Course Description Form

1. Course Name:
Mechanical Design
2. Course Code:
MPAC305
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:
Weekly Theoretical and practical lectures
6. Number of Credit Hours (Total) / Number of Units (Total)
(90 theoretical and 30 practical) 120 hours/ 5 unit
7. Course administrator's name (mention all, if more than one name)
Name: Asst. Lect. Riyam Abd-Alrazaq Salman Email: riyam.a@uowa.edu.iq
8. Course Objectives

Course Objectives	-Learning the design process of mechanical -To improve competence in multi-axis stress analysis. - To obtain a knowledge in the use of the proper failure theories under steady and variable loadings. -To develop the design skills of mechanical components under steady and variable loadings. - To be able to solve open-ended design problems, cope with decision making and satisfy competing objectives. -. Use and integrate the fundamentals studied previously towards the goal of analyzing and designing mechanical components to achieve satisfactory levels of safety and life.

9. Teaching and Learning Strategies	
Strategy	Assessment is based on hand-in assignments, Written exam, Quizzes, Tutorial, Seminars, Reports.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1,2	6	Student understanding of the lecture	Simple Stresses in Machine Parts	Theoretical and practical lectures, scientific films, paper and electronic books	Daily and weekly tests, daily attendance, monthly tests, reports
3,4	6	Student understanding of the lecture	Engineering Materials and their Properties		
5,6	6	Student understanding of the lecture	Variable Stresses in Machine Parts		
7,8	6	Student understanding of the lecture	Combined Steady and Variable Stresses		
9,10	6	Student understanding of the lecture	Screwed Joints		
11	3	Student understanding of the lecture	Riveted Joints		
12,13	6	Student understanding of the lecture	Welded Joints		
14,15	6	Student understanding of the lecture	Power Screws design		

16,17 18	9	Student understanding of the lecture	Shafts design Key and coupling		
19	3	Student understanding of the lecture	Cotter joint		
20	3	Student understanding of the lecture	Knuckle joint		
21	3	Student understanding of the lecture	Clutches and brakes		
22,23	6	Student understanding of the lecture	Bearing design		
24,25	6	Student understanding of the lecture	Design of sliding bearing		
26,27	6	Student understanding of the lecture	Pressure vessels and pipes		
28	3	Student understanding of the lecture	Gears design		
29,30	6	Student understanding of the lecture			

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	Machine Design - Khurmi
Main references (sources)	Machine Design - Khurmi
Recommended books and references (scientific journals, reports...)	- Design Of Machine Elements By Shishleys. Machine Design.
Electronic References, Websites	

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 theoretical + 60 practical) 150 hours /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 + 2 practical	The student understand the lesson	Introduction, methods of heat transfer ,thermal equilibrium equation.	A theoretical and practical lectures	Weekly exams

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 effectiven 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 membrane condensation (for a vertical surface, for inclined surface, for a horizo surface, for a horizontal ball	A theoretical and practical lectures	Weekly exams, pre and post questions

			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)

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:
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 + 30 hrs. practical) 90 hours /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, typ pump selections, design water distribution syster 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 fo	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 nonfreezir 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 comparativ 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, HACCI 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 desigr 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 syster	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	

Course Description Form

1. Course Name:

English language – Third class

2. Course Code:

MPAC308

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:

Weekly

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

30 hrs. (theoretical) / 2 units

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

Name: Asst. Lect. NoorUlhuda Salam Ahmed
Email: nooralhuda.salam@uowa.edu.iq

8. Course Objectives

Course Objectives	**Introducing the student to the importance of learning the English language it is the language of communication between engineers of different nationali through lectures, discussions and dialogues between students.**

9. Teaching and Learning Strategies

Strategy	

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	1	The student sh understand the less	Introduction - Textbook - Make a written test	Theoretical	Daily tests and monthly
2	1	The student sh understand the less	Hello	Theoretical	Daily tests and monthly
3	1	The student sh understand the less	Complement the unit	Theoretical	Daily tests and monthly
4	1	The student sh understand the less	All about you	Theoretical	Daily tests and monthly

