Course Description Form

1. Course Name:

Heat Transfer/ 3rd

2. Course Code:

MPAC303

3. Semester / Year:

(Annual System) (2024−2025)

4. Description Preparation Date:

The beginning of the university calendar for the year (2024-2025)

5. Available Attendance Forms:

Theoretical and Practical Classes

6. Number of Credit Hours (Total) / Number of Units (Total)

90 hrs. (theoretical) + 30 hrs. (practical) /8 units

7. Course administrator's name (mention all, if more than one name)

Name: Asst. Lect. Walaa Nasser Abbas
Email: walaa.na@uowa.edu.iq

8. Course Objectives

Course Objectives	• Introducing the student to the basic processes of heat transfer • Introducing the student to the different media of heat transfer • Introducing the student to the basic types of heat transfer • Teaching the student to calculate the thermal conductivity of various materials • Introducing the student to calculating the thermal loads of buildings • Introducing the student to the calculation of heat transfer by free and forced convection • Introducing the student to the types of heat exchangers • Teaching the student how to calculate thermal loads in heat exchangers • Teaching the student how to calculate the heat loads transmitted by radiation

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- Delivering a lecture, answering students' questions, and discussing with them.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3 theoretical	The student understanc	Introduction, methods of	A theoretical and	Weekly exams

	+ 2 practical	the lesson	heat transfer ,thermal equilibrium equation.	practical lectures	
2	3 theoretical+ practical	The student understand the lesson	The general equation for heat transfer by conduction, types of boundary conditions initial conditions.	A theoretical and practical lectures	Weekly exams, pre and post questions
3	3 theoretical+ practical	The student understand the lesson	Steady-state, one-dimensional conduction through a wall section, applying boundary conditions	A theoretical and practical lectures	Weekly exams, pre and post questions
4	3 theoretical+ practical	The student understand the lesson	Steady-state conduction in dimension through a cylindrical and spherical section with the application boundary conditions.	A theoretical and practical lectures	Weekly exams, pre and post questions
5	3 theoretical+ practical	The student understand the lesson	Steady-state conduction multilayer sections, total heat transfer coefficient	A theoretical and practical lectures	Weekly exams, pre and post questions
6	3 theoretical+ practical	The student understand the lesson	Critical dielectric thickness surface contact resistance.	A theoretical and practical lectures	Weekly exams, pre and post questions
7	3 theoretical+ practical	The student understand the lesson	Thermal conduction through regular and variable cross-section fins.	A theoretical and practical lectures	Weekly exams, pre and post questions
8	3 theoretical+ practical	The student understand the lesson	Fin efficiency, fin performance	A theoretical and practical lectures	Weekly exams, pre and post questions
9	3 theoretical+ practical	The student understand the lesson	Transitional conduction (unstable heat) analysis combined capacitances.	A theoretical and practical lectures	Weekly exams, pre and post questions
10-11	3 theoretical+ practical	The student understand the lesson	Numerical analysis of heat transfer by steady conduction in one dimension and two dimension	A theoretical and practical lectures	Weekly exams, pre and post questions
12	3 theoretical+ practical	The student understand the lesson	Numerical analysis of unsteady(transitional)thermal conductivity.	A theoretical and practical lectures	Weekly exams, pre and post questions
13	3 theoretical+ practical	The student understand the lesson	Heat transfer by convection (introduction), review of fluid flow (continuity equation, momen equation, energy equation).	A theoretical and practical lectures	Weekly exams, pre and post questions
14	3 theoretical+ practical	The student understand the lesson	The adjacent layer theory momentum and heat, analytical solution to the heat transfer equation by forced convection for both types of mass and laminar flow.	A theoretical and practical lectures	Weekly exams, pre and post questions
15	3 theoretical+ practical	The student understand the lesson	Heat transfer equation by fo convection in a steady state in one dimension.	A theoretical and practical lectures	Weekly exams, pre and post questions
16	3 theoretical+ practical	The student understand the lesson	Apparent temperature and r dimensional sums, the physical meaning of non-dimensional sums.	A theoretical and practical lectures	Weekly exams, pre and post questions

17	3 theoretical+ practical	The student understand the lesson	Experimental relationships forced convection heat transfe flow on a flat surface.	A theoretical and practical lectures	Weekly exams, pre and post questions
18	3 theoretical+ practical	The student understand the lesson	Experimental relationships heat transfer by forced convection of external flow on pipe and card assemblies.	A theoretical and practical lectures	Weekly exams, pre and post questions
19	3 theoretical+ practical	The student understand the lesson	Experimental relationships forced convection heat transfe internal flow through clo pipes and ducts.	A theoretical and practical lectures	Weekly exams, pre and post questions
20	3 theoretical+ practical	The student understand the lesson	The theory of heat transfer free convection.	A theoretical and practical lectures	Weekly exams, pre and post questions
21	3 theoretical+ practical	The student understand the lesson	Experimental relationships heat transfer by free convection.	A theoretical and practical lectures	Weekly exams, pre and post questions
22	3 theoretical+ practical	The student understand the lesson	Heat exchangers (introduction), Types of heat exchangers.	A theoretical and practical lectures	Weekly exams, pre and post questions
23	3 theoretical+ practical	The student understand the lesson	The total heat transfer coeffici the soiling coefficient, and logarithmic average of temperature difference.	A theoretical and practical lectures	Weekly exams, pre and post questions
24	3 theoretical+ practical	The student understand the lesson	Heat exchanger effectiver analysis of thermal performa in the heat exchanger for diffe types of flow.	A theoretical and practical lectures	Weekly exams, pre and post questions
25	3 theoretical+ practical	The student understand the lesson	(Thermal radiation) introduction - basic concepts.	A theoretical and practical lectures	Weekly exams, pre and post questions
26	3 theoretical+ practical	The student understand the lesson	Radiation properties, Kirchhoff's law, shape factor, Stephen Boltzmann equation, thermal radiation exchange between surfaces of black bodies.	A theoretical and practical lectures	Weekly exams, pre and post questions
27	3 theoretical+ practical	The student understand the lesson	Thermal radiation exchange between two surfaces of gray objects.	A theoretical and practical lectures	Weekly exams, pre and post questions
28	3 theoretical+ practical	The student understand the lesson	Thermal radiation exchange between the radiation barrier.	A theoretical and practical lectures	Weekly exams, pre and post questions
29	3 theoretical+ practical	The student understand the lesson	Heat transfer during boiling, boiling of a stagnant liquid, boiling cu and systems, experimental equations, improving heat transfer, boiling of a flowing liquid.	A theoretical and practical lectures	Weekly exams, pre and post questions
30	3 theoretical+ practical	The student understand the lesson	Heat transfer in the case condensation, membrane condensation, flow systems, experimental equations for heat transfer in	A theoretical and practical lectures	Weekly exams, pre and post questions

			membrane condensation (for a vertical surface, for inclined surface, for a horizo surface, for a horizontal ball cylinder, for a set of horizo tubes), membrane condensa inside a horizontal tube.		

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 books, if any)	Principles of air conditioning - Dr. Munther Al-Droubi
Main references (sources)	1−Fundamentals of Heat and Mass Transfer 6th edition 2- Cengel Y A Heat Transfer A Practical Approach (Mgh, 2002)
Recommended books and references (scientific journals, reports…)	1- Air Conditioning Engineering - 5th Edition (Maelstrom)Maelstroms 2- Refrigeration and Air Conditioning – Abbas Al joubory
Electronic References, Websites	Refrigeration and Air Conditioning (MCQ)