



Engineering Program

Specialization	Common
Course Number	20207131
Course Title	Internal Combustion Engines
Credit Hours	3
Theoretical Hours	3
Practical Hours	0



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

Brief Course Description:

- ❖ Definition and introduction to the (ICE) fundamentals of engine, operation engine types and classification, engine construction, engine measurements and performance, engine system (lubrication, cooling, fuel) Including both carburetor and electronic fuel injection system.

Course Objectives:

After studying this course student of Autotronics should be able to Know :

1. Studying types of engines.
2. Studying and operating of internal combustion engine.
3. Studying fuel used and system of engine.
4. Studying fuel in Gasoline and diesel engine.
5. The student should know about turbo charging and super charge and intercooler.



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

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	Introduction to internal combustion engines	<ul style="list-style-type: none"> ▪ Types of (ICE) ▪ System of (ICE) ▪ Important of (ICE) in different fields ▪ Differences between (ICE) and other engine types like steam engine, electrical vehicles 	
2.	Classification of (ICE) according to	<ul style="list-style-type: none"> ▪ Number and arrangement of cylinders ▪ Valve arrangement in cylinder head ▪ Type of cooling systems ▪ Type of fuel 	
3.	Engine operation	<ul style="list-style-type: none"> ▪ Four stroke operation for Gasoline and diesel engine ▪ Engine diagram between pressure and crankshaft angles for four stroke engine (Gasoline and diesel) ▪ Engine pressure volume diagram with the relation of rpm and piston displacement for Gasoline engine ▪ Engine pressure – volume diagram for all Gasoline engine 	
4.	Piston , cylinder construction	<ul style="list-style-type: none"> ▪ Engine cylinder block types and operation ▪ Piston types and operation ▪ Piston rings types and operation ▪ Cylinder head types and operation ▪ Combustion chamber types ▪ Connecting rods, types and operation ▪ Crankshaft types and operation ▪ Vibration dampers ▪ Intake and exhaust manifolds 	
5.	Valves and valves Trains	<ul style="list-style-type: none"> ▪ Cam and cam shaft and operation ▪ Mechanical and Hydraulic valves, construction parts and cooling ▪ Springs and oil seals for valves ▪ Valve seats and types ▪ Valve lifters and types ▪ Rocker Arms ▪ Valve timing and types ▪ Engine timing gears and types 	

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		<ul style="list-style-type: none"> ▪ Valve operation and engine timing operation 	
6.	Engine – performance measurements	<ul style="list-style-type: none"> ▪ Bore and stroke ▪ Piston displacement ▪ Top and bottom Dead centers ▪ Compression ratio (CR) and effects and increasing CR on engine operation ▪ Mean effective pressure ▪ Engine friction and indicated power out put ▪ Volumetric friction and indicated efficiency ▪ Power out put calculation ▪ Engine torque and relation with power out put and engines speed and diagrams ▪ Delivery of air-fuel mixture 	
7.	Automotive engine fuels	<ul style="list-style-type: none"> ▪ Gasoline , sources ,types and volatility ▪ Antiknock value in gasoline engine and facts effect knocking ▪ Octane No. rating, measuring, antiknock value during combustion and chemical control effectuating ▪ Types of abnormal combustion and normal combustion ▪ Diesel fuel, types, classification, volatility, and viscosity ▪ Cetane NO. and conditions effects its value ▪ Diesel fuel additives ▪ Diesel fuel combustion and conditions effect on it ▪ Detonation of diesel fuel and factors effect on it 	
8.	Gasoline engine fuel and Exhaust system	<ul style="list-style-type: none"> ▪ Purpose of fuel system ▪ Components of gasoline fuel system and operation (Tank, fuel pump, lines, carburetors , indicators and others) ▪ Components of Gasoline carburetor operation and types ▪ Carburetor cycles and systems ▪ Mechanical and electrical fuel pumps ▪ Conditions effect cerebration Fuel filters ▪ Crank case ventilation, and exhaust gas recalculation 	

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		<ul style="list-style-type: none"> ▪ Exhaust system, muffler and exhaust pipes ▪ Exhaust gases treatment and its effect on environment 	
9.	Diesel fuel – injection systems	<ul style="list-style-type: none"> ▪ Diesel fuel – injection systems requirements ▪ Types of fuel – injection systems ▪ Cam operated 1-line plunger pump, components and operation ▪ Rotary distributor pump, components and operation ▪ Governors, types (centrifugal weights, vacuum) ▪ Automatic advance system of injection ▪ Diesel fuel injection and different factors effected by ▪ Fuel injectors- types and classifications, components and operation ▪ Diesel engine combustion chambers, types and its effect on combustion 	
10.	Engine cooling system	<ul style="list-style-type: none"> ▪ Purpose of the cooling system ▪ Types of the cooling systems (water, air) ▪ Components of water cooling system, function of each part, and explain cooling circulation in the system ▪ Operation of air cooling system ▪ Radiators types and materials ▪ Antifreeze solution ▪ Temperature indicators 	
11.	Engine lubricating systems	<ul style="list-style-type: none"> ▪ Purpose of the lubricating system ▪ Types of lubricating systems ▪ Components of lubricating system, operation of each part ▪ Oil filters, types and purpose ▪ Oil indicators 	
12.	Wangle (rotary) engines , and turbo charge engines , and increase power engine systems	<ul style="list-style-type: none"> ▪ Wangle (rotary) engines, components and operation ▪ Turbo – charges components and operation ▪ Super charge components and operation ▪ Inter cooler components and operation 	

Evaluation Strategies:

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



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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Engineering Program

Specialization	Common
Course Number	20207132
Course Title	Internal composition Engines lab
Credit Hours	1
Theoretical Hours	0
Practical Hours	3



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

Brief Course Description:

- ❖ Performance tests for spark and compression engines, air and fuel consumption, air fuel ratio, brake and indicated horse power, specific fuel consumption, volumetric efficiency, energy balance, variable compression ratio, engine emission, diagnostic, adjustment of engine.

Course Objectives:

After practical this course you should be able to :

1. Studying and calculate engine measurement and performance.
2. Studying and calculate engine efficiency torque and horse power.
3. Studying and training compression, firing order, timing advance. Timing valves, wheel balance.



Detailed Course Description:

lab Number	lab Name	lab Content	Time Needed
1.	Introduction to internal combustion engine		1
2.	Specific fuel consumption		1
3.	Specific air consumption		1
4.	Richness of mixture and excesses air		1
5.	Volumetric efficiency Heat balance		1
6.	Heat loss in cooling water		1
7.	Heat loss at engine exhaust		1
8.	Heat loss by radiation		1
9.	Engine torque, brake power, and Mechanical efficiency		1
10.	Compression pressure		1
11.	Cylinder leakage		1
12.	Timing advance test, firing order		1
13.	Timing valves adjustment and		1



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Evaluation Strategies:

Exams		Percentage	Date
Exams	Mid Exam	20%	
	Discussion of Sheets	30%	
	Final Exam	50%	

Teaching Methodology:

Laboratory

Text Books & References:

References:

1. Introduction to Internal Combustion Engines, by Richard Stone, 3rd Edition, 1999, SAE International
2. Jack ERJAVEC, AUTOMOTIVE Technology A system Approach, Delmar. U.S.A – 2005.
3. John Remling , Automotive Electricity , John Willy & sons, Inc., U.S.A. 1987 .
4. William H. Crouce and Donald Anglin, Automotive Mechanics, Hill school publishing company, USA, 1993.



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