Ministry of Higher Education and Scientific Research
Scientific Supervision and Scientific Evaluation Apparatus
Directorate of Quality Assurance and Academic Accreditation
Accreditation Department

Academic Program and Course Description Mechanical power department

2025

Introduction:

The department was established in 1987-1988 under the leadership of Dr. Tahseen Ali Hussein, and it has been successively led by many competent academic and administrative professors. It began with two branches (Automobiles and Refrigeration), and currently, it is chaired by Mr. Ahmed Hasan Tawfeeq. In 1993, the Automobile branch was transferred to Kufa Technical Institute as part of the state's austerity policy during the economic blockade at that time.

The department prepares and qualifies students academically, technically, and skillfully to deal with various heating and cooling devices and systems for various industrial, medical, automotive, and domestic applications, including design, installation, regular maintenance, troubleshooting, and blueprint preparation under the supervision of experienced and competent professors. Hundreds of competent students have graduated from the department, some of whom have completed their university and postgraduate studies and have assumed scientific and administrative positions at the university.

The department, its staff, and students have contributed to the maintenance, repair, and rehabilitation of many refrigeration devices and advanced systems and provided consultations to sacred institutions such as the Holy Imam Ali Shrine, Al-Hanana Mosque, and Al-Kufa Grand Mosque.

Quality Policy in the Department of Power Mechanical Techniques:

The quality system is based on the quality policy of the Ministry of Higher Education and Scientific Research, which aims to achieve the development objectives of the ministry's plans, programs, and initiatives, meeting the requirements of the internal and external academic community. The administration of the department is committed to the implementation of the quality system and the continuous improvement process, focusing on the quality and effectiveness of educational and research outputs. The department cooperates with the scientific committees in the scientific departments to ensure the success of the quality system through the adoption of the best practices and continuous development of the department's capabilities.

Academic Program Description Form

University Name: Al-Furat Al-Awsat technical university
Faculty/Institute: Najaf technical institute
Scientific Department: Mechanical power techniques
Academic or Professional Program Name: Diploma of Mechanical power techniques.
Final Certificate Name: Diploma in Mechanical power techniques.
Academic System: Annual system
Description preparation date: 2025
Date of File Completion: 2025

Signature:
Head of Department Name:
Mr Ahmed Hasan Tawfeeq

Signature:
Name of Scientific Assistant:
Mr. Salah Mehdi Saleh

File reviewed by
Quality Assurance and University Performance Division
Name of the Quality Assurance and University Performance Division
Director:
Date:
Signature

Approval of the Dean
Prof. Dr. Hyder Hassan Balla

1. Program Vision

Deepening the students' technical concepts and keeping pace with modern technologies in the field of air conditioning and refrigeration enable graduates to work in various sectors.

2. Program Mission

Starting from the edges of science to develop curricula theoretically and practically, utilizing the latest teaching and training methods, and actively participating in the development of the university and community environment.

3. Program Objectives

1-Preparing technical personnel to work professionally in various projects in both the public and private sectors in the field of air conditioning and refrigeration with high dedication.

2- Enhancing the performance efficiency of department members by engaging them in specialized courses to update their knowledge, develop their skills and expertise, and provide them with resources and information to conduct scientific research.

3- Creating a suitable university environment for students and enhancing social, sports, and other activities to strengthen the sense of belonging to the institute and the department.

4- Continuously updating curricula theoretically and practically to adopt the latest and most suitable curricula according to the principles of sustainable engineering and providing appropriate laboratories for this purpose.

5- Establishing collaborative relationships and interactions between the department and governmental agencies and sacred institutions. 6- Providing services and training to all segments of society, such as the unemployed and the families of martyrs, to contribute to job opportunities and eliminate unemployment.

4. Program Accreditation

5. Other external influences

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	**6**	**20**	**% 16**	
College Requirements	**3**	**22**	**% 18**	

Department Requirements	**12**	**82**	**% 66**	
Summer Training	**1**	**0**	**% 0**	
Other				

* This can include notes whether the course is basic or optional.

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
First level		**Principles of air refrigeration and air-conditioning**	**2 theoretical**	**2 practical**
		Thermodynamics	**2 theoretical**	**1 practical**
		Mechanics	**2 theoretical**	**1 practical**
		Computer applications 1	**1 theoretical**	**2 practical**
		Engineering drawing		**3 practical**
		mathematics	**2 theoretical**	
		Electrical technique	**2 theoretical**	**2 practical**
		English language skills 1	**2 theoretical**	
		Human rights and democracy	**2 theoretical**	
		Mechanical workshops		**6 practical**
Second level		**Refrigeration system**	**2 theoretical**	**2 practical**
		Air conditioning	**2 theoretical**	**2 practical**
		Heat transfer	**2 theoretical**	**1 practical**
		Control systems	**2 theoretical**	**1 practical**
		Maintenance of refrigeration and air conditioning systems	**2 theoretical**	**4 practical**
		Drawings of refrigeration and air conditioning systems		**3 practical**
		Management and occupational safety	**2 theoretical**	
		Computer applications 2	**1 theoretical**	**2 practical**
		English language skills 2	**2 theoretical**	
		project		**2 theoretical**

8. Expected learning outcomes of the program

Knowledge	
1- Acquiring theoretical knowledge in various scientific curricula relevant to the specialization. 2- Reading blueprints, drawings, and designs. 3- Performing theoretical calculations for various specialized issues. 4- Participating in the design of air conditioning equipment blueprints.	1- Pipe and joint welding. 2- Refrigeration equipment charging. 3- Connecting separate refrigeration units. 4- Calculating heat loads.
Skills	
1- Practical maintenance and troubleshooting in refrigeration systems. 2- Installation, assembly, and disassembly of various parts of refrigeration devices and systems.	1- Connecting electrical circuits related to the specialty. 2- Fabricating air ducts and welding various types.
Ethics	
1- Learning installation of refrigeration devices. 2- Learning maintenance of refrigeration devices 3- Detecting and diagnosing faults.	Maintenance and installation of various refrigeration devices for residential, commercial, and centralized packages.

9. Teaching and Learning Strategies

Teaching and learning strategies and methods adopted in the implementation of the program in general.

10. Evaluation methods

Oral exams - Theoretical exams - Semester exams - Final exams - Daily assessments

11.Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Ass.Proff. Mr	Mechanical Engineering	Air conditioning and refrigeration			✓	

Ass.proff. Dr	Mechanical Engineering	Thermal engineering			✓	
Mr,	Mechanical Engineering	Thermal engineering			✓	
Mr,	Mechanical Engineering	Thermal engineering			✓	
Mr,	Mechanical Engineering	Thermal engineering			✓	

Professional Development

Mentoring new faculty members

Regular meetings for refining academic and administrative skills, engaging them in core committees, and attending courses and workshops relevant to the program and the institution as a whole.

Professional development of faculty members

Participation in academic courses and workshops, encouragement of scientific research, involvement in local and international scientific conferences, and community service.

12. Acceptance Criterion

The admission system is centrally managed by the ministry and is subject to selection criteria determined by the institution based on the secondary vocational and preparatory study grades.

13. The most important sources of information about the program

Websites of ATU and Najaf technical institute

14. Program Development Plan

Working on increasing the department's capacity and upgrading the laboratories by equipping them with modern devices to keep pace with the advancements in refrigeration and air conditioning systems to meet the demands of the job market.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
First level		Principles of air refrigeration and air-conditioning		*	*	*		*	*	*	*	*	*	*	*
		Thermodynamics		*		*			*	*	*		*	*	*
		Mechanics		*		*			*	*	*		*	*	*
		Computer applications 1		*	*	*			*	*	*		*	*	*
		Engineering drawings		*		*		*		*		*	*		
		mathematics				*		*		*		*	*		
		Electrical technique				*		*	*	*	*		*	*	*
		English language skills 1				*	*	*	*	*	*		*	*	*
		Human rights and democracy		*	*	*	*	*	*	*	*	*	*	*	*

		Mechanical workshops			*	*	*					*			*
Second level		**Refrigeration system**			*	*	*	*	*	*		*	*	*	
		Air conditioning		*	*		*	*	*	*	*	*	*	*	*
		Heat transfer		*		*	*	*	*	*	*	*	*		*
		Control systems			*			*	*	*		*	*	*	*
		Maintenance of refrigeration and air conditioning systems			*			*	*	*		*	*	*	*
		Drawings of refrigeration and air conditioning systems		*		*		*		*		*	*		
		Management and occupational safety		*	*	*	*		*		*	*	*		*
		Computer applications 2			*		*	*	*	*		*	*	*	
		English language skills 2		*	*	*					*			*	
		project			*		*		*		*	*			

- **Please tick the boxes corresponding to the individual program learning outcomes under evaluation.**

Course Description Form

1. Course Name:

Principles of Refrigeration and Air Conditioning

2. Course Code:

3. Semester / Year:

First year

4. Description Preparation Date:

2025

5. Available Attendance Forms:

Full attendance system

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

4 hours/ 8 units

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

Name: Ali Jabir Talib
Email: ali.talib@atu.edu.iq

8. Course Objectives

Course Objectives	• Introducing students to the basic procedures for air conditioning of buildings and calculating the capacity and efficiency of each procedure. • Introducing students to the fundamental refrigeration systems used in the field of refrigeration. • Focusing on compression systems and studying the types of compressors, condensers, expansion valves, evaporators, and refrigerants used in them.

