (Learning Assistance Center)
5. Equipment operating manuals
6. Manufactures' Service Manuals