



Engineering Program

Specialty	Common
Course Number	20210221
Course Title	Automotive Electricity and Electronics
Credit Hours	3
Theoretical Hours	3
Practical Hours	0



❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2009/2008



Brief Course Description:

- ❖ Introduction, battery, starting system, charging system, ignition system, electronic fuel injection system, lights, safety and signaling, driver information and control devises, wiring harnesses, instrument panel, (CANbus) technology for automotive application.

Course Objectives:

1. Explain electricity in terms of electrons.
2. Define voltage, current and resistance and explain how they are related.
3. Explain the basic operation of diodes and transistors.
4. Studying the battery and stating, charging, fuel injection, and electronics system.
5. Describe Ram. Rom and Prom and explain how the ECM controls engine operation.
6. Studying the sensors reporting to the ECM and can bus for automotive.



Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	Electricity and electronic control	<ul style="list-style-type: none"> ▪ Electricity and the engine ▪ Electricity and electric current ▪ Electrical charges ▪ Measuring electricity ▪ Ohm's law ▪ Introduction to electronics ▪ Semiconductors, diodes, transistor ▪ Electronic control module (ECM) ▪ Microprocessor, memory ▪ Electronic engine control 	
2.	Battery construction	<ul style="list-style-type: none"> ▪ Battery operation ▪ Chemicals in battery ▪ Connecting cells ▪ Battery rating ▪ Battery efficiency ▪ Variations in thermal voltage 	
3.	Starting system	<ul style="list-style-type: none"> ▪ Need for starting system ▪ Basic motor principles ▪ Starting motor construction and operation ▪ Starting motor drive ▪ Overrunning the overrunning clutch 	
4.	Charging system	<ul style="list-style-type: none"> ▪ Purpose of charging system ▪ Alternator operation ▪ Alternator principles ▪ Alternator regulator ▪ Alternator terminal ▪ Alternator cooling 	
5.	Ignition system contact point	<ul style="list-style-type: none"> ▪ Purpose of ignition system ▪ Components in contact point ignition system ▪ Producing the spark ▪ Contact point ▪ Primary resistance 	

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		<ul style="list-style-type: none"> ▪ Secondary voltage ▪ Advancing the spark ▪ Centrifugal advance ▪ Vacuum advance ▪ Spark plugs and heat range and reach ▪ Ignition switch 	
6.	Electronic ignition systems	<ul style="list-style-type: none"> ▪ Type of electronic systems ▪ Fundamental of electronic ignition ▪ Pickup-coil voltage pulse ▪ High-energy ignition system ▪ Electronic spark advance ▪ Hall-effect switch ▪ Optical photodiode distributor ▪ Fundamentals of distributor less ignition ▪ Multiple-coil distributor ignition ▪ Crankshaft-position sensor ▪ Camshaft-position sensor ▪ Direct multiple-coil ignition ▪ Direct capacitor discharge ignition 	
7.	Ignition system diagnosis	<ul style="list-style-type: none"> ▪ Ignition system trouble diagnosis ▪ Oscilloscope patterns ▪ Reading scope patterns ▪ Stored ignition-system trouble codes 	
8.	Lights, Safety, and signaling and driver information and control devices	<ul style="list-style-type: none"> ▪ Automotive lights ▪ Head lamps ▪ Light bulbs ▪ Head lamp switch ▪ Automotive head lamp controls ▪ Turn signal lights ▪ Computer controlled lighting ▪ Distributed lighting system ▪ Horn and horn relay ▪ Vehicle security systems ▪ Seat belts ▪ Air bags 	

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		<ul style="list-style-type: none"> ▪ Wind shield wiper and washers ▪ Instrument panel ▪ Speedometer and odometer ▪ Other electronic and electronic devices ▪ Multiplex system ▪ Data bus network 	
9.	Electronic fuel injection systems	<ul style="list-style-type: none"> ▪ Introduction to gasoline fuel-injection systems ▪ Comparing port and throttle-body injection ▪ Air fuel metering ▪ Operation of fuel injection systems ▪ Type of fuel injection ▪ Cold-start valve ▪ Throttle-position sensor ▪ Measuring in tank-air flow ▪ Indirect measurement of air flow ▪ Main fold absolute pressure ▪ Direct measurement of air flow ▪ Air temperature sensor ▪ Coolant-temperature sensor ▪ Oxygen sensor ▪ Engine speed sensor ▪ Purpose of actuators ▪ Idle air control valve ▪ Electronic air control valve ▪ Electronic port-injection timing 	
10.	Diesel fuel-injection systems	<ul style="list-style-type: none"> ▪ Diesel engine construction operation ▪ Diesel engine characteristics ▪ Diesel fuel ▪ Cetan number ▪ Cleaning diesel fuel ▪ Diesel fuel-injection pump ▪ Rotary-distributor injection pump ▪ Distributor –pump control ▪ Mechanical governors 	

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		<ul style="list-style-type: none">▪ Diesel electronic control system▪ Injection nozzle▪ Direct and indirect injection▪ Diesel starting procedures▪ Coolant and fuel heater▪ Vacuum pump	
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Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	20%	--/--/----
	Second Exam	20%	--/--/----
	Assignments	10%	--/--/----
	Final Exam	50%	--/--/----

Teaching Methodology:

- ❖ Lectures and presentations

Text Books & References:

Textbook:

1. Jack ERJAVEC, AUTOMOTIVE Technology A system Approach, Delmar. U.S.A – 2005.
2. John Remling , Automotive Electricity, John Wikly & sons, Inc., U.S.A. 1987.
3. William H. Crouce and Donald Anglin, Automotive Mechanics, Hill school publishing company, USA, 1993.



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