9. Teaching and Learning Strategies

Strategy	Theoretical lectures Practical lectures Scientific trips Summer training Student projects

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-2	8		Principles of thermodynamics, property, state, Temp. (dry and wet), pressure (Abs., ga, atm.), sp. volume, sp. humidity, Rel. humidity, heat (sens. And lat.), dew-point, air conditioning, refrigeration, Ton and refrigeration, refrigeration types, element and equipment for property measurements.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments

3	4		Air properties, Dalton laws, psychometric properties calculations, sp. humidity, rel. humidity, enthalpy, pressure and Temp.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
4	4		Psychometric chart.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
5-6	8		Psychometric chart using, for mixing process, sen. Heating and cooling, lat. Heating and cooling, humidification and dehumidification, steam injection.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
7-8	8		Actual air conditioning process, air- mixing and cooling with dehumidification with and without re heat coils, humidification of air and heating with reheat coils.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
9-10	8		Sensible heat factor, by-bass factor, contact factor, humidification efficiency, thermal comfort requirements in space.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
11	4		Principle of refrigeration, method of heat transfer, sp. heat, pressure and critical pressure, temp. and critical temp. , phase change	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
12-14	8		Refrigeration method, natural and industrial system, vapour-compression system, absorption system, steam-jet system , thermos-electric system , liquefaction of gases system, air- system in air-craft and others	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
15	4		Pressure –enthalpy chart, for common refrigerant	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
16-17	8		Vapor-compression system, theoretical calculation (heat added , heat rejected, work compressor , cop., quantity of refrigerant)	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
18-19	8		Actual vapor compression system, the effect of vapor super-heated in suction line, sub-cooled in liquid line, pressure drop (pressure losses and heat exchanger on C.O.P.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
20-22	8		Compressor, classification, working principles, types, (reciprocating, rotary, center	Lecture + Practical	Oral Exams + Written Exams + Daily assignments

			fugal, screw, and another types), construction, secondary types, type of refrigerant using, advantage and disadvantage for each type.	Examples + Laboratory	
23-24	8		Condensers and cooling tower, classification condenser (air- cooled, water cooled, evaporative), advantages and disadvantages for each types, classification of cooling tower.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
25-26	8		Expansion devices types, (manual device, automatic valve, thermostatic valve, low and high side float valve, capillary tubes, advantages and disadvantages for each type.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
27-28	8		Evaporators types-(natural and forced convection), (floated and dry expansion) advantages and disadvantages for each type.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
29-30	8		Refrigerant, classification, (main and secondary) required prosperities, selection of refrigerant.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments

11.Course Evaluation

For the first semester (10 theoretical + 10 practical), it accounts for 20%. For the second semester (10 theoretical + 10 practical), it also accounts for 20%. Yearly assignments count for 10%. Consequently, the annual effort is 50%. The final theoretical exam is 40%, and the final practical exam is 10%. (The total is 100%).

12.Learning and Teaching Resources

1- Principles of Refrigeration and Air Conditioning by Adnan Rikan. 2- Principles of Refrigeration and Air Conditioning by Abdul Hadi Nama Khalifa.	
The book "Principles of Refrigeration and Air Conditioning' Khalid Al-Joudi.	
Website of Najaf technical institute	

Course Description Form

13.Course Name:

Thermodynamics

14.Course Code:

15.Semester / Year:

First year

16.Description Preparation Date:

2025

17. Available Attendance Forms:

Full attendance system

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

3 hours/ 6 units

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

Name: Mr.Ahmed Hasan Tawfeeq
Email: Ahmed.h.t @atu.edu.iq

20. Course Objectives

Course Objectives	To give the students information about basic principles of thermodynamic, first law, and second law of thermodynamic, deep study for Carnot power cycle and reverse Cycle.

21. Teaching and Learning Strategies

Strategy	Theoretical lectures Practical lectures Scientific trips Summer training Student projects

22. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-6	18		Thermodynamic term-measuring devices-properties- state — process-cycles –density and specific volume – the pressure (gage, vacuum, and absolute)- temperature relations (Celsius, Kelvin and ranking scale)-energy-renewable energy-resources (solar energy, wind energy, energy of water falling, tidal energy)-hydrocarbons source (oil & gas)-form of energy used in thermodynamic-potential energy-kinetic energy-heat-work. Internal energy-flow work.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
7-8	6		First law of thermodynamics-flow system-nun flow system — steady –un steady –open – closed. examples.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
9 – 10 – 11	9		Applications of the first law on nozzle, diffuser, condenser, evaporator, compressor, heat exchanger	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments

			(surface, open), turbine, boiler. examples.		
12 – 13	6		Thermodynamic process undergoing at constant (pressure, volume, temperature, enthalpy)- polytrophic process- with representation on a(P-V),(T-S)&(P-H) diagram.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
14	3		Specific heat, kind of specific heat- gas constant .	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
15	3		**The second law of thermodynamics, statement of the second law, heat engine, heat pump .**	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
16 – 17	6		Carnot power cycle-reversed Carnot cycle (refrigeration & heat pump applications). Examples .	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
18 -19	6		Study of steam. Steam properties- using steam tables .	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
20	3		Calculations of the properties for (liquid-vapour)mixture(wet steam).	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
21 -22	6		Steam process under going at constant (pressure, volume)-isentropic process, adiabatic process & applications.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
23 -24	6		**The Rankine cycle ,processes of the cycle , examples**	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
25	3		**The vapour Compression cycle.**	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
26 -27-28	9		Fuel –definition of accounts and properties of the fuel used in boilers and cooling systems absorbance.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
29 -30	6		Boiler – types – characteristics .	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments

23.Course Evaluation

For the first semester (10 theoretical + 10 practical), it accounts for 20%. For the second semester (10 theoretical + 10 practical), it also accounts for 20%. Yearly assignments count for 10%. Consequently, the annual effort is 50%. The final theoretical exam is 40%, and the final practical exam is 10%. (The total is 100%).

24.Learning and Teaching Resources

1-applied thermodynamics by Khurmi	

2-applied thermodynamics by Yunus Singel	
Website of Najaf technical institute	

Course Description Form

25.Course Name:
Mechanics
26.Course Code:
27.Semester / Year:
First year
28.Description Preparation Date:
2025
29.Available Attendance Forms:
Full attendance system
30.Number of Credit Hours (Total) / Number of Units (Total)
3 hours/ 6 units
31.Course administrator's name (mention all, if more than one name)
Name: Ali Abdul Ameer Abbas
32.Course Objectives

Course Objectives	The aim of the course is to equip students with the fundamental skills in mechanical calculations of materials and applied fluids.

33.Teaching and Learning Strategies

Strategy	Theoretical lectures Practical lectures Scientific trips Summer training Student projects

34. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3		Introduction to mechanics (Definitions, Units, Load, Applied mechanics, Stress, Strain, Safety factor,	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments

			Mechanical Properties, Stress Strain diagram)		
2 – 8	21		Stresses due to : - Normal Load (Tension & compression) - Tangential Load (Shear & Torsion) - Change in Temperature (Thermal)	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
9 – 10	6		Application with uniform and non uniform material and load with variable cross section	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
11	3		Introduction to Fluid Mechanics (Definition, Properties of fluid, steady flow)	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
12	3		Fluid static , Pressure of a certain depth	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
13	3		Specific Gravity, Viscosity (Newton's law of Viscosity, Types of fluids) , effect of temperature on viscosity , effect of pressure on viscosity	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
14	3		Pressure Measurement (Boarder gage, Piezometer, manometer, Pitot)	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
15	3		Floating and sub – merged calculation	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
16-17	6		Continuity equation with application	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
18-19	6		Bernolli equation with application	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
20-21	6		Energy equation with application	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
22-23	6		Momentum equation with application	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments

2423	6		Orifice & Gates	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
25-26	6		Flow in pipes (parallel and series losses in pipes)	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
27-28	6		Friction losses in pipes	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
29– 30	6		Air flow in ducts	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments

35.Course Evaluation

For the first semester (10 theoretical + 10 practical), it accounts for 20%. For the second semester (10 theoretical + 10 practical), it also accounts for 20%. Yearly assignments count for 10%. Consequently, the annual effort is 50%. The final theoretical exam is 40%, and the final practical exam is 10%. (The total is 100%).

