Course Description Form

1. Course Name:
Renewable energy
2. Course Code:
MPAC407
3. Semester / Year:
Annual (2024–2025)
4. Description Preparation Date:
Beginning of the academic calendar (2024–2025)
5. Available Attendance Forms:
Official working hours of 3 hours (theoretical + practical)
6. Number of Credit Hours (Total) / Number of Units (Total)
(Theoretical 60 – Practical 30) 90 hours/ 5 Units
7. Course administrator's name (mention all, if more than one name)
Name: lec. Prof .Dr. Hassan Taleb Email: hasanth2030@uowa.edu.iq
8. Course Objectives

Course Objectives	**1. Expanding the student's knowledge through his introduction to new sources of energy other than traditional sources. The primary objective of the course lies in the importance of renewable energy and its applications, which has become one of the most important fields proposed in the twenty–first century for economic and environmental reasons, and in the importance of obtaining renewable (sustainable) and clean energy as a guarantee for the present and security for the future.** **2. Getting to know renewable energy sources and how to benefit from them to obtain energy and learn about the various application systems associated with those sources.** **3. Students can benefit from this course in their field of work as engineers in the field of refrigeration and air conditioning and include in general education curricula concepts about preserving the environment and using clean and renewable energy.**

	4. Studying traditional energy sources, sources of energy consumption, the world's energy needs, as well as environmental problems related to the use of traditional energies and studying ways and methods to reduce energy consumption. 5. Knowledge of the basics of various renewable energy sources and the technologies required for associated energy systems. 6. Studying the types of renewable energy, its working principle, properties, applications, development prospects, and explaining the importance of using such energies from an environmental and economic perspective. 7. Providing students with scientific and applied research skills.

9. Teaching and Learning Strategies

Strategy	1. Theoretical lectures 2. Practical application and laboratory experiments 3. Discussions, workshops and seminars 4. Using modern presentation and teaching methods 5. Field visits and professional training 6. Review the latest published research in the field of renewable energy 7. Self-education

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Knowledge of renewable energy sources and their applications, and identification of environmental problems resulting from the use of traditional fuels	General introduction to renewable energy Renewable energy sources and applications Renewable Energy and environmental problems (Acid rain, Ozone layer depletion, Global climate change, Nuclear hazards)	1. Theoretical lectures 2. Practical application and laboratory experiments 3. Discussions, workshops and seminars 4. Using modern presentation and teaching methods	● Daily and oral tests ● Monthly tests ● Practical tests ● Reports ● Extracurricular activities ● Projects ● Annual tests
2	3	How to calculate solar time equation	The sun Reckoning of time (the equation of time and longitude correction)		

3	3	Calculating solar angles required for solar energy applications	Solar angles (declination, hour angle, solar altitude angle, solar azimuth angle, Sunrise and sunset times and day length, incidence angle)	5. Field visits and professional training 6. Review the latest published research in the field of renewable energy 7. Self-education	
4	3	Calculating solar radiation incident on different surfaces	Extraterrestrial solar radiation, Atmospheric attenuation, Terrestrial irradiation, Total radiation on tilted surfaces.		
5	3	Knowing the types and characteristics of fixed solar collectors	SE collectors Stationary collectors (Flat-Plate Collectors, Compound Parabolic Collectors, Evacuated Tube Collectors)		
6	3	Knowing the types and characteristics of tracking solar collectors	Sun-tracking concentrating collectors (Parabolic Trough Collectors, Fresnel collectors, Parabolic Dish Reflectors, Heliostat Field Collectors)		
7	3	Learn about the characteristics and advantages of solar heating systems	Solar water heating systems Passive systems (Thermosiphon systems, Integrated collector storage)		
8	3	Know the characteristics of features Direct and indirect heating systems	Active systems (Direct Circulation Systems, Indirect Water Heating Systems, Pool Heating Systems)		
9	3	Learn about renewable energy storage systems	Heat storage systems (Air System Thermal Storage, Liquid System Thermal Storage, and Thermal Analysis of Storage Systems).		

10	3	Learning how to design the module and array and know the auxiliary devices and equipment in renewable energy systems	Module and array design (module design, and array Design) Differential temperature controller, Placement of Sensors		
11	3	Calculating the amount of hot water required and knowing the practical requirements for renewable energy systems	Hot water demand Practical considerations (pipes, supports, insulation, pumps, valves, and instrumentation).		
12	3	Calculating the heating and cooling load of buildings	Solar Space Heating and Cooling Calculation of heat load		
13	3	Heating and cooling buildings with solar energy	Solar space heating and cooling (Space heating and service hot water, Air systems, Water systems, Location of auxiliary heater, Heat pump systems) Solar cooling (Adsorption units, Absorption units) Solar cooling with absorption refrigeration		
14	3	Learn about solar heating processes for industrial purposes	Industrial Process Heat (Solar industrial air and water systems, Solar steam generation systems) Chemistry Applications (Reforming of fuels, Fuel cells, Materials processing, Solar detoxification)		
15	3	Knowing the types, features and characteristics of solar dryers and greenhouses	Solar Dryers (Active Solar Energy Dryers, Passive Solar Energy Dryers		

