Ministry of Higher Education and Scientific Research
Scientific supervision and evaluation device
Department of Quality Assurance and Academic Accreditation
Department Accreditation

Academic program and course description guide

2024/2025

Introduction:

The educational program is considered a coordinated and organized package of academic courses that includes procedures and experiences organized in the form of academic vocabulary, the main purpose of which is to build and refine the skills of graduates, making them qualified to meet the requirements of the labor market. It is reviewed and evaluated annually through internal or external audit procedures and programs such as the external examiner program. The description of the academic program provides a brief summary of the main features of the program and its courses, indicating the skills that students are working to acquire based on the objectives of the academic program. The importance of this description is evident because it represents the cornerstone of obtaining program accreditation, and the teaching staff participates in writing it under the supervision of the scientific committees in the scientific departments.

This guide, in its second edition, includes a description of the academic program after updating the vocabulary and paragraphs of the previous guide in light of the latest developments in the educational system in Iraq, which included a description of the academic program in its traditional form (annual, quarterly), in addition to adopting the description of the academic program circulated according to the book of the Department of Studies 3/2906. On 5/3/2023 with regard to programs that adopt the Bologna Process as a basis for their work. In this area, we can only emphasize the importance of writing descriptions of academic programs and courses to ensure the smooth conduct of the educational process

Concepts and terminology:

Description of the academic program: The description of the academic program provides a brief summary of its vision, mission, and objectives, including an accurate description of the targeted learning outcomes according to specific learning strategies. Course Description: Provides a necessary summary of the most important characteristics of the course and the learning outcomes that the student is expected to achieve, demonstrating whether he or she has made the most of the available learning opportunities. It is derived from the program description. Program Vision: An ambitious picture for the future of the academic program to be a developed, inspiring, motivating, realistic and applicable program. The program's mission: It briefly explains the goals and activities necessary to achieve them, and also defines the program's development paths and directions. Program objectives: These are statements that describe what the academic program intends to achieve within a specific period of time and are measurable and observable. Curriculum structure: All courses/study subjects included in the academic program according to the approved learning system (semester, annual, Bologna track), whether it is a requirement (ministry, university, college, or scientific department), along with the number of study units. Learning outcomes: A consistent set of knowledge, skills, and values that the student has acquired after the successful completion of the academic program. The learning outcomes for each course must be determined in a way that achieves the program objectives. Teaching and learning strategies: They are the strategies used by

the faculty member to develop the student's teaching and learning, and they are plans that are followed to reach the learning goals. That is, it describes all curricular and extracurricular activities to achieve the learning outcomes of the programming.

Concepts and terminology:

Description of the academic program: The description of the academic program provides a brief summary of its vision, mission, and objectives, including an accurate description of the targeted learning outcomes according to specific learning strategies.

Course Description: Provides a necessary summary of the most important characteristics of the course and the learning outcomes that the student is expected to achieve, demonstrating whether he or she has made the most of the available learning opportunities. It is derived from the program description.

Program Vision: An ambitious picture for the future of the academic program to be a developed, inspiring, motivating, realistic and applicable program.

The program's mission: It briefly explains the goals and activities necessary to achieve them, and also defines the program's development paths and directions.

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Teaching and learning strategies: They are the strategies used by the faculty member to develop the student's teaching and learning, and they are plans that are followed to reach the learning goals. That is, it describes all curricular and extracurricular activities to achieve the learning outcomes of the programming.

Academic program description form

University name: Northern Technical University

College/Institute: Engineering Technical College / Mosul

Scientific Department: Power Mechanics Techniques Engineering Department.

Name of the academic or professional program: Bachelor of Power Mechanical Techniques Engineering.

Name of final degree: Bachelor's degree in Power Mechanics Techniques Engineering.

School system: Courses.

Date of preparing the description: 30/9/2024

Date of form completion: 3 /10/2024

Signature:
Assist Prof. Dr. Mohammed S. Jarjees
Dean's Assistant for Scientific Affairs
Date: 6 /10/ 2024

Signature:
Dr. Ammar H. Suhail
Head of Department
Date: 6 /10/ 2024

The file was audited by the
Quality Assurance and University Performance Manager

Signature:
Assist. Lecturer Warqaa Hashim Mahmood
Date: 8 /10/2024

Authentication of the Dean

وزارة التعليم العالي والبحث العلمي
الجامعة التقنية الشمالية
الكلية التقنية الهندسية/الموصل

Signature:
Prof. Dr. Majid Kh. Najim
Dean
Date: 8/10/2024

1. View the program

The Department of Mechanical Power Engineering Technologies aims to be a national leader in engineering education and applied research. It strives to produce skilled, practice-oriented engineers in renewable energy, refrigeration and air conditioning, production and automation at the preliminary study and postgraduate studies. The department is committed to enhancing innovation, promoting sustainability, and aligning its academic programs with global standards. It aspires to contribute to national development by preparing graduates with the competencies needed to advance Iraq's technological progress and meet the evolving demands of society and the labor market.

2. Program message

Creating a distinguished theoretical and practical learning environment for students by delivering high quality scientific lectures in specialized fields, providing modern laboratories, workshops, and hands on training to enhance technical proficiency, and continuously updating curricula and programs to keep pace with technological development.

3. Program Goals

A- Refrigeration and Air Conditioning Branch:

This branch aims to:

1- Graduate engineers capable of performing thermal load calculations and system testing, qualifying them to work on engineering systems and conduct feasibility studies for various specialized projects.
2- Diagnose and repair a wide range of thermal systems—including small, combined, separate, and central units, as well as refrigerated and freezing storage systems and steam systems—serving both industrial and service sectors.
3- Develop refrigeration and freezing systems that are adapted to the country's climatic and environmental conditions, while keeping pace with technological advancements in the field.
4- Install, operate, and manage maintenance and repair facilities related to the branch's specialization.
5- Conduct research and investigations, promote energy rationalization, and explore alternative solutions within the field.

B- Renewable Energy Branch:

This branch aims to meet growing energy needs by:

1- Preparing graduates with the skills necessary to design and analyze alternative energy systems, including solar thermal systems, photovoltaic modules, biofuels, wind energy, and solar power technologies.
2- Providing career pathways in research and development as well as engineering design, fostering scientific and technological advancement across various industrial sectors.
3- Graduating engineers capable of innovating, researching, and designing renewable energy systems that directly contribute to Iraq's sustainable development, energy security, and industrial progress.

4. Program accreditation

Program of the Ministry of Higher Education and Scientific Research

5. Other external influences

None

6. Program structure

Program Structure	Branch Name	Number of Courses	Number of Units	Percentage	Notes*
Enterprise requirements	Refrigeration and Air Conditioning	11	20	11.8	Secondary course
	Renewable Energy	11	20	12.6	
College requirements	Refrigeration and Air Conditioning	10	21	12.4	Basic course
	Renewable Energy	10	21	13.3	
Department requirements	Refrigeration and Air Conditioning	29	82	48.5	Basic course
	Renewable Energy	29	86	54.4	
summer training	Refrigeration and Air Conditioning	2	-	-	Basic course
	Renewable Energy	2	-	-	
Others (branch)	Refrigeration and Air Conditioning	12	35	20.7	Basic course
	Renewable Energy	11	34	21.5	

*Notes may include whether the course is core or elective.

7. Program description

Level/Semester	course code	Course or course name	Credit hours	
			Theoretical	Optical
First / First	NTU 100	Human Rights	1	0
First / First	NTU 101	English Language1	2	0
First / First	NTU 102	Computer Principles 1	1	2
First / First	NTU 106	Democracy	1	0
First / First	TEMO 100	Electrical Technology	2	2
First / First	TEMO101	Mathematics 1,2	6	0
First / First	PM100	Thermodynamics 1,2	2	2
First / First	PM 102	Engineering Mechanics-Statics	3	0
First / First	PM 104	Occupational Safety Principles	1	3
First / First	PM 105	Workshops	0	4

7. Program description				
Level/Semester	course code	Course or course name	Credit hours	
			Theoretical	Optical
First / Second	NTU 103	Computer Principles 2	1	2
First / Second	NTU 104	Arabic Language	2	0
First / Second	TEMO 103	Engineering Drawing	1	2
First / Second	TEMO 104	Engineering Workshop	0	2
First / Second	TEMO 105	Chemistry	2	1
First / Second	TEMO 106	Physics	4	2
First / Second	PM 103	Engineering Mechanics dynamics	3	0
Second/ First	TEMO 200	Mathematics 3	3	0
Second/ First	PM 200	Thermodynamics 3	2	2
Second/ First	PM 202	Fluid Mechanics 1	2	2
Second/ First	PM 204	Strength of Materials 1	2	2
Second/ First	PM 206	Engineering Materials 1	2	2
Second/ First	PM 209	Refrigeration & Air Conditioning 1	2	2
Second/ First	PM 210	Mechanical Drawing	1	3
Second/ Second	NTU 201	Professional Ethics	2	0
Second/ Second	NTU 200	English language 2	2	0
Second/ Second	TEMO 201	Mathematics 4	3	0
Second/ Second	TEMO 202	Summer Training 1	0	6
Second/ Second	PM 203	Fluid Mechanics 2	2	2
Second/ Second	PM 205	Strength of Materials 2	2	2
Second/ Second	PM 207	Engineering Materials 2	2	2
Second/ Second	PM 208	Theory of Machines 1	2	2
Second/ Second	PM 201	Thermodynamics 4	2	2
Air conditioning Branch				
Third / Five	NTU 300	English Language 3	2	**0**
Third / Five	PM 300	Computer Applications	1	**2**
Third / Five	PM 301	Engineering Analysis	3	**0**
Third / Five	RAC 300	Heat & Mass Transfer 1	2	**2**
Third / Five	RAC 302	Refrigeration & Air Conditioning 2	2	**2**
Third / Five	RAC 304	Drawing of Refrigeration & Air Conditioning Systems	1	**3**
Third / Five	RAC 305	Maintenance of Refrigeration & Air Conditioning Systems	2	**3**
Third / sex	TEMO 300	Summer Training 2	0	6
Third / sex	PM 302	Numerical Analysis	3	0
Third / sex	PM 303	Electrical & Electronic Engineering	2	2
Third / sex	PM 304	Machine Design	2	2
Third / sex	PM 305	Vibration	2	2
Third / sex	RAC 301	Heat & Mass Transfer 2	2	2
Third / sex	RAC 303	Refrigeration & Air Conditioning 3	2	2
Fourth / Seven	NTU 410	Methodology of Scientific Research	2	0
Fourth / Seven	TEMO 400	Engineering Management	2	0
Fourth / Seven	PM 400	Engineering Measurement Systems	2	2
Fourth / Seven	RAC 401	Air Conditioning Systems Design 1	2	2
Fourth / Seven	RAC 403	Refrigeration Systems Design 1	2	2

7. Program description

Level/Semester	course code	Course or course name	Credit hours	
			Theoretical	Optical
Fourth / Seven	RAC 405	Thermal Power Plants	2	2
Fourth / Eight	NTU 400	English Language 4	2	0
Fourth / Eight	TEMO 401	Project	0	8
Fourth / Eight	PM 401	Automatic Control Systems	2	2
Fourth / Eight	PM 402	Computer Aided Design	1	3
Fourth / Eight	RAC 402	Air Conditioning Systems Design 2	2	2
Fourth / Eight	RAC 404	Refrigeration Systems Design 2	2	2
Fourth / Eight	RAC 400	Renewable Energy	2	2
Renewable energy branch				
Third / Five	NTU 300	English Language 3	2	0
Third / Five	PM 300	Computer Applications	1	2
Third / Five	PM 301	Engineering Analysis	3	0
Third / Five	RE 300	Heat and mass transfer 1	2	2
Third / Five	RE 302	Introduction to Renewable Energy	2	2
Third / Five	RE 304	Biofuels	2	0
Third / sex	TEMO 300	Summer Training 2	0	6
Third / sex	PM 302	Numerical Analysis	3	0
Third / sex	PM 303	Electrical & Electronic Engineering	2	2
Third / sex	PM 304	Machine Design	2	2
Third / sex	PM 305	Vibration	2	2
Third / sex	RE 301	Heat and mass transfer 2	2	2
Third / sex	RE 303	Gas dynamics	2	0
Fourth / Seven	NTU 410	Methodology of Scientific Research	2	0
Fourth / Seven	TEMO 400	Engineering Management	2	0
Fourth / Seven	PM 400	Engineering Measurement Systems	2	2
Fourth / Seven	RE 400	Renewable Energy 1	3	2
Fourth / Seven	RE 402	Combustion Engineering	2	0
Fourth / Seven	RE 404	Photovoltaic Energy	2	2
Fourth / Seven	RE 405	Thermal Power Plants	2	2
Fourth / Eight	NTU 400	English Language 4	2	0
Fourth / Eight	TEMO 401	Project	0	8
Fourth / Eight	PM 401	Automatic Control Systems	2	2
Fourth / Eight	PM 402	Computer Aided Design	1	3
Fourth / Eight	RE 401	Renewable Energy 2	3	2
Fourth / Eight	RE 406	Air Pollution	2	0
Fourth / Eight	RE 403	Thermal System Design	3	0

8. Expected learning outcomes of the program

Knowledge

1. A. Performing mathematical calculations and designing mechanical components using computers, and studying the economic feasibility of various projects in the specialization field.
2. A. Diagnosing faults and performing maintenance and repair work on mechanical systems for industrial and service purposes.
3. A. Conducting research, studies, and searching for alternatives in the field of specialization using the latest technologies.
4. A. Designing systems operating on renewable energies and cooling systems using various manufacturing methods to achieve maximum efficiency.

Skills	
1.B. Performing mathematical calculations and designing mechanical components. 2. B. Conducting non-destructive analyses and inspections for mechanical parts. 3. B. Conducting experiments and failure tests for parts. 4. B. Ability to draw conclusions and analyze data.	
Value	
1.C. Developing students' abilities to participate in idea sharing. 2.C. Enhancing the fundamental skills necessary for designing, implementing, and maintaining systems and laboratory projects. 3.C. Providing a broad appreciation for problems that may arise in professional practice, including teamwork, leadership, occupational safety, communication, professional ethics, and economic feasibility. 4.C.Ability to analyze, deduce, and solve problems in an engineering manner according to required standards	Summer and vocational training, laboratories, scientific films and videos (electronic and in-person) blended learning, and graduation projects
9. Teaching and learning strategies	
- Explaining the scientific material to students in detail. - Participation of students in solving mathematical problems - Discussion and dialogue about vocabulary related to the topic. - Daily tests, mid-term exams, final exams, weekly reports within the subject, descriptive homework assignments.	

10. Evaluation methods
Daily tests, mid-term exams, final exams, weekly reports within the subject, descriptive homework assignments.

11. Education institution

Faculty members

Scientific rank	Specialization		Special requirements /skills (if any)		Preparing the teaching staff	
	General	Private			Permanent staff	Lecturer
Assist Prof	Mechanical Eng.	Thermal	None		7	0
Lecturer	Mechanical Eng.	Thermal	None		8	0
Lecturer	Architecture Eng.	Architecture	None		1	0
Lecturer	Mechanical Eng.	Vibrations	None		1	0
Assist Lecturer	Mechanical Eng.	Thermal	None		8	0
Assist Lecturer	Mathematical sciences	Applied mathematics	None		1	0
Assist Lecturer	Computer technology engineering	Computer	None		1	0

Professional development
Orienting new faculty members
Teamwork skills. Computer and Internet skills. Communication skills such as English and presentation. Leadership skills and taking responsibility. Self-education and lifelong learning skills.
Professional development for faculty members
-Training courses within the institution. - Training courses outside the institution. - Scientific research - seminars and scientific symposiums. - Self education
12. Acceptance standard
- Scientific section - Professional study - The grade
13. The most important sources of information about the program
- Methodological books. - Help resources (Internet). - Scientific research and its latest developments.

14. Program development plan
- Learn about the experiences of Arab and foreign counterpart universities and colleges and benefit from the development taking place with them

Program skills chart															
				Learning outcomes required from the program											
Level / semester	Course Code	Course Name	Essential or optional	Knowledge				Skills				Values			
				1A	2A	3A	4A	B1	B2	B3	B4	C1	C2	C3	C4
First / First	NTU 100	Human Rights	Supported												
First / First	NTU 101	English Language1	Supported												
First / First	NTU 102	Computer Principles 1	Supported					√	√		√	√			
First / First	NTU 106	Democracy	Supported												
First / First	TEMO 100	Electrical Technology	Basic	√	√		√	√	√	√	√	√	√	√	√
First / First	TEMO101	Mathematics 1,2	Basic	√				√				√			
First / First	PM100	Thermodynamics 1,2	Basic	√	√	√	√	√		√	√	√	√	√	√
First / First	PM 102	Engineering Mechanics-Statics	Basic	√	√	√	√	√		√		√			
First / First	PM 104	Occupational Safety Principles	Supported		√									√	
First / First	PM 105	Workshops	Basic		√					√		√	√	√	√
First / Second	NTU 103	Computer Principles 2	Supported									√			
First / Second	NTU 104	Arabic Language	Supported												
First / Second	TEMO 103	Engineering Drawing	Basic		√		√					√	√	√	√
First / Second	TEMO 104	Engineering Workshop	Basic		√		√					√	√	√	√
First / Second	TEMO 105	Chemistry	Basic									√			
First / Second	TEMO 106	Physics	Basic									√			
First / Second	PM 103	Engineering Mechanics dynamics	Basic	√	√	√	√	√				√			
Second/ First	TEMO 200	Mathematics 3	Basic	√			√					√			
Second/ First	PM 200	Thermodynamics 3	Basic					√	√	√	√	√	√	√	√
Second/ First	PM 202	Fluid Mechanics 1	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Second/ First	PM 204	Strength of Materials 1	Basic	√		√		√	√	√	√	√	√	√	√

Program skills chart															
				Learning outcomes required from the program											
Level / semester	Course Code	Course Name	Essential or optional	Knowledge				Skills				Values			
				1A	2A	3A	4A	B1	B2	B3	B4	C1	C2	C3	C4
Second/ First	PM 206	Engineering Materials 1	Basic	√		√		√	√	√	√	√	√	√	√
Second/ First	PM 209	Refrigeration & Air Conditioning 1	Basic	√		√		√	√	√	√	√	√	√	√
Second/ First	PM 210	Mechanical Drawing	Basic	√		√						√	√	√	√
Second/ Second	NTU 201	Professional Ethics	Supported											√	
Second/ Second	NTU 200	English language 2	Supported												
Second/ Second	TEMO 201	Mathematics 4	Basic	√				√				√			
Second/ Second	TEMO 202	Summer Training 1	Basic	√	√		√					√	√	√	√
Second/ Second	PM 203	Fluid Mechanics 2	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Second/ Second	PM 205	Strength of Materials 2	Basic	√		√		√	√	√	√	√	√	√	√
Second/ Second	PM 207	Engineering Materials 2	Basic	√		√		√	√	√	√	√	√	√	√
Second/ Second	PM 208	Theory of Machines 1	Basic	√		√		√	√	√	√	√	√	√	√
Second/ Second	PM 201	Thermodynamics 4	Basic	√		√		√	√	√	√	√	√	√	√
Refrigeration & Air-conditioning Branch															
Third / Five	NTU 300	English Language 3	Supported												
Third / Five	PM 300	Computer Applications	Supported									√			
Third / Five	PM 301	Engineering Analysis	Basic	√				√				√			
Third / Five	RAC 300	Heat & Mass Transfer 1	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Third / Five	RAC 302	Refrigeration & Air Conditioning 2	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Third / Five	RAC 304	Drawing of Refrigeration & Air Conditioning Systems	Basic	√	√		√					√	√	√	√
Third / Five	RAC 305	Maintenance of Refrigeration & Air Conditioning Systems	Basic		√		√			√		√	√	√	√

Program skills chart															
				Learning outcomes required from the program											
Level / semester	Course Code	Course Name	Essential or optional	Knowledge				Skills				Values			
				1A	2A	3A	4A	B1	B2	B3	B4	C1	C2	C3	C4
Third / sex	TEMO 300	Summer Training 2	Basic	√	√		√					√	√	√	√
Third / sex	PM 302	Numerical Analysis	Basic	√				√				√			
Third / sex	PM 303	Electrical & Electronic Engineering	Basic	√	√		√	√	√	√	√	√	√	√	√
Third / sex	PM 304	Machine Design	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Third / sex	PM 305	Vibration	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Third / sex	RAC 301	Heat & Mass Transfer 2	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Third / sex	RAC 303	Refrigeration & Air Conditioning 3	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Forth / seven	NTU 400	Methodology of Scientific Research	Basic			√									
Fourth / Seven	TEMO 400	Engineering Management	Basic												
Fourth / Seven	PM 400	Engineering Measurement Systems	Basic	√	√		√	√	√	√	√	√	√	√	√
Fourth / Seven	RAC 401	Air Conditioning Systems Design 1	Basic	√	√	√	√	√		√	√	√	√	√	√
Fourth / Seven	RAC 403	Refrigeration Systems Design 1	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Fourth / Seven	RAC 405	Thermal Power Plants	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Fourth / Eighth	NTU 400	English Language 4	Supported												
Fourth / Eighth	TEMO 401	Project	Basic	√	√	√	√					√	√	√	√
Fourth / Eighth	PM 401	Automatic Control Systems	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Fourth / Eighth	PM 402	Computer Aided Design	Basic				√		√		√	√	√	√	√
Fourth / Eighth	RAC 402	Air Conditioning Systems Design 2	Basic	√	√	√	√	√	√	√	√	√	√	√	√