5	1	The student sho understand the less	Complement the unit	Theoretical	Daily tests and monthly
6	1	The student sho understand the less	Family and friend	Theoretical	Daily tests and monthly
7	1	The student sho understand the less	Complement the unit	Theoretical	Daily tests and monthly
8	1	The student sho understand the less	The way I live	Theoretical	Daily tests and monthly
9	1	The student sho understand the less	Complement the unit	Theoretical	Daily tests and monthly
10	1	The student sho understand the less	Every day	Theoretical	Daily tests and monthly
11	1	The student sho understand the less	Complement the unit	Theoretical	Daily tests and monthly
12	1	The student sho understand the less	My favorites	Theoretical	Daily tests and monthly
13	1	The student sho understand the less	Complement the unit	Theoretical	Daily tests and monthly
14	1	The student sho understand the less	Times present	Theoretical	Daily tests and monthly
15	1	The student sho understand the less	Complement the unit	Theoretical	Daily tests and monthly
16	1	The student sho understand the less	Present simple	Theoretical	Daily tests and monthly
17	1	The student sho understand the less	Complement the unit	Theoretical	Daily tests and monthly
18	1	The student sho understand the less	Present continuous	Theoretical	Daily tests and monthly
19	1	The student sho understand the less	Complement the unit	Theoretical	Daily tests and monthly
20	1	The student sho understand the less	Present perfect	Theoretical	Daily tests and monthly
21	1	The student sho understand the less	Complement the unit	Theoretical	Daily tests and monthly
22	1	The student sho understand the less	Present perfect continuous	Theoretical	Daily tests and monthly
23	1	The student sho understand the less	Complement the unit	Theoretical	Daily tests and monthly
24	1	The student sho understand the less	Testing	Theoretical	Daily tests and monthly
25	1	The student sho understand the less	Complement the unit	Theoretical	Daily tests and monthly
26	1	The student sho understand the less	Testing	Theoretical	Daily tests and monthly
27	1	The student sho understand the less	Complement the unit	Theoretical	Daily tests and monthly
28	1	The student sho understand the less	Seminar	Theoretical	Daily tests and monthly

29	1	The student sho understand the less	Conservation	Theoretical	Daily tests and monthly
30	1	The student sho understand the less	Conservation	Theoretical	Daily tests and monthly

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 (curricu books, if any)	
Main references (sources)	Headway Plus Pre-Intermediate
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name:
Engineering and Numerical Analysis
2. Course Code:
MPAC300
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:
Weekly Theoretical
6. Number of Credit Hours (Total) / Number of Units (Total) :
90 hours / 6 units
7. Course administrator's name (mention all, if more than one name)
Name: Ali Muselm Email: ali.muslim@uowa.edu.iq
8. Course Objectives

Course Objectives	This course aims to provide a good knowledg the students about the Engineering a numerical analysis with understand the basis solutions and their application in differ branches of engineering / mechanical, mater Civil and power

9. Teaching and Learning Strategies	
Strategy	1. Understand the methods of solutions for first, second and high orders differential equations and their engineering applications. 2. Understand the types and method of solution for Fourier Series and their engineering applications. 3. Understand the methods of solution by Laplace transformation and their applications. 4. Understand the methods of solution for partial differential equation and their engineering application. 106 5. Understand the numerical methods for solving linear and non-linear equations and their engineering applications. 6. Understand the numerical methods for solving the differential equations and their engineering applications.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st week	**4**	The student understands subject	First order differer equations, Special cases	Theoretical	Assignment and c

			first order D.E and t engineering		
2nd week	**4**	The student understands subject	applications.	Theoretical	Assignment and q
3rd week	**4**	The student understands subject	Second order linear equa with constant coefficients their engineering applicatio	Theoretical	Assignment and q
4th week	**4**	The student understands subject	High order linear differer equations , Integral opera and their enginee applications.	Theoretical	Assignment and q
5th week	**4**	The student understands subject	Fourier series, even and functions and their enginee applications.	Theoretical	Assignment and q
6th week	**4**	The student understands subject	Laplace transformat Inverse Lap transformation, Lap transformation to solution	Theoretical	Assignment and q
7th week	**4**	The student understands subject	differential equations and t engineering applications.	Theoretical	Assignment and q
8th week	**4**	The student understands subject	Partial differential equati solution by separation met and their enginee applications.	Theoretical	Assignment and q
9th week	**4**	The student understands subject	Nonlinear equations solut Simple Iteration, New Raphson, finite differe methods.	Theoretical	Assignment and q
10th weel	**4**	The student understands subject	Solution of simultane linear equations, Direct Indirect methods	Theoretical	Assignment and q
11th weel	**4**	The student understands subject	10 Interpolation by Lagran and Newton methods.	Theoretical	Assignment and q
12th weel	**4**	The student understands subject	Curves fitting analysis Newton method.	Theoretical	Assignment and q
13th weel	**4**	The student understands subject	Numerical integrat complex numerical integra and their applications.	Theoretical	Assignment and q
14th weel	**4**	The student understands subject	Numerical method to s partial differential equat by separation method.	Theoretical	Assignment and q
15th weel	**4**	The student understands subject	Numerical method to s differential equations by Ra Kotta and Power series.	Theoretical	Assignment and q
16th weel	**4**	The student understands subject	Newton-Raphson method	Theoretical	Assignment and q
17th weel	**4**	The student understands subject	finite difference method	Theoretical	Assignment and q
18th weel	**4**	The student understands subject	Interpolation	Theoretical	Assignment and q
19th weel	**4**	The student understands subject	Lagrangian method	Theoretical	Assignment and q
20th weel	**4**	The student understands subject	Solution of simultane linear equations.	Theoretical	Assignment and q
21st week	**4**	The student understands subject	Direct methods. Indi methods	Theoretical	Assignment and q
22nd wee	**4**	The student understands subject	Numerical integrat Complex numer integration, applications	Theoretical	Assignment and q