			Greenhouses and Greenhouse materials.		
16	3	Knowledge of the types, features and characteristics of water desalination systems and solar desalination processes	Solar Desalination Systems, Desalination processes Direct collection systems (Classification of Solar Distillation Systems, Performance of Solar Stills)		
17	3	Learn about solar cells, their working principle, and the components of the solar electrical generation system	Solar cells, Structure of Photovoltaic PV System		
18-19	3	Knowledge of the components and characteristics of the solar generation system and the hybrid system	Design of PV system Hybrid PV/T systems and applications		
20	3	Knowledge of the components, characteristics and working principle of solar thermal electricity generation systems	Solar Thermal Power Systems (Parabolic trough collector systems, Power tower systems)		
21	3	Knowledge of the components, characteristics and working principles of dish collector systems and solar ponds	Solar Thermal Power Systems (Dish systems, Solar ponds)		
22	3	Learn about the basics of wind energy, wind turbines, and the aerodynamics of rotors and wind turbines	Introduction to Wind Energy Power available in the WE Wind turbine WT power and torque Classification of WTs (Horizontal axis WTs, Vertical axis WTs)		

			Characteristics of wind rotors Aerodynamics of WTs (Airfoil, Aerodynamic theories)		
23	3	Know how to design a wind turbine rotor and how to analyze wind data	Rotor design - Rotor performance Analysis of wind data		
24	3	Learn the characteristics and advantages of wind conversion systems and wind generators	Wind energy conversion systems Wind electric generators (Tower, Rotor, Gear box, Power regulation, Safety brakes, Generator) Wind farms, Offshore wind farms Wind pumps - Wind water heater		
25	3	Know the characteristics of wind energy conversion, power curve, and capacity factor in wind energy	Performance of wind energy conversion system Power curve of wind turbine Capacity factor		
26	3	Learn about power generation from water and water turbines	Introduction, Water Cycle Water Turbines		
27	3	Identify the characteristics, features and working principle of hydropower stations	Hydropower Plants (Run - of - River Power Plants, Storage Power Plants, Pumped - Storage Power Plants) system design		
28	3	Knowledge of bioenergy and its use in heat and electricity generation plants	Tidal Power Plants, Wave Power Plants		
29	3	Learn about geothermal power plants, their characteristics and	Introduction to bioenergy (biomass, biogas, biofuel)		

		the principle of their operation	Biomass Heating (Wood as a Fuel, Fireplaces and Closed Wood burning Stoves, Wood Pellet Heating) Biomass Heat and Power Plants		
30	3	Identify tidal energy and wave energy, their characteristics, and their principle of operation	Introduction to geothermal energy Geothermal Plants (Geothermal Heat Plants, Geothermal Power Plants), Geothermal Heat pump		

11. 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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1- Soteris Kalogirou , 2009 " solar energy engineering – processes and systems " 1st Ed. Elsevier Inc. ., USA 2- Sathyajith Mathew, 2006 , " Wind Energy , Fundamentals , Resource Analysis and Economics ", Springer , Netherlands . 3- Volker Quaschning , 2010 ," Renewal energy and climate change " John Wiley a Sons, Ltd.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name:
Ethics Professional
2. Course Code:
MTU1008
3. Semester / Year:
(Annual System) (2024-2025)
4. Description Preparation Date:
The beginning of the academic calendar for the year (2024−2025)
5. Available Attendance Forms:
Theoretical and Lecture Classes
6. Number of Credit Hours (Total) / Number of Units (Total)
60 hrs./ 2 units
7. Course administrator's name (mention all, if more than one name)
Name: Malik N. Hawas Email: Com.mlk@atu.edu.iq
8. Course Objectives

Course Objectives	- Introducing students to general ethics and the ethics of the engineering profession. - Raising the level of students' awareness so that they can understand the ethical dimensions surrounding the practice - Their future professions. - Developing students' true conviction of the importance of moral commitment.

9. Teaching and Learning Strategies	
Strategy	Giving theoretical lessons, activating discussion, dialogue, brainstormin and role-playing, critical thinking skills, writing reports on scientific material, presenting experiences drawn from the reality of professional life, and daily and weekly exams.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-2	2 theoretical	Knowledge, understanding and application	Introduction and definition ethics, its origin and sources Sources and foundations of professional ethics	A theoretical lecture	Weekly exams

3-4	2 theoretical	Explaining the principles of ethical analysis and thinking various professional situations.	Codes of professional ethics. Principles of engineering ethics.	A theoretical lecture	Weekly exams, pre and post questions
4-6	2 theoretical	Developing opportunities for dialogue and discussion about ethical concepts. Solving the ethical problems facing the graduate at work. Developing students' moral judgment skills and their readiness for moral commitment after graduation. *Preparing professionally and ethically qualified graduates and enabling them to carry out practical professional tasks High quality graduation.	Principles of ethics for practicing the engineering profession. The obligations incurred by engineer to practice the profession.	A theoretical lecture	Weekly exams, and post questions
6-7	2 theoretical		Obligations towards work officials in the engineering professions. Community commitments	A theoretical lecture	Weekly exams, and post questions
8	2 theoretical		Community commitments	A theoretical lecture	Weekly exams, and post questions
9	2 theoretical		Ethical obligations towards engineering profession	A theoretical lecture	Weekly exams, and post questions
10-12	2 theoretical		Ethical obligations towards engineering profession. Union instructions and regulations and cooperation with the Engineers Syndicat Union instructions and regulations and cooperation with the Engineers Syndicat	A theoretical and a practical lecture	Weekly exams, and post questions
13-14	2 theoretical		Commitments to colleagues and work counterparts. Commitments to colleagues and work counterparts.	A theoretical lecture	Weekly exams, and post questions
15	2 theoretical		Ethics of practicing enginee professions.	A theoretical lecture	Weekly exams, and post questions
16	2 theoretical		Ethics of practicing enginee professions.	A theoretical lecture	Weekly exams, and post questions
17-18	2 theoretical		Obligations to preserve the environment and take into account sustainability requirements. Sustainable environment an environmentally friendly engineering controls	A theoretical practical lecture	Weekly exams, and post questions
19	2 theoretical		Responsibilities for applyin professional ethics	A theoretical lecture	Weekly exams, and post questions
20	2 theoretical		Engineer responsibilities	A theoretical lecture	Weekly exams, and post questions