Program skills chart															
				Learning outcomes required from the program											
Level / semester	Course Code	Course Name	Essential or optional	Knowledge				Skills				Values			
				1A	2A	3A	4A	B1	B2	B3	B4	C1	C2	C3	C4
Fourth / Eight	RAC 404	Refrigeration Systems Design 2	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Fourth / Eight	RAC 400	Renewable Energy	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Renewable energy branch															
Third / Five	NTU 300	English Language 3	Supported												
Third / Five	PM 300	Computer Applications	Supported					√		√	√	√	√	√	√
Third / Five	PM 301	Engineering Analysis	Basic	√				√			√	√			
Third / Five	RE 300	Heat and mass transfer 1	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Third / Five	RE 302	Introduction to Renewable Energy	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Third / Five	RE 304	Biofuels	Basic	√			√					√			
Third / sex	TEMO 300	Summer Training 2	Basic	√	√	√	√					√	√	√	√
Third / sex	PM 302	Numerical Analysis	Basic	√				√				√			
Third / sex	PM 303	Electrical & Electronic Engineering	Basic	√	√		√	√	√	√	√	√	√	√	√
Third / sex	PM 304	Machine Design	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Third / sex	PM 305	Vibration	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Third / sex	RE 301	Heat and mass transfer 2	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Third / sex	RE 303	Gas dynamics	Basic	√	√	√	√	√		√	√	√			
Fourth / Seven	NTU 410	Methodology of Scientific Research	Supported			√									
Fourth /seven	TEMO 400	Engineering Management	Supported												
Fourth / Seven	PM 400	Engineering Measurement Systems	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Fourth / Seven	RE 400	Renewable Energy 1	Basic	√	√	√	√	√	√	√	√	√	√	√	√

Program skills chart															
				Learning outcomes required from the program											
Level / semester	Course Code	Course Name	Essential or optional	Knowledge				Skills				Values			
				1A	2A	3A	4A	B1	B2	B3	B4	C1	C2	C3	C4
Fourth / Seven	RE 402	Combustion Engineering	Basic	√		√	√	√		√	√				
Fourth / Seven	RE 404	Photovoltaic Energy	Basic	√			√	√	√	√	√	√	√	√	√
Fourth / Seven	RE 405	Thermal Power Plants	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Fourth / Eight	NTU 400	English Language 4	Supported												
Fourth / Eight	TEMO 401	Project	Basic	√	√	√	√	√				√	√	√	√
Fourth / Eight	PM 401	Automatic Control Systems	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Fourth / Eight	PM 402	Computer Aided Design	Supported				√	√		√	√	√	√	√	√
Fourth / Eight	RE 401	Renewable Energy 2	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Fourth / Eight	RE 406	Air Pollution	Basic	√		√	√	√		√	√	√			
Fourth / Eight	RE 403	Thermal System Design	Basic	√	√	√	√	√	√	√	√	√	√	√	√

Course Description Form

1. Course Name:	
English-3	
2. Course Code:	
NTU300	
3. Semester / Year:	
2024-2025	
4. Description Preparation Date:	
٦/١٠/2024	
5. Available Attendance Forms:	
6. Number of Credit Hours (Total) / Number of Units (Total)	
30hours / 2	
7. Course administrator's name (mention all, if more than one name)	
Name: Luluwah AbdulWahaab Yaseen Email: luluwah.alhubaity@ntu.edu.iq	
8. Course Objectives	
The course covers the English Language Support Program at MU offers language courses to assist international students with reading, writing and speaking skills. The meeting times and locations of these courses can be found in	
9. Teaching and Learning Strategies	
Strategy	lectures, seminors

10. Course Structure

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1st ,2nd ,3d	3		Introduction to english langauge, Syntax in english language, verbs, subject, object, prepositions	Therotical lectures	Daily and weekly test
4th ,5th ,6th	3		Types of verbs tenses: past, present and future	Therotical lectures	Daily and weekly test
7th ,8th ,9th	3		Grammers :Nominal and Verbal Syntax	Therotical lectures	Daily and weekly test
10th ,11th ,12th	3		Grammers: ask by Do, did, does, have, has, had	Therotical lectures	Daily and weekly test
13th , 14th ,15th	3		Grammer: sinterrogative ask by what, where, when , why, ,how often , how long,	Therotical lectures	Daily and weekly test
16th ,17th ,18th	3		Grammers: passive voice pronounciation	Therotical lectures	Daily and weekly test
19th , 20th , 21st	3		The use of scientific terms in the English language	Therotical lectures	Daily and weekly test
22nd ,23rd , 24th	3		Extra Questions: Reading and speaking, Listening and answers The way I live	Therotical lectures	Daily and weekly test
25th ,26th ,27th	3		Extra Questions: Reading and speaking, Listening and answers Family and friends	Therotical lectures	Daily and weekly test
28th ,29th ,30th	3		Extra Questions: Reading and speaking, Listening and answers Social expressions	Therotical lectures	Daily and weekly test

11. Course Evaluation
50 assignments and 50 final exams. The 50 assignments consist of: 10 daily exams + 10 homework + 10 homework s+ 10 midterms + 10 seminars.
12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	New Headway beginner Students book 4th edition John and Liz Soars
Main references (sources)	New Headway beginner Students book 2nd edition John and Liz Soars
Recommended books and references (scientific journals, reports...)	Machine Design.
Electronic References, Websites	https://www.housecallpro.com/learn/best-hvac-books/

1. Course Name:
Computer Applications 3
2. Course Code:
PM 300
3. Semester / Year:
First Semester - Third Stage / Academic Year 2024-2025
4. Description Preparation Date:
٦/١٠/2024
5. Available Attendance Forms:
Blended (Classroom + Online)
6. Number of Credit Hours (Total) / Number of Units (Total)
(1 Theoretical Hour) + (2 Practical Hours) = Total: 3 Hours/ 2 units
7. Course administrator's name (mention all, if more than one name)
Name: Asst. Prof. Dr. Thamir Own Al-Din Mohammed Sheet Al-Mula Email: thamir_own@ntu.edu.iq
8. Course Objectives
1) Qualify students to become 'applied' engineers familiar with modern applications in the design, construction, drawing, and analysis of mechanical parts. 2) Provide students with scientific skills that enable them to design, construct, draw, and analyze mechanical parts, diagnose and fix malfunctions, and implement required modifications. 3) Conduct applied and practical research to develop the design, construction, drawing, and analysis of mechanical parts. 4) Train and develop engineering staff to operate and maintain various mechanical systems. 5) Expose and train students on the latest developments in the design, construction, drawing, and analysis of mechanical parts. 6) Develop the concept of selecting modern mechanical systems currently in use. 7) Design mechanical part loads for various applications.

9. Teaching and Learning Strategies	
Strategy	-Theoretical lectures - Practical labs - Scientific seminars - Training courses Specialized exhibitions using Autodesk Mechanical Desktop (MDT) software

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	(1)th (2h)Lab	Design and draw Fasteners: Nuts, Screws, Washers	Fasteners: Nuts, Screws, Washers	Blended (Classroom + Online)	*H.W + *C.W+ Quiz+Lab
Week 2	(1)th (2h)Lab	Design and draw Shaft Generators	Shaft Generators	Blended (Classroom + Online)	*H.W + *C.W+ Quiz+Lab
Week 3	(1)th (2h)Lab	Design and draw of Cylinder	Cylinders	Blended (Classroom + Online)	*H.W + *C.W+ Quiz+Lab
Week 4	(1)th (2h)Lab	Design and draw of Wrench	Wrenches	Blended (Classroom + Online)	*H.W + *C.W+ Quiz+Lab
Week 5	(1)th (2h)Lab	Design and draw of Thread	Threads	Blended (Classroom + Online)	*H.W + *C.W+ Quiz+Lab
Week 6	(1)th (2h)Lab	Design and draw of Gears	Gears	Blended (Classroom + Online)	*H.W + *C.W+ Quiz+Lab
Week 7	(1)th (2h)Lab	Design and draw of Chamfer and Fillet	Chamfer and Fillet	Blended (Classroom + Online)	*H.W + *C.W+ Quiz+Lab
Week 8	(1)th (2h)Lab	Mid Examination	Mid Examination	Blended (Classroom + Online)	Th. Exam+Lab
Week 9	(1)th (2h)Lab	Design and draw of Shaft Component	Shaft Components	Blended (Classroom + Online)	*H.W + *C.W+ Quiz+Lab
Week 10	(1)th (2h)Lab	Design and draw of Roller Bearing	Roller Bearing calculations	Blended (Classroom +	*H.W + *C.W+

		calculations		Online)	Quiz+Lab
Week 11	(1)th (2h)Lab	Design and draw of Key: Parallel , Woodruff Key	Key: Parallel , Woodruff Key	Blended (Classroom + Online)	*H.W + *C.W+ Quiz+Lab
Week 12	(1)th (2h)Lab	Design and draw of Seals	Seals	Blended (Classroom + Online)	*H.W + *C.W+ Quiz+Lab
Week 13	(1)th (2h)Lab	Design and draw of Drill Bushing: Assembly Drawing	Drill Bushing: Assembly Drawing	Blended (Classroom + Online)	*H.W + *C.W+ Quiz+Lab
Week 14	(1)th (2h)Lab	Design and draw of Springs: (1) Compression; (2) Extension	Springs: (1) Compression; (2) Extension	Blended (Classroom + Online)	*H.W + *C.W+ Quiz+Lab
Week 15	(1)th (2h)Lab	Design and draw of Springs: (3)Torsion	Springs: (3)Torsion	Blended (Classroom + Online)	*H.W + *C.W+ Quiz+Lab
Note: C.W = Class Work, H.W = Homework					

11. Course Evaluation

Coursework: Year Work (Homework + Class Work + Quiz) = 10% + Midterm = 20%

Theory + 20% Lab = 50%

Final Exam: Lab Work = 10% + Theory = 40% = 50%

Total = 50% Coursework + 50% Final = 100%

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	non
Main references (sources)	Autodesk Mechanical Desktop 2009 (MDT) software Help Document
Recommended books and references (scientific journals, reports...)	non
Electronic References, Websites	non

1. Course Name:
Engineering Analysis
2. Course Code:
PM - 301
3. Semester / Year:
First / 2024 - 2025
4. Description Preparation Date:
٦/١٠/2024
5. Available Attendance Forms:
In – person or online attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
3 hrs. (weekly) / 3 45 hrs. / semester
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Qais A. Yousif Email: kaisyusuf@ntu.edu.iq Name: Raid Abdulhadi Abdulqader Email: raid.alabdullah@ntu.edu.iq
8. Course Objectives
1) Applications of first- and second-order differential 2) equations. 3) Simultaneous differential equations. 4) Second-order differential equations with variable coefficients. 5) Fourier series. 6) Laplace transforms. 7) Applying the acquired knowledge to solve practical problems.
9. Teaching and Learning Strategies

Strategy	• **Interactive Learning**: Encouraging active student participation in the learning process through discussions, group activities, and collaborative problem-solving. • **Direct Instruction**: Explaining basic engineering concepts and principles in an organized and logical manner.

	• **Problem Solving**: Presenting engineering problems for students to solve using their analytical skills and creative thinking to develop their ability to apply concepts in new contexts. • **Collaborative Learning**: Encouraging teamwork among students to solve engineering problems and tasks, which promotes the exchange of ideas and collaboration to achieve common goals. • **Use of Educational Software**: Using specialized software such as MATLAB, Mathematica, or Python to perform complex calculations and conduct engineering analyses. • **Self-learning**: Guiding students to research and learn independently by reading references, watching educational videos, and completing exercises. • **Brainstorming**: Proposing diverse ideas and solutions to complex engineering problems, with the goal of arriving at the best solutions

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	To enable students to know and understand the practical applications of engineering analysis in order to prepare technical engineers in the field of mechanical engineering who are distinguished by a high level of knowledge and technical	Laplace transformation	Lectures Theory, Questions and Discussions During lectures, Solving examples and problems	Daily exams, Quizzes, Monthly exams, End-of-semester exams
2	3		Laplace transformation		
3	3		Inverse Laplace Transformation		
4	3		Solution of differential equations using Laplace transformation		
5	3		Periodic function		
6	3		Periodic function		
7	3		Fourir Series		
8	3		Fourier series		
9	3		Linear and non – linear equations		
10	3		Solution of linear and		

		creativity, in line with the solid standards approved globally in ensuring quality and academic accreditation of corresponding engineering programs, while adhering to the ethics of the engineering profession.	non – linear equations		
11	3		System of linear and non – linear equations		
12	3		Solution of system of linear and non – linear equations		
13	3		Applicaions of linear and non-linear equations		
14	3		Applicaions of linear and non-linear equations		
15	3		Applicaions of linear and non-linear equations		

11. Course Evaluation	
• Questions and discussions during lectures, • Homework, • Daily exams, • Quizzes, • Monthly exams, • End-of-semester exams	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	non
Main references (sources)	Advanced Engineering Mathematics" by Erwin Kreyszig
Recommended books and references (scientific journals, reports...)	non
Electronic References, Websites	non

1. Course Name:
heat and mass transfer 1
2. Course Code:
RAC300
3. Semester / Year:
Semester1
4. Description Preparation Date:
٦/١٠/2024
5. Available Attendance Forms:
class attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
4 hours/ 3 units
7. Course administrator's name (mention all, if more than one name)
Name: Ahmed Hani Ghanim, Dr. Omer Mohammed, Dr.Omar Raafe Email: ahmed.hanigh@ntu.edu.iq
8. Course Objectives
Apply knowledge in the field of heat transfer 1) The ability to challenge and find solutions to engineering problems and related work 2) The ability to design and implement engineering systems 3) Teach leadership skills and confront future challenges in solidarity 4) Teach students to commit to ethical behavior with others.

9. Teaching and Learning Strategies	
Strategy	A study of the types of heat transfer and their practical applications. The types are conduction, convection, and radiation. Practical applications of heat transfer include fins, heat exchangers, and insulators, along with their uses in factories and electrical appliances. The study also includes a study and calculation of the convection heat transfer coefficient using tables. Radiation heat, the effect of barriers between two radiant plates, and boiling were also studied.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
١st	٤	Student understanding of the lecture	Introduction, Basic Concepts of Heat Transfer, Heat Transfer Mechanisms.	Theoretical and practical lectures	٤
٣+٢ (nd)	٨	Student understanding of the lecture	Steady State One Dimensional Heat Conduction in a Large Plane Wall, and in a Cylinder.	Theoretical and practical lectures	٨
4th	٤	Student understanding of the lecture	Conduction through Multilayer Plane Wall, and Cylinder.	Theoretical and practical lectures	٤
5th	٤	Student understanding of the lecture	Over all Heat Transfer Coefficient.	Therotical and practical lectures	٤
6th, 7th	٨	Student understanding of the lecture	Critical Radius of Insulation. Thermal Contact Resistance.	Theoretical and practical	٨

				lectures	
8th ,9th	٨	Student understanding of the lecture	The Fins	Theoretical and practical lectures	٨
10th	٤	Student understanding of the lecture	Transient Heat Conduction, (Lumped System Analysis)	Theoretical and practical lectures	٤
11th	٤	Student understanding of the lecture	Two Dimensional Steady Heat Conduction	Theoretical and practical lectures	٤
12th	٤	Student understanding of the lecture	Introduction to Heat Transfer by Convection, Review to the Fluid Flow	Theoretical and practical lectures	٤
13th	٤	Student understanding of the lecture	Non-Dimensional Group Numbers Analysis	Theoretical and practical lectures	٤
14th , 15th	٨	Student understanding of the lecture	Analytical Solution for Heat Convection Heat Transfer for Laminar And Turbulent Flow	Theoretical and practical lectures	٨

11. Course Evaluation

١٠-Report
٤٠=Theory
١٠=Practical
٤٠=Final exam

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	1 J.P. Holman;"Heat Transfer"; Tenth Edition Mc. Graw hi 2010 Yunus A. cengel "Heat Transfer a Practical Approach Second Edition Mc. Graw hill, 2010.
Main references (sources)	The ASME Journal of Heat Transfer http://heattransfer.asmedigitalcollection.asme.org/journal.as
Recommended books and references (scientific journals, reports...)	Taylor & Francis Online http://www.tandfonline.com
Electronic References, Websites	Taylor & Francis Online http://www.tandfonline.com

1. Course Name:
Refrigeration and Air Conditioning 2
2. Course Code:
RAC 302
3. Semester / Year:
First Semester / Third Year
4. Description Preparation Date:
٦/١٠/2024
5. Available Attendance Forms:
Theoretical and practical lectures, scientific films, printed and electronic books
6. Number of Credit Hours (Total) / Number of Units (Total)
4 hours/ 3 units
7. Course administrator's name (mention all, if more than one name)
Name: Assist. Prof. Dr. Ayad Suleiman Abdullah Email: ayad.selman@ntu.edu.iq
8. Course Objectives
1) Ability to segment and analyze the components of refrigeration and air conditioning systems and describe the function of each part. 2) Ability to diagnose faults in refrigeration and air conditioning systems. 3) Ability to provide appropriate solutions for the faults in refrigeration and air conditioning systems. 4) Ability to develop an appropriate maintenance plan for refrigeration and air conditioning systems. 5) Ability to prepare and study the suitable conditions for selecting each system.

9. Teaching and Learning Strategies	
Strategy	Conducting theoretical and practical lectures, operating laboratories and workshops, and providing summer training during the summer vacation.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-4	٤	Student Understanding of the Lecture	Site survey of the air-conditioned space, relationship between heat gain and cooling load. Determining internal and external local conditions (summer and winter), calculating heating load (heat loss through doors and windows, building structures like walls, ceilings, floors, building foundations, ventilation losses via different methods, and infiltration losses), total heat load.	Theoretical and practical lectures	٤
5-7	٨	Student Understanding of the Lecture	Cooling load (heat from solar radiation through glass, heat transfer through glass, walls, ceilings, using equivalent temperature difference method), partition heat transfer, heat generated by occupants and their metabolic rates, lighting, electrical equipment, ventilation losses, and air leakage.	Theoretical and practical lectures	٨
8-9	٤	Student Understanding of the Lecture	Total room heat load, total building heat load, bypass factor, determination of cooling coil temperature.	Theoretical and practical lectures	٤

10-11	٤	Student Understanding of the Lecture	Applied psychrometric processes: cooling and dehumidification, high latent heat load cooling and dehumidification, cooling and humidification, evaporative cooling for split systems, heating and humidification via water spraying.	Therotical and practical lectures	٤
12-15	٨	Student Understanding of the Lecture	Air ducts (pressure losses in straight ducts, in shaped ducts, and duct fittings including sudden expansion, contraction, branches, air intakes). Duct design methods, design based on constant pressure loss method, duct system balancing. Fans (types, selection, centrifugal fan characteristics, fan laws), air distribution in rooms, selection of air outlets, air diffusers, grilles, return air vents. Water pipe design, pressure losses in straight pipes, pipe fittings, refrigerant piping, water piping network design.	Theoretical and practical lectures	٨

11. Course Evaluation
Monthly theoretical exams: 20 marks Monthly practical exams: 20 marks Coursework (daily exams + reports): 10 marks

Final theoretical exam: 40 marks Final practical exam: 10 marks

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	N/A
Main references (sources)	ASHRAE, Fundamentals, 1997–2011 W. E. Stoecker, Refrigeration and Air Conditioning, 1982
Recommended books and references (scientific journals, reports...)	Khaled Al-Joudi, Fundamentals of Refrigeration and A Conditioning, University of Basrah, 1982
Electronic References, Websites	www.BookFi.org www.ashrae.org

1. Course Name:
Refrigeration & air conditioning Drawing
2. Course Code:
RAC 304
3. Semester / Year:
First Semester / Third Year
4. Description Preparation Date:
6/10/2024
5. Available Attendance Forms:
Theoretical and practical lectures,
6. Number of Credit Hours (Total) / Number of Units (Total)
4 hours / 2 units
7. Course administrator's name (mention all, if more than one name)
Name: Assist Lecturer: Sohaib Hassan Mohammed Email: sohaib.hassan.1983@ntu.edu.iq
8. Course Objectives
Studying all types of air conditioning systems, , as well as identifying the types of these systems, drawing all types of air conditioning systems as well as reading and design the air ducts which uses in central air conditioning units.
9. Teaching and Learning Strategies

Strategy	Introduce the student to the groups used in refrigeration and to know their installation and how they work A2- Familiarize students with the selection and connection of all pipes and special accessories

10. Course Structure

Week	Hours	Required Learning	Unit or	Learning	Evaluation

		Outcomes	subject name	method	method
1	4	Student comprehension of the lecture	Architecture drawing (double line)with air outlet distribution	Theoretical and practical lecture	Daily and weekly
2	4	Student comprehension of the lecture	Architecture drawing (double line)with air duct network (single line)	Theoretical and practical lecture	Daily and weekly
3-5	12	Student comprehension of the lecture	Shop drawing of the air duct net work .	Theoretical and practical lecture	Daily and weekly
6	4	Student comprehension of the lecture	Shop drawing of the air out lets (grill, diffuser, …)	Theoretical and practical lecture	Daily and weekly tests
8-9	4	Student comprehension of the lecture	Architecture drawing (double line) with air duct network (double line)	Theoretical and practical lecture	Daily and weekly tests
10-11	8	Student comprehension of the lecture	Architecture drawing (double line) with air duct network (double line) and air out lets with all details'	Theoretical and practical lecture	Daily and weekly tests
12-13	8	Student comprehension of the lecture	Shop drawings of piping systems and fittings with expansion tank	Theoretical and practical lecture	Daily and weekly tests
14-15	8	Student comprehension of the lecture	Machine room drawing with	Theoretical and practical	Daily and weekly tests

			distribution of all equipment and connecting all pipes and fittings	lecture	
16-17	8	Student comprehension of the lecture	Air conditioning systems drawings (All air, Air-water, All water, Dx) systems	Theoretical and practical lecture	Daily and weekly tests
18-19	8	Student comprehension of the lecture	Detail drawing of (window type , split unit, …)	Theoretical and practical lecture	Daily and weekly tests
20	8	Student comprehension of the lecture	Detail drawing of (packaged unit, fan coil unit, induction unit,)	Theoretical and practical lecture	Daily and weekly tests
21-23	4	Student comprehension of the lecture	Detail drawing of (exhaust fan, centrifugal fan,)	Theoretical and practical lecture	Daily and weekly tests
24	12	Student comprehension of the lecture	Detail drawing of water pumps used in air conditioning system	Theoretical and practical lecture	Daily and weekly tests
25	4	Student comprehension of the lecture	Detail drawing of water chillers	Theoretical and practical lecture	Daily and weekly tests
26	4	Student comprehension of the lecture	Detail drawing of cooling tower	Theoretical and practical lecture	Daily and weekly tests

27-30	4	Student comprehension of the lecture	Detail drawing of air handling units	Theoretical and practical lecture	Daily and weekly tests

11. Course Evaluation

Monthly theoretical exams: 20 marks

Monthly practical exams: 20 marks

Coursework (daily exams + reports): 10 marks

Final theoretical exam: 40 marks

Final practical exam: 10 marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	W. E. Stoecker, "Refrigeration and air conditioning", .McGrawHill, 1982
Recommended books and references (scientific journals, reports...)	A Brief History of Air Conditioning ,6th edition,2010.
Electronic References, Websites	

1. Course Name:
Maintenance of Refrigeration & Air Conditioning Systems
2. Course Code:
RAC 305
3. Semester / Year:
First semester/ 2024-2025
4. Description Preparation Date:
6/10/2024
5. Available Attendance Forms:
Weekly- 2 hours theory + 3 hours practical
6. Number of Credit Hours (Total) / Number of Units (Total)
75 hours / 3 units
7. Course administrator's name (mention all, if more than one name)
Name: 1- Lect. Dr. Ammar Hassan Suhail 2- Asst. Lecturer. Abdullah Adel Badr Email: 1. ammarsuhail@ntu.edu.iq 2. abdulladel06@ntu.edu.iq
8. Course Objectives
1) Study all types of refrigeration and air conditioning systems, enabling students to perform all types of maintenance on various types of refrigeration and air conditioning systems. 2) Prepare refrigeration and air conditioning systems used in central air conditioning units. 3) Diagnose faults and repair them in all types of refrigeration and air conditioning units.

