Engineering Program

Specialization	**Automotive Maintenance**
Course Number	2011113
Course Title	**Modern engines technology**
Credit Hours	**2**
Theoretical Hours	**2**
Practical Hours	**0**

Brief Course Description:
Modern engine specifications ,Air-Fuel ratio ,Electronic Fuel injection systems ,Electronic ignition systems ,Engine Management systems , Air induction systems ,Turbo charging system ,Emission control system.

Course Objectives:
Upon the completion of this course, the student will be able to:
1. Identify various types of electronic fuel injection systems, electronic ignition systems and their electrical circuits.
2. Identify various types of engine managements systems, air induction systems, turbo charging systems, emission control system and their electrical circuits.
3. Describe the purpose and operation of major components of modern engines.
4. Explain the operation of circuit diagrams for each system.

Detailed Course Outline:

Unit Number	Unit Title	Unit Content	Time Needed(hr)
1.	**Modern engines specifications**	▪ Engine torque and power ▪ Fuel consumption ▪ Atmospheric pollutants	**2**
2.	**Air fuel ratio (A/F)**	▪ Air fuel ratios (A/F) ▪ Results of combustion ▪ Air fuel mixing	**2**
3.	**Electronic fuel injection system (EFI)**	▪ Outline of (EFI) History of (EFI) What is (EFI)? Features of (EFI) Types of (EFI) systems Basic (EFI) construction (EFI) components ▪ Fuel system Fuel pumps and fuel pumps control Fuel tank and pipes Fuel filter Pressure regulating Pulsation damper Injectors and injectors drive methods Cold start injector Cold start injector timing switch ▪ Air induction system Air filter Throttle body Idle speed control valves (ISC) Throttle position sensor (TPS) Engine load sensors (MAP ,MAF , VAF) Intake air temperature sensor (IAT) ▪ Electronic control unit (ECU) Power circuitry Contrast voltage circuitry Ground circuitry (ECU) functions ▪ Engine sensors	**9**

		Coolant temperature Crankshaft position sensor Camshaft position sensor Knocking sensor Vehicle speed sensor ▪ Fuel injection system electric circuit diagram (symbols , color codes) ECU terminals Circuit diagram reading ▪ Examples of (EFI) systems	
4.	**Electronic ignition system**	▪ General ▪ Transistor assist contact breaker ignition system ▪ Breaker less ignition system types ▪ Distributor less ignition system ▪ Separate amplifier wasted type ignition system ▪ Separate amplifier direct ignition system ▪ Digital wasted ignition system types ▪ Digital direct ignition system types ▪ Electronic spark advancing ▪ Oscilloscope	**6**
5.	**Engine management**	▪ General ▪ Function of engine management system ▪ Types of engine management systems ▪ Motoronic system structure ▪ M- motornoic system ▪ ME- motornoic system ▪ MED- motornoic system	**4**
6.	**Air induction system**	▪ Variable valve timing ▪ Variable intake manifold geometry	**2**

7.	**Turbo charger system**	▪ Function of turbo charger ▪ Turbo charger operation and components ▪ Regulation of turbo charger pressure	**2**
8.	**Emission control system**	▪ Main automotive pollutant gases ▪ How to reduce pollutant gases? ▪ Exhaust gas recirculation system (EGR) ▪ Secondary air system ▪ Evaporation emission control system ▪ Lambda control system ▪ Positive crankcase ventilation system ▪ Catalytic converter ▪ Emission control system applications	**5**

Evaluation Strategies:

Exams		**Percentage**	**Date**
Exams	First Exam	20%	
	Second Exam	20%	
	Final Exam	50%	
Homework and Projects Discussions and lecture Presentations		10%	

Teaching Methodology:

- ❖ Lectures and presentations

Text Book

1. Otto-engine management, BOSCH, Automotive technology, forth edition.

References

1. Otto-engine management, BOSCH, Automotive technology, forth edition
2. TOYOTA training program, Toyota motor corporation.