21	2 theoretical		Engineer responsibilities	A theoretical lecture	Weekly exams, and post questions
22	2 theoretical		Cases of failure to impleme obligations	A theoretical lecture	Weekly exams, and post questions
23	2 theoretical		Remedies for failure to implement obligations	A theoretical lecture	Weekly exams, and post questions
24	2 theoretical		Procedures resulting from failure to implement obligations	A theoretical and a practical lecture	Weekly exams, and post questions
25	2 theoretical		Professional honor documer	A theoretical and a practical lecture	Weekly exams, and post questions
26	2 theoretical		Professional regulations and commitments	A theoretical and a practical lecture	Weekly exams, and post questions
27	2 theoretical		Honor documents, regulatio and official pledges	A theoretical and a practical lecture	Weekly exams, and post questions
28	2 theoretical		Honor documents, regulatio and official pledges	A theoretical and a practical lecture	Weekly exams, and post questions
29-30	2 theoretical		Terms and regulations of th Arab Society of Engineers Code Review	A theoretical and a practical lecture	Weekly exams, and post questions

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)	• أ.د. يحيى خليف (مدخل الى اخلاقيات مهنة الهندسة)، جامعة الكلك فهد للبترول والمعادن، 2000. • د.احمد جابر حسنين (اخلاقيات العمل بين الدين والمجتمع)،2011. • اتحاد المهندسين العرب: ميثاق اخلاق مهنة الهندسة، 2018
Main references (sources)	

Recommended books and references (scientific journals, reports…)	ة اخلاقيات ممارسة المهنة الهندسية ، وزارة الاعمار والاسكان والبلديات والاشغال العامة، الطبعة الاولى، 2017.
Electronic References, Websites	

Course Description Form

1. Course Name:
Control and Measurements
2. Course Code:
MPAC410
3. Semester / Year:
yearly(2024-2025)
4. Description Preparation Date:
The beginning of the academic calendar for the year (2024-2025)
5. Available Attendance Forms:
Weekly / theoretical and practical
6. Number of Credit Hours (Total) / Number of Units (Total)
60 hours / 4 units
7. Course administrator's name (mention all, if more than one name)
Name: Ahmed Ehsan Email: ahmedahssan83@gmail.com:
8. Course Objectives

Course Objectives	1. Identification of the types and components of control systems. 2. Capacity to represent electrical and mechanical systems in the form of circuits of control 3. Analysis of the exit signal from the control systems.

9. Teaching and Learning Strategies	
Strategy	1. Lectures. 2. Use of blackboard and telephones. 3. Computer use.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st week	2 Theoretical + 2 practical.	The student understands the subject	Introduction to Control Systems, Open and Closed Systems.	Theoretical + practical	quiz

2nd week	2 Theoretical + 2 practical	The student understands the subject	Introduction to Control Systems, Open and Closed Systems.	Theoretical + practical	quiz
3rd week	2 Theoretical + 2 practical	The student understands the subject	Mathematical Modeling of Physical Systems and Transfer Functions, Mathematical Modeling of D.C. Servo Motor.	Theoretical + practical	quiz
4th week	2 Theoretical + 2 practical	The student understands the subject	Mathematical Modeling of Physical Systems and Transfer Functions, Mathematical Modeling of D.C. Servo Motor.	Theoretical + practical	quiz
5th week	2 Theoretical + 2 practical	The student understands the subject	Mathematical Modeling of Physical Systems and Transfer Functions, Mathematical Modeling of D.C. Servo Motor.	Theoretical + practical	quiz
6th week	2 Theoretical + 2 practical	The student understands the subject	Mathematical Modeling of Physical Systems and Transfer Functions, Mathematical Modeling of D.C. Servo Motor.	Theoretical + practical	quiz
7th week	2 Theoretical + 2 practical	The student understands the subject	Block Diagrams.	Theoretical + practical	quiz
8th week	2 Theoretical + 2 practical	The student understands the subject	Block Diagrams.	Theoretical + practical	quiz
9th week	2 Theoretical + 2 practical	The student understands the subject	Time Domain Analysis of Closed Loop Control 10Systems and Error Analysis.	Theoretical + practical	quiz
10th week	2 Theoretical + 2 practical	The student understands the subject	Time Domain Analysis of Closed Loop Control	Theoretical + practical	quiz