23rd wee	**4**	The student understands subject	Curves fitting analysis	Theoretical	Assignment and q
24th weel	**4**	The student understands subject	Newton method	Theoretical	Assignment and q
25th weel	**4**	The student understands subject	Numerical method to s differential equations	Theoretical	Assignment and q
26th week	**4**	The student understands subject	Rang-Kotta method	Theoretical	Assignment and q
27th week	**4**	The student understands subject	Power series method	Theoretical	Assignment and q
28th week	**4**	The student understands subject	Exponential equations	Theoretical	Assignment and q
29th week	**4**	The student understands subject	Frobinous method	Theoretical	Assignment and q
30th week	**4**	The student understands subject	Preparatory week before final Exam	Theoretical	Assignment and q

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- Advanced Engineering Mathematics, Erwin Kreysz John Wiley & Sons, Inc. - 2- Advanced Engineering Mathematics, Peter V. O'N Thomson Brooks/Cole – 3- Advanced Engineering Mathematics, A.B. Mathur & Y Jaggi, Khanna Publishers – 4- Advanced Engineering Mathematics, Wyle Barrett /t edition.
Main references (sources)	1- Numerical Methods for Scientists and Engine R.w. Hamming knowledge. – 2- 2- Numerical Analysis, Richard L. Burden & Douglas Faires.
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name:
Computer Application II
2. Course Code:
MPAC301
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:
Weekly 3 hours (theoretical + practical)
6. Number of Credit Hours (Total) / Number of Units (Total)
(30 theoretical hours + 60 practical hours)90 hours/4 units
7. Course administrator's name (mention all, if more than one name)
Name: Asst. Lect. Saja Abdul Hamza Email: saja.abdulhamza@uowa.edu.iq
8. Course Objectives

Course Objectives	1. The ability to keep pace with scientific and technical modernity 2. Demonstrate the student's ability to use knowledge to prepare scientific and applied research. 3. The ability to think to extract engineering solutions to problems related to air conditioning systems. 4. The ability to use electronic programs to solve problems with air conditioning systems. 5. Teaching leadership skills, the value and quality of commitment, love of work and loyalty to it

9. Teaching and Learning Strategies	
Strategy	Explaining the lesson material in a clear manner to the student, th working on applying the explanations on the computer. Involving the student in the lecture and explaining the available wo possibilities and the various applications of this program.

10. Course Structure

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

1 2 3 4	3	Student understanding of the lecture	Gear connection: - Nuts - Bolts - Al-Washrat	Daily and weekly testing	Theoretical and practical lecture
5	3	Student understanding of the lecture	Transmission shafts of all kinds,	Daily and weekly testing	Theoretical and practical lecture
6	3	Student understanding of the lecture	drawing Cylinder	Daily and weekly testing	Theoretical and practical lecture
7	3	Student understanding of the lecture	Multi-section transmission shaft	Daily and weekly testing	Theoretical and practical lecture
8	3	Student understanding of the lecture	Gears	Daily and weekly testing	Theoretical and practical lecture
9	3	Student understanding of the lecture	Al-Dashli	Daily and weekly testing	Theoretical and practical lecture
10	3	Student understanding of the lecture	The Sandpaper	Daily and weekly testing	Theoretical and practical lecture
11	3	Student understanding of the lecture	Fillet	Daily and weekly testing	Theoretical and practical lecture
12	3	Student understanding of the lecture	Transmission shaft accessories	Daily and weekly testing	Theoretical and practical lecture
13	3	Student understanding of the lecture	Rolling supports	Daily and weekly testing	Theoretical and practical lecture
14	3	Student understanding of the lecture	Pipes (peripheral and central)	Daily and weekly testing	Theoretical and practical lecture
15	3	Student understanding of the lecture	Leakage contraindications	Daily and weekly testing	Theoretical and practical lecture
16	3	Student understanding of the lecture	Bush: Assembly drawing exercise	Daily and weekly testing	Theoretical and practical lecture
17-21	3	Student understanding of the lecture	Springs: - Compressive - Stretching - Torsional	Daily and weekly testing	Theoretical and practical lecture
22-23	3	Student understanding of the lecture	Assembly drawing exercise	Daily and weekly testing	Theoretical and practical lecture
24-25	3	Student understanding	Threshold clips	Daily and weekly testing	Theoretical and practical lecture

		of the lecture			
26	3	Student understanding of the lecture	the accounts	Daily and weekly testing	Theoretical and practical lecture
27	3	Student understanding of the lecture	Moment of inertia	Daily and weekly testing	Theoretical and practical lecture
28	3	Student understanding of the lecture	Assembly drawing exercise	Daily and weekly testing	Theoretical and practical lecture
29-30	3	Student understanding of the lecture	Tenderness	Daily and weekly testing	Theoretical and practical lecture