36.Learning and Teaching Resources

1. Strength of materials by singer 2. Strength of materials by young &Timoshenko 3. Fluid mechanics by Streeter	
Website of Najaf technical institute	

Course Description Form

37.Course Name:

Mathematics

38.Course Code:

39.Semester / Year:

First year

40.Description Preparation Date:

2025

41.Available Attendance Forms:

Full attendance system

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

2hours/ 4 units

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

Name: Maha Salah Juhaid

44.Course Objectives

Course Objectives	The objective is to familiarize students with the application of mathematics in other scientific subjects, enhancing their logical thinking skills when solving exercises. Moreover, it aims to improve their ability to connect data with their knowledge to find solutions to problems

45. Teaching and Learning Strategies

Strategy	Theoretical lectures Summer training Student projects

46. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2		matrices, determinants, their properties	Theoretical lecture	Oral Exams + Written Exams + Daily assignments
2	2		linear equations, Kramer's method, applications, arc analysis, vectors,	Theoretical lecture	Oral Exams + Written Exams + Daily assignments
3	2		vector analysis, types of vectors, scalars, standard vector algebra,	Theoretical lecture	Oral Exams + Written Exams + Daily assignments
4	2		operations on vectors, orthogonal vector unit, vector measurement	Theoretical lecture	Oral Exams + Written Exams + Daily assignments
5	2		standard and directional multiplication, vector applications, torque arc analysis	Theoretical lecture	Oral Exams + Written Exams + Daily assignments
6	2		logarithms, logarithm definition, logarithm laws, solving logarithmic equations, trigonometric ratios	Theoretical lecture	Oral Exams + Written Exams + Daily assignments
7	2		laws of trigonometric ratios, function meaning	Theoretical lecture	Oral Exams + Written Exams + Daily assignments
8	2		independent and dependent variables, explicit and implicit functions	Theoretical lecture	Oral Exams + Written Exams + Daily assignments
9	2		measurements, trigonometric and algebraic functions	Theoretical lecture	Oral Exams + Written Exams + Daily assignments
10	2		linear speed applications, areas, details, derivatives	Theoretical lecture	Oral Exams + Written Exams + Daily assignments
11	2		derivatives of algebraic functions, chain rule applications,	Theoretical lecture	Oral Exams + Written Exams + Daily assignments
12	2		implicit function derivatives, higher-order derivatives, exponential function derivatives,	Theoretical lecture	Oral Exams + Written Exams + Daily assignments
13	2		logarithmic function derivatives, trigonometric function derivatives	Theoretical lecture	Oral Exams + Written Exams + Daily assignments

14	2		exponential function derivatives, logarithmic function derivatives,	Theoretical lecture	Oral Exams + Written Exams + Daily assignments
15	2		trigonometric function derivatives, circular function derivatives,	Theoretical lecture	Oral Exams + Written Exams + Daily assignments
16	2		partial differentiation, derivative applications (slope equation, tangent, velocity, acceleration)	Theoretical lecture	Oral Exams + Written Exams + Daily assignments
18	2		derivative applications (instantaneous change), increase, decrease, maximum and minimum points, function graphing, integration	Theoretical lecture	Oral Exams + Written Exams + Daily assignments
19	2		indefinite integration, integration of algebraic functions, integration of exponential and logarithmic functions	Theoretical lecture	Oral Exams + Written Exams + Daily assignments
20	2		integration of trigonometric functions, definite integration, applications (area under the curve, distance between curves)	Theoretical lecture	Oral Exams + Written Exams + Daily assignments
21	2		rotational volumes and arc length of the curve, integration approximation (trapezoidal rule, Simpson's rule)	Theoretical lecture	Oral Exams + Written Exams + Daily assignments
22	2		integration methods, integration by parts, partial fraction decomposition integration, solving first-order and first-degree differential equations,	Theoretical lecture	Oral Exams + Written Exams + Daily assignments
23	2		continuous homogeneous differential equations, differential equations - linear - applications,	Theoretical lecture	Oral Exams + Written Exams + Daily assignments
24	2		complex numbers - addition - subtraction - division - multiplication, the application form,	Theoretical lecture	Oral Exams + Written Exams + Daily assignments
25	2		converting the carbine attribute to linear and vice versa	Theoretical lecture	Oral Exams + Written Exams + Daily assignments
27-26	4		statistical operations, repetitive distributions,	Theoretical lecture	Oral Exams + Written Exams + Daily assignments
28-27	4		cumulative distribution, repetitive curve	Theoretical lecture	Oral Exams + Written Exams + Daily assignments
30-29	4		arithmetic mean, range, standard deviation, variance.	Theoretical lecture	Oral Exams + Written Exams + Daily assignments
47.Course Evaluation					

For the first semester 20%. For the second semester 20%. Yearly assignments count for 10%. Consequently, the annual effort is 50%. The final theoretical exam is 50% (The total is 100%).

48.Learning and Teaching Resources	
1-Panal colter "Technical Mathematics" 2- Murray R. "Mathematical handbook" 3- Shantinarayam " Engineering Mathematics part 1 – 1987	
Website of Najaf technical institute	

Course Description Form

49.Course Name:
Engineering Drawings
50.Course Code:
51.Semester / Year:
First year
52.Description Preparation Date:
2025
53.Available Attendance Forms:
Full attendance system
54.Number of Credit Hours (Total) / Number of Units (Total)
3hours/ 6 units
55.Course administrator's name (mention all, if more than one name)
Name: Zainab Ahmed Abd
56.Course Objectives

Course Objectives	The importance of engineering drawing - The importance of using the computer for engineering drawing - Standard drawing board dimensions - Overview of AutoCAD program

57.Teaching and Learning Strategies	
Strategy	practical lectures Summer training Student projects

58. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2		Introduction to importance of engineering drawing by computer –	Practical lecture	Oral Exams + Written Exams + Daily assignments

			limits and dimension of drawing palate by AutoCAD history		
2	2		Type of line in AutoCAD – using the menu and tool bar for line and texts	Practical lecture	Oral Exams + Written Exams + Daily assignments
3	2		Basic shapes by AutoCAD	Practical lecture	Oral Exams + Written Exams + Daily assignments
4	2		Drawing modifications by AutoCAD – drawing assistance by AutoCAD	Practical lecture	Oral Exams + Written Exams + Daily assignments
5	2		Engineering operation by AutoCAD – Dimension	Practical lecture	Oral Exams + Written Exams + Daily assignments
6	2		Application on pervious concepts	Practical lecture	Oral Exams + Written Exams + Daily assignments
7	2		Drawing perspective – drawing perspective contain circle, rectangle, triangle	Practical lecture	Oral Exams + Written Exams + Daily assignments
8	2		Projection theory – drawing simple projection	Practical lecture	Oral Exams + Written Exams + Daily assignments
9	2		But dimension on 3-D shapes and on projection drawing	Practical lecture	Oral Exams + Written Exams + Daily assignments
10	2		Investigate the third projection from previous two projection	Practical lecture	Oral Exams + Written Exams + Daily assignments
11	2		Cutting theory – type of cutting lines according to the material - practice	Practical lecture	Oral Exams + Written Exams + Daily assignments
12	2		Practice on cutting projection from specific projection Practice on partially cut projection Application and project	Practical lecture	Oral Exams + Written Exams + Daily assignments
13	2		Introduction to importance of engineering drawing by computer – limits and dimension of drawing palate by AutoCAD history	Practical lecture	Oral Exams + Written Exams + Daily assignments
14	2		Type of line in AutoCAD – using the menu and tool bar for line and texts	Practical lecture	Oral Exams + Written Exams + Daily assignments
15	2		Basic shapes by AutoCAD	Practical lecture	Oral Exams + Written Exams + Daily assignments
16	2		Drawing modifications by AutoCAD – drawing assistance by AutoCAD	Practical lecture	Oral Exams + Written Exams + Daily assignments
18	2		Engineering operation by AutoCAD – Dimension	Practical lecture	Oral Exams + Written Exams + Daily assignments