			Systems and Error Analysis.		
11th week	2 Theoretical + 2 practical	The student understands the subject	P, PI, PD, and PID	Theoretical + practical	quiz
12th week	2 Theoretical + 2 practical	The student understands the subject	Modes of Feedback	Theoretical + practical	quiz
13th week	2 Theoretical + 2 practical	The student understands the subject	Control, Realization of	Theoretical + practical	quiz
14th week	2 Theoretical + 2 practical	The student understands the subject	PID Controller Using Active and Passive Elements.	Theoretical + practical	quiz
15th week	2 Theoretical + 2 practical	The student understands the subject		Theoretical + practical	quiz
16th week	2 Theoretical + 2 practical	The student understands the subject	P, PI, PD, and PID	Theoretical + practical	quiz
17th week	2 Theoretical + 2 practical	The student understands the subject	Modes of Feedback	Theoretical + practical	quiz
18th week	2 Theoretical + 2 practical	The student understands the subject	Control, Realization of	Theoretical + practical	quiz
19th week	2 Theoretical + 2 practical	The student understands the subject	PID Controller Using Active and Passive Elements.	Theoretical + practical	quiz
20th week	2 Theoretical + 2 practical	The student understands the subject	Stability Analysis and Rouths Stability Criterion.	Theoretical + practical	quiz
21st week	2 Theoretical + 2 practical	The student understands the subject	Stability Analysis and Rouths Stability Criterion.	Theoretical + practical	quiz
22nd week	2 Theoretical + 2 practical	The student understands the subject	Root Locus Technique.	Theoretical + practical	quiz
23rd week	2 Theoretical + 2 practical	The student understands the subject	Root Locus Technique.	Theoretical + practical	quiz
24th week	2 Theoretical + 2 practical	The student understands the subject	Analysis of Control	Theoretical + practical	quiz
25th week	2 Theoretical + 2 practical	The student understands the subject	System in Frequency Domain and Bode Diagrams.	Theoretical + practical	quiz
26th week	2 Theoretical + 2 practical	The student understands the subject	Analysis of Control	Theoretical + practical	quiz
27th week	2 Theoretical + 2 practical	The student understands the subject	System in Frequency Domain and	Theoretical + practical	quiz

			Bode Diagrams.		
28th week	2 Theoretical + 2 practical	The student understands the subject	Control System Design Using Bode Diagrams.	Theoretical + practical	quiz
29th week	2 Theoretical + 2 practical	The student understands the subject	Control System Design Using Bode Diagrams.	Theoretical + practical	quiz
30th week	2 Theoretical + 2 practical	The student understands the subject	Definitions of Non Linear Systems.	Theoretical + practical	quiz

11. 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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	K. Warwick, An Introduction to Control Systems, 2nd ed., vol. 8
Main references (sources)	K. Ogata, Modern Control Engineering, 3rd e Upper Saddle River, NJ 07458: PrenticeHall, Inc. , 1997 .
Recommended books and references (scientific journals, reports…)	Problems and solutions of cotrol systems by A. K. Jairath.
Electronic References, Websites	https://highperformancehvac.com/control-circuits-for-hvac-systems/

نموذج وصف المقرر

١. اسم المقرر
اللغة الانكليزية – المرحله الرابع
٢. رمز المقرر
MPAC409
٣. الفصل / السنة
النظام سنوي/ (2024-2025)
٤. تاريخ اعداد هذا الوصف
بداية التقويم الجامعي لسنة (2024-2025)
٥. اشكال الحضور المتاحة
دوام اسبوعي بواقع ساعة اسبوعي نظري
٦. عدد الساعات الدراسية (الكلي)/عدد الوحدات (الكلي)
30 ساعه نظري /2 وحدات
٧. اسم مسؤول المقرر الدراسي (اذا اكثر من اسم يذكر)
الاسم : المدرس المساعد نور الهدى سلام احمد الايميل : nooralhuda.salam@uowa.edu.iq
٨. اهداف المقرر

اهداف المادة الدراسية	• تعريف الطالب على اهمية تعلم اللغة الانكليزيه كونها لغة التواصل بين المهندسين بمختلف جنسياتهم من خلال المحاضرات و المناقشات و الحوارات بين الطلاب.

٩. استراتيجيات التعليم والتعلم

استراتيجية	

١٠.

١١. بنية المقرر

الأسبوع	الساعات	مخرجات التعلم المطلوبة	اسم الوحدة او الموضوع	طريقة التعلم	طريقة التقيم
1	1	ان يفهم الطالب الدرس	مقدمه- الكتاب المقرر- عمل اختبار تحريري	نظري	اختبارات يوميه و شهريه
2	1	ان يفهم الطالب الدرس	All about you	نظري	اختبارات يوميه و شهريه
3	1	ان يفهم الطالب الدرس	تكملة الوحده	نظري	اختبارات يوميه و شهريه
4	1	ان يفهم الطالب الدرس	Family and friend	نظري	اختبارات يوميه و شهريه
5	1	ان يفهم الطالب الدرس	تكملة الوحده	نظري	اختبارات يوميه و شهريه
6	1	ان يفهم الطالب الدرس	Every day	نظري	اختبارات يوميه و شهريه
7	1	ان يفهم الطالب الدرس	تكملة الوحده	نظري	اختبارات يوميه و شهريه
8	1	ان يفهم الطالب الدرس	The way I live	نظري	اختبارات يوميه و شهريه
9	1	ان يفهم الطالب الدرس	تكملة الوحده	نظري	اختبارات يوميه و شهريه
10	1	ان يفهم الطالب الدرس	My favorites	نظري	اختبارات يوميه و شهريه
11	1	ان يفهم الطالب الدرس	تكملة الوحده	نظري	اختبارات يوميه و شهريه
12	1	ان يفهم الطالب الدرس	Where I live	نظري	اختبارات يوميه و شهريه
13	1	ان يفهم الطالب الدرس	تكملة الوحده	نظري	اختبارات يوميه و شهريه
14	1	ان يفهم الطالب الدرس	Times future	نظري	اختبارات يوميه و شهريه
15	1	ان يفهم الطالب الدرس	تكملة الوحده	نظري	اختبارات يوميه و شهريه
16	1	ان يفهم الطالب الدرس	Simple future	نظري	اختبارات يوميه و شهريه
17	1	ان يفهم الطالب الدرس	تكملة الوحده	نظري	اختبارات يوميه و شهريه
18	1	ان يفهم الطالب الدرس	future continuous	نظري	اختبارات يوميه و شهريه
19	1	ان يفهم الطالب الدرس	تكملة الوحده	نظري	اختبارات يوميه و شهريه