9. Teaching and Learning Strategies	
Strategy	The primary strategy for delivering this unit is to encourage students to initially participate in home appliance maintenance, while honing their critical thinking skills and expanding them to central systems. This is achieved through classroom instruction, interactive lessons, and visits to construction sites as scientific visits. The course covers various types of refrigeration and air conditioning systems, maintenance methods, and potential malfunctions, including practical activities of interest to students.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
١st	5	Student understanding of the theoretical lecture and practical procedures performed on the devices	Tools and equipment used in maintenance	Theoretical and practical lecture	Quiz + Report
2nd	5	Student understanding of the theoretical lecture and practical procedures performed on the devices	Identify the compression cycle and all its parts	Theoretical and practical lecture	Quiz + Report
3rd	5	Student understanding of the theoretical lecture and practical procedures performed on the devices	Identify the electrical cycle and how to connect it to all its parts	Theoretical and practical lecture	Quiz + Report
4th	5	Student understanding of	Domestic refrigeration	Theoretical and	Quiz + Report

		the theoretical lecture and practical procedures performed on the devices	appliances (domestic refrigerator and water refrigerator) and how to maintain mechanical and electrical parts	practical lecture	
5th	5	Student understanding of the theoretical lecture and practical procedures performed on the devices	Refrigeration and air conditioning devices (window air conditioners and wall split air conditioners) and how to maintain mechanical and electrical parts	Theoretical and practical lecture	Quiz + Report
6th	5	Student understanding of the theoretical lecture and practical procedures performed on the devices	Refrigeration and air conditioning devices (inverter split and vertical split), and how to maintain mechanical and electrical parts	Theoretical and practical lecture	Quiz + Report
7th	5	Student understanding of the theoretical lecture and practical procedures performed on the devices	Car air conditioning and refrigeration equipment (for old and new systems), and how to maintain mechanical and electrical parts	Theoretical and practical lecture	Quiz + Report
8th	5	Student understanding of the theoretical lecture and practical procedures performed on the devices	Cooling towers used in cooling systems and how to maintain mechanical and electrical parts	Theoretical and practical lecture	Quiz + Report
9th	5	Student understanding of	Types of compressors	Theoretical and	Quiz + Report

		the theoretical lecture and practical procedures performed on the devices	used in refrigeration systems and how to maintain mechanical and electrical parts	practical lecture	
10th	5	Student understanding of the theoretical lecture and practical procedures performed on the devices	Types of condensers and evaporators used in refrigeration systems and how to maintain them	Theoretical and practical lecture	Quiz + Report
11th	5	Student understanding of the theoretical lecture and practical procedures performed on the devices	Types of expansion devices used in refrigeration systems and how to maintain them	Theoretical and practical lecture	Quiz + Report
12th	5	Student understanding of the theoretical lecture and practical procedures performed on the devices	Water chillers used in refrigeration processes, and how to maintain mechanical and electrical parts	Theoretical and practical lecture	Quiz + Report
13th	5	Student understanding of the theoretical lecture and practical procedures performed on the devices	Water boilers used in air conditioning and how to maintain mechanical and electrical parts	Theoretical and practical lecture	Quiz + Report
14th	5	Student understanding of the theoretical lecture and practical procedures performed on the devices	Variable Refrigerant Flow (VRF) Refrigeration and Air Conditioning Equipment and How to Maintain Mechanical and	Theoretical and practical lecture	Quiz + Report

			Electrical Parts		
15th	5	Student understanding of the theoretical lecture and practical procedures performed on the devices	How to apply occupational safety standards during maintenance and repair operations. As well as handling refrigerants used in the field of refrigeration and air conditioning safely and correctly.	Theoretical and practical lecture	Quiz + Report

11. Course Evaluation

١- Theoretical exams and attendance (10)
٢- Reports (10)
٣- Practical exams (10)
٤- Midterm exam (20)
٥- Final practical exam (10)
٦- Final theoretical exam (40)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	ASHRAE, Fundamental, 1997-2011.
Main references (sources)	MODERN REFRIGERATION AND AIR CONDITIONING-18th edition
Recommended books and references (scientific journals, reports...)	Bill Whitman Bill Johnson John Tomczyk Euger Silberstein - Refrigeration and Air Conditioning Technology (2016, Cengage Learning) - libgen.li

1. Course Name:
Electrical and Electronic Engineering
2. Course Code:
PM 303
3. Semester / Year:
2020-2021
4. Description Preparation Date:
6/10/2024
5. Available Attendance Forms:
2 hours of theory + 2 hours of practical work per week
6. Number of Credit Hours (Total) / Number of Units (Total)
120 hours (60 practical + 60 theoretical) / 3
7. Course administrator's name (mention all, if more than one name)
Name: Safwan Assaf Hamoodi Email: safwan79azb@ntu.edu.iq
8. Course Objectives
Providing students with basic and advanced skills and knowledge to understand the theoretical foundations and practical applications of fundamental principles in electrical circuits, electromagnetism, electronics, and signal processing, and to apply mathematical and physical theories to solve engineering problems. Learn to design and analyze electrical and electronic circuits using simulation programs such as PSpice, MATLAB, and Proteus. Also, acquire skills in electrical measurements and the use of laboratory equipment (such as oscilloscopes, signal generators, and spectrometers).

9. Teaching and Learning Strategies	
Strategy	Theoretical lectures + project-based learning + practical experiments +modern technologies discussion workshops and interactive sessions

10. Course Structure

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

		Outcomes			
1st, 2nd, 3rd, 4th	16	Student understanding of the lecture	•DC motors: operating principle - types of DC motors - installation. •Reverse electromotive force - speed equation - for different types of DC motors control. • DC motor starting - starter connection for each type - DC motor torque.	Theoretical and practical lecture	Daily and weekly test
5th,6th 7th	12	Student understanding of the lecture	• Single-phase split-phase induction motors - capacitor - misaligned pole. •Three-phase induction motors - construction - working theory - synchronous speed - slip.	Theoretical and practical lecture	Daily and weekly test
8th, 9th 10th 11th	16	Student understanding of the lecture	• Controlling the speed of a three-phase motor using voltage and frequency control. • Starting three-phase induction motors - starting using resistors with the stator, using an autotransformer, or using a star-triangle switch.	Theoretical and practical lecture	Daily and weekly test
12th, 13th, 14th,	16	Student understanding of the lecture	• Measuring Instruments - Ammeter -	Theoretical and practical lecture	Daily and weekly test

15th,			Voltmeter - Resistance Meter - Power Meter - Waveform • Receiver - Relay - Timer. • Thermal Overcurrent Relay - Direct Start. • Fuse - Circuit Breaker - Types and Selection Method. • Voltage Drop in Cables - Selecting Cable Size. Diode - Characteristics Curve - Half-Wave Rectifier with Solved Examples.		
16th, 17th, 18th, 19th, 20th	18	Student understanding of the lecture	• Full-wave rectifier using four or two diodes with solved examples • Transistors - construction - connection types - transistor bias - external characteristics curve Transistor operating regions (saturation - active - cut-off) - Transistors as amplifiers and electronic switches	Theoretical and practical lecture	Daily and weekly test
11. Course Evaluation					

Daily preparation (10%), daily oral tests (10%), monthly or written tests (40%), reports (20%), projects (20%).

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Electric machinery and transformation. (Bhag S.). 2022.
Main references (sources)	1. B.L THERAJA, Electrical Technology,2022. Power electronic, technically faculty of K.A.2020
Recommended books and references (scientific journals, reports...)	Electrical Machines. (Suad Ibrahim).
Electronic References, Websites	1-www.BookFi.org 2-www.ashrae.org

1.Course Name:
Machine Design
2.Course Code:
PM 304
3.Semester / Year:
Second Semester - Third Stage / Academic Year 2023-2024
4.Description Preparation Date:
2024/10/6
5.Available Attendance Forms:
Classroom attendance
6.Number of Credit Hours (Total) / Number of Units (Total)
(2 Theoretical Hour) + (2 Practical Hours) = Total: 4 Hours/ 3 units
7.Course administrator's name (mention all, if more than one name)
Name: Assist. Prof. Hussein Mohammed Ali Email: alabadi.hussein@ntu.edu.iq

8. Course Objectives	
Course Objectives	The aim of the module is to enhance students' knowledge and understanding of the mathematics and scientific principles related to mechanics, materials, manufacturing and design processes, and to develop their ability to apply this knowledge in a number of topics.
9. Teaching and Learning Strategies	
Strategy	The main strategy for this module is to encourage students to actively participate in exercises and improve their critical thinking skills. We will achieve this through interactive classes, tutorials, and simple experiments that involve sampling activities students find interesting.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	4	Student comprehension of the lecture	Introduction to Machine Design	Theoretical and practical lecture	Daily and weekly test
Week 2	4	Student comprehension of the lecture	Selection of Materials in Machine Design	Theoretical and practical lecture	Daily and weekly test
Week 3	4	Student comprehension of the lecture	Design of Piston	Theoretical and practical lecture	Daily and weekly test
Week 4	4	Student comprehension of the lecture	Design of Cylinder	Theoretical and practical lecture	Daily and weekly test
Week 5	4	Student	Design of	Theoretical	Daily and

		comprehension of the lecture	Connecting Rod	and practical lecture	weekly test
Week 6	4	Student comprehension of the lecture	Design of Crankshaft	Theoretical and practical lecture	Daily and weekly test
Week 7	4	Student comprehension of the lecture	Design of Belts	Theoretical and practical lecture	Daily and weekly test
Week 8	4	Student comprehension of the lecture	Design of springs	Theoretical and practical lecture	Daily and weekly test
Week 9	4	Student comprehension of the lecture	Power Transmitted by a Shaft	Theoretical and practical lecture	Daily and weekly test
Week 10	4	Student comprehension of the lecture	Design of Flywheel	Theoretical and practical lecture	Daily and weekly test
Week 11	4	Student comprehension of the lecture	Design of clutch	Theoretical and practical lecture	Daily and weekly test
Week 12	4	Student comprehension of the lecture	Design of Bearings	Theoretical and practical lecture	Daily and weekly test
Week 13	4	Student comprehension of the lecture	Design Consideration for a Gear Drive	Theoretical and practical lecture	Daily and weekly test
Week 14	4	Student comprehension of the lecture	Design of Gears	Theoretical and practical lecture	Daily and weekly test
Week 15	4	Student comprehension of the lecture	Gear Trains	Theoretical and practical lecture	Daily and weekly test
Note: C.W = Class Work, H.W = Homework					

11. Course Evaluation

Coursework: Year Work (Homework + Class Work + Quiz) = 10% + Midterm = 20% Theory + 20% Lab = 50%

Final Exam: Lab Work = 10% + Theory = 40% = 50%

Total = 50% Coursework + 50% Final = 100%

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Machine Design, R.S.Khurmi and J.K. Gupta.
Main references (sources)	Budynas, R., Nisbett, J.K., Shigley's Mechanical Engineering Design,McGraw-Hill
Recommended books and references (scientific journals, reports...)	None
Electronic References, Websites	https://www.coursera.org/learn/machine-design1

1. Course Name:
Vibration
2. Course Code:
PM 305
3. Semester / Year:
2024-2025
4. Description Preparation Date:
6/10/2024
5. Available Attendance Forms:
Weekly, 2 hours theory and 2 hours practical (4 hours Weekly)
6. Number of Credit Hours (Total) / Number of Units (Total)
60 hours / 4 Credit
7. Course administrator's name (mention all, if more than one name)
Name: Yasir Hassan Ali Email: yha2006@ntu.edu.iq
8. Course Objectives
1. Acquiring the skill and ability to interact with devices and machines and use them, calculate vibrations and ways to reduce and treat them, and demonstrate the student's ability to use knowledge to prepare scientific and applied research. 2. The ability to use electronic programs to solve vibration problems in mechanical systems. 3. The ability to think critically to develop engineering solutions to problems related to mechanical vibrations. 4. The ability to keep pace with scientific and technological advancements. 5. Teaching leadership skills and the value and quality of commitment, love of work, and dedication The student will be able to: 1. The ability to use experiments, obtain results, and analyze them. 2. The ability to provide comfortable working conditions within the work environment, free from problems such as vibration, noise, etc. 3. The ability to calculate mechanical loads

4. The ability to design mechanical parts without vibration.

9. Teaching and Learning Strategies	
Strategy	

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Student understanding of the lecture	Basic concepts of vibration	Theoretical and practical lectures	Daily and weekly test
٢	4	Student understanding of the lecture	Introduction to oscillatory motion	Theoretical and practical lectures	Daily and weekly test
3	4	Student understanding of the lecture	Free vibration of an undamped single degree of freedom system	Theoretical and practical lectures	Daily and weekly test
4	4	Student understanding of the lecture	Energy method (Rayleigh Principle)	Theoretical and practical lectures	Daily and weekly test
5	4	Student understanding of the lecture	Free vibration of a viscously damped single degree of freedom system	Theoretical and practical lectures	Daily and weekly test
6	4	Student understanding of the lecture	Equivalent springs and dampers	Theoretical and practical lectures	Daily and weekly test
7	4	Student understanding of the lecture	Decay rate (logarithmic decrement)	Theoretical and practical lectures	Daily and weekly test
8	4	Student understanding of the lecture	Forced vibration of a single degree of freedom system	Theoretical and practical lectures	Daily and weekly test
9	4	Student understanding of the lecture	Forced vibration of a single degree of freedom system	Theoretical and practical lectures	Daily and weekly test
10	4	Student understanding of the lecture	Forced vibration of a single degree of freedom system	Theoretical and practical lectures	Daily and weekly test
11	4	Student understanding of the lecture	Two - degree of freedom system	Theoretical and practical lectures	Daily and weekly test
12	4	Student understanding	Two - degree of freedom system	Theoretical and	Daily and weekly test

		of the lecture		practical lectures	
13	4	Student understanding of the lecture	Two - degree of freedom system	Theoretical and practical lectures	Daily and weekly test
14	4	Student understanding of the lecture	Multi –degree of freedom system	Theoretical and practical lectures	Daily and weekly test
15	4	Student understanding of the lecture	Multi –degree of freedom system	Theoretical and practical lectures	Daily and weekly test

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Theory of Vibration with Applications
Main references (sources)	Theory of Vibration with Applications
Recommended books and references (scientific journals, reports...)	All relevant reputable scientific journals
Electronic References, Websites	https://ocw.mit.edu/courses/2-003sc-engineering-dynamics-fall-2011/pages/syllabus/

1. Course Name:	
heat and mass transfer 2	
2. Course Code:	
RAC301	
3. Semester / Year:	
Semester2	
4. Description Preparation Date:	
٦/10/2024	
5. Available Attendance Forms:	
class attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
4 hours/ 3 units	
7. Course administrator's name (mention all, if more than one name)	
Name: ahmed hani ghanim , dr.omer mohammed , dr.omar raafe Email: ahmed.hanigh@ntu.edu.iq	
8. Course Objectives	
• The ability to implement and maintain systems based on the principle of heat transfer. • The ability to use engineering methods, tools, and skills. • The ability to conduct experiments and obtain satisfactory results. • The ability to analyze, deduce, and solve problems.	
9. Teaching and Learning Strategies	
Strategy	A study of the types of heat transfer and their practical applications. The types are conduction, convection, and radiation. Practical applications of heat transfer include fins, heat exchangers, and insulators, along with their uses in factories and electrical appliances. The study also includes the calculation of the convection heat transfer coefficient using tables. Radiation heat and the effect of barriers between two radiant plates were also studied, as were boiling and its types. Thermal conductivity and the heat transfer coefficient were also studied. Conductive heat transfer in multiple layers, whether in a wall or a cylinder, was also studied, and the total resistance was calculated in all cases.

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	4	Student understanding of the lecture	One Dimensional Steady State Force Convection Heat Transfer on Flat Plate	Therotical and practical lectures	Daily and weekly test
2+3	8	Student understanding of the lecture	Empirical Equations for Forced Convection Heat Transfer (Laminar and Turbulent Flow)	Therotical and practical lectures	Daily and weekly test
4	4	Student understanding of the lecture	Natural Convection Heat Transfer	Therotical and practical lectures	Daily and weekly test
5	4	Student understanding of the lecture	Empirical Equations for Natural Convection Heat Transfer	Therotical and practical lectures	Daily and weekly test
6	4	Student understanding of the lecture	Introduction to Heat Exchangers, Kinds of Heat Exchangers	Therotical and practical lectures	Daily and weekly test
7	4	Student understanding of the lecture	The Overall Heat Transfer Coefficient, Fouling Factor	Therotical and practical lectures	Daily and weekly test
8	4	Student understanding of the lecture	The Log Mean Temperature Difference Method, The Effectiveness of the heat Exchangers	Therotical and practical lectures	Daily and weekly test
9+10	8	Student understanding of the lecture	The Performances for Difference Kinds of the Heat Exchangers	Therotical and practical lectures	Daily and weekly test
11	4	Student understanding of the lecture	Heat Radiation, Introduction, Basic Concepts	Therotical and practical lectures	Daily and weekly test

12	4	Student understanding of the lecture	Characteristics of Radiation, The View Factor	Therotical and practical lectures	Daily and weekly test
13-15	12	Student understanding of the lecture	Radiation Heat Transfer Between Two Black Surfaces	Therotical and practical lectures	Daily and weekly test

11. Course Evaluation	
١٠ = report ٤٠= theory ١٠= practical ٤٠= final exam	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	1 J.P. Holman;"Heat Transfer"; Tenth Edition Mc. Graw hill, 2010 Yunus A. cengel "Heat Transfer a Practical Approach" Second Edition Mc. Graw hill, 2010.
Main references (sources)	The ASME Journal of Heat Transfer http://heattransfer.asmedigitalcollection.asme.org/journal.aspx
Recommended books and references (scientific journals, reports...)	Taylor & Francis Online http://www.tandfonline.com
Electronic References, Websites	Taylor & Francis Online http://www.tandfonline.com

1. Course Name:	
heat and mass transfer 2	
2. Course Code:	
RAC301	
3. Semester / Year:	
Semester2	
4. Description Preparation Date:	
٦/10/2024	
5. Available Attendance Forms:	
class attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
4 hours/ 3 units	
7. Course administrator's name (mention all, if more than one name)	
Name: ahmed hani ghanim , dr.omer mohammed , dr.omar raafe Email: ahmed.hanigh@ntu.edu.iq	
8. Course Objectives	
• The ability to implement and maintain systems based on the principle of heat transfer. • The ability to use engineering methods, tools, and skills. • The ability to conduct experiments and obtain satisfactory results. • The ability to analyze, deduce, and solve problems.	
9. Teaching and Learning Strategies	
Strategy	A study of the types of heat transfer and their practical applications. The types are conduction, convection, and radiation. Practical applications of heat transfer include fins, heat exchangers, and insulators, along with their uses in factories and electrical appliances. The study also includes the calculation of the convection heat transfer coefficient using tables. Radiation heat and the effect of barriers between two radiant plates were also studied, as were boiling and its types. Thermal conductivity and the heat transfer coefficient were also studied. Conductive heat transfer in multiple layers, whether in a wall or a cylinder, was also studied, and the total resistance was calculated in all cases.

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	4	Student understanding of the lecture	One Dimensional Steady State Force Convection Heat Transfer on Flat Plate	Therotical and practical lectures	Daily and weekly test
2+3	8	Student understanding of the lecture	Empirical Equations for Forced Convection Heat Transfer (Laminar and Turbulent Flow)	Therotical and practical lectures	Daily and weekly test
4	4	Student understanding of the lecture	Natural Convection Heat Transfer	Therotical and practical lectures	Daily and weekly test
5	4	Student understanding of the lecture	Empirical Equations for Natural Convection Heat Transfer	Therotical and practical lectures	Daily and weekly test
6	4	Student understanding of the lecture	Introduction to Heat Exchangers, Kinds of Heat Exchangers	Therotical and practical lectures	Daily and weekly test
7	4	Student understanding of the lecture	The Overall Heat Transfer Coefficient, Fouling Factor	Therotical and practical lectures	Daily and weekly test
8	4	Student understanding of the lecture	The Log Mean Temperature Difference Method, The Effectiveness of the heat Exchangers	Therotical and practical lectures	Daily and weekly test
9+10	8	Student understanding of the lecture	The Performances for Difference Kinds of the Heat Exchangers	Therotical and practical lectures	Daily and weekly test
11	4	Student understanding of the lecture	Heat Radiation, Introduction, Basic Concepts	Therotical and practical lectures	Daily and weekly test

12	4	Student understanding of the lecture	Characteristics of Radiation, The View Factor	Therotical and practical lectures	Daily and weekly test
13-15	12	Student understanding of the lecture	Radiation Heat Transfer Between Two Black Surfaces	Therotical and practical lectures	Daily and weekly test

11. Course Evaluation	
١٠ = report ٤٠= theory ١٠= practical ٤٠= final exam	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	1 J.P. Holman;"Heat Transfer"; Tenth Edition Mc. Graw hill, 2010 Yunus A. cengel "Heat Transfer a Practical Approach" Second Edition Mc. Graw hill, 2010.
Main references (sources)	The ASME Journal of Heat Transfer http://heattransfer.asmedigitalcollection.asme.org/journal.aspx
Recommended books and references (scientific journals, reports...)	Taylor & Francis Online http://www.tandfonline.com
Electronic References, Websites	Taylor & Francis Online http://www.tandfonline.com

1. Course Name:
Methodology of Scientific Research
2. Course Code:
NTU 410
3. Semester / Year:
first/2024-2025
4. Description Preparation Date:
6/10/2024
5. Available Attendance Forms:
Weekly Schedule: 1 hour of theoretical lecture
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours/ 2 units
7. Course administrator's name (mention all, if more than one name)
Name: omar sadoon khaleel Email: omarsadoon@ntu.edu.iq
8. Course Objectives
• To introduce students to the concepts of scientific research and its importance in solving theoretical and practical problems. • To enable students to identify various types of research and their corresponding methodologies. • To develop students' skills in formulating research problems, objectives, questions, and hypotheses. • To train students in preparing and implementing a research plan step by step. • To build students' ability to collect data using appropriate tools and analyze them scientifically. • To enable students to write a research report in a structured and academic format. • To enhance students' critical thinking, analytical reasoning, and scientific interpretation skills. • To promote adherence to research ethics and academic integrity.