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 any)	Engineering Design and Graphics with SolidWorks® by James D. Bethune
Main references (sources)	Engineering Design and Graphics with SolidWorks® by James D. Bethune
Recommended books and references (scientific journals, reports…)	Engineering Design and Graphics with SolidWorks® by James D. Bethune
Electronic References, Websites	https://youtube.com/@mohammedalzubaidy7979?si=GcMp-LCnajh8ZJec

Course Description Form

1. Course Name:
Air Conditioning systems Drawing
2. Course Code:
MPAC309
3. Semester / Year:
Annual
4. Description Preparation Date:
The beginning of the academic calendar for the year (2024-2025)
5. Available Attendance Forms:
Official working hours of 3 practical hours
6. Number of Credit Hours (Total) / Number of Units (Total)
(90 practical) (90) Hours / Number of Units (2)
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	**1. To enable and qualify the student to understand the architectural plans and their sections.** **2. To draw and understand the mechanical layouts of the ducting network for ventilation.** **3. To provide the ability to draw the piping network of the central air conditioning systems with all the necessary accessories of valves, fittings and sensors.** **4. To draw the detail drawings of the air conditioning devices of fan coil units, chillers, boilers, air handling units, and cooling towers.** **5. To design VRF systems for selective AC companies.** **6. To understand the electrical and control diagrams of the air conditioning systems.**

9. Teaching and Learning Strategies	
Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises. This will be achieved through classes, interactive tutorials and by considering some simple real projects as well as site visiting for finished and ongoing projects.
10. Course Structure	

	Material Covered
Week 1	Making site survey
Week 2	Draw architectural plans
Week 3	Draw elevation plans
Week 4	Cooling load estimation
Week 5	Specify the required ventilation
Week 6	Package units, fan coil units and AHUs selection
Week 7	Design ducting network by Duct Sizer
Week 8	Drawing ducting network
Week 9	Midterm Exam
Week 10	Chillers, boilers, cooling towers and pumps selection
Week 11	Design piping system by Pipe Sizer
Week 12	Drawing the piping system
Week 13	VRV/VRF system design and drawing
Week 14	Drawing the electrical and control diagram of central air conditioning system
Week 15	Drawing the electrical and control diagram of VRV/VRF systems

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)	2021 ASHRAE handbook. Fundamentals
Recommended books and references (scientific journals, reports…)	Design manual for heating, ventilation and air conditioning with coordinated standard details: Lee Kendrick, Julian C. Gonzalez,1986
Electronic References, Websites	Principles of heating, ventilating, and air conditioning: a textbook with design data based on the 2021 ASHRAE handbook--Fundamentals

نموذج وصف المقرر

١. اسم المقرر	
صيانة انظمة تكييف الهواء/مرحلة ثالثة	
٢. رمز المقرر	
MPAC410	
٣. الفصل / السنة	
سنوي	
٤. تاريخ اعداد هذا الوصف	
بداية التقويم الدراسي للعام الدراسي (2024-2025)	
٥. اشكال الحضور المتاحة	
دوام رسمي بواقع 3 ساعات اسبوعيا / نظري و عملي	
٦. عدد الساعات الدراسية (الكلي)/عدد الوحدات (الكلي)	
(30 ساعه نظري +60 ساعة عملي) 90 ساعة /4 وحدات	
٧. اسم مسؤول المقرر الدراسي (اذا اكثر من اسم يذكر)	
الاسم : م.م. امين سامي امين aminsami2000@yahoo.com	
٨. اهداف المقرر	
اهداف المادة الدراسية	• دراسة صيانة جميع أنواع أنظمة التبريد. • تعريف الطالب بكافة المواضيع الأساسية لهذا المقرر الجانب النظري والجانب العملي. • يقدم نظريات وعمليات نظام التدفئة وتكييف الهواء. يشمل الخدمة واختبار وإصلاح أنظمة تكييف الهواء والتهوية والسخان وتبريد المحرك
٩. استراتيجيات التعليم والتعلم	
استراتيجية	١- يعتمد التقييم على المهام اليدوية والامتحانات الكتابية والاختبارات والتقارير والاختبار العملي والاختبار عبر الإنترنت.

