COURSE OUTLINE

Course Number	Course Title	Credits
AUT 112	**Automotive Fuel Systems**	**3**
Hours: Lecture/Lab/Other	**Co- or Pre-requisite**	**Implementation Semester & Year**
2/3	**AUT 110 and AUT 111**	**Spring 2022**

Catalog description:

An examination of gasoline and diesel automotive fuel systems. Lessons include fuel basics, electronic fuel injection systems, gasoline direct injection, diesel fuel delivery systems, and On-Board Diagnostics II (OBD II). Lessons focus on theory of operation, driveability diagnostic procedures, and the use of diagnostic equipment.

General Education Category:
Not GenEd

Course coordinator:
Jason Evans, 609-570-3776, evansj@mccc.edu

Required texts & Other materials: Halderman, James D., Automotive Fuel and Emissions Control Systems, Edition 4. Pearson Education Publishing, 2016
ISBN-13: 9780133799491

Access to a personal laptop computer, tablet, or Chromebook is strongly recommended during class and lab.

Students must purchase safety glasses, work boots, and appropriate clothing to work in the automotive lab. This requirement is reviewed with the students on the first day of class. These items are not needed for the first class meeting of the term.

The following is provided at no charge to the students:
Vehicle service information provided though Stellantis, Subaru of America, Audi of America, or ALLDATA.

Accreditation Statement:
The Automotive Technology, Mopar CAP, Program is Master Automotive Service Technology (MAST) accredited by Automotive Service Excellence Education Foundation.
https://www.aseeducationfoundation.org/

Course Student Learning Outcomes (SLO):

Upon successful completion of this course, the student will be able to:

1. Demonstrate and understanding of the characteristics, use, and production of conventional and alternative petroleum-based fuel sources and systems used in current passenger vehicle. [Supports ILG # 1, 10 ; PLO # 3, 4]
2. Recognize the personal and environmental hazards associated with malfunctioning fuel and emissions systems, and with the testing and repair processes for those systems. [Supports ILG # 1, 4, 9, 10, 11 ; PLO # 1, 2, 3, 4]
3. Demonstrate an understanding of the proper use of diagnostic tools and equipment by successfully testing vehicle systems and components for proper operation and failure. [Supports ILG # 4, 10, 11 ; PLO # 1, 3]
4. Demonstrate an understanding of the OBD II fuel and emissions management systems used on current vehicles by answering questions on tests, quizs, and during lab activities. [Supports ILG # 1, 4, 10, 11; PLO # 1, 3, 4]
5. Apply his or her knowledge of automotive fuel systems to diagnose the root cause of a fuel or emissions system concern. [Supports ILG # 3, 4, 10, 11 ; PLO # 1, 3]

Course-specific Institutional Learning Goals (ILG):

Institutional Learning Goal 1. Written and Oral Communication in English. Students will communicate effectively in both speech and writing.
Institutional Learning Goal 3. Science. Students will use the scientific method of inquiry, through the acquisition of scientific knowledge.
Institutional Learning Goal 4. Technology. Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.
Institutional Learning Goal 9. Ethical Reasoning and Action. Students will understand ethical frameworks, issues, and situations.
Institutional Learning Goal 10. Information Literacy: Students will recognize when information is needed and have the knowledge and skills to locate, evaluate, and effectively use information for college level work.
Institutional Learning Goal 11. Critical Thinking: Students will use critical thinking skills understand, analyze, or apply information or solve problems.

Program Learning Outcomes for Automotive Technology (PLO)

1. Diagnose, service, and repair current automotive technologies.
2. Demonstrate desirable attitudes and work habits while working individually or with others.
3. Obtain service repair information and procedures from online websites and electronic databases.
4. Communicate effectively and professionally with customers and fellow technicians.

Units of study in detail – Unit Student Learning Outcomes:

Unit I **Types of Fuels and Fuel Production [Supports Course SLO # 1, 4]**

Learning Objectives

The student will be able to:

- Describe the production process of conventional and alternative fuels
- Recite the terminology related to different motor fuel types
- Identify vehicle driveability concerns related to fuel quality and contamination
- Describe characteristics of motor fuels by successfully answering questions on tests, quizzes, and student lab activities

Unit II **The Basic Operation of the Gasoline Engine Fuel System [Supports Course SLOs # 2, 4]**

Learning Objectives

The student will be able to:

- Demonstrate his/her understanding of the types of fuel systems used on current gasoline engine vehicles by successfully answering questions on a test, quiz, or student activity sheet
- Identify the types of vehicle emissions, how they are produced and their effects on the environment, both verbally or written on a test
- Describe the advantages of using a computer controlled fuel management system, both verbally or written on a test

