

<b>Number of units</b> 5	<b>T</b> 4	<b>Pr</b> 3	<b>Th</b> 1	Number of weekly hours	Annual System 30 weeks	<b>Al-Esra'a University College Department: Engineering of Refrigeration and Air Conditioning Technologies</b>
				<b>Refrigeration and Air Conditioning Device Maintenance</b>	Third stage	
<b><u>Course Objective</u></b>						
To study the maintenance of all types of refrigeration systems.						

**Theoretical part**

<b>Week</b>		<b>Topic</b>	<b>Lab. Experiment Assignments</b>
1		Refrigeration and air conditioning systems strategies.	
2-3		Refrigeration and air conditioning equipment classification (types, applications, maintenance, control, mechanical and electrical parts).	
4		Test and commissioning Refrigeration and air conditioning equipment (electrical sources test, electrical and mechanical parts, leaks test performance test).	
5-6		Refrigeration and air conditioning equipment installation, the type of installation, mechanical and electrical connections, piping Appropriate places selection, piping's and insulations assembly, air purge, vacuum and charge, installation problems.	
7-8		Mollier's charts (drawing, point's determination, troubleshooting for central air conditioning systems.	
9-10		Mechanical troubleshooting study of Refrigeration and air conditioning system and water chillers.	
11-12		Electrical troubleshooting study of Refrigeration and air conditioning system and water chillers.	

13-14		Conventional air condition system (mechanical and	
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	electrical components, features, installation, connection, commissioning, maintenance, and control.	
15-16	Compressors (types, applications, maintenance, assembly and dis assembly, test and commissioning).	
17-18	Evaporators and air washer (types, applications, maintenance, assembly and dis assembly, test and commissioning).	
19-20	Condensers (types, applications, maintenance, assembly and dis assembly, test and commissioning).	
21-22	Cooling tower (types, applications, maintenance, assembly and dis assembly, test and commissioning).	
23	Expansion devices (types, applications, maintenance, assembly and dis assembly, test and commissioning).	
24	Mechanical and electrical accessories (types, applications, maintenance, assembly and dis assembly, test and commissioning).	
25	Fans (types, applications, maintenance, assembly and dis assembly, test and commissioning).	
26	Pumps (types, applications, maintenance, assembly and dis assembly, test and commissioning).	
27-28	Refrigeration and air conditioning components cleaning by using chemical materials.	
29	Organizing maintenance contracts.	
30	Organizing quantities estimating reports of refrigeration and air conditioning equipment maintenance	
	<b>Practical Part</b>	
1-2	Dismantling the commercial system knew the basic parts and accessories and isolate each part of it for other parts.	
3-4-5	Repair compressor through the dismantling of reciprocating compressor semi –hermetic of commercial system and identify the parts and functions and the method of examination and then gathered and examined parts of the compressor and take all measures in order .to examine the operation and performance	
6	Maintenance of air cooled condenser system for commercial and examination of the leak and treatment. Cleaning of the inside and outside and sweep the fins also work includes everything related to	

	the fans for the condenser.
7	Maintenance of water-cooled condenser system for commercial and examination of the leak and treatment. Cleaning of the interior and exterior work includes mechanical and chemical cleaning, as well as ..the pump and piping for the condenser.
8	Maintenance - evaporator system for commercial and leakage of examination and treatment. Cleaning of the inside and outside and sweep the fins also work includes everything related to the fans for the evaporator
9	Dismantling expansion valve (used for different types of commercial systems) and checked and calibrated and cleaned.
10	Maintenance of mechanical accessories for commercial system (oil separator accumulator –liquid receiver –dryer filter valves-piping ...etc.)
11	Maintenance of electrical 3accessories for commercial and est it (power and control circuit.
12	Connect the electrical connections of the power and control circuits and test the connections.
14	Conduct a process of checking the leak and add oil and make the process of charging and discharging of the gas by using modern equipment not impact on the environment.
15	Checking the final inspection of the system and the first to hold the operation of the system to ensure the safety of the electrical and mechanical connection.
16	The commissioning of the commercial system and examine performance using measuring devices and testing necessary.
17	Diagnosis and analysis of faults for a commercial system.
18	Maintenance of mechanical and electrical axial fans and Accessories.
19	Maintenance of mechanical and electrical centrifugal fans and Accessories.
20-21	Maintenance of water pumps (the dismantling of the pump and the maintenance of internal parts and then assembled) adjust the straightness of the pump and the electric motor.
22	Maintenance of all extensions of piping system (disassembly of the different types of valves to get to know their parts and re- assembled and tested) and examined and operated.
23-24	Maintenance of air handling unit through the dismantling of parts and inspection and lubrication and then re- connect and straighter transmission belt and pulleys.
25	Maintenance of cooling tower (fans –ball bearing- tank-nozzles-

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		pipings and straighter transmission belt and pulleys).
26-27		Maintenance of an air vehicle air conditioner and includes cleaning - Maintenance – components vacuum and churning with modern equipment that do not adversely affect the environment, operating and inspection.
28		Scientific-site visit to ice plant.
29		Scientific-site visit to the central air conditioning system.
30		Scientific-site visit to the absorption central air conditioning system.