

Course Description Form

1. Course Name:					
Refrigeration Systems / 4 rd					
2. Course Code:					
MPAC405					
3. Semester / Year:					
(Annual System) (2025-2026)					
4. Description Preparation Date:					
The beginning of the university calendar for the year (2025-2026)					
5. Available Attendance Forms:					
Theoretical and Practical Classes					
6. Number of Credit Hours (Total) / Number of Units (Total)					
(60 hours. theoretical + 40 hours. practical) 100 hours / 12 units					
7. Course administrator's name (mention all, if more than one name)					
Name: Asst. Lect. Rassol Hamed Rasheed Email: rassol.ha@uowa.edu.iq					
4. Course Objectives					
Course Objectives			This course aims to enhance the students' knowledge of the principles of vapor compression refrigeration systems and its analysis, also studying types of refrigeration units and cryogenic refrigeration.		
5. Teaching and Learning Strategies					
Strategy		1- Lectures and illustrations: Data Show 2- Practical tests using laboratory equipment 3- Multimedia using the e-learning system 4- Delivering a lecture, answering students' questions, and discussing with them.			
6. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

1-3	2Theoretical+ 2 practical.	The student understands subject	Condensers and Evaporators: Condensers and evaporators as heat exchangers, overall heat transfer coefficients, heat transfer and pressure drop for the fluid flow in heat exchanger tubes and shell. Extended surfaces, Heat transfer and pressure drop for air side.	Theoretical + practical	quiz
4-5	2Theoretical+ 2 practical.	The student understands subject	Condensers, Required condensing capacity, condensing coefficient, fouling factor, super heating, condenser design, Wilson plots, air and non-condensable gases.	Theoretical + practical	quiz
6-7	2Theoretical+ 2 practical.	The student understands subject	Evaporators, Boiling in the shell, boiling inside tube, evaporators performance, pressure drop in tubes, frost.	Theoretical + practical	quiz
8-10	2Theoretical+ 2 practical.	The student understands subject	Expansion devices Purpose and types of expansion devices, capillary tube, selection of capillary tube, analytical computation of pressure drop in capillary tube, pressure increment	Theoretical + practical	quiz

			length, choked flow, graphical method of capillary tube selection, Constant pressure expansion valve, controlling of super-heating thermostatic expansion valve.		
11-13	2Theoretical+ 2 practical.	The student understands subject	Vapor compression refrigeration system Analysis balance point and system simulation, reciprocating compressors, condenser performance, condensing unit system mathematical and graphical analysis, evaporator performance, performance of complete system graphical and mathematical analysis, some performance trends the expansion devices, sensitivity analysis.	Theoretical + practical	quiz
14-15	2Theoretical+ 2 practical.	The student understands subject	Cooling towers and evaporative condensers: Heat rejected to atmosphere, cooling towers, analysis of counter flow cooling tower, stepwise integration,	Theoretical + practical	quiz

			acceptance to predicting outlet conditions from tower, air conditioning through tower evaporative condensers, when using a cooling tower and evaporative condensers.		
16-18	2Theoretical+ 2 practical.	The student understands subject	Absorption refrigeration system relation between vapour compression and absorption refrigeration units, temperature and concentration properties of LiBr-water solution, calculations of mass flow rates in the absorption cycle, enthalpy of LiBr-water solution thermal analysis of simple cycle, absorption cycle with heat exchanger, crystallization, capacity control, aqua-ammonia system.	Theoretical + practical	quiz
19-20	2Theoretical+ 2 practical.	The student understands subject	Adsorption system : the relation between adsorption and absorption, absorption and vapour	Theoretical + practical	quiz

			compression cycle, the analysis of adsorption system, mathematical analysis of the adsorption system .		
21	2Theoretical+ 2 practical.	The student understands subject	Steam refrigeration: system components, analysis of steam refrigeration system approximation analysis, equilibrium concentration.	Theoretical + practical	quiz
22-23	2Theoretical+ 2 practical.	The student understands subject	Air refrigeration system : the working principle of the cycle, design considerations, atmosphere temperature, humidity and pressure, load calculation, refrigeration, heating, temperature control, ventilation, pressure control of zone, types of system.	Theoretical + practical	quiz
24	2Theoretical+ 2 practical.	The student understands subject	Thermoelectric refrigeration: working principle, types of thermoelectric refrigeration system, electro-acoustic refrigeration, working principle, types.	Theoretical + practical	quiz
25-26	2Theoretical+ 2 practical.	The student understands	Cryogenic liquefaction of	Theoretical + practical	quiz

		subject	gases: Cryogen Joul-Thomson effect, air liquefacti by Hopson system (Jo Thomson expansion		
27-28	2Theoretical+ 2 practical.	The student understands subject	Temperature entro diagram for air, calculation work required for gas compressio Claude syst,em, casca system, general considerati for gas liquefaction, Hydrogen , P Cooling system for liquefaction, Heliu	Theoretical + practical	quiz
29	2Theoretical+ 2 practical.	The student understands subject	Vortex tube: Typ and working principle	Theoretical + practical	quiz
30	2Theoretical+ 2 practical.	The student understands subject	Heat Pipe: Types a working principle.	Theoretical + practical	quiz

7. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc

8. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Refrigeration and Air conditioning W.f.stoker
Main references (sources)	1- Air Conditioning Engineering - 5th Edition (Malestrom)- J P Jones 2- Refrigeration and Air Conditioning – Abbas Al joubory
Recommended books and references (scientific journals, reports...)	Refrigeration and Air Conditioning (MCQ)

Electronic References, Websites

Refrigeration and Air conditioning

W.f.stoker


 استاذ المادة : م.م رسول حمد رشيد
 التاريخ: 2025-08-31




 ا.م.د محمد حسن عبود الموسوي
 التاريخ : 2025-08-31