20	1	ان يفهم الطالب الدرس	Future perfect	نظري	اختبارات يوميه و شهريه
21	1	ان يفهم الطالب الدرس	تكملة الوحده	نظري	اختبارات يوميه و شهريه
22	1	ان يفهم الطالب الدرس	Future perfect continuous	نظري	اختبارات يوميه و شهريه
23	1	ان يفهم الطالب الدرس	تكملة الوحده	نظري	اختبارات يوميه و شهريه
24	1	ان يفهم الطالب الدرس	Testing	نظري	اختبارات يوميه و شهريه
25	1	ان يفهم الطالب الدرس	تكملة الوحده	نظري	اختبارات يوميه و شهريه
26	1	ان يفهم الطالب الدرس	Testing	نظري	اختبارات يوميه و شهريه
27	1	ان يفهم الطالب الدرس	تكملة الوحده	نظري	اختبارات يوميه و شهريه
28	1	ان يفهم الطالب الدرس	Seminar	نظري	اختبارات يوميه و شهريه
29	1	ان يفهم الطالب الدرس	Conservation	نظري	اختبارات يوميه و شهريه
30	1	ان يفهم الطالب الدرس	Conservation	نظري	اختبارات يوميه و شهريه

١٢. تقيم المقرر

توزيع الدرجة من 100 على وفق المهام المكلف بها الطالب مثل التحضير اليومي و الامتحانات اليومية و الشفوية و الشهرية و التحريرية و التقارير ....ألخ

١٣. مصادر التعلم والتدريس

الكتب المقررة المطلوبة (المنهجية أن وجدت)	
المراجع الرئيسة (المصادر)	Headway Plus Upper– Intermediate
الكتب والمراجع الساندة التي يوصى بها (المجلات العلمية , التقارير .....)	
المراجع الاكترونية , مواقع الانترنيت	

Course Description Form

1. Course Name:
Refrigeration Systems / 4rd
2. Course Code:
MPAC406
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)
(60 hours. theoretical + 60 hours. practical)120 hours /6 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 it's 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 the

6. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-3	2Theoretical+ 2 practical.	The student understands th subject	Condensers and Evaporat Condensers and evaporators as exchangers, overall	Theoretical + practical	quiz

			heat transfer coefficients, heat transfer and pressure drop for the flui flow in heat exchanger tubes and shell. Extended surfaces, Heat transfer and pressure drop for air side		
4-5	2Theoretical+ 2 practical.	The student understands th subject	Condensers, Required condensing capacity, condensing coefficient, fouling factor, de-super heating, condenser design, Wilson plots, air and non-condensable gases.	Theoretical + practical	quiz
6-7	2Theoretical+ 2 practical.	The student understands th 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 th subject	Expansion devices: Purpose and types of expansion devices, capillary tube, selection of capillary tube , analytical computation of pressure drop in capillary tube, increment length, chocked flow graphical method of capillary tube selection , Constant pressure expansion valve, controlling of super-heating in thermostatic expansion valve.	Theoretical + practical	quiz
11-13	2Theoretical+ 2 practical.	The student understands th subject	Vapor compression refrigeration system Analysis: balance point and system simulation, reciprocating compressors, condenser performance, condensing 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 th subject	Cooling towers and evaporative condensers: Heat rejected to atmosphere, cooling towers, analysis of counter flow cooling tower, stepwise integration, acceptance test, predicting outlet conditions from tower, air conditions through tower, evaporative condense when using a cooling tower and evaporative condensers.	Theoretical + practical	quiz
16-18	2Theoretical+ 2 practical.	The student understands th subject	Absorption refrigeration system: relation between vapour compres and absorption refrigeration units, the absorption refrigeration system, temperature and concentration properties of LiBr-water solution, calculations of mass flow rates in the absorption cycle, enthalpy of LiBr-water solutions, 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 th subject	Adsorption system : the relation between adsorption and absorption, absorption and vapour compression cycle, the analysis of adsorption system, mathematical analysis of the adsorption system .	Theoretical + practical	quiz
21	2Theoretical+ 2 practical.	The student understands th subject	Steam jet refrigeration: system components, analysis of steam refrigeration system, approximation analysis, equilibrium concentration.	Theoretical + practical	quiz
22-23	2Theoretical+ 2 practical.	The student understands th subject	Air refrigeration system : the working principle of the cycle, design considerations, atmosphere temperature, humidity pressure, load calculation, refrigeration, heating, temperature control, ventilation, pressure control of zone, types of air system.	Theoretical + practical	quiz
24	2Theoretical+ 2 practical.	The student understands th subject	Thermoelectric refrigeration: working principle, types of thermoelectric refrigeration systems, electro-acoustic refrigeration, working principle, types.	Theoretical + practical	quiz
25-26	2Theoretical+ 2 practical.	The student understands th subject	Cryogenic and liquefaction of gases: Cryogenic, Joul-Thomson effect, air liquefaction by Hopson system (Joul-Thomson expansion)	Theoretical + practical	quiz
27-28	2Theoretical+ 2 practical.	The student understands th subject	Temperature entropy diagram for air, calculation of work required for gas compression , Claude syst,em, cascade system, general consideration for gas liquefaction, Hydrogen , Pre-Cooling system for air liquefaction, Helium	Theoretical + practical	quiz
29	2Theoretical+ 2 practical.	The student understands th subject	Vortex tube: Types and working principle	Theoretical + practical	quiz
30	2Theoretical+ 2 practical.	The student understands th subject	Heat Pipe: Types and working princi	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