9. Teaching and Learning Strategies

	Outcomes	Teaching Methods	Assessment Methods
Strategy	A. Knowledge	Lectures + Guided discussion	Written exam (mid/final)
	Explain the basic concepts, purposes, and functions of scientific research.	Case examples + Group discussions	Written test + Oral questions
	Differentiate between quantitative, qualitative, and mixed research methods.	Case study + Proposal analysis	Written assignment + Evaluation of sample proposals
	Enumerate the steps for preparing a research proposal in a structured manner.	Interactive discussion + Case analysis	Short test + Scenario evaluation
	Describe research ethics and requirements for integrity and proper citation.		
	B. Skills	Workshop + Individual exercises	Assessment Methods
	Formulate a clear research problem with defined objectives and testable hypotheses.	Practical training + Student project presentations	Problem statement evaluation + Mini report
	Design appropriate data collection tools (questionnaire, interview, observation).	Computer applications + Technical guidance	Tool submission + Scientific evaluation
	Use Excel or SPSS to perform basic data analysis.	Student presentations + Critical discussion	Practical test + Data analysis report
	Compare analysis results with initial expectations and interpret findings.		Research report + Oral defense
	C. Values	Case discussions + Ethical dilemmas	Behavioral observation + Final project assessment
	Commit to research ethics, honesty, and participant confidentiality.	Hands-on citation practice + Reviewing published research	Final report review + Citation score
	Document sources accurately using APA or MLA citation styles.	Group activities + Task delegation	Individual performance assessment + Group report
	Demonstrate responsibility in individual and group research work.	Open discussion + Peer feedback	Behavioral observation + Presentation evaluation
	Show respect and openness to others'		

	opinions during research discussions.				

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st, 2nd, 3rd,4th	١٦	**1. Topic Selection** Precisely and clearly define the research topic. Ensure the topic is specific and relevant to your field of study. Consider the originality and novelty of the topic.	Student Understanding of the Lecture	Theoretical Lecture	Daily And Weekly Test
5th, 6th	٨	**2. Research Plan** Research Title: Concise, accurate, and reflective of the study's content. Research Problem: The main question or issue the study seeks to address. Objectives: What the researcher aims to achieve. Significance: The scientific and practical importance of the study. Research Questions or Hypotheses: Depending on the nature of the study. Scope and Limitations: Time, location, and subject boundaries. Methodology: The	Student Understanding of the Lecture	Theoretical Lecture	Daily And Weekly Test

		approach used (descriptive, experimental, analytical, etc.).			
7th, 8th, 9th	١٢	**3. Introduction** An overview of the topic. Background information. Reasons for choosing the topic. Importance of the research.	Student Understanding of the Lecture	Theoretical Lecture	Daily And Weekly Test
10th, 11th, 12th	١٢	**4. Literature Review and Previous Studies** A detailed presentation of the most relevant existing literature. Critical analysis of previous research. Identifying gaps that the current research addresses. Highlighting what makes this study unique.	Student Understanding of the Lecture	Theoretical Lecture	Daily And Weekly Test
13th, 14th, 15th	١٢	**5. Data Collection Tools, Samples, and Procedures** Data Collection Tools: Questionnaires, interviews, tests, observations, etc. Sample: Type, size, and sampling method. Procedures: Steps of applying the tools and fieldwork details.	Student Understanding of the Lecture	Theoretical Lecture	Daily and Weekly Test
11. Course Evaluation					

• 10 marks: for daily evaluation (preparation, attendance, class participation). • 30 marks: for monthly written exams. • 60 marks: for the final theoretical exam (covering all course topics).

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Available
Main references (sources)	**Creswell, John W.** – Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. **Leedy, Paul D., & Ormrod, Jeanne Ellis** – Practical Research: Planning and Design. **Saunders, Lewis & Thornhill** – Research Methods for Business Students. **Flick, Uwe** – An Introduction to Qualitative Research. **Babbie, Earl** – The Practice of Social Research. **Neuman, W. Lawrence** – Social Research Methods: Qualitative and Quantitative Approaches. **Patton, Michael Quinn** – Qualitative Research & Evaluation Methods
Recommended books and references (scientific journals, reports...)	• Journal of Educational Research • International Journal of Social Research Methodology • Educational Research Review • Research in Higher Education • International Journal of Research & Method in Education • Social Science Research
Electronic References, Websites	https://www.sciencedirect.com https://scholar.google.com https://www.researchgate.net https://www.ssrn.com https://libguides.mit.edu

1. Course Name:	
Engineering Management	
2. Course Code:	
TEMO 400	
3. Semester / Year:	
First semester - fourth year	
4. Description Preparation Date:	
2024/10/6	
5. Available Attendance Forms:	
Student attendance in person	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours / 2 units	
7. Course administrator's name (mention all, if more than one name)	
Name: Shaima Salem Younis / Lecturer Email: shaima.salem@ntu.edu.iq	
8. Course Objectives	
Course Objectives	1- Introduce students to the concepts of general and engineering management, and distinguish between the roles of managers and leaders within engineering work environments. 2-Enable students to understand the administrative differences between global organizational models, such as the American and Chinese styles, and analyze the impact of organizational culture on management style. 3- Enhance students' understanding of marketing concepts, with a focus on its types and applications in engineering projects and the industrial labor market. 4- Explain different organizational structures, including the general and hybrid structure, and link them to the strategic objectives of the engineering organization. 5-Instill the importance of organizational culture in the behavior of individuals and groups, linking it to corporate values and work performance 6-Introduce students to the fundamentals of human resource management, including the types of resources, their objectives, principles, and the challenges associated with them in the workplace. 7- Raise students' awareness of common human errors in engineering work environments and provide them with effective strategies to avoid these errors. Furthermore, understand the importance of inventory management, its causes, and its role in the efficiency of production processes.
9. Teaching and Learning Strategies	

Strategy	**1- Interactive Lecture** - Use presentations to explain basic concepts (such as the difference between management and engineering, or types of marketing). - Pause during the explanation to ask short questions to stimulate thinking and interaction. **2- Problem-Based Learning (PBL)** - Present realistic situations from engineering work environments (such as human error on a work site or a malfunction in inventory management). - Divide students into small groups to analyze the problem and propose practical management solutions. **3- Case Study Method** - Analyze real or hypothetical case studies of companies with American and Chinese management models. - Encourage students to provide management solutions and recommendations specific to each case. **4- Cooperative Learning** - Divide students into groups to work on a simple project, such as developing an organizational structure for a hypothetical company or a marketing plan for an engineering product. - Take turns within each group to promote collaboration and accountability. **5- Brainstorming** - Use it at the beginning of lessons such as human resources or organizational culture to stimulate students' ideas and prior experiences. - Write the brainstorming results on the board and develop them during the lecture. **6- Student Presentations** - Assign students to give short presentations on specific topics, such as "The Importance of Inventory Management" or "Types of Administrative Leadership." - Enhance presentation skills and self-confidence.

10. Course Structure

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

FIRST	2	The student will understand the concepts of engineering management and their importance in different work environments.	Introduction to Engineering Management	Interactive lecture + presentation	Class participation + homework
Second	2	The student should be able to distinguish between the basic functions of management and the tasks of the manager in the institution.	Director's duties and management functions	Interactive lecture + presentation	Class participation + homework
Third	2	The student should differentiate between the characteristics of a manager and a leader and analyze their roles in management.	The difference between a manager and a leader	Interactive lecture + brainstorming	Class participation + individual exercise
Fourth	2	The student will understand the organizational differences between the American and Chinese management styles.	American and Chinese organization	Interactive lecture + educational video	Class participation +analytical paper
Fifth	2	Measuring student comprehension of basic concepts (1-4)	First daily test	Interactive review + paper test	Paper test
Sixth	2	The student will understand marketing and classify its different types.	The Concept of Marketing and Its Types	Interactive Lecture	Open Discussion + Real-Life Examples Practical Exercise

Seventh	2	The student will distinguish between types of organizational structures and apply the concept to a typical organization	Organizational Structure and Its Types	Interactive Lecture	Homework
Eighth	2	Explain to the student the organization's culture, characteristics, and basic objectives.	Organizational culture and basic objectives.	Interactive lecture + case study.	Homework
Ninth	2	Comprehensive assessment of student understanding of topics from Weeks 1 to 8	Semester Exam	Paper-based Exam	Paper-based Exam
Tenth	2	Explain to the student the concept of human resources and their basic functions.	Introduction to Human Resources Management	Interactive Lecture + Mind Maps	Class Participation
Eleventh	2	The student will differentiate between internal and external human resources and the principles adopted in their management	Types of human resources and their management principles	Interactive lecture	Class participation
Twelfth	2	The student will understand the current challenges in this field and propose appropriate solutions.	Contemporary Challenges in Human Resource Management	Interactive Lecture	Class Participation
Thirteen	2	The student will be taught to classify the types of human errors and suggest	Human errors, their types, and ways to avoid them.	Interactive lecture	Class participation + paper-based test.

		strategies to reduce them.			
Fourteen	2	Explain to the student the importance of inventory management and compare different methods for doing so.	Inventory Management	Interactive Lecture	Class Participation
Fifteenth	2	The student will summarize the course's key concepts and answer comprehensive questions.	Comprehensive review + final exam.	Group review + open-ended questions	Class participation + final exam.

11. Course Evaluation

1- Yearly work (10) including: (paper test + attendance + daily participation + classwork)

2- Semester exam (30)

3- Annual effort (10 + 30) = 40

4- Final exam (60)

5- Final grade (annual effort out of 40 + final exam out of 60) = 100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Lectures prepared by the instructor according to the prescribed educational package
Main references (sources)	1- The Manager's Job: Folklore and Fact 2- Human Resource Management. 16th Edition, Pearson (2020) Gary Dessler, 3- Organization Theory and Design. 13th Edition, Cengage Learning Daft, R. L. (2021)
Recommended books and references (scientific journals, reports...)	1- Leadership in Organizations (9th Edition, 2019) – Pearson (Yukl, G)
Electronic References, Websites	1-**https://journals.aom.org/journal/arm** **2https://onlinelibrary.wiley.com/journal/13665567**

1. Course Name:
Engineering Measurement Systems
2. Course Code:
PM400
3. Semester / Year:
First Semester / 2025
4. Description Preparation Date:
6/10/2024
5. Available Attendance Forms:
In-person
6. Number of Credit Hours (Total) / Number of Units (Total)
Theory Hours (2) + Practical Hours (2) = Total Hours (4) / Total Units (3)
7. Course administrator's name (mention all, if more than one name)
Name: Karam Hashim Mohammed Email: karam.hashim@ntu.edu.iq Name: Ashraf Emad Abdulrazzaq Email: ashroo.emad@ntu.edu.iq
8. Course Objectives

The "Engineering Measurement Systems" course aims to equip students with a solid understanding of measurement principles and their practical applications by:	Developing skills in analyzing accuracy, error, and uncertainty in measurements. Enhancing the ability to select appropriate tools (e.g., thermometers, pressure sensors, Pitot tubes) and evaluate their performance. Gaining experience in statistical data processing through linear and nonlinear regression and error propagation theory. Understanding the challenges of measurements under transient conditions (e.g., varying temperature and pressure) and techniques for fluid velocity measurements. Linking theoretical concepts to real-world engineering applications such as instrument calibration, quality control, and monitoring of dynamic systems.

9. Teaching and Learning Strategies	
Theoretical Lectures	Delivering core concepts and theories with practical examples.
Interactive Discussions	Encouraging questions and critical thinking.
Problem-Solving Exercises	Applying concepts to practical scenarios.
Case Studies	Analyzing real-world engineering problems.
Laboratory Experiments & Demos	Hands-on experience with tools and understanding sources of error.
Group Projects	Developing teamwork skills and applying principles in real contexts.
Use of Technology	Simulation programs, digital resources, and interactive assessments.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	- Define measurement and its importance - Identify types of measurements	Basic Concepts of Measurement	Lecture + Interactive Discussion	Quiz
٢	4	- Analyze instrument characteristics - Classify error sources	Measurement Tools and Errors	Case Study + Exercises	Analytical Report
3	4	- Calculate standard deviation and	Statistical Data Analysis	Lecture + Excel Applications	Calculations

		mean - Apply error propagation theory			
4	4	- Model variable relationships. - Interpret R^2 (coefficient of determination)	Linear and Multiple Regression	Lecture + Data Workshop	Quiz
5	4	- Apply exponential and logarithmic regression. - Evaluate model quality	Nonlinear Regression	Data Analysis + Discussion	Research Report
6	4	- Design multivariable experiments. - Analyze variance (ANOVA).	Design of Experiments (DOE)	Lecture + Design Exercises	Midterm Exam
7	4	- Analyze thermometer principles. - Evaluate calibration impact.	Basics of Thermal Measurement	Visual Presentations + Discussion	Oral Evaluation
8	4	- Interpret voltage-temperature relationship. - Choose thermocouple types.	Thermocouples: Principles & Applications	Lecture + Q&A Session	Quiz
9	4	- Compare RTD and thermocouples. - Analyze Wheatstone bridge circuits	RTDs (Resistance Temperature Detectors)	Electronic Modeling + Exercises	Technical Report
10	4	- Calculate temperature via radiation. - Analyze measurement	Pyrometry: Radiation Temperature Measurement	Real Example Analysis	Scientific Seminar

		uncertainty			
11	4	- Model thermal sensor dynamics. - Analyze time constant.	Transient Thermal Measurements	Mathematical Simulation + Exercises	Quiz
12	4	- Diagnose thermal error sources. - Suggest bias solutions.	Thermal Measurement Errors	Feasibility Studies + Discussion	Analytical Report
13	4	- Analyze measurement delay in dynamic systems. - Evaluate pressure devices.	Dynamics of Pressure Measurement Devices	Curve Analysis + Exercises	Midterm Exam
14	4	- Apply Bernoulli's equation for velocity. - Explain Doppler effect	Fluid Velocity Measurement	Video Presentations + Discussion	Research Report
15	4	- Evaluate smart sensors. - Analyze IoT applications.	Modern Measurement Technologies	Final Seminar + Review	Final Project

11. Course Evaluation		
Details	Weight	Assessment Method
Objective and applied questions.	20%	Quizzes
Data analysis and lab experiment reports.	25%	Practical Reports
Covers foundational concepts up to week 7.	20%	Midterm Exam
Engagement in lectures and seminars.	15%	Participation & Discussion
Practical application of measurement of variables (Temp/Pressure/Fluid Speed).	20%	Final Project

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	**Principles of Measurement Systems by John P. Bentley**
Main references (sources)	**Measurement and Instrumentation Principles Alan S. Morris**
Electronic References, Websites	**https://www.youtube.com/watch?v=5xMnNdtJo60&list=PLWF9TXck7O_x_ELS1TWr4UynicysmoBjU**

1. Course Name:
Air Conditioning Systems Design 1
2. Course Code:
RAC 401
3. Semester / Year:
First/2024-2025
4. Description Preparation Date:
6/10/2024
5. Available Attendance Forms:
Weekly Schedule: 2 hour of theoretical lecture and 2 hours of practical/laboratory work
6. Number of Credit Hours (Total) / Number of Units (Total)
60 hours/ 3 units
7. Course administrator's name (mention all, if more than one name)
Name: omar sadoon khaleel/ Mustafa yashker Email: omarsadoon@ntu.edu.iq
8. Course Objectives
• To understand types of air conditioning systems. • To understand how to select the best A/C system for each application. • To understand the basic processes for refrigeration and air conditioning systems. • To understand the air properties and how to use a psychrometric chart to draw each process. • To understand types of air distribution within each zone. • To understand advanced air duct design. • To understand how to select the best air diffuser with all accessories.

9. Teaching and Learning Strategies			
Strateg	Outcomes	Teaching Methods	Assessment Methods

	A. Knowledge	Theoretical lectures, visual presentations, videos.	Written exams, oral discussions.
	1. Identify different types of air conditioning systems.	Analytical lectures on air schematic diagrams.	Written exams, homework assignments.
	2. Understand thermal calculations for cooling and air conditioning.	Detailed explanation, interactive presentations, videos.	Practical test using software.
	3. Recognize the main and auxiliary components of HVAC systems.	Interactive lessons, comparison between various cases.	Applied report or illustrative drawing.
	4. Understand air distribution in rooms and methods of airflow.		
	B. Skills	Teaching and Learning Methods	Assessment Methods
	1. Ability to select suitable air conditioning system for each project.	Case studies, training workshops.	Reports, mini project, presentation.
	2. Ability to read and interpret air distribution schematics.	Practical training on air diagrams.	Practical examination, applied questions.
	3. Drafting air distribution layout.	Hands-on practice using CAD software.	Applied computer-based test.
	4. Selection of outlet positions and accessories (Ducts/Diffusers).	Study of composite systems, applied scenarios.	Analytical report submission, partial modeling.
	C. Values	Teaching and Learning Methods	Assessment Methods
	1. Commitment to ethical standards in selecting HVAC systems.	Classroom discussions, real-world examples.	Ethical reports, team behavior evaluation.
	2. Teamwork in executing design projects.	Group work within small teams.	Individual and peer group evaluations.
	3. Time management and project	Guided instruction, timed tasks.	Time-based reports, organizational review.
		Professional reviews, evaluation interviews.	Continuous assessment, written supervisor feedback.

	submission deadlines. 4. Responsiveness to technical feedback for improvement.				

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st, 2nd, 3rd,4th	١٦	١.Types of air conditioning systems for building 2.single duct, types, advantages and disadvantages. Single zone system, variable volume, advantages and disadvantages. 3.Air handling unit advantages and disadvantages, Fan coil units advantages and disadvantages. 4.multiple zone, advantages and disadvantages.	Student Understanding of the Lecture	Theoretical and Practical Lecture	Daily and Weekly Test
5th, 6th	٨	5.Air - water systems 6.All - water systems	Student Understanding of the Lecture	Theoretical and Practical Lecture	Daily And Weekly Test
7th, 8th, 9	١٢	7.Method of	Student	Theoretical and	Daily

		design air duct 8.Pressure losses 9.Air distributed	Understanding of the Lecture	Practical Lecture	And Weekly Test
10th, 11th 12th	١٢	10.Ventilation apertures 11.Fans design and its selection 12.Fan's laws.	Student Understanding of the Lecture	Theoretical and Practical Lecture	Daily And Weekly Test
13th, 14th 15th	١٢	13.Filter 14.Air impurities 15.HEPA filter	Student Understanding of the Lecture	Theoretical and Practical Lecture	Daily and Weekly Test

11. Course Evaluation

- **10 marks**: for daily evaluation (preparation, attendance, class participation).
- **20 marks**: for monthly written exams.
- **10 marks**: for ongoing practical assessment during lab sessions.
- **10 marks**: for the final practical exam.
- **50 marks**: for the final theoretical exam (covering all course topics).

12. Learning and Teaching Resources

Required textbooks (curricu books, if any)	Available
Main references (sources)	• **ASHRAE Fundamentals Handbook for air conditioning and Refrigeration, SI,1997.** • **G.F. Hundy , "Refrigeration and Air Conditioning",2010.** • **P. L. Ballaney, "Refrigeration and Air Conditioning ".** • **Stoecker and Lekold W. Jones, "Refrigeration and Air Conditioning", McGraw-Hill, 1982.** • **Handbook of Air Conditioning System Design /Carrier Air Conditioning Co. by Carrier Air Conditioning Pty. Ltd**

Recommended books and references (scientific journals, reports...)	**• A Bhatia, HVAC Made Easy: A Guide of Heating and Cooling Load Estimation, PDH online course M196 (4PDH).** **• Carrier, Technical Development program.**
Electronic References, Websites	**• http://www.learnhvac.org/** **• https://www.youtube.com/watch?v=gHHYnzgn-_M** **•https://www.youtube.com/watch?v=PN9FTV5S9TM** **• https://www.youtube.com/user/ESErgovaAlbania** **• https://www.youtube.com/watch?v=4I06uXrOs4M** **• https://www.youtube.com/watch?v=bjM_Z6LPvYc** **• https://www.youtube.com/watch?v=TDs8ZX8pcGA&index=2** **•https://www.youtube.com/watch?v=wvTYDVk_2aM** **• https://www.youtube.com/watch?v=6n_qYmbx_1g** **•https://www.youtube.com/watch?v=YCogTVa3XOw** **• https://www.youtube.com/watch?v=fqvo7bSr6t8** **• https://www.youtube.com/watch?v=OvVCCljuluY**

1. Course Name:

Refrigeration Systems Design 1

2. Course Code:

RAC 403

3. Semester / Year:

Fourth Level - First semester

4. Description Preparation Date:

2024/10/6

5. Available Attendance Forms:

Theoretical and Practical

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

60/3

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

Name: Hareth Maher Abd
Email: harethmaher2018@ntu.edu.iq

8. Course Objectives

- To enhance the student's knowledge of the various refrigeration systems kinds.
- To understand the working principle of various refrigeration systems.
- Understanding how to choose the best refrigeration system for each application.
- To emphasize the students' understanding of the fundamentals and analyses of refrigeration systems that use vapor compression.
- To be able to compute the overall heat transfer coefficients, heat transfer, and pressure drop for the fluid flow in heat exchanger tubes and shells.
- To emphasize the students' knowledge of the analysis and calculation of various refrigeration systems.
- To comprehend the liquefaction of gases and cryogenic refrigeration

9. Teaching and Learning Strategies

The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials, and by considering types of simple experiments involving some sampling activities that are interesting to the students.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st, 2nd and 3rd weeks	12	Condensers vapor compression refrigeration systems	Condenser type Overall heat-transfer coefficient Condenser design	Lectures	Presentation, explanation, questions and answers, discussion
4th and 5th week	8	Evaporators vapor compression refrigeration systems	Evaporator type Overall heat-transfer coefficient Boiling inside tubes	Lectures	Presentation, explanation and discussion
6th, 7th week	8	Expansion device	Type of Expansion device Capillary length	Lectures	Presentation, explanation and discussion

			Starving and flooding		

1. Educational institution

8th weeks	4	Quiz			
9th week	4	Cascade system	Principle working of Cascade system COP of Cascade system	Lectures	Presentation, explanation and discussion
10th week	4	Cooling tower	Cooling tower type Estimate the outlet of cooling tower	Lectures	Presentation, explanation and discussion
11th and 12th week	8	Analysis of vapor compression refrigeration system	Estimate the outlet of vapor compression refrigeration system	Lectures	Presentation, explanation and discussion
13th and 14th	8	Absorption refrigeration system	Compound of Absorption refrigeration system Determine the COP Environment effectiveness of cycle operation	Lectures	Presentation, explanation and discussion
15th week	4	Mid term exam			Mid term exam

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Refrigeration and Air Conditioning, Wilbert F. Stoecker A
Main references (sources)	Textbook of Refrigeration and Air Conditioni R.S. Khurmi and J.K. Gupta.
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Technical Engineering College\Mosul

2. Scientific Department

Mechanical Power Engineering

3. Course name/code

Thermal Power Plants RAC 405

4. Available forms of attendance

presence

5. Semester/Year

Second /2024-2025

6. Number of study hours (total)

75 hours

7. Date this description was prepared

6/10/2024

8. Course objectives (general objectives of the course)

- Power Plant Engineering deals with the study of energy, its sources and the use of energy to generate power.
- Power is generated by prime movers (e.g. hydraulic turbines, steam turbines, diesel engines)
- A large amount of power is generated by prime movers at a site or layout called power plants, where all the equipment and machinery required for generating power are located
- Energy can be defined as the ability to do work. Energy exists in various forms, such as mechanical energy, thermal energy, electrical energy, solar energy, etc.
- Energy can be defined as the ability to do work. Energy exists in various forms, such as mechanical energy, thermal energy, electrical energy, solar energy, etc..