١٠. بنية المقرر

الأسبوع	الساعات	مخرجات التعلم المطلوبة	اسم الوحدة او الموضوع	طريقة التعلم	طريقة التقييم
الاول	1 نظري + 3 عملي	الطالب يفهم الموضوع	Introduction to Control Systems, Open and Closed Systems.	نظري + عملي	quiz
الثاني	1 نظري + 3 عملي	الطالب يفهم الموضوع	Introduction to Control Systems, Open and Closed Systems.	نظري + عملي	quiz
الثالث	1 نظري + 3 عملي	الطالب يفهم الموضوع	Mathematical Modeling of Physical Systems and Transfer Functions, Mathematical Modeling of D.C. Servo Motor.	نظري + عملي	quiz
الرابع	1 نظري + 3 عملي	الطالب يفهم الموضوع	Mathematical Modeling of Physical Systems and Transfer Functions, Mathematical Modeling of D.C. Servo Motor.	نظري + عملي	quiz
الخامس	1 نظري + 3 عملي	الطالب يفهم الموضوع	Mathematical Modeling of Physical Systems and Transfer Functions, Mathematical Modeling of D.C. Servo Motor.	نظري + عملي	quiz
السادس	1 نظري + 3 عملي	الطالب يفهم الموضوع	Mathematical Modeling of Physical Systems and Transfer Functions, Mathematical Modeling of D.C. Servo Motor.	نظري + عملي	quiz
السابع	1 نظري + 3 عملي	الطالب يفهم الموضوع	Block Diagrams.	نظري + عملي	quiz
الثامن	1 نظري + 3 عملي	الطالب يفهم الموضوع	Block Diagrams.	نظري + عملي	quiz

التاسع	1 نظري + 3 عملي عملي	الطالب يفهم الموضوع	Time Domain Analysis of Closed Loop Control Systems and Error Analysis.	نظري + عملي	quiz
العاشر	1 نظري + 3عملي	الطالب يفهم الموضوع	Time Domain Analysis of Closed Loop Control Systems and Error Analysis.	نظري + عملي	quiz
الحادي عشر	1 نظري + 3 عملي	الطالب يفهم الموضوع	P, PI, PD, and PID Modes of Feedback Control, Realization of PID Controller Using Active and Passive Elements.	نظري + عملي	quiz
الثاني عشر	1 نظري + 3 عملي عملي	الطالب يفهم الموضوع	P, PI, PD, and PID Modes of Feedback Control, Realization of PID Controller Using Active and Passive Elements.	نظري + عملي	quiz
الثالث عشر	1 نظري + 3عملي	الطالب يفهم الموضوع	Stability Analysis and Rouths Stability Criterion.	نظري + عملي	quiz
الرابع عشر	1 نظري + 3 عملي عملي	الطالب يفهم الموضوع	Stability Analysis and Rouths Stability Criterion.	نظري + عملي	quiz
الخامس عشر	1 نظري + 3عملي	الطالب يفهم الموضوع	Root Locus Technique.	نظري + عملي	quiz
السادس عشر	1 نظري + 3عملي	الطالب يفهم الموضوع	Root Locus Technique.	نظري + عملي	quiz
السابع عشر	1 نظري + 3عملي	الطالب يفهم الموضوع	Root Locus Technique	نظري + عملي	quiz
الثامن عشر	1 نظري + 3عملي	الطالب يفهم الموضوع	Analysis of Control System in Frequency Domain and Bode Diagrams.	نظري + عملي	quiz

التاسع عشر	1 نظري + 3 عملي	الطالب يفهم الموضوع	Analysis of Control System in Frequency Domain and Bode Diagrams.	نظري + عملي	quiz
العشرون	1 نظري + 3 عملي	الطالب يفهم الموضوع	Analysis of Control System in Frequency Domain and Bode Diagrams.	نظري + عملي	quiz
الحادي والعشرون	1 نظري + 3 عملي	الطالب يفهم الموضوع	Design of Control Systems and Compensation concepts.	نظري + عملي	quiz
الثاني و عشرون	1 نظري + 3 عملي	الطالب يفهم الموضوع	Control System Design Using Root Locus Method.	نظري + عملي	quiz
الثالث والعشرون	1 نظري + 3 عملي	الطالب يفهم الموضوع	Control System Design Using Root Locus Method.	نظري + عملي	quiz
الرابع والعشرون	1 نظري + 3 عملي	الطالب يفهم الموضوع	Control System Design Using Root Locus Method.	نظري + عملي	quiz
الخامس والعشرون	1 نظري + 3 عملي	الطالب يفهم الموضوع	Control System Design Using Root Locus Method.	نظري + عملي	quiz
السادس والعشرون	1 نظري + 3 عملي	الطالب يفهم الموضوع	Control System Design Using Bode Diagrams.	نظري + عملي	quiz
السابع و العشرون	1 نظري + 3 عملي	الطالب يفهم الموضوع	Control System Design Using Bode Diagrams.	نظري + عملي	quiz
الثامن والعشرون	1 نظري + 3 عملي	الطالب يفهم الموضوع	Control System Design Using Bode Diagrams.	نظري + عملي	quiz
التاسع والعشرون	1 نظري + 3 عملي	الطالب يفهم الموضوع	Control System Design Using Bode Diagrams.	نظري + عملي	quiz