Course Description Form

1. Course Name:

Air Conditioning System Design/ 4th

2. Course Code:

MPAC401

3. Semester / Year:

(Annual System) (2024-2025)

4. Description Preparation Date:

The beginning of the academic calendar for the year (2024−2025)

5. Available Attendance Forms:

Theoretical and Practical Classes

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

(60 hrs. theoretical + 60 hrs. practical)120 hours /6 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 understand the parts of the air handling unit, air purification, and devices used.

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	2 theoretical + 2 practical	The student understands: 1. Air distribution 2. zoning air 3. Duct layout	Air handling and distribu systems ,zoning, Air –conditioning layou systems ,duct sizing	A theoretical and a practical lecture	Weekly exams

3-4	2 theoretical + 2 practical	The student understands: 1. Room air distribution 2. Air distribution requirements 3. Air outlets	Room air distribution, conditioned room air distribution systems, room air distribution requirements, air outlets (types), calculation and selection, design.	A theoretical and a practical lecture	Weekly exams, pre and post questions
4-6	3 theoretical + 2 practical	The student understands: 1. Air –handling units 2. Components	Air –handling units, fan-c units (components, calculation, design and selection) system resistan in series and parallel.	A theoretical and a practical lecture	Weekly exams, and post questions
6-7	2 theoretical + 2 practical	The student understands: 1. Fans 2. types 3. designs 4. selection	Fans (types ,designs ,selection ,calculation and connection in series and parallel point the working point by system and characteristics curves.	A theoretical and a practical lecture	Weekly exams, and post questions
8	2 theoretical + 2 practical	The student understands: 1. Air filtration 2. types 3. function 4. selection	Air filtration (types, application, selection and relations with conditioned room function.	A theoretical and a practical lecture	Weekly exams, and post questions
9	2 theoretical + 2 practical	The student understands: 1. noise in air conditionin systems 2. Sources 3. treatments	The noise in air condition systems. (Sources and treatments by using ducts silencers and plenum), air outlet selection with recommended noise.	A theoretical and a practical lecture	Weekly exams, and post questions
10-12	2 theoretical + 2 practical	The student understands: 1. psychometric charts applications	Advanced applications on psychometric charts.	A theoretical and a practical lecture	Weekly exams, and post questions
13-14	2 theoretical + 2 practical	The student understands: 1. Piping’s systems 2. accessories 3. types 4. design	Piping’s systems and accessories (open and clo system), (two, three, four pipe system) comparative study and design and applications.	A theoretical and a practical lecture	Weekly exams, and post questions
15	2 theoretical + 2 practical	The student understands: 1. Evaporative cooling 2. application	Evaporative cooling syste application and design of cooler, cooling tower, and washers), psychome chart.	A theoretical and a practical lecture	Weekly exams, and post questions
16	2 theoretical + 2 practic	The student understands: 1. Air conditioning systems	Air conditioning systen (types and selection) and relation with occupant’ activities.	A theoretical and a practical lecture	Weekly exams, and post questions
17-18	2 theoretical + 2 practic	The student understands: 1. All air systems	All air systems, design features, advantages,	A theoretical and a practical	Weekly exams, and post

			disadvantages, comparat study with other system and psychometric char	lecture	questions
19	2 theoretical + 2 practica	The student understands: 1. Air conditioning syste	Single zone system (varia volume constant tempera and variable temperatu constant volume), comparative study (cost a performance) , psychome chart.	A theoretical and a practical lecture	Weekly exams, and post questions
20	2 theoretical + 2 practica	The student understands: 1. Dual conduit systems	Dual conduit system, mu zone system comparativ study, psychometric cha	A theoretical and a practical lecture	Weekly exams, and post questions
21	2 theoretical + 2 practica	The student understands: 1. Air –water systems	Air –water systems (typ design, features, advantag disadvantages, comparat study with other system psychometric chart.	A theoretical and a practical lecture	Weekly exams, and post questions
22	2 theoretical + 2 practica	The student understands: 1. Induction unit systems	Induction unit systems (study, design, types, ar controls).	A theoretical and a practical lecture	Weekly exams, and post questions
23	2 theoretical + 2 practica	The student understands: 1. All –water systems	All –water systems, cont performance, design an applications.	A theoretical and a practical lecture	Weekly exams, and post questions
24	2 theoretical + 2 practica	The student understands: 1. Fan –coil unit	Fan –coil unit systems ,a primary air and fan –co system (comparative stu ,design and control)	A theoretical and a practical lecture	Weekly exams, and post questions
25	2 theoretical + 2 practica	The student understands: 1. Dx –systems 2. package system	Dx –systems, package system, control and applications.	A theoretical and a practical lecture	Weekly exams, and post questions
26	2 theoretical + 2 practica	The student understands: 1. Energy conservation	Energy conservation in conditioning systems.	A theoretical and a practical lecture	Weekly exams, and post questions
27	2 theoretical + 2 practica	The student understands: 1. Heat recovery systems	Heat recovery systems.	A theoretical and a practical lecture	Weekly exams, and post questions
28	2 theoretical + 2 practica	The student understands: 1. Heat pump system	Heat pump system for air conditioning system.	A theoretical and a practical lecture	Weekly exams, and post questions
29-30	2 theoretical + 2 practica	The student understands: 1. Evaluations air conditioning systems 2. Analysis air conditioni systems	evaluations and commerc analysis for air conditioni systems.	A theoretical and a practical lecture	Weekly exams, and post questions