9-Course outcomes, teaching, learning and assessment methods

Definition: It is a set of knowledge, skills, and values that the course seeks to achieve in students.

Its importance: It provides the learner with a clear idea of what he will be able to do after completing the course, and it helps in designing and evaluating academic courses.

How they are determined: Course outcomes are determined based on the objectives of the academic program to which the course belongs.

Outcomes	Teaching and	Evaluation Methods

	Learning Methods	
A- Knowledge A1 - The ability to segment and analyze the components of mechanical devices and determine the function of each component. A2 - The ability to diagnose faults in various mechanical equipment. A3 -- The ability to provide appropriate solutions to faults in various mechanical devices.	Daily exams, semester exams, daily attendance, laboratory reports, annual evaluation.	Conducting theoretical and practical lectures, operating laboratories, workshops, and summer training during the summer vacation.
B - Skills B1 - Training and developing engineering personnel to operate and maintain various mechanical equipment B2 - Designing mechanical equipment with high efficiency and cost-effectiveness B3 - Providing scientific and practical consultations in the field of mechanical engineering	Daily exams, semester exams, daily attendance, laboratory reports, annual evaluation	Holding theoretical and practical lectures, operating laboratories and workshops, and conducting summer training during the summer vacation

10. Course structure (theoretical and practical vocabulary)

Week	Hour	Desired Learning Outcomes	Unit/Or Topic Name	Teaching Method	Assessment Method
1st , 2nd	10	Introduction to steam cycles, learning objectives, course content - Introductory concepts, basic concepts of steam cycles	Student understanding of the lecture	Theoretical and practical lecture	Daily and weekly tests
, 3rd 4th , 5th	15	Introductory concepts for reheating cycles - Introductory concepts for feed cycles - Introductory concepts for gaseous cycles	Student understanding of the lecture	Theoretical and practical lecture	Daily and weekly tests
6th, 7th 8th ,	15	- Dual Introductory Concepts for Cycles Combustion and Fuel	Student understanding of the lecture	Theoretical and practical lecture	Daily and weekly tests

9th	5	condensers	Student understanding of the lecture	Theoretical and practical lecture	Daily and weekly tests
10th, 11th	10	Turbine	Student understanding of the lecture	Theoretical and practical lecture	Daily and weekly tests
12th	5	The pumps	Student understanding of the lecture	Theoretical and Practical lecture	Daily And Weekly tests
, 13th 14th ,	10	The nozzles	Student understanding of the lecture	Theoretical And Practical lecture	Daily and weekly tests
15th	5	Water treatment	Student understanding of the lecture	Theoretical And Practical lecture	Daily and weekly tests

11. Curriculum development plan

Continuously updating the curriculum to keep pace with labor market developments (Curriculum Update Committee, Scientific Committee), such as:
1. Developing curricula that are appropriate for the labor market
2. Holding scientific seminars and conferences aimed at updating curricula
3. Monitoring scientific developments in the field of specialization

12. Infrastructure	
Classrooms, laboratories, and workshops a	Available
1- Required textbooks	Available
1- Main references (sources)	Thermal engineering (eighth edition) R. K. RAJPUT
a) A-Recommended books and references (scienti journals, reports, etc(.	Applied thermodynamics .
B-Electronic references, websites..... ,	https://www.sfu.ca/~mbahrami/ENSC%2046 1/Notes/Vapor%20Power%20Cycles.pdf https://www.e3s-conferences.org/articles/e3sconf/pdf/2021/21/e3sconf_aeecs2021_03015.pdf

1. Course Name:	
English language 4	
2. Course Code:	
NTU 400	
3. Semester / Year:	
Second semester - Fourth year	
4. Description Preparation Date:	
6/10/2024	
5. Available Attendance Forms:	
In-person - mandatory	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours / 2 units	
7. Course administrator's name (mention all, if more than one name)	
Name: Shaima Salem Younis Email: shaima.salem@ntu.edu.iq	
8. Course Objectives	
Course Objectives	**1- Developing basic English language skills:** The course aims to develop students' skills in the four aspects of the English language: reading, listening, speaking, and writing, in an integrated manner. **2- Supporting the student's academic specialization:** Through mastering the English language, students are expected to acquire language proficiency that aligns with their university majors in the fields of science, technology, culture, and the arts. **3- Enhancing motivation to learn the language:** The course encourages students to develop their English language skills through activities and content that motivate them to participate and engage effectively**.** **4- Expanding general knowledge:** The course seeks to expand students' horizons not only linguistically, but also cognitively, through diverse educational topics such as government, economics, technology, and health. **5- Developing character and building values:** The course is part of the character development curriculum, contributing to enhancing communication skills, appreciating different cultures, and developing critical thinking among students

9. Teaching and Learning Strategies	
Strategy	1- **Interactive Learning**: This strategy relies on engaging students in activities such as pair work, small group work, and role-playing. The goal is to break down barriers and build confidence in using the language. Students are asked to introduce themselves, conduct interviews, or exchange information. 2- **Integrated Skills Approach**: This approach combines reading, listening, speaking, and writing skills within a single learning unit. This integration helps students use the language more comprehensively and naturally, as it occurs in real life. 3- **Contextualized Learning**: Activities are based on real-life situations from university students, such as "daily routine," "education," "health," and "jobs." Linking language to everyday contexts contributes to making the learning process more effective. ٤- **Task-Based Learning:** This involves engaging in goal-oriented activities such as arranging sentences to form a paragraph, writing formal letters, or simulating a job interview. 5- **Developing Critical Thinking and Expressing Opinions**: This course asks students to express their opinions on social and educational issues (e.g., "Is free education possible?") and justify their positions using English. "Agree, Somewhat, Agree, disagree" activities are also used to support dialogue and discussion skills, developing analytical thinking alongside language skills.

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
FIRST	2	- Introducing yourself and others using simple sentences - Understanding the use of possessive pronouns and possessive adjectives	Unit one Introduction of English	Interactive lecture + Presentation	Class participation homework
Second	2	Forming questions using interrogative words (W h-questions)	Unit one (W h-questions)	Interactive lecture + group discussion	Class participation homework
Third	2	Describe daily routine using the simple present tense.	Unit two Daily Routines	Interactive lecture + brainstorming	Class participation + individual exercise
Fourth	2	Using Adverbs of Frequenc (always, sometimes, never)	Unit two Daily Routines	Interactive Lecture + Educational Video	Class Participation
Fifth	2	Measuring Student Comprehension of Basic Concepts (1-4)	Daily Test	Interactive Review + Paper Test	Paper Test
Sixth	2	Identify different professions and describe their duties.	unit three Professions	Interactive lecture	Open discuss + real-life examples and practical exercises
Seventh	2	Use possessive forms ('s) and possessive pronouns. Write a paragraph about the family's profession.	unit three Professions	Interactive Lecture Group Activity: Professional Interview	Oral Test
Eighth	2	Discussing educational issues using modal verbs (Could).	Unit four Education	Interactive lecture + case study	Homework
Ninth	2	Expressing agreement and disagreement. Write a paragraph about an educational experience.	Unit four Education	Interactive Lecture	Class Participation
Tenth	2	Comprehensive assessment of student understanding of topics from Weeks 1 to 9	Semester Exam	Interactive Lecture	Paper-based Test

Eleventh	2	Using the Future Tense (will/be going to)	Unit Five Government	Interactive Lecture	Class Participation
Twelfth	2	Write a paragraph about your opinion on a public opinion issue.	Unit Five Government	Interactive lecture	Class participation paper-based t
Thirteenth	2	Depends on the type of noun (numerical/nonnumerical) and context (positive, negative, interrogative).	Unit Six Noun Un & Noun Quantifiers	Interactive Lecture + Open-ended Questions	Class Participation Paper-Based Test
Fourteenth	2	Comprehensive assessment of student understanding of topics from weeks 1 to 14	Comprehensive review	Interactive lecture	Class participatio n
Fifteenth	2	The student will summarize the course's key concepts and answer comprehensive questions.	Final Exam	Group Review + Open-Ended Questions	Final Exam

11. Course Evaluation

1- Yearly work (10) including: (paper test + attendance + daily participation + classwork)
2- Semester exam (30)
3- Annual effort (10 + 30) = 40
4- Final exam (60)
6- Final grade (annual effort out of 40 + final exam out of 60) = 100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Lectures prepared by the instructor according the prescribed educational package
Main references (sources)	English for University Students: A Handbook of Activities & Classroom Teaching (Revi Edition)
Recommended books and references (scientific journals, reports...)	"Academic Writing: A Handbook for Internatio Students" – Stephen Bailey
Electronic References, Websites	https://www.oxfordonlineenglish.com/freeengli grammar-lessons

1. Course Name
Automatic Control Systems
2. Course Code
PM401
3. Semester / Year
Second Semester / 2025
4. Date of Description Preparation
2024/10/6
5. Available Attendance Modes
In-person
6. Total Credit Hours / Units
Theory Hours (2) + Practical Hours (2) = Total Hours (4) / Total Units (3)
7. Course Coordinator(s)
Name: Karam Hashim Mohammed Email: karam.hashim@ntu.edu.iq Name: Ashraf Emad Abdulrazzaq Email: ashroo.emad@ntu.edu.iq
8. Course Objectives

This course aims to provide students with theoretical and practical foundations of automatic control systems through:	□ Developing a deep understanding of feedback control principles and system types (open-loop/closed-loop). □ Enabling students to model mechanical and electrical systems using transfer functions and block diagrams. □ Building skills in analyzing system stability and performance using tools like “signal flow graphs” and “Mason’s rule.” □ Developing the ability to design effective controllers capable of addressing real-world engineering challenges. □ Linking theoretical concepts to industrial applications such as motor control systems and thermal systems.

9. Teaching and Learning Strategies

Theoretical Lectures	Conveying core concepts (transfer functions, feedback, stability).
Practical Exercises (Simulink)	Applying theories through simulation software.
Group Projects	Designing simplified control systems (e.g., thermal control).
Industrial Case Studies	Analyzing control systems in real-world applications (motors, cooling).
Interactive Discussions	Stimulating critical thinking in solving control problems.
Group Projects	Enhancing teamwork skills and applying principles in realistic contexts.

Use of Technology	Simulation software, electronic resources, interactive assessments.

10. Course Structure

Week	Hours	Learning Outcomes	Unit/Topic	Teaching Method	Assessment Method
1	4	Distinguish between OLCS and CLCS with examples.	Introduction to Control Systems	Lecture + Discussion	Quiz
2	4	Analyze components of feedback systems.	Feedback Control Systems (I)	Case Study	Report
3	4	Calculate transfer functions of mechanical systems.	Feedback Control Systems (II)	Applied Exercises	Quiz
4	4	Derive transfer functions for springs and dampers.	Transfer Functions & Block Diagrams	Simulink Workshop	Report
5	4	Model mechanical series and parallel structures.	Mechanical Modeling: Series/Parallel	Lecture + Exercises	Seminar
6	4	Calculate equivalent impedance of electrical circuits.	Electrical Modeling: Series/Parallel	Electronic Simulation	Midterm Exam
7	12	Simplify complex block diagrams using algebra.	Block Diagrams & Transfer Functions	Group Projects	Report + Quiz
8	12	Apply Mason's rule to compute transfer functions.	Signal Flow Graphs	Example Solving	Seminar
9	12	Design simple controllers using analysis tools.	Mason's Rule & Applications	Review + Project	Final Project

11. Course Assessment

Details	Weight	Assessment Method
Weekly evaluation of basic concept understanding.	20%	Quizzes
System analysis using Simulink.	25%	Practical Reports
Engagement in lectures/workshops.	15%	Participation/Activities
Covers weeks 1–6.	20%	Midterm Exam
Design a control system and submit a report.	20%	Final Project

12. Learning and Teaching Resources	
Main Textbook	**Dorf & Bishop, Modern Control Systems**
References	**Nagrath, Control Systems Engineering**
Online Resources	**https://www.youtube.com/playlist?list=PLBlnK6fEyqRhqzJT87LsdQKYZBC93ezDo** **https://www.youtube.com/watch?v=LZq3sMEwRyA&list=PL6FPxL5CnQeW-lEQYwCA6vVOOjTg36-5V**

1. Course Name:
Computer Aided Design
2. Course Code:
PM402
3. Semester / Year:
second/2024-2025
4. Description Preparation Date:
6/10/2024
5. Available Attendance Forms:
Weekly Schedule: 1 hour of theoretical lecture and 3 hours of practical/laboratory work
6. Number of Credit Hours (Total) / Number of Units (Total)
60 hours/ 2 units
7. Course administrator's name (mention all, if more than one name)
Name: omar sadoon khaleel/ qias waleed Email: omarsadoon@ntu.edu.iq
8. Course Objectives
• Provide students with fundamental knowledge of concepts and principles of engineering drawing using computers. • Enable students to use CAD software to create accurate three-dimensional engineering drawings. • Develop students' skills in interpreting and analyzing technical engineering drawings. • Enhance students' technical competence within modern engineering work **environments**

9. Teaching and Learning Strategies			
Strategy	Outcomes	Teaching Methods	Assessment Methods
	A. Knowledge □ Understanding traditional and computer-aided drafting basics. □ Familiarity with CAD environments like AutoCAD. □ Knowing symbols and technical terms in mechanical drawings. □ Understanding 3D modeling principles using computers. |	□ Theoretical lectures □ Demonstrations □ Practical software sessions □ Interactive/video lessons	□ Written exams, Homework □ Practical tests □ Group discussions ,Reports □ Projects, Presentations
	B. Skills □ Use AutoCAD tools to create 2D and 3D drawings. □ Ability to edit and revise technical drawings. □ Distinguishing between projection types and sectional views. □ Applying skills in a comprehensive practical project	□ Practical exercises □ CAD lab work □ Manual + computer drawing □ Group projects	□ Lab evaluations □ Practical tests □ Homework review □ Final project presentation
	C. Values		

	□ Commitment to ethics in design work. □ Teamwork and responsibility in projects. □ Time management and deadline compliance. □ Accepting technical feedback and improving work accordingly	□ Class discussions □ Real-world examples □ Group activities □ Weekly tasks ,Feedback sessions	□ Ethics reports □ Team performance evaluations □ Timeline tracking □ Instructor feedback review

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st, 2nd, 3rd,4th	١٦	• Intro to CAD & AutoCAD Interface • Units & Coordinate Systems (UNITS – UCS) • Viewing Tools: View, Zoom, Pan • Grid Setup, Drawing Limits, Basic 2D Drawing	Student Understanding of the Lecture	Theoretical and Practical Lecture	Daily and Weekly Test
5th, 6th	٨	•3D Workspace Introduction •3D Primitives	Student Understanding of the Lecture	Theoretical and Practical Lecture	Daily And Weekly Test
7th, 8th, 9th	١٢	•Create objects: Extrude, Presspul •Revolve,Region,Loft, Helix •.Boolea Operations: Unio Subtract, Intersect	Student Understanding of the Lecture	Theoretical and Practical Lecture	Daily And Weekly Test
10th, 11th,	١٢	•.Modifyobjects: Slice,	Student Understanding	Theoretical	Daily And

12th		•.Shell,Move,Rotate Visual Style&Materials •.Lighting & Rendering |	of the Lecture	and Practical Lecture	Weekly Test
13th, 14th, 15th	١٢	•.Dimensioning&Textin3I •.Full3Dmodelpractice •.Final practical exam + project	Student Understanding of the Lecture	Theoretical and Practical Lecture	Daily and Weekly Test

11. Course Evaluation

- **10 marks**: for daily evaluation (preparation, attendance, class participation).
- **30 marks**: for monthly written exams.
- **10 marks**: for ongoing practical assessment during lab sessions.
- **10 marks**: for the final practical exam.
- **40 marks**: for the final theoretical exam (covering all course topics).

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Available
Main references (sources)	- AutoCAD 2021 for Engineers and Designers – Prof. Sham Tickoo, CADCIM Technologies. - Engineering Drawing and Design – David A. Madsen, Cengage Learning. - Technical Drawing with Engineering Graphics – Frederick E. Giesecke, Pearson. - Mastering AutoCAD 2021 and AutoCAD LT 2021 – Brian C. Benton & George Omura, Sybex. - AutoCAD and Its Applications: Basics and Advanced – Terence Shumaker, Goodheart-Willcox.
Recommended books and references (scientific journals, reports...)	- Computer-Aided Design (Elsevier) – https://www.journals.elsevier.com/computer-aided-design - Engineering with Computers (Springer) – https://www.springer.com/journal/366 - International Journal of CAD/CAM – http://www.ijcc.org - Advanced Engineering Informatics (Elsevier) – https://www.journals.elsevier.com/advanced-engineering-informatics - Journal of Mechanical Design (ASME) –

	https://asmedigitalcollection.asme.org/mechanicaldesign - Computer-Aided Design and Applications – https://www.cadanda.com
Electronic References, Websites	**https://www.autodesk.com** **https://knowledge.autodesk.com** **https://www.cadcim.com** **https://www.youtube.com** **https://www.grabcad.com**

1. Course Name:

Air Conditioning Systems Design ٢

2. Course Code:

RAC ٤٠٢

3. Semester / Year:

Second/2024-2025

4. Description Preparation Date:

6/10/2024

5. Available Attendance Forms:

Weekly Schedule: 2 hour of theoretical lecture and 2 hours of practical/laboratory work

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

٦٠ hours / 3 units

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

Name: omar sadoon khaleel/ Mustafa yashker
Email: omarsadoon@ntu.edu.iq

8. Course Objectives

- Equip the student with a comprehensive understanding of the **psychrometric chart** and its use in analyzing various thermal processes such as **humidification and dehumidification**.
- Introduce students to the **different methods of humidification and dehumidification**, and explain their practical applications in air conditioning systems.
- Develop the student's understanding of **advanced applications in HVAC systems**, linking theoretical knowledge to engineering practices.
- Enable the student to identify the **main components of chilled water systems**, understand the function of each component, and recognize their operational benefits.
- Distinguish between different types of **water-based air conditioning systems**, and analyze the advantages and disadvantages of each type based on usage conditions.
- Provide students with **calculation skills** for designing pipe diameters, calculating pump capacity, and determining both static and dynamic head losses.
- Enhance students' ability to **analyze pressure drop issues within piping systems** and propose solutions to minimize such losses.
- Develop understanding of the **principles of evaporative cooling**, analyze its performance, and identify appropriate application scenarios.
- Raise students' awareness of **noise sources in HVAC systems**, introduce sound fundamentals, and train them on how to **measure and reduce noise** using silencers.
- Build the ability to **apply acoustic criteria (Noise Criteria)** in designing comfortable and healthy indoor environments.

9. Teaching and Learning Strategies

	Outcomes	Teaching Methods	Assessment Methods
Strategy	B. Knowledge	Theoretical lectures, visual presentations,	Written exams, oral discussions.

	1. Identify different types of air conditioning systems.	videos.	Written exams, homework assignments.
	2. Understand thermal calculations for cooling and air conditioning.	Analytical lectures on air schematic diagrams.	Practical test using software.
	3. Recognize the main and auxiliary components of HVAC systems.	Detailed explanation, interactive presentations, videos.	Applied report or illustrative drawing.
	4. Understand air distribution in rooms and methods of airflow.	Interactive lessons, comparison between various cases.	
	B. Skills	Teaching and Learning Methods	Assessment Methods
	1. Ability to select suitable air conditioning system for each project.	Case studies, training workshops.	Reports, mini project, presentation.
	2. Ability to read and interpret air distribution schematics.	Practical training on air diagrams.	Practical examination, applied questions.
	3. Drafting air distribution layout.	Hands-on practice using CAD software.	Applied computer-based test.
	4. Selection of outlet positions and accessories (Ducts/Diffusers).	Study of composite systems, applied scenarios.	Analytical report submission, partial modeling.
	C. Values	Teaching and Learning Methods	Assessment Methods
	1. Commitment to ethical standards in selecting HVAC systems.	Classroom discussions, real-world examples.	Ethical reports, team behavior evaluation.
	2. Teamwork in executing design projects.	Group work within small teams.	Individual and peer group evaluations.
	3. Time management and project submission deadlines.	Guided instruction, timed tasks.	Time-based reports, organizational review.
	4. Responsiveness to technical feedback for improvement.	Professional reviews, evaluation interviews.	Continuous assessment, written supervisor feedback.