الثلاثون	1 نظري + 3 عملي	الطالب يفهم الموضوع	Definitions of Non Linear Systems.	نظري + عملي	quiz

١. 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	
٢. مصادر التعلم والتدريس	
الكتب المقررة المطلوبة (المنهجية أن وجدت)	frigeration and air conditioning Technology
المراجع الرئيسة (المصادر)	ɔdren refrigeration and airconditioning maintenance
الكتب والمراجع الساندة التي يوصى بها (المجلات العلمية , التقارير .....)	
المراجع الاكترونية , مواقع الانترنيت	

Course Description Form

1. Course Name:

Theory of machine and vibration

2. Course Code:

WAR-30-04

3. Semester / Year:

third stage/yearly

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 theoretical+ 30 hours practical)90 hours/ 5 units

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

Name: lec. Ali hammoudi Alwazir
Email: ali.ham@uowa.edu.iq

8. Course Objectives

Course Objectives	To develop students' fundamental knowledge and insight into the theory of machines, balancing of rotating masses, theory of gears, governors, cams, belts, free vibrations and damped vibration to be used in machines design

9. Teaching and Learning Strategies

Strategy	Assessment is based on hand-in assignments, Written exam, Quizzes, Tutorial, Seminars, Reports

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st week	3 Theoretical + 1practical.	The student understands the subject	Introduction and Definition. Graphical Representation of Displacement, velocity and acceleration with respect time. Solved problems	Theoretical + practical	quiz

2nd week	3 Theoretical + 1 practical	The student understands the subject	Velocity in mechanisms	Theoretical + practical	quiz
3rd week	3 Theoretical + 1 practical	The student understands the subject	Solved problems for velocity in mechanisms. Acceleration in mechanisms	Theoretical + practical	quiz
4th week	3 Theoretical + 1practical	The student understands the subject	Accelerations in slider crank mechanisms. Solved problems for acceleration in mechanisms	Theoretical + practical	quiz
5th week	3Theoretical + 1 practical	The student understands the subject	Balancing of rotating masses. Balancing of a single rotating mass by a single mass rotating in the same plane. Balancing of a single rotating mass by two masses rotating in different planes. Balancing of several masses rotating in the same plane. (a) Analytical method. (b) Graphical method	Theoretical + practical	quiz
6th week	3 Theoretical + 1 practical	The student understands the subject	Balancing of several masses rotating in different planes. Solved problems	Theoretical + practical	quiz
7th week	3Theoretical + 1 practical	The student understands the subject	Classification of gears, spur gears, velocity ratio (gear ratio). Center to center distance	Theoretical + practical	quiz
8th week	3 Theoretical +1practical	The student understands the subject	Gear trains, velocity ratio of simple gear trains, velocity ratio of compound gear trains, solved problems	Theoretical + practical	quiz
9th week	3 Theoretical + 1 practical	The student understands the subject	Epicyclical gear trains, simple epicyclical gear trains	Theoretical + practical	quiz
10th week	3 Theoretical +1 practical	The student understands the subject	Compound epicyclical gear trains	Theoretical + practical	quiz
11th week	3 Theoretical + 1practical	The student understands the subject	Solved problems	Theoretical + practical	quiz

12th week	3 Theoretical + 1practical	The student understands the subject	Types of governors, watt governor, solved problems	Theoretical + practical	quiz
13th week	3 Theoretical +1 practical	The student understands the subject	Porter governor: (a) Equilibrium method. (a) Instantaneous center	Theoretical + practical	quiz
14th week	3 Theoretical + 1 practical	The student understands the subject	Proell governor, Hartnell governor, solved problems	Theoretical + practical	quiz
15th week	3 Theoretical + 1 practical	The student understands the subject	Types of belts, types of flat belt drive, selection of belt drive. Velocity ratio of open belt drive. Effect of belt thickness on Velocity ratio, slip of the belt. Creep of the belt	Theoretical + practical	quiz
16th week	3 Theoretical + 1practical	The student understands the subject	Velocity ratio of a compound belt drive. Length of belt. (a)Open belt. (b)Cross belt. Ratio of driving tension for flat belts. Determination of angle of contact. (a)Open belt. (b)Cross belt.	Theoretical + practical	quiz
17th week	3 Theoretical + 1 practical	The student understands the subject	Power transmitted by a belt. Centrifugal tension (Tc). Maximum tension in the belts (Tmax). Condition for the Transmission of Maximum Power. Initial tension in the belt (to).V – Belt drive and rope drive. Solved problems	Theoretical + practical	quiz
18th week	3 Theoretical + 1 practical	The student understands the subject	Types of brakes. Simple block or shoe brake. (a) Single block or shoe brake. (b) Double block or shoe brake. Band brake: (a) Simple band brake. (b) Differential band brake.	Theoretical + practical	quiz
19th week	3 Theoretical +1practical	The student understands the subject	Band and block brake. Internal expanding shoe brake.	Theoretical + practical	quiz