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	

Course Description Form

1. Course Name:
Computer Applications 3
2. Course Code:
MPAC404
3. Semester / Year:
Annual(2024-2025)
4. Description Preparation Date:
The beginning of the academic calendar for the year (2024-2025)
5. Available Attendance Forms:
Theoretical and Practical Classes
6. Number of Credit Hours (Total) / Number of Units (Total)
(30 hours theoretical +60 hours practical) (90) hours/ Number of Units (4)
7. Course administrator's name (mention all, if more than one name)
Name: Assist. Lech. Hussein Ali Jaffar Email: hussein.a.j@gmail.com
8. Course Objectives

Course Objectives	**AutoCAD 3d course teaches students to create basic 2D and 3D drawings using drawing and editing tools, organizes drawing objects on solids, basic dimensions, and prepares to plot. This course is designed for Mechanival Engineers.**

9. Teaching and Learning Strategies

Strategy	AutoCAD 3D certificate goal is to educate individuals on extra-advanced functions, the strategy, how to design and model items in the 3D design software program, enveloping surface areas, and solids in visualizing engineering designs.

10. Course Structure

	Material Covered
Week 1	Introduction to AutoCAD -3D, workspace, visual style, 3d views, view ports, right hand rule, world coordinate and user coordinate systems and types of coordinate systems. 3D solids (box, wedge and cylinder).
Week 2	3D solids (cone and tours). 3D solids (sphere and pyramid).
Week 3	Examples to 3D solids. Basic solid editing (union, subtract and intersect) with examples.
Week 4	Fillet and chamfer with applied examples. 3D operations (3d move and 3d rotate) with examples.
Week 5	3D operations (3d align and 3d mirror) with examples. 3D operations (3d array and slice) with examples.

Week 6	More applied examples. User coordinate system (origion, face and objects) with examples.
Week 7	User coordinate system (view, world ,x-y-z) with examples. User coordinate system (z-axis and 3 points) with examples.
Week 8	Advanced 3d commands (extrude and loft) with examples.
Week 9	Advanced 3d commands (revolve, sweep) with examples. Advanced 3d commands (presspull and section plane) with examples.
Week 10	Advanced solid editing/face (extrude, move,rotate and offest).
Week 11	Advanced solid editing/face (taper, delete, copy, color, material, undo and exit).
Week 12	Applied examples. Advanced solid editing/edge (copy and color).
Week 13	Advanced solid editing/body (imprint, separate, shell, clean and check).
Week 14	Surface (box, cone, dome and mesh). surface (pyramid and sphere)
Week 15	surface (torus and wedge) with examples.

11. 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

12. Learning and Teaching Resources

Main references (sources)	Autocad user manual
Recommended books and references (scientific journals, reports…)	Introduction to AutoCAD **2022**
Electronic References, Websites	https://help.autodesk.com/view/ACD/2022/ENU/

Course Description Form

1. Course Name:
Industrial engineering and quality control
2. Course Code:
MPAC405
3. Semester / Year:
Yearly (2024-2025)
4. Description Preparation Date:
The beginning of the academic calendar for the year (2024-2025)
5. Available Attendance Forms:
Weekly / theoretical + practical
6. Number of Credit Hours (Total) / Number of Units (Total)
(60 theoretical hours + 30 practical hours) 90 hours / 5 units
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Hussein salim Email: hussein.kt@uowa.edu.iq

8. Course Objectives

Course Objectives	1. Identify the stages of industrial engineering development. 2. Studying the plant selection and plant location. 3. Studying the production planning using operation research. 4- studying the statistical methods used in quality control. 5- controlling production process by designing and using quality control charts.

9. Teaching and Learning Strategies

Strategy	1. Lectures (power point) 2. Use of weight board.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st week	2 Theoretical	The student understands the subject	Introduction to industrial engineering.	Theoretical	quiz
2-3	2 Theoretical	The student understands the subject	Using operation research in	Theoretical	quiz