19	2		Application on pervious concepts	Practical lecture	Oral Exams + Written Exams + Daily assignments
20	2		Drawing perspective – drawing perspective contain circle, rectangle, triangle	Practical lecture	Oral Exams + Written Exams + Daily assignments
21	2		Projection theory – drawing simple projection	Practical lecture	Oral Exams + Written Exams + Daily assignments
22	2		But dimension on 3-D shapes and on projection drawing	Practical lecture	Oral Exams + Written Exams + Daily assignments
23	2		Investigate the third projection from previous two projection	Practical lecture	Oral Exams + Written Exams + Daily assignments
24	2		Cutting theory – type of cutting lines according to the material - practice	Practical lecture	Oral Exams + Written Exams + Daily assignments
25	2		Practice on cutting projection from specific projection Practice on partially cut projection Application and project	Practical lecture	Oral Exams + Written Exams + Daily assignments
27-26	4		Introduction to importance of engineering drawing by computer – limits and dimension of drawing palate by AutoCAD history	Practical lecture	Oral Exams + Written Exams + Daily assignments
28-27	4		Type of line in AutoCAD – using the menu and tool bar for line and texts	Practical lecture	Oral Exams + Written Exams + Daily assignments
30-29	4		Basic shapes by AutoCAD	Practical lecture	Oral Exams + Written Exams + Daily assignments

59.Course Evaluation

For the first semester 20%. For the second semester 20%. Yearly assignments count for 10%. Consequently, the annual effort is 50%. The final theoretical exam is 50% (The total is 100%).

60.Learning and Teaching Resources

AutoCAD 2014 Tutorial - First Level: 2D Fundamentals by Randy H. Shih	
Website of Najaf technical institute	

61.Course Name:

Electrical techniques

62.Course Code:

63.Semester / Year:

First year

64.Description Preparation Date:

2025

65. Available Attendance Forms:

Full attendance system

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

4 hours/ 8 units

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

Name: Qasim Hammodi Hassan

68. Course Objectives

Course Objectives	The aim of the subject is to provide the student with the theoretical and practical foundations of electrical and machinery technology, which they will truly need when practicing their specialization.

69. Teaching and Learning Strategies

Strategy	Theoretical lectures Practical lectures Scientific trips Summer training Student projects

70. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4		Introduction to electron technology, definitions, amperes, current, voltage, resistance, ohms.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
3-2	8		Electronic parallelism and energy, mutual circuit, mixed circuit	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
5-4	8		Kirchhoff's law, Ohm's applications	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
6	4		Principles of electronic magnets, magnetic field, magnetic force, magnetic density	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
7	4		Electronic magnetism.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
9-8	8		Alternating current, alternating current generation and voltage characteristics, EMF, EMI wave formation, example.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
10	4		Single-phase alternating current resistance circuit, coil circuit,	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments

			capacitor circuit, phase diagram, phase angle.		
12-11	8		Resistance file of circuit contents, capacitors connected in series, power calculations, power factor, modified power methods, trend diagrams.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
14-13	8		Three-phase alternating current, generation, wiring and connection methods, star, delta, voltage lines, current lines, phase diagrams, current, voltage and power.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
16-15	8		Electrical transformer, methods and types of work, construction, applications, loss in transformer, transformer testing, transformer efficiency, automatic transformer	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
17	4		Electronic energy distribution (voltage law).	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
18	4		Converting solar energy to electric	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
21-20-19	12		DC motors, their components, business principles, types of applications, types of start, loss, power calculation	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
24-23-22	12		AC motors, components, principles of work, types of applications, single phase – three phases, types of start, speed control	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
27-26-25	12		Motor Protection , Current Protection Devices , Overload , Heat , Increased Protection	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
30-29-28	12		Engine Testing, Engine Maintenance & Parts Repair	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments

71.Course Evaluation

For the first semester (10 theoretical + 10 practical), it accounts for 20%. For the second semester (10 theoretical + 10 practical), it also accounts for 20%. Yearly assignments count for 10%. Consequently, the annual effort is 50%. The final theoretical exam is 40%, and the final practical exam is 10%. (The total is 100%).

72.Learning and Teaching Resources

1-Electrical Technology by Theraga 2 -Electrical **T**echnology by Hayke **3-** Electrical Engineering ,theory & practical	
Electrical Installation work by Franc	
Website of Najaf technical institute	

73.Course Name:
Human Rights
74.Course Code:
75.Semester / Year:
First year
76.Description Preparation Date:
2025
77.Available Attendance Forms:
Full attendance system
78.Number of Credit Hours (Total) / Number of Units (Total)
2hours/ 4 units
79.Course administrator's name (mention all, if more than one name)
Name: Mahdi Ali Mohammed
80.Course Objectives

Course Objectives	Introducing the student to human rights, their objectives and their development throughout human history

81.Teaching and Learning Strategies

Strategy	Theoretical lectures, daily assignments

82. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2		Human rights, definition, objectives	theoretical lecture	Oral Exams + Written Exams + Daily assignments
2	2		The roots and development of human rights in human history: human rights in antiquity and medieval times	theoretical lecture	Oral Exams + Written Exams + Daily assignments
3	2		Human rights in ancient civilizations, especially the civilization of Mesopotamia	theoretical lecture	Oral Exams + Written Exams + Daily assignments
4	2		Human rights in divine laws with a focus on human rights in Islam	theoretical lecture	Oral Exams + Written Exams + Daily assignments

5	2		Human rights in the Middle Ages: human rights in doctrines - schools - political theories - human rights in companies - their declarations - revolutions and constitutions	theoretical lecture	Oral Exams + Written Exams + Daily assignments
6	2		Human Rights in Contemporary and Modern History: International Recognition of Human Rights since World War I and the League of Nations	theoretical lecture	Oral Exams + Written Exams + Daily assignments
7	2		Regional recognition of human rights: European Convention on Human Rights 1950 American Convention on Human Rights 1969 African Charter on Human Rights 1981 Arab Charter on Human Rights 1994	theoretical lecture	Oral Exams + Written Exams + Daily assignments
9-8	4		NGOs and human rights (ICRC, Amnesty International, Human Rights Watch) National Human Rights Organizations	theoretical lecture	Oral Exams + Written Exams + Daily assignments
10	2		Human rights in Iraqi constitutions between theory and reality	theoretical lecture	Oral Exams + Written Exams + Daily assignments
12-11	4		The relationship between human rights and public freedoms: in the Universal Declaration of Human Rights in regional conventions and national constitutions	theoretical lecture	Oral Exams + Written Exams + Daily assignments
13	2		Essential human rights and collective human rights	theoretical lecture	Oral Exams + Written Exams + Daily assignments
14	2		Economic, social and cultural human rights and civil and political human rights	theoretical lecture	Oral Exams + Written Exams + Daily assignments
15	2		Modern human rights: facts in development, the right to a clean environment, the right to solidarity, the right to religion	theoretical lecture	Oral Exams + Written Exams + Daily assignments
17-16	4		Guarantees of respect and protection of human rights at the national level, guarantees in the Constitution and laws, guarantees in the principle of the rule of law Guarantees in	theoretical lecture	Oral Exams + Written Exams + Daily assignments

			constitutional oversight, Guarantees in freedom of the press and public opinion		
19-18	4		Guarantees, respect and protection of human rights at the international level: the role of the United Nations and its specialized agencies in providing guarantees The role of regional organizations (League of Arab States, European Union, African Union, Organization of American States, ASEAN)	theoretical lecture	Oral Exams + Written Exams + Daily assignments
20	2		The general theory of freedoms: the origin of rights and freedoms, the position of the project on the declared rights and freedoms, the use of the term public freedoms	theoretical lecture	Oral Exams + Written Exams + Daily assignments
21	2		The functional nature of the concept of public freedoms: philosophical considerations of the right to employment - structural considerations of positive right - economic considerations and public freedoms	theoretical lecture	Oral Exams + Written Exams + Daily assignments
23-22	4		The legal basis of the rule of law	theoretical lecture	Oral Exams + Written Exams + Daily assignments
24	2		Regulation of public freedoms by public authorities	theoretical lecture	Oral Exams + Written Exams + Daily assignments
25	2		Non-judicial litigation or grievance	theoretical lecture	Oral Exams + Written Exams + Daily assignments
26	2		Judicial appeal, determining the responsibility of the state for its legitimate acts	theoretical lecture	Oral Exams + Written Exams + Daily assignments
27	2		The effect of dual elimination of public freedoms Public freedoms under administrative jurisprudence	theoretical lecture	Oral Exams + Written Exams + Daily assignments
28	2		Equality: the historical development of the concept of equality	theoretical lecture	Oral Exams + Written Exams + Daily assignments
29	2		The modern development of the idea of equality	theoretical lecture	Oral Exams + Written Exams + Daily assignments
30	4		Gender equality between individuals according to their beliefs and race	theoretical lecture	Oral Exams + Written Exams + Daily assignments
83.Course Evaluation					

For the first semester 20%. For the second semester 20%. Yearly assignments count for 10%. Consequently, the annual effort is 50%. The final theoretical exam is 50% (The total is 100%).