			The braking of a vehicle. (a) Value of retardation when the brakes are applied to rear wheels only. (b) Value of retardation when the brakes are applied to front wheels only. (c) Value of retardation when the brakes are applied to all the wheels. Solved problems		
20th week	3 Theoretical + 1practical	The student understands the subject	Types of followers. Nomenclatures for cam profile. Motions of the follower. (a) Uniform motion or uniform velocity of a follower. Solved problems	Theoretical + practical	quiz
21st week	3Theoretical + 1practical	The student understands the subject	(b) Simple harmonic motion of follower. (c) Uniform acceleration and uniform retardation. Solve problems	Theoretical + practical	quiz
22nd week	3 Theoretical +1practical	The student understands the subject	Cam profile construction. Solve problems	Theoretical + practical	quiz
23rd week	3 Theoretical +1 practical	The student understands the subject	Types of vibration. Important definitions for vibrating motion. Equivalent spring stiffness. Solved problems	Theoretical + practical	quiz
24th week	3Theoretical + 1 practical	The student understands the subject	Free vibrations. Methods of finding the natural frequency of free. Longitudinal vibrations. (a) Equilibrium method. (b) Energy method. (c) Rayleigh's method. Method for natural frequency of free transverse vibration.	Theoretical + practical	quiz

			Solved problems		
25th week	3 Theoretical +1 practical	The student understands the subject	Natural frequency of transverse vibrations of shafts or Beams under different types of loads and end conditions. (a) Natural frequency of a shaft carrying a single concentrated load. (b) Natural frequency of a shaft carrying a uniformly distributed load. Natural frequency of transverse vibration of a system of several load attached to the same shaft. (a) Energy or (Rayleigh's) method. Dunkerley's method. Solved problems	Theoretical + practical	quiz
26th week	3 Theoretical + 1 practical	The student understands the subject	Whirling speeds or critical speeds. Solved problems	Theoretical + practical	quiz
27th week	3 Theoretical + 1 practical	The student understands the subject	Frequency of free damped vibrations (viscous damping). Solve problems Expression for displacement for over-damped, under-damped and critical-damped system. Logarithmic decrement. Solved problems	Theoretical + practical	quiz
28th week	3 Theoretical + 1 practical	The student understands the subject	Expression for displacement for over-damped, under-damped and critical-damped system. Logarithmic decrement. Solved problems	Theoretical + practical	quiz

29th week	3 Theoretical + 1 practical	The student understands the subject	Natural frequency of free torsional vibrations. Free torsional vibrations of a single rotor system. Free torsional vibrations of a two rotor system.	Theoretical + practical	quiz
30th week	3 Theoretical + 1 practical	The student understands the subject	Torsional equivalent shaft. Solved problems	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)	1-Theory of machine and vibration, by gubta and kromy,2004 2- Theory of machine and vibration, by tomes beven,1995. 3-machine design, by gubta ,2004
Main references (sources)	Theory of machine and vibration, by gubta and kromy,2004
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name:

Electrical and Electronic Engineering / 3rd

2. Course Code:

MPAC311

3. Semester / Year:

(Annual System) (2024-2025)

4. Description Preparation Date:

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)

Units (Total) 90 hrs. (theoretical) + 60 hrs. (practical) /4 units

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

Name: Asst.Prof.Dr. Muhannad Kamil
Email: muhannad.k@uokerbla.edu.iq

8. Course Objectives

Course Objectives	1- Introducing the student to the basic processes of Electrical and Electro Engineering 2- To study the principles of electrical machines and electronic devices necessary refrigeration and air conditioning engineers.

9. Teaching and Learning Strategies

Strategy	1- Lectures and illustrations: Data Show 2- Multimedia using the e-learning system 3- Knowing the students and developing their respect 4- Effective questioning techniques and discussion with them. 5- Explicitly teach thinking skills & problem-solving techniques

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3 theoretical + 2 practical	understand the lesson	D.C motors, constructio commutator, types of D. motors	Theoretical & pract lectures	Quiz& Discussion
2	3 theoretical + 2 practical	understand the lesson	Back e.m.f, speed equati speed control	Theoretical & pract lectures	Quiz& Discussion
3	3 theoretical + 2 practical	understand the lesson	Starting of D.C mo starter connection, tor of D.C motors	Theoretical & pract lectures	Quiz& Discussion