			production planning (linear programming methods).		
4-5	2 Theoretical	The student understands the subject	Using operation research in production planning (simplex programming method).	Theoretical	quiz
6	2 Theoretical	The student understands the subject	Selection of plant location	Theoretical	quiz
7-8	2 Theoretical	The student understands the subject	Plant layout	Theoretical	quiz
9-10	2 Theoretical	The student understands the subject	Motion and time study	Theoretical	quiz
11-12	2 Theoretical	The student understands the subject	Feasibility study	Theoretical	quiz
13-14	2 Theoretical	The student understands the subject	Maintenance and replacement	Theoretical	quiz
15-16	2 Theoretical	The student understands the subject	Resources management	Theoretical	quiz
17-18	2 Theoretical	The student understands the subject	Definition and introduction to quality control	Theoretical	quiz
19-20	2 Theoretical	The student understands the subject	0bjectives and functions of quality control	Theoretical	quiz
21-22	2 Theoretical	The student understands the subject	Economics of quality control	Theoretical	quiz
23-24	2 Theoretical	The student understands the subject	Statistic principles	Theoretical	quiz
25-26	2 Theoretical	The student understands the subject	Quality control charts	Theoretical	quiz
27-28	2 Theoretical	The student understands the subject	Probability theory and using in QC	Theoretical	quiz
29	2 Theoretical	The student understands the subject	Probability distributions	Theoretical	quiz
30	2 Theoretical	The student understands the subject	Sampling programs and inspection by samples	Theoretical	Quiz
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					
Learning and Teaching Resources	Introduction to industrial engineering				
Required textbooks (curricular books, if any)	Production planning and control				
Main references (sources)	0peration research				
Recommended books and references (scientific journals, reports…)	https://highperformancehvac.com/industrail engineering, operation research and production planning.				
Electronic References, Websites	https://highperformancehvac.com/control-circuits-for-hvac-systems/				
11.					

12.	

Course Description Form

1. Course Name:
Power Plants
2. Course Code:
MPAC402
3. Semester / Year:
Annual System 2024/2025
4. Description Preparation Date:
The beginning of the academic calendar for the year (2024−2025)
5. Available Attendance Forms:
3 hours/week - “theoretical + Practical”
6. Number of Credit Hours (Total) / Number of Units (Total)
(60 theoretical hours + 30 practical hours) 90 hours / 5 units
7. Course administrator's name (mention all, if more than one name)
Name: Raoof Mohammed Radhi Email: raof@uowa.edu.iq
8. Course Objectives
Teaching the student, the steam properties, thermal processes types of boilers fuels and combustion the turbines which needed in air conditioning
9. Teaching and Learning Strategies
Strategy Data show lecture with discussion to ensure understanding Video clip during lectures for respective clarification Strong emphasis on scientific visits to related sites Example solving with students participation Tutorial sheet solution as Home work Frequent quizzes to motivate student Lab exam Encourage student to attend seminars & discussion work-shops Students seminars Serious attention for class attendance to reduce “% absences”
10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

1 - 4	8-8	Student Understanding The lecture	Plant Steam Cycles, M Cycles, Reheat Cy Regenerative Cycle, C Feed Water Heater, Clo Feed Water Heater, Combi Cycles, Binary Cycle Work on Mercury and Ste Combined Condenser.	Theoretical And practical	Weekly Quiz and Lab report
6-5	4-4	Student Understanding The lecture	Introduction to H Exchangers, Theoret Principles, Parallel Flow H Counter Flow H.E, Cross F H.E, The Log M Temperature Differe Method, The NTU Meth Shell and Tubes H Condensing, Evaporation.	Theoretical And practical	Weekly Quiz and Lab report
7-11	10-10	Student Understanding The lecture	Steam Boilers, Kinds, Burn Air Preheated, Preheated Superheated, Combustion Fuels, Complete Incomplete Combust Correct Air/Fuel Ratio, Ac Air Supplied, Heat Generat Boiler Efficiency, pi principle.	Theoretical And practical	Weekly Quiz and Lab report
12-14	6-6	Student Understanding The lecture	Steam Condensers, Ki Direct Contact Condens Surface Condenser, Design Manufacturing, Efficiency the Condensers.	Theoretical And practical	Weekly Quiz and Lab report
15-16	4-4	Student Understanding The lecture	Steam Nozzles, Applicati Steam Expansion, Discha Velocity of Steam Thro Nozzles, Values of Cri Pressure, Diameters of Th and Exit for Maximum	Theoretical And practical	Weekly Quiz and Lab report
17-18	4-4	Student Understanding The lecture	Turbo-Machinery, Classification, Princ Theory, Dimension Numbers.	Theoretical And practical	Weekly Quiz and Lab report
19-22	8-8	Student Understanding The lecture	The Pumps, Kinds of Pur System Characteristics, Pu Characteristics, Matc Pumps to Sys Characteristics, Operation Pumps in series and Para Centrifugal pumps, Hydraulic Characteris Cavitation	Theoretical And practical	Weekly Quiz and Lab report
23-28	12-12	Student Understanding The lecture	Steam Turbines, The Ki Impulse Turbine, Bl Efficiency, Reaction Turb Reaction Ratio, Installat Multi Stage Blades Velocity Triangles, Blades Guidance, The Blades ,External Guidance,	Theoretical And practical	Weekly Quiz and Lab report
29-30	4-4	Student	Power Plants Systems, Feed	Theoretical	Weekly

		Understanding The lecture	Water Cycle, Water Treatm and Testing, Piping Syste Valves, Globe Valve, C Valve, Chick Valve, Spe Valves, Safety Valves, Cor Systems, Blow Measurement instruments, Goal of Measureme Classifications, Tempera Measurements, Pres Measurements, Discha Measurements, Gas Analy Velocity Measurements, L Recorder, Electr Measurements	And practical	Quiz and Lab report

11. 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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	A Textbook of Thermal Engineering" . by R.S. KHURMY and J.K. GUPTA
Main references (sources)	Engineering an Thermodynamics" Approach "fifth edition by YUNUS A.CENGEL
Recommended books and references (scientific journals, reports…)	Applied Thermodynamics Onkar - Singh 3rd_Edition
Electronic References, Websites	1- WWW.B-OK.ORG 2- WWW.BOOKFI.ORG