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1st, 2nd, 3rd,4th	١٦	Fast review about process that student took in second stage. Explain psychometrics chart. Humidification methods. Dehumidification methods.	Student Understanding of the Lecture	Theoretical and Practical Lecture	Daily and Weekly Test
5th, 6th	٨	Advanced applications. Main components of water air conditioning system with benefits	Student Understanding of the Lecture	Theoretical and Practical Lecture	Daily And Weekly Test
7th, 8th, 9th	١٢	Types of water air conditioning system, Explain advantages and disadvantages of	Student Understanding of the Lecture	Theoretical and Practical Lecture	Daily And Weekly Test

		water air conditioning system Water effects, Water pipe diameter design, Types of pump connection. Pump capacity and head calculation. Static loss calculates. Dynamic loss calculates.			
10th, 11th, 12th	١٢	Reduce loss within pipe. Problems. Study the evaporative cooling system. How the system work. Performance of evaporative system. Advantages and disadvantages. Application.	Student Understanding of the Lecture	Theoretical and Practical Lecture	Daily And Weekly Test

13th, 14th, 15th	١٢	Definition of Sound. Basic of noise. Study the source of noise. Noise criteria and how to reduce it by using silencers, Types of silencer. Design mini project for different air conditioning systems	Student Understanding of the Lecture	Theoretical and Practical Lecture	Daily and Weekly Test

11. Course Evaluation

- **10 marks**: for daily evaluation (preparation, attendance, class participation).
- **20 marks**: for monthly written exams.
- **10 marks**: for ongoing practical assessment during lab sessions.
- **10 marks**: for the final practical exam.
- **50 marks**: for the final theoretical exam (covering all course topics).

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Available
Main references (sources)	• ASHRAE Fundamentals Handbook for air conditioning and Refrigeration, SI,1997. • G.F. Hundy , "Refrigeration and Air Conditioning",2010. • P. L. Ballaney, "Refrigeration and Air Conditioning ". • Stoecker and Lekold W. Jones, "Refrigeration and Air Conditioning", McGraw-Hill, 1982. • Handbook of Air Conditioning System Design /Carrier Air Conditioning Co. by Carrier Air Conditioning Pty. Ltd
Recommended books and references (scientific journals, reports...)	• A Bhatia, HVAC Made Easy: A Guide of Heating and Cooling Load Estimation, PDH online course M196 (4PDH). • Carrier, Technical Development program.
Electronic References, Websites	**http://www.learnhvac.org/** **https://www.youtube.com/watch?v=gHHYnzgn-_M** **https://www.youtube.com/watch?v=PN9FTV5S9TM** **https://www.youtube.com/user/ESErgovaAlbania** **https://www.youtube.com/watch?v=4I06uXrOs4M** **https://www.youtube.com/watch?v=bjM_Z6LPvYc** **https://www.youtube.com/watch?v=TDs8ZX8pcGA&index=2** **https://www.youtube.com/watch?v=wvTYDVk_2aM** **https://www.youtube.com/watch?v=6n_qYmbx_1g** **https://www.youtube.com/watch?v=YCogTVa3XOw** **https://www.youtube.com/watch?v=fqvo7bSr6t8** **https://www.youtube.com/watch?v=OvVCCljuluY**

1. Course Name:

Refrigeration Systems Design 2

2. Course Code:

RAC 404

3. Semester / Year:

Fourth Level - Second semester

4. Description Preparation Date:

2024/10/6

5. Available Attendance Forms:

Theoretical and Practical

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

60/3

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

Name: Hareth Maher Abd
Email: harethmaher2018@ntu.edu.iq

8. Course Objectives

- To enhance the student's knowledge of the various refrigeration systems kinds.
- To understand the working principle of various refrigeration systems.
- Understanding how to choose the best refrigeration system for each application.
- To emphasize the students' understanding of the fundamentals and analyses of refrigeration systems that use vapor compression.
- To be able to compute the overall heat transfer coefficients, heat transfer, and pressure drop for the fluid flow in heat exchanger tubes and shells.
- To emphasize the students' knowledge of the analysis and calculation of various refrigeration systems.
- To comprehend the liquefaction of gases and cryogenic refrigeration

9. Teaching and Learning Strategies

The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials, and by considering types of simple experiments involving some sampling activities that are interesting to the students.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st, 2nd and 3rd weeks	12	steam refrigeration systems	Principle work of the system ejector design Overall heat-transfer coefficient	Lectures	Presentation, explanation, questions and answers, discussion
4th and 5th week	8	Air refrigeration systems	Simple air refrigerant cycle Overall heat-	Lectures	Presentation, explanation and

			transfer coefficient Bootstrap air cycle		discussion
6th week	8	Cryogenic	Joule – Thompson for real gas	Lectures	Presentation, explanation and discussion
7th weeks	4	Liquefaction of Air	Hampson System The Linde dual – pressure cycle		
8th, 9th week	8	Adsorption system	Working principle Advantages and disadvantages	Lectures	Presentation, explanation and discussion
10th, 11th week	8	Thermoelectrical cooling system	Working principle Advantages and disadvantages	Lectures	Presentation, explanation and discussion
12th week	8	Vortex tube cooler	Working principle Advantages and disadvantages	Lectures	Presentation, explanation and discussion
13th and14th week	8	Heat pipe cooler	Working principle Advantages and disadvantages	Lectures	Presentation, explanation and discussion
15th week	4	Mid term exam			Mid term exam`

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Refrigeration and Air Conditioning, Wilbert F. Stoecker A
Main references (sources)	Textbook of Refrigeration and Conditioning, R.S. Khurmi and J.K. Gupta.
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

1. Course Name:
Renewable Energy
2. Course Code:
RAC400
3. Semester / Year:
First semester, fourth year
4. Description Preparation Date:
2024/10/6
5. Available Attendance Forms:
In person
6. Number of Credit Hours (Total) / Number of Units (Total)
Number of Credit Hours 60/ Number of Units 6
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Omar Abdulhadi Mustafa Email: omeralhayaly1@ntu.edu.iq
8. Course Objectives
• Students will learn the fundamentals of renewable energy. • Students will become familiar with the new technics and energy resources in the world. • Students must know what are the advantages and disadvantage of this types of ener resources.
9. Teaching and Learning Strategies

Strategy	١. The recipient of this material will be able to adapt to modern learning methods and create non-standard models, similar to those encountered in the early years of education. 2. By learning this material, they will be able to keep up with scientific advancements and integrate with modern patterns adopted in the job incubator. 3. This material enables them to design and operate the modern power plants

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st weeks	4	Traditional Energy sources	Traditional Energy sources	Presentation, explanation, questions and answers, discussion	Quiz
2nd week	4	Solar Energy	Solar Energy	Presentation, explanation and discussion	Self-assessment examines
3rd week	4	Types of solar	Types of	Presentation,	seminar

		collector	solar collector	explanation and discussion	
4th week	4	Thermal needs of life	Thermal needs of life	Presentation, explanation and discussion	Quiz
5th weeks	4	variation of extraterrestrial radiation	variation of extraterrestrial radiation	Presentation, explanation, questions and answers, discussion	
6th week	4	Calculations of the solar energy	Calculations of the solar energy	Presentation, explanation and discussion	Self-assessme examines
7th week	4	Mid. examine			
8th weeks	4	Wind Energy	Wind Energy	Presentation, explanation, questions and answers, discussion	Home work
9th , 10 week	6	Wind Energy Natural Characteristics, Main Components of a Wind Turbine, Wind Turbine design, Sizing Wind Turbine,	Wind Energy Natural Characteristics, Main Components of a Wind Turbine, Wind Turbine design, Sizing Wind Turbine,	Presentation, explanation and discussion	Self-assessment examines
11th , 12th 13th weeks	9	Geothermal energy, Commercial types of conventional geothermal power plants	Geothermal energy, Commercial types of conventional geothermal power plants	Presentation, explanation, questions and answers, discussion	Home work
14th week	3	Hydroelectricity	Hydroelectricity	Discussion	Self-assessme examines
15th week	3	Final examines			

11. Course Evaluation

10% on student status in the course, 20% on the quiz, 30% on the mid examines, 30% on the final examines, 10% on the reports.

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Solar Energy, Fundamentals, Technology, and Systems, Klaus Jäger, Olindo Isabella, Arno H.M. Smets, René A.C.M.M. van Swaaij, Miro Zeman, 2014
Main references (sources)	Biofuel Technology Handbook, Dominik Rutz & Rainer Janssen 2008
Recommended books and references (scientific journals, reports...)	An overview of biofuel as a renewable energy source: development and challenges, Masjuki Hj. Hassan*, Md. Abul Kalam, 5th BSME International Conference on Thermal Engineering, 2013.
Electronic References, Websites	

Course Description Form

1. Course Name:	
English-3	
2. Course Code:	
NTU300	
3. Semester / Year:	
2024-2025	
4. Description Preparation Date:	
6/10/2024	
5. Available Attendance Forms:	
6. Number of Credit Hours (Total) / Number of Units (Total) :	
30hours / 2	
7. Course administrator's name (mention all, if more than one name) :	
Name: Luluwah AbdulWahaab Yaseen Email: luluwah.alhubaity@ntu.edu.iq	
8. Course Objectives :	
The course covers the English Language Support Program at MU offers language courses to assist international students with reading, writing and speaking skills. The meeting times and locations of these courses can be found in	
9. Teaching and Learning Strategies :	
Strategy	lectures, seminors

10. Course Structure :

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1st ,2nd ,3d	3		Introduction to english langauge, Syntax in english language, verbs, subject, object, prepositions	Therotical lectures	Daily and weekly test
4th ,5th ,6th	3		Types of verbs tenses: past, present and future	Therotical lectures	Daily and weekly test
7th ,8th ,9th	3		Grammers :Nominal and Verbal Syntax	Therotical lectures	Daily and weekly test
10th ,11th ,12th	3		Grammers: ask by Do, did, does, have, has, had	Therotical lectures	Daily and weekly test
13th , 14th ,15th	3		Grammer: sinterrogative ask by what, where, when , why, ,how often , how long,	Therotical lectures	Daily and weekly test
16th ,17th ,18th	3		Grammers: passive voice pronounciation	Therotical lectures	Daily and weekly test
19th , 20th , 21st	3		The use of scientific terms in the English language	Therotical lectures	Daily and weekly test
22nd ,23rd , 24th	3		Extra Questions: Reading and speaking, Listening and answers The way I live	Therotical lectures	Daily and weekly test
25th ,26th ,27th	3		Extra Questions: Reading and speaking, Listening and answers Family and friends	Therotical lectures	Daily and weekly test
28th ,29th ,30th	3		Extra Questions: Reading and speaking, Listening and answers Social expressions	Therotical lectures	Daily and weekly test

11. Course Evaluation:	
50 assignments and 50 final exams. The 50 assignments consist of: 10 daily exams + 10 homework + 10 homework s+ 10 midterms + 10 seminars.	
12. Learning and Teaching Resources :	
Required textbooks (curricular books, if any)	New Headway beginner Students book 4th edition John and Liz Soars
Main references (sources)	New Headway beginner Students book 2nd edition John and Liz Soars
Recommended books and references (scientific journals, reports...)	Machine Design.
Electronic References, Websites	https://www.housecallpro.com/learn/best-hvac-books/

1. Course Name:
Computer Applications 3
2. Course Code:
PM 300
3. Semester / Year:
First Semester - Third Stage / Academic Year 2024-2025
4. Description Preparation Date:
6/10/2024
5. Available Attendance Forms:
Blended (Classroom + Online)
6. Number of Credit Hours (Total) / Number of Units (Total)
(1 Theoretical Hour) + (2 Practical Hours) = Total: 3 Hours/ 2 units
7. Course administrator's name (mention all, if more than one name)
Name: Asst. Prof. Dr. Thamir Own Al-Din Mohammed Sheet Al-Mula Email: thamir_own@ntu.edu.iq
8. Course Objectives
8) Qualify students to become 'applied' engineers familiar with modern applications in the design, construction, drawing, and analysis of mechanical parts. 9) Provide students with scientific skills that enable them to design, construct, draw, and analyze mechanical parts, diagnose and fix malfunctions, and implement required modifications. 10) Conduct applied and practical research to develop the design, construction, drawing, and analysis of mechanical parts. 11) Train and develop engineering staff to operate and maintain various mechanical systems. 12) Expose and train students on the latest developments in the design, construction, drawing, and analysis of mechanical parts. 13) Develop the concept of selecting modern mechanical systems currently in use. 14) Design mechanical part loads for various applications.
9. Teaching and Learning Strategies
Strategy

	-Theoretical lectures - Practical labs - Scientific seminars - Training courses Specialized exhibitions using Autodesk Mechanical Desktop (MDT) software

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	(1)th (2h)Lab	Design and draw Fasteners: Nuts, Screws, Washers	Fasteners: Nuts, Screws, Washers	Blended (Classroom + Online)	*H.W + *C.W+ Quiz+Lab
Week 2	(1)th (2h)Lab	Design and draw Shaft Generators	Shaft Generators	Blended (Classroom + Online)	*H.W + *C.W+ Quiz+Lab
Week 3	(1)th (2h)Lab	Design and draw of Cylinder	Cylinders	Blended (Classroom + Online)	*H.W + *C.W+ Quiz+Lab
Week 4	(1)th (2h)Lab	Design and draw of Wrench	Wrenches	Blended (Classroom + Online)	*H.W + *C.W+ Quiz+Lab
Week 5	(1)th (2h)Lab	Design and draw of Thread	Threads	Blended (Classroom + Online)	*H.W + *C.W+ Quiz+Lab
Week 6	(1)th (2h)Lab	Design and draw of Gears	Gears	Blended (Classroom + Online)	*H.W + *C.W+ Quiz+Lab
Week 7	(1)th (2h)Lab	Design and draw of Chamfer and Fillet	Chamfer and Fillet	Blended (Classroom + Online)	*H.W + *C.W+ Quiz+Lab
Week 8	(1)th (2h)Lab	Mid Examination	Mid Examination	Blended (Classroom + Online)	Th. Exam+Lab
Week 9	(1)th (2h)Lab	Design and draw of Shaft Component	Shaft Components	Blended (Classroom + Online)	*H.W + *C.W+ Quiz+Lab
Week 10	(1)th (2h)Lab	Design and draw of Roller Bearing calculations	Roller Bearing calculations	Blended (Classroom + Online)	*H.W + *C.W+ Quiz+Lab
Week 11	(1)th (2h)Lab	Design and draw of Key: Parallel ,	Key: Parallel , Woodruff Key	Blended (Classroom +	*H.W + *C.W+

		Woodruff Key		Online)	Quiz+Lab
Week 12	(1)th (2h)Lab	Design and draw of Seals	Seals	Blended (Classroom + Online)	*H.W + *C.W+ Quiz+Lab
Week 13	(1)th (2h)Lab	Design and draw of Drill Bushing: Assembly Drawing	Drill Bushing: Assembly Drawing	Blended (Classroom + Online)	*H.W + *C.W+ Quiz+Lab
Week 14	(1)th (2h)Lab	Design and draw of Springs: (1) Compression; (2) Extension	Springs: (1) Compression; (2) Extension	Blended (Classroom + Online)	*H.W + *C.W+ Quiz+Lab
Week 15	(1)th (2h)Lab	Design and draw of Springs: (3)Torsion	Springs: (3)Torsion	Blended (Classroom + Online)	*H.W + *C.W+ Quiz+Lab
Note: C.W = Class Work, H.W = Homework					

11. Course Evaluation

Coursework: Year Work (Homework + Class Work + Quiz) = 10% + Midterm = 20%

Theory + 20% Lab = 50%

Final Exam: Lab Work = 10% + Theory = 40% = 50%

Total = 50% Coursework + 50% Final = 100%

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	non
Main references (sources)	Autodesk Mechanical Desktop 2009 (MDT) software Help Document
Recommended books and references (scientific journals, reports...)	non
Electronic References, Websites	non

1. Course Name:
Engineering Analysis
2. Course Code:
PM - 301
3. Semester / Year:
First / 2024 - 2025
4. Description Preparation Date:
6/10/2024
5. Available Attendance Forms:
In – person or online attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
3 hrs. (weekly) / 3 45 hrs. / semester
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Qais A. Yousif Email: kaisyusuf@ntu.edu.iq Name: Raid Abdulhadi Abdulqader Email: raid.alabdullah@ntu.edu.iq
8. Course Objectives
1) Applications of first- and second-order differential 2) equations. 3) Simultaneous differential equations. 4) Second-order differential equations with variable coefficients. 5) Fourier series. 6) Laplace transforms. 7) Applying the acquired knowledge to solve practical problems.
9. Teaching and Learning Strategies
Strategy

	• **Interactive Learning**: Encouraging active student participation in the learning process through discussions, group activities, and collaborative problem-solving. • **Direct Instruction**: Explaining basic engineering concepts and principles in an organized and logical manner. • **Problem Solving**: Presenting engineering problems for students to solve using their analytical skills and creative thinking to develop their ability to apply concepts in new contexts. • **Collaborative Learning**: Encouraging teamwork among students to solve engineering problems and tasks, which promotes the exchange of ideas and collaboration to achieve common goals. • **Use of Educational Software**: Using specialized software such as MATLAB, Mathematica, or Python to perform complex calculations and conduct engineering analyses. • **Self-learning**: Guiding students to research and learn independently by reading references, watching educational videos, and completing exercises. • **Brainstorming**: Proposing diverse ideas and solutions to complex engineering problems, with the goal of arriving at the best solutions

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	3	To enable students to know and understand the practical applications of engineering analysis in order to prepare technical engineers in the field of mechanical engineering who are distinguished by a high level of knowledge and technical creativity, in line with the solid standards approved globally in ensuring quality and academic accreditation of corresponding engineering programs, while adhering to the ethics of the engineering profession.	Laplace transformation	Lectures Theory, Questions and Discussions During lectures, Solving examples and problems	Daily exams, Quizzes, Monthly exams, End-of-semester exams
2	3		Laplace transformation		
3	3		Inverse Laplace Transformation		
4	3		Solution of differential equations using Laplace transformation		
5	3		Periodic function		
6	3		Periodic function		
7	3		Fourir Series		
8	3		Fourier series		
9	3		Linear and non – linear equations		
10	3		Solution of linear and non – linear equations		
11	3		System of linear and non – linear equations		
12	3		Solution of system of linear and non – linear equations		
13	3		Applicaions of linear and non-linear equations		
14	3		Applicaions of linear and non-linear equations		
15	3		Applicaions of linear and non-linear equations		

11. Course Evaluation

• Questions and discussions during lectures, • Homework, • Daily exams, • Quizzes, • Monthly exams, • End-of-semester exams

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	non
Main references (sources)	Advanced Engineering Mathematics” by Erwin Kreyszig
Recommended books and references (scientific journals, reports...)	non
Electronic References, Websites	non

1. Course Name:
heat and mass transfer 1
2. Course Code:
RE300
3. Semester / Year:
Semester1
4. Description Preparation Date:
6/10/2024
5. Available Attendance Forms:
class attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
4 hours/ 3 units
7. Course administrator's name (mention all, if more than one name)
Name: Ahmed Hani Ghanim, Dr. Omer Mohammed, Dr.Omar Raafe Email: ahmed.hanigh@ntu.edu.iq
8. Course Objectives
Apply knowledge in the field of heat transfer 8) The ability to challenge and find solutions to engineering problems and related work 9) The ability to design and implement engineering systems 10) Teach leadership skills and confront future challenges in solidarity 11) Teach students to commit to ethical behavior with others.

9. Teaching and Learning Strategies	
Strategy	A study of the types of heat transfer and their practical applications. The types are conduction, convection, and radiation. Practical applications of heat transfer include fins, heat exchangers, and insulators, along with their uses in factories and electrical appliances. The study also includes a study and calculation of the convection heat transfer coefficient using tables. Radiation heat, the effect of barriers between two radiant plates, and boiling were also studied.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
١st	٤	Student understanding of the lecture	Introduction, Basic Concepts of Heat Transfer, Heat Transfer Mechanisms.	Theoretical and practical lectures	٤
٣+٢ (nd)	٨	Student understanding of the lecture	Steady State One Dimensional Heat Conduction in a Large Plane Wall, and in a Cylinder.	Theoretical and practical lectures	٨
4th	٤	Student understanding of the lecture	Conduction through Multilayer Plane Wall, and Cylinder.	Theoretical and practical lectures	٤
5th	٤	Student understanding of the lecture	Over all Heat Transfer Coefficient.	Therotical and practical lectures	٤
6th, 7th	٨	Student understanding of the lecture	Critical Radius of Insulation. Thermal Contact Resistance.	Theoretical and practical	٨

				lectures	
8th ,9th	٨	Student understanding of the lecture	The Fins	Theoretical and practical lectures	٨
10th	٤	Student understanding of the lecture	Transient Heat Conduction, (Lumped System Analysis)	Theoretical and practical lectures	٤
11th	٤	Student understanding of the lecture	Two Dimensional Steady Heat Conduction	Theoretical and practical lectures	٤
12th	٤	Student understanding of the lecture	Introduction to Heat Transfer by Convection, Review to the Fluid Flow	Theoretical and practical lectures	٤
13th	٤	Student understanding of the lecture	Non-Dimensional Group Numbers Analysis	Theoretical and practical lectures	٤
14th , 15th	٨	Student understanding of the lecture	Analytical Solution for Heat Convection Heat Transfer for Laminar And Turbulent Flow	Theoretical and practical lectures	٨

11. Course Evaluation

١٠-Report
٤٠=Theory
١٠=Practical
٤٠=Final exam

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	1 J.P. Holman;"Heat Transfer"; Tenth Edition Mc. Graw hi 2010 Yunus A. cengel "Heat Transfer a Practical Approach Second Edition Mc. Graw hill, 2010.
Main references (sources)	The ASME Journal of Heat Transfer http://heattransfer.asmedigitalcollection.asme.org/journal.as
Recommended books and references (scientific journals, reports...)	Taylor & Francis Online http://www.tandfonline.com
Electronic References, Websites	Taylor & Francis Online http://www.tandfonline.com

1. Course Name:
Bio Fuels
2. Course Code:
RE 304
3. Semester / Year:
First semester, third year
4. Description Preparation Date:
6/10/2024
5. Available Attendance Forms:
In person
6. Number of Credit Hours (Total) / Number of Units (Total)
Number of Credit Hours 45/ Number of Units 4
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Omar Abdulhadi Mustafa Email: omeralhayaly1@ntu.edu.iq
8. Course Objectives
1) Students will learn the fundamentals of bio fuel. 2) Students will learn how can design the systems using this type of fuel. 3) Students will become familiar with the operation of activators using bio fuels. 4) Students will make the calculations deals with bio fuels.

