Course Description Form

1. Course Name:
Air Conditioning and Refrigeration systems/ 3rd
2. Course Code:
MPAC304
3. Semester / Year:
(Annual System) (2024-2025)
4. Description Preparation Date:
23/09/2024
5. Available Attendance Forms:
Theoretical and Practical Classes
6. Number of Credit Hours (Total) / Number of Units (Total)
60 hrs. (theoretical) + 30 hrs. (practical) /5 units
7. Course administrator's name (mention all, if more than one name)
Name: Ihab Omar Email: ihab.om@uowa.edu.iq
8. Course Objectives

Course Objectives	a) Helping the student understand the properties of the mixture of air and vapor. b) Helping the student to understand the behavior of the air and vapor mixture. c) Helping the student to understand and use the laws for calculating the properties of air and vapor mixtures. d) Helping the student understand, use and design fans. e) Helping the student understand, use and design water pipes f) Helping the student conduct a site survey of the air-conditioned space. g) Help the student calculate the heating and cooling load. h) Helping the student calculate the cooling load for freezer stores.

9. 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- Giving the lecture, answering students' questions, and discussing with the students aspe that are not clear to them.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 theoretical + 1 practical	The student understands: 1. cooling and heating loa	Site survey of air conditioned space, relati between heat gain and cooling load.	A theoretical and a practical lecture	Weekly exams

2-4	2 theoretical + 1 practical	The student understands: 1. cooling and heating loa	Inside and outside design conditions, for winter & summer, heating load calculation (heat loss from windows, doors, walls, roof, floor, base of building, ventilation (air change method, air required for each person, air volume per unit area,) infiltration (crack method) total heating load.	A theoretical and a practical lecture	Weekly exams, pre and post questions
5	2 theoretical + 1 practical	The student understands: 1. cooling and heating load	Cooling load (radiation glasses, conduction heat transfer through walls, ro glasses,..etc using equival temperature deference,)	A theoretical and a practical lecture	Weekly exams, and post questions
6-7	2 theoretical + 1 practical	The student understands: 1. cooling and heating loa	Heat transfer through part ions, peoples heat generat people metabolic rate, lighting heat, motors & equipment, ventilation an infiltration load.	A theoretical and a practical lecture	Weekly exams, and post questions
9-11	2 theoretical + 1 practical	The student understands: 1. Psychrometric process	Psychrometric processes, cooling & dehumidificati cooling & dehumidificati in case of high latent load cooling & humidification evaporative cooling, heati & humidification.	A theoretical and a practical lecture	Weekly exams, and post questions
13	2 theoretical + 1 practical	The student understands: 1. design duct	Air ducting (pressure lose in straight duct, duct fittir (sudden enlargement & contraction, branches, ber ….etc)	A theoretical and a practical lecture	Weekly exams, and post questions
13	2 theoretical + 1 practical	The student understands: 1. design duct	Duct design, methods of design, equal friction method, balancing of duc system.	A theoretical and a practical lecture	Weekly exams, and post questions
14-15	2 theoretical + 1 practical	The student understands: 1. Fans 2. type 3. selection 4. design	Fans (type, selection, performance of centrifuga laws) room air distributio selection of supply & retu air opening, diffusers, gri return grilles.)	A theoretical and a practical lecture	Weekly exams, and post questions
16-17	2 theoretical + 1 practical	The student understands: 1. design pipe	Water piping design, pres losses in straight, and o links, valves, and accesso	A theoretical and a practical lecture	Weekly exams, and post questions

			cooling water pipes, w pipe network design.		
18-19	2 theoretical + 1 practic	The student understands: 1. Pumps 2. types	Pumps (performance, ty pump selections, design water distribution syste design of expansion tan	A theoretical and a practical lecture	Weekly exams, and post questions
17-18	2 theoretical + 1 practic	The student understands: 1. thermal properties of f	Food thermal propertie water contain, primary freezing point, ice fracti density, specific heat.	A theoretical and a practical lecture	Weekly exams, and post questions
20	2 theoretical + 1 practic	The student understands: 1. thermal properties of f	Freezing and nonfreezi foods, thermal conductiv parallel method, respirat heat, heat transfer coeffic of surface.	A theoretical and a practical lecture	Weekly exams, and post questions
21	2 theoretical + 1 practic	The student understands: 1. Dual conduit systems	Dual conduit system, mu zone system comparati study, psychometric cha	A theoretical and a practical lecture	Weekly exams, and post questions
22	2 theoretical + 1 practic	The student understands: 1. Estimation of Food cooling Time	Time of Food cooling and freezing.	A theoretical and a practical lecture	Weekly exams, and post questions
23	2 theoretical + 1 practic	The student understands: 1. Estimation of Food cooling Time	Estimation of Food cooli Time depending on dimensionless heat trans coefficient, method of freezing estimation.	A theoretical and a practical lecture	Weekly exams, and post questions
24	2 theoretical + 1 practic	The student understands: 1. Estimation of Food cooling Time	Blanc Equation for freez time estimation.	A theoretical and a practical lecture	Weekly exams, and post questions
25-26	2 theoretical + 1 practic	The student understands: 1. the food deceases	Refrigeration and the foo deceases, biological dece sources, microbes growth critical growth requireme of microbes, control of microbes growth, HACC method.	A theoretical and a practical lecture	Weekly exams, and post questions
27-29	2 theoretical + 1 practic	The student understands: 1.Refrigeration Load	Thermal load of transportation, air filtrati equipment, safety facto total ref. load, principle freezing storage desig volume calculation, desi of the storage constructi storage requirement,	A theoretical and a practical lecture	Weekly exams, and post questions
30	2 theoretical + 1 practic	The student understands: 1.Refrigeration Load	Methods of constructio space requirement, treatm of air and vapor infiltrati from cracks, floor structu preparing of the roof, wa derange, Freezing syste	A theoretical and a practical lecture	Weekly exams, and post questions

			,fan coil unit, valve selection, vale position system design, Refrigerat		

11. Course Evaluation

1. Daily oral questions.
2. Discussion and dialogue with students
3. Attendance
4. Bi-monthly oral exams.
5. Monthly written tests.
6. Semester exam (first semester + second semester)
7. Final annual exam.

12. Learning and Teaching Resources

Required textbooks (curricular book any)	"ASHRAE fundamentals Handbook for air conditioning Refrigeration", SI, 2013.
Main references (sources)	Wilbert F., Stoecker and Lekold W. Jones, " Refrigeration and Air condition McGraw-Hill, 1982 .
Recommended books and references (scientific journals, reports…)	1- Dr. Abdul Hadi N. Khalifa, Refrigeration and Air conditioning Engineering Dept. Engineering Technical College 3rd year – refrigeration and Air conditioning Course,2015. 2- Nihal E Wijeysundera, principles of heating ventilation and air conditioning worked examples
Electronic References, Websites	