84.Learning and Teaching Resources

Website of Najaf technical institute	

85.Course Name:

Mechanical Laboratories

86.Course Code:

87.Semester / Year:

First year

88.Description Preparation Date:

2025

89.Available Attendance Forms:

Full attendance system

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

6 hours/ 12 units

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

Name: Laboratories and workshops staff

92.Course Objectives

Course Objectives	**Gain the manual skill, craftsmanship of the student when carrying out work and manufacturing using various tools and tools**

93.Teaching and Learning Strategies

Strategy	Practical lectures Scientific trips Summer training Student projects

94. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
3-2-1	18		Plumbing – the importance of plumbing – safety precautions in the workshop – sand – its types Forming the sand mold for a one-piece model – melting and pouring metal into	Lecture Practical + Laboratory	Oral Exams + Written Exams + Daily assignments

			the mold – molds for a two-piece or more model with the assembly of cast models Other types such as other rotary – fixed mold Study of castings to identify defects and know their causes		
6-5-4	18		The importance of chips - safety precautions in the workshop - types of files used and according to the minerals and shapes required Filing exercises to obtain a good surface. And a good angle – and some filings shapes	Lecture Practical + Laboratory	Oral Exams + Written Exams + Daily assignments
9-8-7	18		Turning – Lathe parts – Measuring equipment – Various turning operations – External – Internal surface turning – Fair or stolen turning – Knowing how to change the speed of the lathe with introducing the student to the necessary security precautions inside the workshop	Lecture Practical + Laboratory	Oral Exams + Written Exams + Daily assignments
12-11-10	18		Carpentry – types of wood – types of tools used and how to use tools such as cutting, filing, drilling and forming	Lecture Practical + Laboratory	Oral Exams + Written Exams + Daily assignments
15-14-13	18		Welding study - the importance of welding - the necessary security rules in welding workshops - types of welding methods - and their relationship to the metal required to be welded with the implementation of several forms of welding	Lecture Practical + Laboratory	Oral Exams + Written Exams + Daily assignments
			Air conditioning workshop	Lecture Practical + Laboratory	Oral Exams + Written Exams + Daily assignments
16	6		Pipes used in the field of refrigeration – with welding exercises and cutting pipes with the use of tools in this field	Lecture Practical + Laboratory	Oral Exams + Written Exams + Daily assignments

17	6		Expansion and flattening of pipes / study of tools used in the field of pipe expansion in preparation for connecting the two pipes to the other with the use of tools for this field	Lecture Practical + Laboratory	Oral Exams + Written Exams + Daily assignments
21-20-19-18	24		Gas welding – welding system parts – copper welding – with silver and stool with the experience of welding two tube pieces – and aluminum welding – welding	Lecture Practical + Laboratory	Oral Exams + Written Exams + Daily assignments
22	6		Compression cooling system in small refrigeration systems (home refrigerator - freezer - air conditioner)	Lecture Practical + Laboratory	Oral Exams + Written Exams + Daily assignments
24-23	12		Charging and discharging process of the cooling medium of the system	Lecture Practical + Laboratory	Oral Exams + Written Exams + Daily assignments
25	6		Inspection and inspection of leaks in the system's pipes	Lecture Practical + Laboratory	Oral Exams + Written Exams + Daily assignments
26	6		Adding oil to the household cooling kit	Lecture Practical + Laboratory	Oral Exams + Written Exams + Daily assignments
30-29-28-27	24		Plumbing – tools used – Types and gauges of sheets – Tin cutting – Simple bending process and other types of folds with the manufacture of a fixed duct of air section – Reverse (bend) expansion, contraction or Shunt T or quadruple	Lecture Practical + Laboratory	Oral Exams + Written Exams + Daily assignments

95.Course Evaluation

Continuous / Final Evaluation 50% Total 100%

96.Learning and Teaching Resources

Website of Najaf technical institute	

Courses of the second stage

97. Course Name:
Refrigeration systems
98. Course Code:
99. Semester / Year:
Second year
100. Description Preparation Date:
2025
101. Available Attendance Forms:
Full attendance system
102. Number of Credit Hours (Total) / Number of Units (Total)
4 hours/ 8 units
103. Course administrator's name (mention all, if more than one name)
Name: Mr.Hazim Ali Sahib Email: Hazim_alzurfi@atu.edu.iq
104. Course Objectives

Course Objectives	Introducing students to a detailed study of the principles of air conditioning and calculating heat loads in both refrigeration and heating systems. • Studying various air conditioning systems and the principles of designing air ducts and pipes, in addition to topics on noise and air purification.

105. Teaching and Learning Strategies	
Strategy	Theoretical lectures Practical lectures Scientific trips Summer training Student projects

106. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
2-1	8		The cooling system (theoretical and practical) and type of refrigerant	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily Journals
5-3	12		Selection of parts of the compressor system / evaporator - condenser - compressor - unit of condensation - balance of the group	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily Journals

8-6	12		Multi-compressor system (multi-compressor) (interstitial exchanger - flashing reservoir) and multiple evaporators	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily Journals
10-9	8		General considerations for the design of the piping (discharge line - liquid line - section line - water pipes)	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily Journals
14-11	16		Accessories of the system of pressure / target - location	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily Journals
16-15	8		Control devices used in cooling systems	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily Journals
20-17	16		Cooling system absorption / working principle - advantages - use in refrigeration and condensation / comparison with the system	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily Journals
22-21	8		Steam cooling systems	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily Journals
25-23	12		Cooling System Using Air features – types	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily Journals
27-26	8		Cooling system with air liquefaction features - types	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily Journals
28	4		Electro thermal cooling system	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily Journals
30-29	8		Food preservation technology - Refrigerated warehouse designs - Storage load account - Warehouse types	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily Journals

107. Course Evaluation

For the first semester (10 theoretical + 10 practical), it accounts for 20%. For the second semester (10 theoretical + 10 practical), it also accounts for 20%. Yearly assignments count for 10%. Consequently, the annual effort is 50%. The final theoretical exam is 40%, and the final practical exam is 10%. (The total is 100%).

108. Learning and Teaching Resources

1-Applied Air – conditioning and refrigeration by C.T Gosling **2 -Air – conditioning Engineering, by W. P. Jones**	
3 -Environment Engineering, analysis & practice by Jennings **4-A course of refrigeration & Air-conditioning by Arora S. Domkundwar**	

5-Ashrae Handbook , Fundamentals	
Website of Najaf technical institute	

109. Course Name:
Air condoning
110. Course Code:
111. Semester / Year:
Second year
112. Description Preparation Date:
2025
113. Available Attendance Forms:
Full attendance system
114. Number of Credit Hours (Total) / Number of Units (Total)
4 hours/ 8 units
115. Course administrator's name (mention all, if more than one name)
Name: Karim Jaafer Alwan

116. Course Objectives

Course Objectives	Introducing the student to a detailed study on the foundations of air conditioning and calculating thermal loads in the cooling and heating systems, a study of different air conditioning groups and the foundations of designing air ducts and pipes, in addition to the topics of noise and air purification.

117. Teaching and Learning Strategies

Strategy	Theoretical lectures Practical lectures Scientific trips Summer training Student projects

118. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4		Heat transfer types & overall coefficient.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
2-3	8		Thermal comfort, parameters , limitation & charts & comfort zones.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
4	4		Heating load parameters & calculations.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments

5 – 7	8		Cooling load Parameters & Calculations	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
8-9	8		Heating & Cooling systems	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
10	4		Automobile air conditioning system.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
11	4		Actual Heating & Cooling Process	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
12	4		Heating Recovery.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
13	4		Computer-aided cooling load calculation.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
14-15	8		Air – ducting Design , kinds , pressure losses, calculation & dimensions.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
16-17	8		Fans , type & it's specification & laws.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
18	4		Vibrations , sources, measuring.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
19-20	8		Pipes & pumps, types, selection, calculation and laws.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
21	4		Air – conditioning system application	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
22-23	8		Air – filtration methods.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
24	4		Air Washers	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
25	4		Dehumidifiers & humidifiers.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
26	4		Energy distribution in air conditioning system	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments

27	4		Noise, limitation & measuring	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
28-30	8		Energy conservation in Building.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments

119. Course Evaluation

For the first semester (10 theoretical + 10 practical), it accounts for 20%. For the second semester (10 theoretical + 10 practical), it also accounts for 20%. Yearly assignments count for 10%. Consequently, the annual effort is 50%. The final theoretical exam is 40%, and the final practical exam is 10%. (The total is 100%).