9. Teaching and Learning Strategies	
Strategy	1) The recipient of this material will be able to adapt to modern learning methods and create non-standard models, similar to those encountered in the early years of education. 2) By learning this material, they will be able to keep up with scientific advancements and integrate with modern patterns adopted in the job incubator. 3) This material enables them to design the systems using this type of fuel.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st weeks	3	Overview of Energy Sources & Utilization, Climate Change & the Impact of Carbon Dioxide	Overview of Energy Sources & Utilization, Climate Change & the Impact of Carbon Dioxide	Presentation, explanation, questions and answers, discussion	Quiz
2nd week	3	overview of biofuel/bioenergy, Fundamental concepts in understanding biofuel/bioenergy production	overview of biofuel/bioenergy, Fundamental concepts in understanding biofuel/bioenergy production	Presentation, explanation and discussion	Self-assessment examines
3rd week	3	Biofuel crops & potential ecological impacts, Introduction to molecular genetics	Biofuel crops & potential ecological impacts, Introduction to molecular genetics	Presentation, explanation and discussion	seminar
4th week	3	History of Fossil Fuels, Renewable Energy Sources & Utilization	History of Fossil Fuels, Renewable Energy Sources & Utilization	Presentation, explanation and	Quiz

				discussion	
5th weeks	3	Chemistry & Biochemistry of Hydrocarbons, Industrial Agriculture, Part 1, Industrial Agriculture, Part 2, History of Biofuels,	Chemistry & Biochemistry of Hydrocarbons, Industrial Agriculture, Part 1, Industrial Agriculture, Part 2, History of Biofuels,	Presentation, explanation, questions and answers, discussion	
6th week	3	1st Generation Biofuels – Corn Ethanol & Sugarcane Ethanol, 1st Generation Biofuels – Biodiesel, Alternative Sources of Biomass	1st Generation Biofuels – Corn Ethanol & Sugarcane Ethanol, 1st Generation Biofuels – Biodiesel, Alternative Sources of Biomass	Presentation, explanation and discussion	Self-assessment examines
7th week	2	Mid. examine			
8th weeks	3	2nd Generation Biofuels – Cellulosic Ethanol, 3rd Generation Aquatic Biomass – Cyanobacteria, Diatoms & Algae, Metabolic Engineering of Photosynthetic Organisms	2nd Generation Biofuels – Cellulosic Ethanol, 3rd Generation Aquatic Biomass – Cyanobacteria, Diatoms & Algae, Metabolic Engineering of Photosynthetic Organisms	Presentation, explanation, questions and answers, discussion	Home work
9th, 10th week	6	Bio prospecting, Genetic Modification & Synthetic Biology, Thermochemical Conversion Technologies, Biogas & Bio hydrogen	Bio prospecting, Genetic Modification & Synthetic Biology, Thermochemical Conversion Technologies, Biogas & Bio hydrogen	Presentation, explanation and discussion	Self-assessment examines
11th, 12th,	9	Biodiesel – Chemistry and	Biodiesel – Chemistry and	Presentation,	Home work

13th weeks		Analysis, Production Processes for Biofuels from Algae, Bioenergy, Water & the Environment, Lifecycle Assessment of Biofuels, Policy & Politics of Energy	Analysis, Production Processes for Biofuels from Algae, Bioenergy, Water & the Environment, Lifecycle Assessment of Biofuels, Policy & Politics of Energy	explanation, questions and answers, discussion	
14th week	3	Nutrient Utilization and Recycling, Value-added processing of biofuel residues and co-products, Fuel Conversion and Future Technology	Nutrient Utilization and Recycling, Value-added processing of biofuel residues and co-products, Fuel Conversion and Future Technology	Discussion	Self-assessment examines
15th week	3	Final examines			

11. Course Evaluation

١٠% on student status in the course, 20% on the quiz, 30% on the mid examines, 30% on the final examines, 10% on the reports.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Biofuels production, trade and sustainable development: emerging issues, Annie Dufey, 2006
Main references (sources)	Biofuel Technology Handbook, Dominik Rutz & Rainer Janssen 2008
Recommended books and references (scientific journals, reports...)	An overview of biofuel as a renewable energy source: development and challenges, Masjuki Hj. Hassan*, Md. Abul Kalam, 5th BSME International Conference on Thermal Engineering, 2013.
Electronic References, Websites	

1. Course Name:
Numerical Analysis
2. Course Code:
PM - 302
3. Semester / Year:
Second / 2024 - 2025
4. Description Preparation Date:
6/10/2024
5. Available Attendance Forms:
In – person or online attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
3 hrs. (weekly) / 3 45 hrs. / semester
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Qais A. Yousif Email: kaisyusuf@ntu.edu.iq Name: Raid Abdulhadi Abdulqader Email: raid.alabdullah@ntu.edu.iq
8. Course Objectives
• The student will be able to numerically solve mathematical models representing various physical and engineering models and find the best fit to experimental data. • The student will develop an understanding of the basic ideas and concepts of numerical methods. • The student will be able to identify, formulate, and solve engineering problems using numerical methods.

9. Teaching and Learning Strategies	
Strategy	• **Interactive Learning:** Encouraging active student participation in the learning process through discussions, group activities, and collaborative problem-solving. • **Direct Instruction:** Explaining basic engineering concepts and principles in an organized and logical manner. • **Problem Solving:** Presenting engineering problems for students to solve using their analytical skills and creative thinking to develop their ability to apply concepts in new contexts. • **Collaborative Learning:** Encouraging teamwork among students to solve engineering problems and tasks, which promotes the exchange of ideas and collaboration to achieve common goals. • **Use of Educational Software:** Using specialized software such as MATLAB, Mathematica, or Python to perform complex calculations and conduct engineering analyses. • **Self-learning:** Guiding students to research and learn independently by reading references, watching educational videos, and completing exercises. • **Brainstorming:** Proposing diverse ideas and solutions to complex engineering problems, with the goal of arriving at the best solutions.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	To enable students to know and understand the practical applications of engineering analysis in order to prepare technical engineers in the field of mechanical engineering who	Numerical methods for Solving linear and non-linear equations	Lectures Theory, Questions and Discussions During lectures, Solving examples and problems	Daily exams, Quizzes, Monthly exams, End-of-semester exams
2	3		Numerical methods for Solving linear and non-linear equations		
3	3		Numerical methods for Solving linear and non-linear		

		are distinguished by a high level of knowledge and technical creativity, in line with the solid standards approved globally in ensuring quality and academic accreditation of corresponding engineering programs, while adhering to the ethics of the engineering profession.	equations		
4	3		Finite difference method		
5	3		Forward & Baehword & Centeral final difference method		
6	3		Numerical differentiation		
7	3		Numerical differentiation		
8	3		Rung – Kutta method		
9	3		Rung – Kutta method		
10	3		Numerical integration		
11	3		Numerical integration		
12	3		Riemann method		
13	3		Riemann method		
14	3		Gausian quadrature method		
15	3		Gausian quadrature method		

11. Course Evaluation

- Questions and discussions during lectures,
- Homework,
- Daily exams,
- Quizzes,
- Monthly exams,
- End-of-semester exams

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Numerical methods for engineering (steven chapra)

1. Course Name:
Electrical and Electronic Engineering
2. Course Code:
PM 303
3. Semester / Year:
2020-2021
4. Description Preparation Date:
6/10/2024
5. Available Attendance Forms:
2 hours of theory + 2 hours of practical work per week
6. Number of Credit Hours (Total) / Number of Units (Total)
120 hours (60 practical + 60 theoretical) / 3
7. Course administrator's name (mention all, if more than one name)
Name: Safwan Assaf Hamoodi Email: safwan79azb@ntu.edu.iq
8. Course Objectives
Providing students with basic and advanced skills and knowledge to understand the theoretical foundations and practical applications of fundamental principles in electrical circuits, electromagnetism, electronics, and signal processing, and to apply mathematical and physical theories to solve engineering problems. Learn to design and analyze electrical and electronic circuits using simulation programs such as PSpice, MATLAB, and Proteus. Also, acquire skills in electrical measurements and the use of laboratory equipment (such as oscilloscopes, signal generators, and spectrometers).

9. Teaching and Learning Strategies	
Strategy	Theoretical lectures + project-based learning + practical experiments +modern technologies discussion workshops and interactive sessions

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st, 2nd, 3rd, 4th	16	Student understanding of the lecture	•DC motors: operating principle - types of DC motors - installation. •Reverse electromotive force - speed equation - for different types of DC motors control. • DC motor starting - starter connection for each type - DC motor torque.	Theoretical and practical lecture	Daily and weekly test
5th,6th 7th	12	Student understanding of the lecture	• Single-phase split-phase induction motors - capacitor - misaligned pole. •Three-phase induction motors - construction - working theory - synchronous speed - slip.	Theoretical and practical lecture	Daily and weekly test
8th, 9th 10th 11th	16	Student understanding of the lecture	• Controlling the speed of a three-phase motor using voltage and frequency control. • Starting three-phase induction	Theoretical and practical lecture	Daily and weekly test

			motors - starting using resistors with the stator, using an autotransformer, or using a star-triangle switch.		
12th, 13th, 14th, 15th,	16	Student understanding of the lecture	• Measuring Instruments - Ammeter - Voltmeter - Resistance Meter - Power Meter - Waveform • Receiver - Relay - Timer. • Thermal Overcurrent Relay - Direct Start. • Fuse - Circuit Breaker - Types and Selection Method. • Voltage Drop in Cables - Selecting Cable Size. Diode - Characteristics Curve - Half-Wave Rectifier with Solved Examples.	Theoretical and practical lecture	Daily and weekly test
16th, 17th, 18th, 19th, 20th	18	Student understanding of the lecture	• Full-wave rectifier using four or two diodes with solved examples • Transistors - construction - connection types - transistor bias - external characteristics curve Transistor	Theoretical and practical lecture	Daily and weekly test

			operating regions (saturation - active - cut-off) - Transistors as amplifiers and electronic switches		

11. Course Evaluation
Daily preparation (10%), daily oral tests (10%), monthly or written tests (40%), reports (20%), projects (20%).

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Electric machinery and transformation. (Bhag S.). 2022.
Main references (sources)	2. B.L THERAJA, Electrical Technology,2022. Power electronic, technically faculty of K.A.2020
Recommended books and references (scientific journals, reports...)	Electrical Machines. (Suad Ibrahim).
Electronic References, Websites	1-www.BookFi.org 2-www.ashrae.org

1. Course Name:
Machine Design
2.Course Code:
PM 304
3.Semester / Year:
Second Semester - Third Stage / Academic Year 2023-2024
4.Description Preparation Date:
2025/10/6
5.Available Attendance Forms:
Classroom attendance
6.Number of Credit Hours (Total) / Number of Units (Total)
(2 Theoretical Hour) + (2 Practical Hours) = Total: 4 Hours/ 3 units
7.Course administrator's name (mention all, if more than one name)
Name: Assist. Prof. Hussein Mohammed Ali Email: alabadi.hussein@ntu.edu.iq

8. Course Objectives	
Course Objectives	The aim of the module is to enhance students' knowledge and understanding of the mathematics and scientific principles related to mechanics, materials, manufacturing and design processes, and to develop their ability to apply this knowledge in a number of topics.
9. Teaching and Learning Strategies	
Strategy	The main strategy for this module is to encourage students to actively participate in exercises and improve their critical thinking skills. We will achieve this through interactive classes, tutorials, and simple experiments that involve sampling activities students find interesting.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	4	Student comprehension of the lecture	Introduction to Machine Design	Theoretical and practical lecture	Daily and weekly test
Week 2	4	Student comprehension of the lecture	Selection of Materials in Machine Design	Theoretical and practical lecture	Daily and weekly test
Week 3	4	Student comprehension of the lecture	Design of Piston	Theoretical and practical lecture	Daily and weekly test
Week 4	4	Student comprehension of the lecture	Design of Cylinder	Theoretical and practical lecture	Daily and weekly test
Week 5	4	Student comprehension of the lecture	Design of Connecting Rod	Theoretical and practical lecture	Daily and weekly test
Week 6	4	Student comprehension of the lecture	Design of Crankshaft	Theoretical and practical lecture	Daily and weekly test
Week 7	4	Student comprehension of the lecture	Design of Belts	Theoretical and practical lecture	Daily and weekly test

Week 8	4	Student comprehension of the lecture	Design of springs	Theoretical and practical lecture	Daily and weekly test
Week 9	4	Student comprehension of the lecture	Power Transmitted by a Shaft	Theoretical and practical lecture	Daily and weekly test
Week 10	4	Student comprehension of the lecture	Design of Flywheel	Theoretical and practical lecture	Daily and weekly test
Week 11	4	Student comprehension of the lecture	Design of clutch	Theoretical and practical lecture	Daily and weekly test
Week 12	4	Student comprehension of the lecture	Design of Bearings	Theoretical and practical lecture	Daily and weekly test
Week 13	4	Student comprehension of the lecture	Design Consideration for a Gear Drive	Theoretical and practical lecture	Daily and weekly test
Week 14	4	Student comprehension of the lecture	Design of Gears	Theoretical and practical lecture	Daily and weekly test
Week 15	4	Student comprehension of the lecture	Gear Trains	Theoretical and practical lecture	Daily and weekly test
Note: C.W = Class Work, H.W = Homework					

11. Course Evaluation

Coursework: Year Work (Homework + Class Work + Quiz) = 10% + Midterm = 20% Theory + 20% Lab = 50%

Final Exam: Lab Work = 10% + Theory = 40% = 50%

Total = 50% Coursework + 50% Final = 100%

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Machine Design, R.S.Khurmi and J.K. Gupta.
Main references (sources)	Budynas, R., Nisbett, J.K., Shigley's Mechanical Engineering Design,McGraw-Hill
Recommended books and references (scientific journals, reports...)	None
Electronic References, Websites	https://www.coursera.org/learn/machine-design1

1. Course Name:	
Vibration	
2. Course Code:	
PM 305	
3. Semester / Year:	
٢٠٢٥_٢٠٢٤	
4. Description Preparation Date:	
2024/10/6	
5. Available Attendance Forms:	
Weekly, 2 hours theory and 2 hours practical (4 hours Weekly)	
6. Number of Credit Hours (Total) / Number of Units (Total)	
60 hours / 4 Credit	
7. Course administrator's name (mention all, if more than one name)	
Name: Yasir Hassan Ali Email: yha2006@ntu.edu.iq	
8. Course Objectives	
Course Objectives 1. Acquiring the skill and ability to interact with devices and machines and use them, calculate vibrations and ways to reduce and treat them, and demonstrate the student's ability to use knowledge to prepare scientific and applied research. 2. The ability to use electronic programs to solve vibration problems in mechanical systems. 3. The ability to think critically to develop engineering solutions to problems related to mechanical vibrations. 4. The ability to keep pace with scientific and technological advancements. 5. Teaching leadership skills and the value and quality of commitment, love of work, and dedication.	The student will be able to: 1. The ability to use experiments, obtain results, and analyze them. 2. The ability to provide comfortable working conditions within the work environment, free from problems such as vibration, noise, etc. 3. The ability to calculate mechanical loads 4. The ability to design mechanical parts without vibration.
9. Teaching and Learning Strategies	
Strategy	
10. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st	4	Student understanding of the lecture	Basic concepts of vibration	Theoretical and practical lectures	Daily and weekly test
2nd	4	Student understanding of the lecture	Introduction to oscillatory motion	Theoretical and practical lectures	Daily and weekly test
3rd	4	Student understanding of the lecture	Free vibration of an undamped single degree of freedom system	Theoretical and practical lectures	Daily and weekly test
4th	4	Student understanding of the lecture	Energy method (Rayleigh Principle)	Theoretical and practical lectures	Daily and weekly test
5th	4	Student understanding of the lecture	Free vibration of a viscously damped single degree of freedom system	Theoretical and practical lectures	Daily and weekly test
6th	4	Student understanding of the lecture	Equivalent springs and dampers	Theoretical and practical lectures	Daily and weekly test
٧th	4	Student understanding of the lecture	Decay rate (logarithmic decrement)	Theoretical and practical lectures	Daily and weekly test
8th	4	Student understanding of the lecture	Forced vibration of a single degree of freedom system	Theoretical and practical lectures	Daily and weekly test
٩th	4	Student understanding of the lecture	Forced vibration of a single degree of freedom system	Theoretical and practical lectures	Daily and weekly test
١٠th	4	Student understanding of the lecture	Forced vibration of a single degree of freedom system	Theoretical and practical lectures	Daily and weekly test
١١th	4	Student understanding of the lecture	Two - degree of freedom system	Theoretical and practical lectures	Daily and weekly test

١٢th	4	Student understanding of the lecture	Two - degree of freedom system	Theoretical and practical lectures	Daily and weekly test
١٣th	4	Student understanding of the lecture	Two - degree of freedom system	Theoretical and practical lectures	Daily and weekly test
١٤th	4	Student understanding of the lecture	Multi –degree of freedom system	Theoretical and practical lectures	Daily and weekly test
١٥th	4	Student understanding of the lecture	Multi –degree of freedom system	Theoretical and practical lectures	Daily and weekly test

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Theory of Vibration with Applications
Main references (sources)	Theory of Vibration with Applications
Recommended books and references (scientific journals, reports...)	All relevant reputable scientific journals
Electronic References, Websites	https://ocw.mit.edu/courses/2-003sc-engineering-dynamics-fall-2011/pages/syllabus/ https://www.scribd.com/document/431196398/Vibration- Lecture-1

1. Course Name:	
heat and mass transfer 2	
2. Course Code:	
RAC301	
3. Semester / Year:	
Semester2	
4. Description Preparation Date:	
٦/10/2024	
5. Available Attendance Forms:	
class attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
4 hours/ 3 units	
7. Course administrator's name (mention all, if more than one name)	
Name: ahmed hani ghanim , dr.omer mohammed , dr.omar raafe Email: ahmed.hanigh@ntu.edu.iq	
8. Course Objectives	
• The ability to implement and maintain systems based on the principle of heat transfer. • The ability to use engineering methods, tools, and skills. • The ability to conduct experiments and obtain satisfactory results. • The ability to analyze, deduce, and solve problems.	
9. Teaching and Learning Strategies	
Strategy	A study of the types of heat transfer and their practical applications. The types are conduction, convection, and radiation. Practical applications of heat transfer include fins, heat exchangers, and insulators, along with their uses in factories and electrical appliances. The study also includes the calculation of the convection heat transfer coefficient using tables. Radiation heat and the effect of barriers between two radiant plates were also studied, as were boiling and its types. Thermal conductivity and the heat transfer coefficient were also studied. Conductive heat transfer in multiple layers, whether in a wall or a cylinder, was also studied, and the total resistance was calculated in all cases.

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	4	Student understanding of the lecture	One Dimensional Steady State Force Convection Heat Transfer on Flat Plate	Therotical and practical lectures	Daily and weekly test
2+3	8	Student understanding of the lecture	Empirical Equations for Forced Convection Heat Transfer (Laminar and Turbulent Flow)	Therotical and practical lectures	Daily and weekly test
4	4	Student understanding of the lecture	Natural Convection Heat Transfer	Therotical and practical lectures	Daily and weekly test
5	4	Student understanding of the lecture	Empirical Equations for Natural Convection Heat Transfer	Therotical and practical lectures	Daily and weekly test
6	4	Student understanding of the lecture	Introduction to Heat Exchangers, Kinds of Heat Exchangers	Therotical and practical lectures	Daily and weekly test
7	4	Student understanding of the lecture	The Overall Heat Transfer Coefficient, Fouling Factor	Therotical and practical lectures	Daily and weekly test
8	4	Student understanding of the lecture	The Log Mean Temperature Difference Method, The Effectiveness of the heat Exchangers	Therotical and practical lectures	Daily and weekly test
9+10	8	Student understanding of the lecture	The Performances for Difference Kinds of the Heat Exchangers	Therotical and practical lectures	Daily and weekly test
11	4	Student understanding of the lecture	Heat Radiation, Introduction, Basic Concepts	Therotical and practical lectures	Daily and weekly test

1. Educational institution					
12	4	Student understanding of the lecture	Characteristics of Radiation, The View Factor	Therotical and practical lectures	Daily and weekly test
13-15	12	Student understanding of the lecture	Radiation Heat Transfer Between Two Black Surfaces	Therotical and practical lectures	Daily and weekly test

11. Course Evaluation	
١٠ = report ٤٠= theory ١٠= practical ٤٠= final exam	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	1 J.P. Holman;"Heat Transfer"; Tenth Edition Mc. Graw hill, 2010 Yunus A. cengel "Heat Transfer a Practical Approach" Second Edition Mc. Graw hill, 2010.
Main references (sources)	The ASME Journal of Heat Transfer http://heattransfer.asmedigitalcollection.asme.org/journal.aspx
Recommended books and references (scientific journals, reports...)	Taylor & Francis Online http://www.tandfonline.com
Electronic References, Websites	Taylor & Francis Online http://www.tandfonline.com

Technical Engineering College\Mosul
2. Scientific Department
Mechanical Power Engineering
3. Course name/code
RE 303
4. Available forms of attendance
Presence
5. Semester/Year
Second /2024-2025
6. Number of study hours (total)
30 Hour
7. Date this description was prepared
2024/10/6
8. Course objectives (general objectives of the course)
The Gas Dynamics course aims to provide students with a comprehensive understanding of the laws and concepts of gas dynamics, including their properties, behavior, and methods of analysis and application in various fields. This includes the study of the fundamentals of thermodynamics, the ide and real gas laws, and the application of this knowledge in fields such as aerospace engineering, energy engineering, and others.