4	3 theoretical + 2 practical	understand the lesson	Speed-torque characteristics of each t of D.C motor	Theoretical & practi lectures	Quiz& Discussion
5	3 theoretical + 2 practical	understand the lesson	Examples to evaluate starting current of I motor with and with starter, also for sp control	Theoretical & practi lectures	Quiz& Discussion
6	3 theoretical + 2 practical	understand the lesson	Single phase induct motor, split-pha capacitor-start, shad pole type	Theoretical & practi lectures	Quiz& Discussion
7	3 theoretical + 2 practical	understand the lesson	3-phase induction moto construction , syn Speed, slip .	Theoretical & practi lectures	Quiz& Discussion
8	3 theoretical + 2 practical	understand the lesson	Control of three-ph induction motor us voltage freque control .	Theoretical & practi lectures	Quiz& Discussion
9	3 theoretical + 2 practical	understand the lesson	Starting of 3-ph induction motor, star-d method, step do transformer	Theoretical & practi lectures	Quiz& Discussion
10	3 theoretical + 2 practical	understand the lesson	Torque characteristic, n torque	Theoretical & practi lectures	Quiz& Discussion
11	3 theoretical + 2 practical	understand the lesson	3-phase system, star delta connection, l current, line voltage, ph current and voltage	Theoretical & practi lectures	Quiz& Discussion
12	3 theoretical + 2 practical	understand the lesson	Instruments measurements, ammet voltmeter, ohmmeter, k h meters .	Theoretical & practi lectures	Quiz& Discussion
13	3 theoretical + 2 practical	understand the lesson	Contactors, relays, time	Theoretical & practi lectures	Quiz& Discussion
14	3 theoretical + 2 practical	understand the lesson	Thermal overload, sta (contactor +timer)	Theoretical & practi lectures	Quiz& Discussion
15	3 theoretical + 2 practical	understand the lesson	Fuse, circuit break types, choice	Theoretical & practi lectures	Quiz& Discussion
16	3 theoretical + 2 practical	understand the lesson	Voltage drop in cables	Theoretical & practi lectures	Quiz& Discussion
17	3 theoretical + 2 practical	understand the lesson	Calculation for choice size of cable	Theoretical & practi lectures	Quiz& Discussion
18	3 theoretical + 2 practical	understand the lesson	Diode, V-I characteris half –wave rectifier	Theoretical & practi lectures	Quiz& Discussion
19	3 theoretical + 2 practical	understand the lesson	Full-wave rectifier, bri and center-top transfor rectifier	Theoretical & practi lectures	Quiz& Discussion
20	3 theoretical + 2 practical	understand the lesson	Transistor, constructi types	Theoretical & practi lectures	Quiz& Discussion

21	3 theoretical + 2 practical	understand the lesson	Transistor biasi collector characteri curves.	Theoretical & practi lectures	Quiz& Discussion
22	3 theoretical + 2 practical	understand the lesson	Saturation, active, bre down region and cu regions	Theoretical & practi lectures	Quiz& Discussion
23	3 theoretical + 2 practical	understand the lesson	Transistor as amplifier Transistor as electro switch.	Theoretical & practi lectures	Quiz& Discussion
24	3 theoretical + 2 practical	understand the lesson	Thyristor , constructio characteristics , silic controlled rectifier .	Theoretical & practi lectures	Quiz& Discussion
25	3 theoretical + 2 practical	understand the lesson	Effect of firing angle on SCR .	Theoretical & practi lectures	Quiz& Discussion
26	3 theoretical + 2 practical	understand the lesson	SCR applications.	Theoretical & practi lectures	Quiz& Discussion
27	3 theoretical + 2 practical	understand the lesson	Diac – Traic characteristics applicati with SCR .	Theoretical & practi lectures	Quiz& Discussion
28	3 theoretical + 2 practical	understand the lesson	Control of A.C devi using solid – state sp control choppers.(1)	Theoretical & practi lectures	Quiz& Discussion
29	3 theoretical + 2 practical	understand the lesson	Control of A.C devi using solid – state sp control choppers.(2)	Theoretical & practi lectures	Quiz& Discussion
30	3 theoretical + 2 practical	understand the lesson	Operational amplifier 74	Theoretical & practi lectures	Quiz& Discussion

11. Course Evaluation

1. Discussion and questions with students
2. Attendance and homework
3. Monthly Exam.
4. Semester exam (first semester + second semester)
5. Final annual exam.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Basic Electrical And Electronics Engineering By S. K. BHATTACHARYA
Main references (sources)	Electrical Engineering, Principles & Applications By Allan Hambley
Recommended books and references (scientific journals, reports…)	Fundamentals of Electrical Engineering and Electronics Theraja, B.L.
Electronic References, Websites	https://electronics.wisc-online.com/ https://electrical-engineering-portal.com