120. Learning and Teaching Resources

1) Applied Air – conditioning and refrigeration by C.T Gosling **2) Air – conditioning Engineering , by W. P. Jones**	
3- Principles of Air Conditioning and Refrigeration Engineering Khaled Al-Judi	
Website of Najaf technical institute	

121. Course Name:

Heat transfer

122. Course Code:

123. Semester / Year:

Second year

124. Description Preparation Date:

2025

125. Available Attendance Forms:

Full attendance system

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

3 hours/ 6 units

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

Name: Qasim Hammodi Hassan

128. Course Objectives

Course Objectives	It aims to study heat transfer to know the student the main general foundations of heat transfer and its practical applications in the field of air conditioning, such as finding the convection of a building, as well as finding thermal continuity, thickness and type of insulator used in the pipes of air conditioning systems and heat exchangers of all kinds and their uses in refrigeration

129. Teaching and Learning Strategies

Strategy	Theoretical lectures Practical lectures Scientific trips Summer training Student projects

130. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3		Basic principles and importance of heat transfer.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
2	3		The three kinds of heat transfer , conduction heat transfer, convection heat transfer , radiation heat transfer, examples	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
3	3		Conduction of heat transfer in the steady state conduction through a homogeneous plans wall	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
4	3		Conduction through a composite plans wall, heat resistance . conduction through a homogeneous cylinder wall	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
5	3		Conduction through a composite cylinder wall , influence of variable conductivity , examples	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
6	3		Heat transfer by convection , Reynolds concept of similarity of the flow of fluids and the viscosity , the most important dimensionless groups, examples	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
7	3		Heat transfer by free convection , heat transfer from vertical and horizontal surfaces , examples	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
8-9	6		Heat transfer by free convection from horizontal square plates , heat transfer proportion of air at atmospheric pressure and	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments

			properties of water . examples		
10	3		Heat transfer by forced convection , the heating of fluids in turbulent flow through pipes , examples	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
11	3		The heating of fluids flowing normal to single wires and tubes the heating of fluids flowing normal to tube banks , examples	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
12-13	6		Heat transfer by the combined effect of conduction and convection, heat transfer between two fluids through a plane wall, heat transfer between two fluids through a cylinder wall, examples	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
14-15	6		Types of heat exchangers, the log mean temperature difference, examples	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
16-17	6		Heat exchanger effectiveness ratio , examples	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
18	3		Heat transfer through fins , condensation and boiling heat transfer	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
19	3		Heat transfer by radiation , the concept of a perfect black body	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
20	3		Stefan –Boltzmann's law of total radiation , general equation for heat exchange by radiation between black surfaces , examples	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
1-22-23	9		Heat exchange by radiation between large parallel black plane , examples	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
4-25-26	9		Heat exchange by radiation between large parallel planes of different emissivity , examples	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
27-28	6		Heat conduction in series with convection and radiation, examples	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
29	3		Heat transfer through air space , examples	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
30	3		General problems , home works		

131. Course Evaluation
For the first semester (10 theoretical + 10 practical), it accounts for 20%. For the second semester (10 theoretical + 10 practical), it also accounts for 20%. Yearly assignments count for 10%. Consequently, the annual effort is 50%. The final theoretical exam is 40%, and the final practical exam is 10%. (The total is 100%).

132. Learning and Teaching Resources	
1- Physical similarity and Dimensional analyses Dancan Edward Arnold – 1953 2- Heat and mass transfer Jakob and Hawking John Wiley & Sons, Inc. 1957 3- Heat transfer by Holman	
Website of Najaf technical institute	

133. Course Name:
Control systems
134. Course Code:
135. Semester / Year:
Second year
136. Description Preparation Date:
2025
137. Available Attendance Forms:
Full attendance system
138. Number of Credit Hours (Total) / Number of Units (Total)
3hours/ 6 units
139. Course administrator's name (mention all, if more than one name)
Name: Haroon Rashid
140. Course Objectives

Course Objectives	Introducing the student to the basic principles that work in control and control systems in general, specifically those used in the field of controlling the work of air conditioning and refrigeration systems

141. Teaching and Learning Strategies	
Strategy	Theoretical lectures Practical lectures Scientific trips Summer training Student projects

142. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3		Principles of control. and general definitions of the most important terms used in control	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
2	3		Principles of control – types of control	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
3	3		Principles of measurement - measurement - control and measurement - the most important factors that are subject to control	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
4	3		Measuring and sensing devices for various factors in refrigeration and air conditioning devices {liquid level - pressure - temperature - humidity}	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
5	3		Electrical control circuits / electrical control balance – diagrams of electrical circuits and control	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
7−6	6		Electrical control elements, thermostat – no breaker for overload protection, moisture regulators, pressure regulators, final control elements, connectors.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
8	3		Electronic control circuits – elements of control circuits, thermostat, humidity regulator	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
−10−9 12−11	12		Pneumatic control circuits, control components, control elements, thermostat, humidity regulator, pressure regulator, control elements, gate drive, pneumatic valves, pneumatic relays, compressed air processing equipment	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
14−13	6		Control System Components for Refrigeration Machines – Dynamic Properties	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
16−15 18−17 19	15		Cooling capacity control methods – control of cooling capacity through evaporator action – control of cooling capacity through the action of centrifugal compressors and control of cooling capacity using thermal expansion valve, capacity	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments

			control using raft in centrifuge		
20	3		Practical applications on control devices for clean rooms - white rooms - computer rooms - hospitals	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
22−21 24−23 26−25	18		Control systems for household units – control circuits for wall air conditioner, household freezer – separate appliances, multiple zones (control devices for the device or multiple zones) – central air conditioning	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
27	3		Components of the control system of the central cooling system and the most important methods used to control temperature and humidity	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
28	3		Control system for air conditioning system that operates throughout the world	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
29	3		Control system for central heating devices	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
30	3		Develop a detailed control map for central refrigeration and air conditioning devices	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments

143. Course Evaluation

For the first semester (10 theoretical + 10 practical), it accounts for 20%. For the second semester (10 theoretical + 10 practical), it also accounts for 20%. Yearly assignments count for 10%. Consequently, the annual effort is 50%. The final theoretical exam is 40%, and the final practical exam is 10%. (The total is 100%).

144. Learning and Teaching Resources

1- Engineering Measurement & instrumentation by L. F. Adams 2- Control systems for heating & ventilation and Air-condition , by Haines	
Website of Najaf technical institute	

145. Course Name:

Maintenance of refrigeration and air conditioning devices

146. Course Code:

147. Semester / Year:

Second year

148. Description Preparation Date:

2025

149. Available Attendance Forms:

Full attendance system

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

6hours/ 12 units

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

Name: Haroon Rashid

152. Course Objectives

Course Objectives	Teaching the student and providing him with the skills, techniques and experiences necessary for the development in the field of refrigeration and air conditioning maintenance

153. Teaching and Learning Strategies

Strategy	Theoretical lectures Practical lectures Scientific trips Summer training Student projects

154. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3		Maintenance corporal, types and purpose	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
2	3		The basic electrical parts of the postal and air conditioning cycle and how to check them (compressor / overload / railing / thermostat) and the mechanical cycle	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
3	3		Electric refrigerator and its types (electrical circuit and its types / mechanical circuit and its types(	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
4	3		Electrical and mechanical failures / replacement of any part of the cycle and then inspection, discharge and charging	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
5	3		Frozen and its types (electrical circuit / mechanical circuit) Electrical and mechanical malfunctions of the freezer Leak detection	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments

			in the cycle - inspection, discharge and charging		
6	3		Water supply (electrical and mechanical circuit / water cycle) electrical and mechanical failures and water cycle malfunctions / inspection, discharge and charging	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
7	3		Oil substitute, types of oils, methods of adding oil and amount of oil according to types of compressors	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
8	3		Wall air conditioners and their types (electrical circuits / mechanical circuits) in the cases of cooling and heating	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
9	3		Electrical and mechanical malfunctions of wall air conditioners, how to replace any part, then inspection, discharge and charging / how to check the fan, how to find out the wires and electrodes without visas on the fan, any scheme, types of amplitudes and how to calculate them	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
10	3		Separate units (split unit) and their types mono-visas and triple visas (electrical circuits and their types / mechanical circuits) in the cases of cooling and heating	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
11	3		Electrical malfunctions / mechanical failures of separate units and malfunctions of the electronic mind and how to connect the Joker board	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
12	3		How to install separate units and choose the appropriate location and size of the device scientifically and the steps of installation in detail / How to convert a device from a place installed to a new place of installation according to the steps without losses in the shipment	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
13	3		Car conditioning (electrical circuit / mechanical circuit) electrical and mechanical malfunctions / how to detect leakage and then inspection, discharge and charging	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
14	3		A scientific visit to one of the industrial sites that have refrigeration and air conditioning devices	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments

15	3		Types of compressors, how to maintain them, electrical and mechanical parts for each type / types of refrigerant media and environmentally friendly alternatives	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
16	3		Combined units (package unit) electrical and mechanical circuit / electrical and mechanical malfunctions and how to maintain and maintain parts of the units and how to check, discharge and charge	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
17	3		The boiler, its components, types and how to maintain it / maintenance before the winter season Explain the parts in detail	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
18	3		Cold and freezing stores devices, their types, parts and how to maintain them	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
19	3		Central cooling, its types, components, types of each part of the cycle, how to maintain it, detect faults, how to charge the cycle with liquid, cooling medium, how to wash condensate with chemicals, and clean each part of the cycle	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
20	3		Cooling towers, their types, components, how to maintain and sustain before the summer season	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
21	3		Types of humidifiers and types of air filters used by district cooling	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
22	3		Modern cooling systems (VRV / VRF), their components, how to install them and the development in this field	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
23	3		A scientific visit to one of the sites that contain modern (VRV and VRF) systems	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
24	3		Pumps, their types, how to maintain them and to sustain them before the operating season	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
25	3		Fans, their types, methods of maintenance and how to maintain before the operating season	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments

26	3		Control devices in small and large units and the work of each part in the devices and how to maintain and sustain them	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
27	3		Checking resistors, how to find out the size of resistors and electrical examination	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
28	3		Ice plants how they work and maintain	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
29	3		Control panels for small and large devices	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
30	3		Air mixing boxes, their purpose, types and how they work in each location	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments

155. Course Evaluation

For the first semester (10 theoretical + 10 practical), it accounts for 20%. For the second semester (10 theoretical + 10 practical), it also accounts for 20%. Yearly assignments count for 10%. Consequently, the annual effort is 50%. The final theoretical exam is 40%, and the final practical exam is 10%. (The total is 100%).

156. Learning and Teaching Resources

3- Engineering Measurement & instrumentation by L. F. Adams 4- Control systems for heating & ventilation and Air-condition , by Haines	
Website of Najaf technical institute	

157. Course Name:

Industrial Management and Safety

158. Course Code:

159. Semester / Year:

Second year

160. Description Preparation Date:

2025

161. Available Attendance Forms:

Full attendance system

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

2hours/ 4 units

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

Name: Duaa Makki Ahmed

164. Course Objectives

Course Objectives	Teaching the student, the foundations and principles of industrial management and occupational safety public and private through his dealings in the sites of refrigeration and air conditioning systems

165. Teaching and Learning Strategies

Strategy	Theoretical lectures Scientific trips Summer training Student projects

166. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2		Management	Lecture	Oral Exams + Written Exams + Daily assignments
2	2		Principles of management - levels of management and factory - factory organization	Lecture	Oral Exams + Written Exams + Daily assignments
3	2		Administrative functions	Lecture	Oral Exams + Written Exams + Daily assignments
4	2		Facility Functions	Lecture	Oral Exams + Written Exams + Daily assignments
5	2		Choosing the location of the plant and the factors affecting it	Lecture	Oral Exams + Written Exams + Daily assignments
6	2		Procurement – the relationship of procurement to other functions of the establishment and the procurement steps	Lecture	Oral Exams + Written Exams + Daily assignments
7	2		Warehouse – Inventory – Inventory Types	Lecture	Oral Exams + Written Exams + Daily assignments
8	2		Types of stores – warehouse inventory	Lecture	Oral Exams + Written Exams + Daily assignments
9	2		Determination of the economic quantity of demand	Lecture	Oral Exams + Written Exams + Daily assignments
10	2		Elementary concepts in costs	Lecture	Oral Exams + Written Exams + Daily assignments
11	2		Wages – Types	Lecture	Oral Exams + Written Exams + Daily assignments
12	2		Methods of calculating wages	Lecture	Oral Exams + Written Exams + Daily assignments
13	2		Training – the importance of training	Lecture	Oral Exams + Written Exams + Daily assignments

14	2		Training methods	Lecture	Oral Exams + Written Exams + Daily assignments
15	2		Leadership, competent manager and types of managers – characteristics and qualities of managers and signs of good and poor management	Lecture	Lecture + Practical Examples + Laboratory
16	2		Basic concepts in quality control (the concept of control) The concept of quality - the quality of quality control - the importance and benefits of quality control	Lecture	Lecture + Practical Examples + Laboratory
17	2		Quality Elements – Design Quality	Lecture	Lecture + Practical Examples + Laboratory
18	2		Quality of implementation – reliability – costs of quality control	Lecture	Lecture + Practical Examples + Laboratory
19	2		Standardization – Standard Specifications (Definition of Specification)	Lecture	Lecture + Practical Examples + Laboratory
20	2		Types of standard specifications	Lecture	Lecture + Practical Examples + Laboratory
21	2		Data and information collection – frequency table – histogram	Lecture	Lecture + Practical Examples + Laboratory
22	2		Quality control methods – sample method – types of schemes	Lecture	Lecture + Practical Examples + Laboratory
23	2		Applications in the use of one of the types of charts	Lecture	Lecture + Practical Examples + Laboratory
24	2		Maintenance – Objectives – Types	Lecture	Lecture + Practical Examples + Laboratory
25	2		Preventive maintenance – benefits – sudden maintenance	Lecture	Lecture + Practical Examples + Laboratory
26	2		تنظيم قسم الصيانة	Lecture	Lecture + Practical Examples + Laboratory
27	2		Honesty and industrial safety, the impact of industrial safety on production efficiency	Lecture	Lecture + Practical Examples + Laboratory
28	2		Qualitative methods with industrial safety, general rules and regulations for the prevention of accidents	Lecture	Lecture + Practical Examples + Laboratory
29	2		Industrial accident and ways to prevent it	Lecture	Lecture + Practical Examples + Laboratory
30	2		Personal protective equipment - fires and methods of fighting them	Lecture	Lecture + Practical Examples + Laboratory
167. Course Evaluation					

For the first semester for 20%. For the second semester 20%. Yearly assignments count for 10%. Consequently, the annual effort is 50%. The final theoretical exam is 50%, (The total is 100%).

168. Learning and Teaching Resources

1- Aysar Sousan: the importance of industrial engineering / February 1986 / Baghdad 2- - Dr. Ali Abdul Majeed Abdul: Scientific Origins of Management and Dar Al-Nahda 1972 3- Dr. Mohieddin Abbas: Procurement Management, Dar Al-Fikr Al-Arabi, Cairo 19774-Henry Alberts : 4- Principles of managements , John Wiley N. Y. 1969	
Website of Najaf technical institute	

169. Course Name:

Computer Applications

170. Course Code:

171. Semester / Year:

Second year

172. Description Preparation Date:

2025

173. Available Attendance Forms:

Full attendance system

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

3hours/ 6 units

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

Name: Ragad Mahdi

176. Course Objectives

Course Objectives	Introducing the student to electronic computers and their uses in solving problems related to specialization

177. Teaching and Learning Strategies

Strategy	Theoretical lectures Practical lectures Scientific trips Summer training Student projects

178. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
3-2-1	9		The concept of networks and their types - the concept of the Internet - Internet - its operation - description of the home screen and its components - how to connect with the World Wide Web (Web) - take advantage of the famous search engines Yahoo , Goggle - Learn ways to search for and access information	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
-8-7-6-5-4 10-9	21		Excel program Learn about the concept of the program: its benefits, specifications, features, methods of operation, identify the home screen and its components, and contain various menus and effective tools. The concept of the cell, basic data types and how to enter them How to save a work page Workbook, Worksheet Close the program and close the file Open the saved file, enter data, perform simple calculations, and learn how to adjust or format data and structure it within a single cell or group of cells Learn about methods of collecting data or group of cells in their different forms, as well as how to sort data Using some functions provided by the program such as, Sum, Min, Max< count, SQRT, Average and other relevant useful statistical functions Learn about the editing process provided by the program, how to copy data or transfer data and learn about the concept of copying calculations as well as the concept of relative cells and absolute cells Control cell width: change its style and format through	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments

			the use of formatting tools Dealing with charts and how to convert numeric and text data into charts of various kinds through the Chart Wizard command and learn how to make adjustments and revisions provided by the program Learn how to add or delete rows or columns on the work page and how to print numeric data or charts		
11	3		Auto CAD program Learn about the different program environment for the screen Menus – Screen – Scroll Bars – tool Bars – Properties	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
12	3		Preparing a drawing sheet – opening a new file – drawing limits – drawing units – grid – jumping Snap storage Save as , Save	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
15−14−13	9		Learn about the different drawing commands – Arc – (Absolute – Relative – Polar) line Multiline – pline – point – circle	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
18−17−16	9		Learn about editing mirror - move - copy - offset	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
19	3		Exact drawing Osnap	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
20	3		Add dimensions	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
21	3		Text Hatch	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
22	3		Layer - Properties - line types -	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
23	3		Block& Attributes	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
24	3		Measure – Block – w block – explode – divide	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments

26–25	9		3d drawings	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
28–27	9		3D surfaces	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
30 – 29	9		3D Solids	Lecture + Practical Examples + Laboratory	Lecture + Practical Examples + Laboratory

179. Course Evaluation

For the first semester (10 theoretical + 10 practical), it accounts for 20%. For the second semester (10 theoretical + 10 practical), it also accounts for 20%. Yearly assignments count for 10%. Consequently, the annual effort is 50%. The final theoretical exam is 40%, and the final practical exam is 10%. (The total is 100%).

180. Learning and Teaching Resources

Website of Najaf technical institute	

181. Course Name:

Drawing of cooling systems

182. Course Code:

183. Semester / Year:

Second year

184. Description Preparation Date:

2025

185. Available Attendance Forms:

Full attendance system

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

3hours/ 6 units

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

Name: Karim Jaafer Alwan

188. Course Objectives

Course Objectives	**Introducing the student to electronic computers and their uses in solving problems related to specialization and marking air paths in cooling systems**

189. Teaching and Learning Strategies

Strategy	Practical lectures Scientific trips Summer training Student projects

190. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3		General introduction about line drawing by Auto CAD	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
2	3		Drawing of all duct fittings (A section of a duct- the inverse of right angle branching from one side –branching two sides four sided fittings.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
3	3		The collection of air duct fittings in one design	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
4	3		Drawing of a complete air duct design with dimensions and how to calculate the allocation value for each duct.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
5	3		Drawing of a complete air duct design with linking by the A.H.U, air grills, and air quantities.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
6	3		Drawing of a complete air duct design with linking by the A.H.U, air grills, and air quantities.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
7	3		Drawing of a building design labeled with details of windows and rooms, entrance , and exit doors.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
8	3		Drawing of an air duct inside a building	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
9	3		Drawing of an air duct inside a building	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments

10	3		General introduction about the pipe systems. Drawing of all linking and valves, fittings.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
11	3		Drawing of a condensed refrigeration system cooled with water in addition to a cooling tower , a working pump, and another pump or emergency.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
12	3		Drawing of a condensed refrigeration system cooled with water in addition to a cooling tower , a working pump, and another pump or emergency.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
13	3		Drawing of a cooling and warming system that works by water of one pipe system with an expansion reservoir for each system.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
14	3		Drawing of a cooling and warming system that works by water of two pipe system with an expansion reservoir for each system.	Lecture + Practical Examples + Laboratory	Oral Exams + Written Exams + Daily assignments
15	3		Drawing of a cooling and warming system that works by water of three pipe system with an expansion reservoir for each system.	Lecture + Practical Examples + Laboratory	Lecture + Practical Examples + Laboratory
16	3		Drawing of a cooling and warming system that works by water of four pipe system with an expansion reservoir for each system.	Lecture + Practical Examples + Laboratory	Lecture + Practical Examples + Laboratory
17	3		Drawing of a machines room labeled with chillers, boilers, closed expansions reservoirs, pumps, pipes, and valves.	Lecture + Practical Examples + Laboratory	Lecture + Practical Examples + Laboratory
18	3		Drawing of a machines room labeled with chillers, boilers, closed	Lecture + Practical Examples + Laboratory	Lecture + Practical Examples + Laboratory

			expansions reservoirs, pumps, pipes, and valves.		
19	3		Drawing of a map for a one-floor building labeled with the linking of fans and coil units and their linking with the machines room.	Lecture + Practical Examples + Laboratory	Lecture + Practical Examples + Laboratory
20	3		Drawing of a building design labeled with linking of an air blower with a coil that works by cool water and the distribution of ducts on the rooms and water pipes from the machines room.	Lecture + Practical Examples + Laboratory	Lecture + Practical Examples + Laboratory
21	3		Drawing of a building design labeled with linking of an air blower with a coil that works by cool water and the distribution of ducts on the rooms and water pipes from the machines room.	Lecture + Practical Examples + Laboratory	Lecture + Practical Examples + Laboratory
22	3		Drawing of a building design labeled with linking of an air blower with a coil that works by cool water and the distribution of ducts on the rooms and water pipes from the machines room.	Lecture + Practical Examples + Laboratory	Lecture + Practical Examples + Laboratory
23	3		Drawing of a dual duct system.	Lecture + Practical Examples + Laboratory	Lecture + Practical Examples + Laboratory
24	3		Drawing the induction system.	Lecture + Practical Examples + Laboratory	Lecture + Practical Examples + Laboratory
25	3		A scientific trip to learn about cooling and duct systems for a work site under construction or a complete system.	Lecture + Practical Examples + Laboratory	Lecture + Practical Examples + Laboratory
26	3		Drawing of a control system on cooling water	Lecture + Practical Examples + Laboratory	Lecture + Practical Examples + Laboratory

			of condenser by using the flow switch.		
27	3		Drawing of a control system on the cooling of an air conditioner.	Lecture + Practical Examples + Laboratory	Lecture + Practical Examples + Laboratory
28	3		Drawing of a control system on the cooling of a separated air cooler.	Lecture + Practical Examples + Laboratory	Lecture + Practical Examples + Laboratory
29	3		Drawing of an operation for fixing of air ducts under the secondary roof-devices supporters-pumps ,bases-pipes – Ascending ducts.	Lecture + Practical Examples + Laboratory	Lecture + Practical Examples + Laboratory
30	3		Drawing of an operation for fixing of air ducts under the secondary roof-devices supporters-pumps ,bases-pipes – Ascending ducts.	Lecture + Practical Examples + Laboratory	Lecture + Practical Examples + Laboratory

191. Course Evaluation

For the first semester 20%. For the second semester), it also accounts for 20%. Yearly assignments count for 10%. Consequently, the annual effort is 50%. The final practical exam is 50%, (The total is 100%).

192. Learning and Teaching Resources

1- **Carrier hand book**
2- **Brochure drawing of refrigeration and air conditioning systems. Prepared by Abdul Amir Abdul Zahra**
3- **Industrial drawing book. Prepared by Abdul Amir Abdul Zahra.**

Website of Najaf technical institute

193. Course Name:

The project

194. Course Code:

195. Semester / Year:

Second year

196. Description Preparation Date:

2025

197. Available Attendance Forms:

Full attendance system

198. Number of Credit Hours (Total) / Number of Units (Total)
2hours/ 4units
199. Course administrator's name (mention all, if more than one name)
Name: Department lecturers
200. Course Objectives

Course Objectives	Introducing the student to electronic computers and their uses in solving problems related to specialization

201. Teaching and Learning Strategies	
Strategy	Theoretical lectures Practical lectures Scientific trips Summer training Student projects

202. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Student projects are distributed to the students of the branch by the branch or department and under the supervision of a professor, so that the projects include one of the following aspects. Making integrated maps for a refrigeration or air conditioning device, within the specialized devices, manufacturing parts or assembly for devices or accessories, with the necessary examinations and tests on it after that. The process of calculating air conditioning loads for any public building, drawing the necessary plans and maps for all air ducts and water transport pipes, as well as illustrations of the required accessories, installation of pipes and devices, sequence of control devices and testing devices					

203. Course Evaluation
Continuous evaluation / seminars / project discussion final grade 100%
204. Learning and Teaching Resources

Website of Najaf technical institute	