Unit III **Gasoline Fuel System Management: Speed Density (MAP) and Mass Air Flow (MAP) [Supports Course SLO # 1, 3, 4, 5]**

Learning Objectives

The student will be able to:

- Identify and describe the different types of electronic gasoline fuel management systems used on modern gasoline vehicles, both verbally or written on a test
- Describe the flow and function of the gasoline fuel delivery system components by successfully answering questions on a test
- Appraise the gasoline fuel management system for proper mechanical and electronic operation, using one of the program vehicles and proper special tools.
- Interpret the signals generated by the various input sensors, using a computerized diagnostic scan tool

Unit IV **The Basic Operation of the Diesel Fuel System [Supports Course SLO # 1, 3, 4, 5]**

Learning Objectives

The student will be able to:

- Explain the differences among diesel fuel delivery systems designs verbally and in written format
- Describe the operation of diesel fuel system components
- Interpret fuel delivery sensor inputs to the engine control module, using a computerized diagnostic scan tool
- Locate proper diagnostic routines to necessary to find electrical and mechanical malfunctions in diesel fuel systems
- Demonstrate proper service, maintenance, and repair procedures for diesel fuel systems in the automotive lab

Unit V **Diesel Fuel Systems Management: Mechanical and Electronic Control Systems [Supports Course SLO # 1, 3, 4, 5]**

Learning Objectives

The student will be able to:

- Identify and describe the different types of electronic diesel fuel management systems used on modern diesel passenger vehicles, both verbally or written on a test
- Describe the flow and function of the diesel fuel delivery system components by successfully answering questions on a test
- Apply his or her knowledge of diesel fuel systems test to evaluate a diesel fuel management systems for proper mechanical and electronic operation
- Interpret the signals generated by the various input sensors, using a computerized diagnostic scan tool

Unit VI **On-Board Diagnostics II (OBD II) [Supports Course SLO # 2, 3, 4, 5]**

Learning Objectives

The student will be able to:

- Demonstrate understanding of OBD II requirements as dictated by state and federal laws
- Explain the major differences and advantages of OBD II systems when compared to OBD I systems or primitive systems that do not use computer controls
- Analyze OBD II monitor status using a diagnostic scan tool
- Demonstrate a diagnostic strategy for a fuel systems related diagnostic trouble codes (DTCs), using a computerized diagnostic scan tool on an OBD II vehicle and related service information

Evaluation of student learning:

Students are evaluated using weekly quizzes, a mid-term exam, a final exam, graded homework assignments, and hands-on work assignments in the automotive laboratory. Students are expected to read the assigned textbook chapters, handouts, and complete vehicle manufacturers' training material (if applicable) outside of class and at appropriate times throughout the course.

Please note that:

- Any student who scores below a 60% (D) on the final exam must repeat the course
- AUT 112 is a prerequisite course to AUT 211. Therefore, a minimum course grade of 70% (C) is needed to pass AUT 112.
- Students enrolled in the any automotive program option sponsored by a vehicle manufacturer (Mopar CAP, Subaru University, or Audi AEP) must complete all vehicle manufacturer web courses, post-tests, and proctored assessments assigned at the start of the semester. The assigned web courses, post-test, and proctored assessments are in addition to the standard course assignments shown below. Due dates for each assigned web course, post-test, and proctored assessment is discussed in class, but all of them must be finished and passed before the beginning of the last week of the term.

Below is a list of the tools used for assessing student learning outcomes in this course. The percentages shown after each assessment tool refers to the weight each assessment has on a student's final course grade.

Exams 40%
Quizzes 20%
Hands-On Lab Assignments 30%
Homework 10%

Policy Statement for Missed Lab Demonstrations:

Due to the concerns for student and staff safety, a student who does not attend tool, equipment, and procedure demonstrations performed by the course instructor, prior to a hands-on learning activity, may be excluded from participating in the hands-on activity. This occurs because the tools, equipment, and chemicals necessary to complete automotive diagnosis and service often present safety hazards for users and observers if the correct handling procedures are not followed.

Reasons for not attending demonstrations may include full or partial absence during the demonstration, or if a student does not give his or her full attention during the demonstration. Enforcement of this classroom policy is at the discretion of the course instructor, and is based largely on the dangers involved with the use of the necessary tools, equipment, and chemicals required to complete the hands-on activity, and the time necessary to complete a make-up demonstration.