9. Course outcomes, teaching, learning and assessment methods

Definition: It is a set of knowledge, skills, and values that the course seeks to achieve in students.

Its importance: It provides the learner with a clear idea of what he will be able to do after completing the course, and it helps in designing and evaluating academic courses.

How they are determined: Course outcomes are determined based on the objectives of the academic program to which the course belongs..

Outcomes	Teaching and Learning Methods	Evaluation Methods
A- Knowledge A -Understand the fundamental notions of gas dynamics and aerodynamics, integrating specific knowledge with that of other related fields in engineering (for example thermodynamics and fluid mechanics). A2-Understand the fundamental notions of gas dynamics and aerodynamics, integrating specific knowledge with that of other related fields in engineering (for example thermodynamics and fluid mechanics)	Daily exams, semester exams, daily attendance, laboratory reports, annual evaluation.	Conducting theoretical and practical lectures, operating laboratories, workshops, and summer training during the summer vacation.
B - Skills B1 - Training and developing engineering personnel to operate and maintain various aircraft systems. B2 - Developing mechanical systems to achieve high efficiency and low cost. B3 - Providing scientific and practical consultations in the field of modern aircraft systems.	Daily exams, semester exams, daily attendance, laboratory reports, annual evaluation	Holding theoretical and practical lectures, operating laboratories and workshops, and conducting summer training during the summer vacation
C- Values C1- Preparing reliable educational cadres within the specialization within state institutions C2- Developing solutions to the problems facing institutions and systems specialized in mechanical engineering C3- Working to meet labor market requirements and enhance economic capabilities	Daily exams, semester exams, daily attendance, laboratory reports, annual evaluation	Holding theoretical and practical lectures, operating laboratories and workshops, and conducting summer training during the summer vacation

10. Course structure (theoretical and practical vocabulary)					
Week	Hour	Desired Learning Outcomes	Unit/Or Topic Name	Teaching Method	Assessment Method
1st , 2nd	4	Introduction to Compressible Gas Flow	Student understanding of the lecture	Theoretical and practical lecture	Daily and weekly tests
3rd	2	Basic equations of compressive flow	Student understanding of the lecture	Theoretical and practical lecture	Daily and weekly tests
4th	2	Wave propagation in compressive properties	Student understanding of the lecture	Theoretical and practical lecture	Daily and weekly tests
5th	2	Isotropic flow of an ideal gas	Student understanding of the lecture	Theoretical and practical lecture	Daily and weekly tests
6th	2	Isotropic choking in nozzles	Student understanding of the lecture	Theoretical and practical lecture	Daily and weekly tests
7th -8th	4	Subsonic and supersonic isentropic flow through a variable area channel	Student understanding of the lecture	Theoretical and practical lecture	Daily and weekly tests
9th	2	Stationary normal shock	Student understanding of the lecture	Theoretical and practical lecture	Daily and weekly tests
10th - 11th	4	Stationary normal shock equations	Student understanding of the lecture	Theoretical and practical lecture	Daily and weekly tests
12th 13th	4	Static vertical shock in nozzles and diffusers	Student understanding of the lecture	Theoretical and practical lecture	Daily and weekly tests
14th 15th	4	Static vertical shock in constricted and obtuse nozzles	Student understanding of the lecture	Theoretical and practical lecture	Daily and weekly tests

11. Curriculum development plan	
Continuously updating the curriculum to keep pace with labor market developments (Curriculum Update Committee, Scientific Committee), such as: 1. Developing curricula that are appropriate for the labor market 2. Holding scientific seminars and conferences aimed at updating curricula 3. Monitoring scientific developments in the field of specialization	
12. Infrastructure	
Classrooms, laboratories, and workshops a	Available
Required textbooks	Available
Main references (sources)	Shapiro A., "Dynamics and thermodynamics of compressible fluid flow Vol.1." ,1953. Anderson, "Modern compressible flow with historical perspective, 1984.
Recommended books and references (scientific journals, reports, etc.	Oosthuizen, "Compressible Fluid Flow" , 1992
B-Electronic references, websites....,	https://www.housecallpro.com/learn/best-hvac-books/

1. Course Name:
Methodology of Scientific Research
2. Course Code:
NTU 410
3. Semester / Year:
first/2024-2025
4. Description Preparation Date:
6/10/2024
5. Available Attendance Forms:
Weekly Schedule: 1 hour of theoretical lecture
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours/ 2 units
7. Course administrator's name (mention all, if more than one name)
Name: omar sadoon khaleel Email: omarsadoon@ntu.edu.iq
8. Course Objectives
• To introduce students to the concepts of scientific research and its importance in solving theoretical and practical problems. • To enable students to identify various types of research and their corresponding methodologies. • To develop students' skills in formulating research problems, objectives, questions, and hypotheses. • To train students in preparing and implementing a research plan step by step. • To build students' ability to collect data using appropriate tools and analyze them scientifically. • To enable students to write a research report in a structured and academic format. • To enhance students' critical thinking, analytical reasoning, and scientific interpretation skills. • To promote adherence to research ethics and academic integrity.

9. Teaching and Learning Strategies

Strategy

Outcomes	Teaching Methods	Assessment Methods
A. Knowledge		
Explain the basic concepts, purposes, and functions of scientific research.	Lectures + Guided discussion	Written exam (mid/final)
Differentiate between quantitative, qualitative, and mixed research methods.	Case examples + Group discussions	Written test + Oral questions
Enumerate the steps for preparing a research proposal in a structured manner.	Case study + Proposal analysis	Written assignment + Evaluation of sample proposals
Describe research ethics and requirements for integrity and proper citation.	Interactive discussion + Case analysis	Short test + Scenario evaluation
B. Skills		
Formulate a clear research problem with defined objectives and testable hypotheses.	Workshop + Individual exercises	Assessment Methods
Design appropriate data collection tools (questionnaire, interview, observation).	Practical training + Student project presentations	Problem statement evaluation + Mini report
Use Excel or SPSS to perform basic data analysis.	Computer applications + Technical guidance	Tool submission + Scientific evaluation
Compare analysis results with initial expectations and interpret findings.	Student presentations + Critical discussion	Practical test + Data analysis report
		Research report + Oral defense
C. Values		
Commit to research ethics, honesty, and participant confidentiality.	Case discussions + Ethical dilemmas	Behavioral observation + Final project assessment
Document sources accurately using APA or MLA citation styles.	Hands-on citation practice + Reviewing published research	Final report review + Citation score
	Group activities + Task delegation	Individual performance assessment + Group report
	Open discussion +	Behavioral observation + Presentation evaluation

	Demonstrate responsibility in individual and group research work. Show respect and openness to others' opinions during research discussions.	Peer feedback		

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st, 2nd, 3rd,4th	١٦	**1. Topic Selection** Precisely and clearly define the research topic. Ensure the topic is specific and relevant to your field of study. Consider the originality and novelty of the topic.	Student Understanding of the Lecture	Theoretical Lecture	Daily And Weekly Test
5th, 6th	٨	**2. Research Plan** Research Title: Concise, accurate, and reflective of the study's content. Research Problem: The main question or issue the study seeks to address. Objectives: What the researcher aims to achieve. Significance: The scientific and practical importance of the study. Research Questions or Hypotheses: Depending on the nature of the study.	Student Understanding of the Lecture	Theoretical Lecture	Daily And Weekly Test

		Scope and Limitations: Time, location, and subject boundaries. Methodology: The approach used (descriptive, experimental, analytical, etc.).			
7th, 8th, 9th	١٢	**3. Introduction** An overview of the topic. Background information. Reasons for choosing the topic. Importance of the research.	Student Understanding of the Lecture	Theoretical Lecture	Daily And Weekly Test
10th, 11th, 12th	١٢	**4. Literature Review and Previous Studies** A detailed presentation of the most relevant existing literature. Critical analysis of previous research. Identifying gaps that the current research addresses. Highlighting what makes this study unique.	Student Understanding of the Lecture	Theoretical Lecture	Daily And Weekly Test
13th, 14th, 15th	١٢	**5. Data Collection Tools, Samples, and Procedures** Data Collection Tools: Questionnaires, interviews, tests, observations, etc. Sample: Type, size, and sampling method. Procedures: Steps of applying the tools	Student Understanding of the Lecture	Theoretical Lecture	Daily and Weekly Test

		and fieldwork details.			

11. Course Evaluation

- 10 marks: for daily evaluation (preparation, attendance, class participation).
- 30 marks: for monthly written exams.
- 60 marks: for the final theoretical exam (covering all course topics).

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Available
Main references (sources)	**Creswell, John W.** – Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. **Leedy, Paul D., & Ormrod, Jeanne Ellis** – Practical Research: Planning and Design. **Saunders, Lewis & Thornhill** – Research Methods for Business Students. **Flick, Uwe** – An Introduction to Qualitative Research. **Babbie, Earl** – The Practice of Social Research. **Neuman, W. Lawrence** – Social Research Methods: Qualitative and Quantitative Approaches. **Patton, Michael Quinn** – Qualitative Research & Evaluation Methods
Recommended books and references (scientific journals, reports...)	• Journal of Educational Research • International Journal of Social Research Methodology • Educational Research Review • Research in Higher Education • International Journal of Research & Method in Education • Social Science Research
Electronic References, Websites	https://www.sciencedirect.com https://scholar.google.com https://www.researchgate.net https://www.ssrn.com https://libguides.mit.edu

1. Course Name:	
Engineering Management	
2. Course Code:	
TEMO 400	
3. Semester / Year:	
First semester - fourth year	
4. Description Preparation Date:	
6/10/2024	
5. Available Attendance Forms:	
Student attendance in person	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours / 2 units	
7. Course administrator's name (mention all, if more than one name)	
Name: **Shaima Salem Younis / Lecturer** Email: **shaima.salem@ntu.edu.iq**	
8. Course Objectives	
Course Objectives	8- Introduce students to the concepts of general and engineering management, and distinguish between the roles of managers and leaders within engineering work environments. 9-Enable students to understand the administrative differences between global organizational models, such as the American and Chinese styles, and analyze the impact of organizational culture on management style. 10- Enhance students' understanding of marketing concepts, with a focus on its types and applications in engineering projects and the industrial labor market. 11- Explain different organizational structures, including the general and hybrid structure, and link them to the strategic objectives of the engineering organization. 12- Instill the importance of organizational culture in the behavior of individuals and groups, linking it to corporate values and work performance 13- Introduce students to the fundamentals of human resource management, including the types of resources, their objectives, principles, and the challenges associated with them in the workplace. 14- Raise students' awareness of common human errors in engineering work environments and provide them with effective strategies to avoid these errors. Furthermore, understand the importance of inventory management, its causes, and its role in the efficiency of production processes.
9. Teaching and Learning Strategies	

Strategy	**1- Interactive Lecture** - Use presentations to explain basic concepts (such as the difference between management and engineering, or types of marketing). - Pause during the explanation to ask short questions to stimulate thinking and interaction. **2- Problem-Based Learning (PBL)** - Present realistic situations from engineering work environments (such as human error on a work site or a malfunction in inventory management). - Divide students into small groups to analyze the problem and propose practical management solutions. **3- Case Study Method** - Analyze real or hypothetical case studies of companies with American and Chinese management models. - Encourage students to provide management solutions and recommendations specific to each case. **4- Cooperative Learning** - Divide students into groups to work on a simple project, such as developing an organizational structure for a hypothetical company or a marketing plan for an engineering product. - Take turns within each group to promote collaboration and accountability. **5- Brainstorming** - Use it at the beginning of lessons such as human resources or organizational culture to stimulate students' ideas and prior experiences. - Write the brainstorming results on the board and develop them during the lecture. **6- Student Presentations** - Assign students to give short presentations on specific topics, such as "The Importance of Inventory Management" or "Types of Administrative Leadership." - Enhance presentation skills and self-confidence.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
FIRST	2	The student will understand the concepts of engineering	Introduction to Engineering Management	Interactive lecture + presentation	Class participation + homework

		management and their importance in different work environments.			
Second	2	The student should be able to distinguish between the basic functions of management and the tasks of the manager in the institution.	Director's duties an management functions	Interactive lecture + presentation	Class participation + homework
Third	2	The student should differentiate between the characteristics of a manager and a leader and analyze their roles in management.	The difference between a manager and a leader	Interactive lecture + brainstorming	Class participation + individual exercise
Fourth	2	The student will understand the organizational differences between the American and Chinese management styles.	American and Chinese organizatic	Interactive lecture + educational video	Class participation +analytical paper
Fifth	2	Measuring student comprehension of basic concepts (1-4)	First daily test	Interactive review + paper test	Paper test
Sixth	2	The student will understand marketing and classify its different types.	The Concept of Marketing and Its Types	Interactive Lecture	Open Discussion + Real-Life Examples Practical Exercise
Seventh	2	The student will distinguish between types	Organizational Structure and Its Types	Interactive Lecture	Homework

		of organizational structures and apply the concept to a typical organization			
Eighth	2	Explain to the student the organization's culture, characteristics, and basic objectives.	Organizational cult and basic objective	Interactive lecture + case study.	Homework
Ninth	2	Comprehensive assessment of student understanding of topics from Weeks 1 to 8	Semester Exam	Paper-based Exam	Paper-based Exam
Tenth	2	Explain to the student the concept of human resources and their basic functions.	Introduction to Human Resources Management	Interactive Lecture + Mind Maps	Class Participation
Eleventh	2	The student will differentiate between internal and external human resources and the principles adopted in their management	Types of human resources and their management principles	Interactive lecture	Class participation
Twelfth	2	The student will understand the current challenges in this field and propose appropriate solutions.	Contemporary Challenges in Human Resource Management	Interactive Lecture	Class Participation
Thirteenth	2	The student will be taught to classify the	Human errors, their types, and ways to avoid	Interactive lecture	Class participation + paper-based

		types of human errors and suggest strategies to reduce them.	them.		test.
Fourteenth	2	Explain to the student the importance of inventory management and compare different methods for doing so.	Inventory Management	Interactive Lecture	Class Participation
Fifteenth	2	The student will summarize the course's key concepts and answer comprehensive questions.	Comprehensive review + final exam.	Group review + open-ended questions	Class participation + final exam.

11. Course Evaluation

1- Yearly work (10) including: (paper test + attendance + daily participation + classwork)

2- Semester exam (30)

3- Annual effort (10 + 30) = 40

4- Final exam (60)

5- Final grade (annual effort out of 40 + final exam out of 60) = 100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Lectures prepared by the instructor according to the prescribed educational package
Main references (sources)	4- The Manager's Job: Folklore and Fact 5- Human Resource Management. 16th Edition, Pearson (2020) Gary Dessler, 6- Organization Theory and Design. 13th Edition, Cengage Learning Daft, R. L. (2021)
Recommended books and references (scientific journals, reports...)	2- Leadership in Organizations (9th Edition, 2019) – Pearson (Yukl, G)
Electronic References, Websites	1-**https://journals.aom.org/journal/arm** **2https://onlinelibrary.wiley.com/journal/13665567**

1. Course Name:
Engineering Measurement Systems
2. Course Code:
PM400
3. Semester / Year:
First Semester / 2025
4. Description Preparation Date:
6/10/2024
5. Available Attendance Forms:
In-person
6. Number of Credit Hours (Total) / Number of Units (Total)
Theory Hours (2) + Practical Hours (2) = Total Hours (4) / Total Units (3)
7. Course administrator's name (mention all, if more than one name)
Name: Karam Hashim Mohammed Email: karam.hashim@ntu.edu.iq Name: Ashraf Emad Abdulrazzaq Email: ashroo.emad@ntu.edu.iq
8. Course Objectives

The "Engineering Measurement Systems" course aims to equip students with a solid understanding of measurement principles and their practical applications by:	Developing skills in analyzing accuracy, error, and uncertainty in measurements. Enhancing the ability to select appropriate tools (e.g., thermometers, pressure sensors, Pitot tubes) and evaluate their performance. Gaining experience in statistical data processing through linear and nonlinear regression and error propagation theory. Understanding the challenges of measurements under transient conditions (e.g., varying temperature and pressure) and techniques for fluid velocity measurements. Linking theoretical concepts to real-world engineering applications such as instrument calibration, quality control, and monitoring of dynamic systems.

9. Teaching and Learning Strategies	
Theoretical Lectures	Delivering core concepts and theories with practical examples.
Interactive Discussions	Encouraging questions and critical thinking.
Problem-Solving Exercises	Applying concepts to practical scenarios.
Case Studies	Analyzing real-world engineering problems.
Laboratory Experiments & Demos	Hands-on experience with tools and understanding sources of error.
Group Projects	Developing teamwork skills and applying principles in real contexts.
Use of Technology	Simulation programs, digital resources, and interactive assessments.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	- Define measurement and its importance - Identify types of measurements	Basic Concepts of Measurement	Lecture + Interactive Discussion	Quiz
٢	4	- Analyze instrument characteristics - Classify error sources	Measurement Tools and Errors	Case Study + Exercises	Analytical Report
3	4	- Calculate standard deviation and	Statistical Data Analysis	Lecture + Excel Applications	Calculations

		mean - Apply error propagation theory			
4	4	- Model variable relationships. - Interpret R^2 (coefficient of determination)	Linear and Multiple Regression	Lecture + Data Workshop	Quiz
5	4	- Apply exponential and logarithmic regression. - Evaluate model quality	Nonlinear Regression	Data Analysis + Discussion	Research Report
6	4	- Design multivariable experiments. - Analyze variance (ANOVA).	Design of Experiments (DOE)	Lecture + Design Exercises	Midterm Exam
7	4	- Analyze thermometer principles. - Evaluate calibration impact.	Basics of Thermal Measurement	Visual Presentations + Discussion	Oral Evaluation
8	4	- Interpret voltage-temperature relationship. - Choose thermocouple types.	Thermocouples: Principles & Applications	Lecture + Q&A Session	Quiz
9	4	- Compare RTD and thermocouples. - Analyze Wheatstone bridge circuits	RTDs (Resistance Temperature Detectors)	Electronic Modeling + Exercises	Technical Report
10	4	- Calculate temperature via radiation. - Analyze measurement	Pyrometry: Radiation Temperature Measurement	Real Example Analysis	Scientific Seminar

		uncertainty			
11	4	- Model thermal sensor dynamics. - Analyze time constant.	Transient Thermal Measurements	Mathematical Simulation + Exercises	Quiz
12	4	- Diagnose thermal error sources. - Suggest bias solutions.	Thermal Measurement Errors	Feasibility Studies + Discussion	Analytical Report
13	4	- Analyze measurement delay in dynamic systems. - Evaluate pressure devices.	Dynamics of Pressure Measurement Devices	Curve Analysis + Exercises	Midterm Exam
14	4	- Apply Bernoulli's equation for velocity. - Explain Doppler effect	Fluid Velocity Measurement	Video Presentations + Discussion	Research Report
15	4	- Evaluate smart sensors. - Analyze IoT applications.	Modern Measurement Technologies	Final Seminar + Review	Final Project

11. Course Evaluation		
Details	Weight	Assessment Method
Objective and applied questions.	20%	Quizzes
Data analysis and lab experiment reports.	25%	Practical Reports
Covers foundational concepts up to week 7.	20%	Midterm Exam
Engagement in lectures and seminars.	15%	Participation & Discussion
Practical application of measurement of variables (Temp/Pressure/Fluid Speed).	20%	Final Project

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	**Principles of Measurement Systems by John P. Bentley**
Main references (sources)	**Measurement and Instrumentation Principles Alan S. Morris**
Electronic References, Websites	**https://www.youtube.com/watch?v=5xMnNdtJo60&list=PLWF9TXck7O_x_ELS1TWr4UynicysmoBjU**

1. Educational institution
Technical Engineering College\Mosul
2. Scientific Department
Mechanical Power Engineering
3. Course name/code
Renewable Energy RE 400
4. Available forms of attendance
Presence
5. Semester/Year
First /2024-2025
6. Number of study hours (total)
75 hour
7. Date this description was prepared
2024/10/6
8. Course objectives (general objectives of the course)
Study all types of clean energy and their sources around the world, and identify the types of these energies that contribute to reducing the use of toxic gas and vapor emissions resulting from burning traditional fuels.
9. Course outcomes, teaching, learning and assessment methods Definition: It is a set of knowledge, skills, and values that the course seeks to achieve in students. Its importance: It provides the learner with a clear idea of what he will be able to do after completing the course, and it helps in designing and evaluating academic courses. How they are determined: Course outcomes are determined based on the objectives of the academic program to which the course belongs.

Outcomes	Teaching and Learning Methods	Evaluation Methods
A- Knowledge A1 - The ability to segment and analyze the components of mechanical devices and determine the function of each component. A2 - The ability to diagnose faults in various mechanical equipment. A3 -- The ability to provide appropriate solutions to faults in various mechanical devices.	Daily exams, semester exams, daily attendance, laboratory reports, annual evaluation.	Conducting theoretical and practical lectures, operating laboratories, workshops, and summer training during the summer vacation.
B - Skills B1 - Training and developing engineering personnel to operate and maintain various mechanical equipment B2 - Designing mechanical equipment with high efficiency and cost-effectiveness B3 - Providing scientific and practical consultations in the field of mechanical engineering	Daily exams, semester exams, daily attendance, laboratory reports, annual evaluation	Holding theoretical and practical lectures, operating laboratories and workshops, and conducting summer training during the summer vacation
C- Values C1- Preparing reliable educational cadres within the specialization within state institutions C2- Developing solutions to the problems facing institutions and systems specialized in mechanical engineering C3- Working to meet labor market requirements and enhance economic capabilities	Daily exams, semester exams, daily attendance, laboratory reports, annual evaluation	Holding theoretical and practical lectures, operating laboratories and workshops, and conducting summer training during the summer vacation

10. Course structure (theoretical and practical vocabulary)					
Week	Hour	Desired Learning Outcomes	Unit/Or Topic Name	Teaching Method	Assessment Method
1st , 2nd	10	Renewable energy sources and their applications, renewable energy and environmental problems (acid rain, ozone depletion, global climate change, nuclear hazards(	Student understanding of the lecture	Theoretical and practical lecture	Daily and weekly tests
3rd , 4th , 5th	15	Sun angles (declination, hour angle, elevation angle, azimuth angle, sunrise and sunset times, day length, and incidence angle.(External solar radiation, atmospheric attenuation, terrestrial radiation, total radiation on inclined surfaces. Solar collectors, fixed collectors (flat-plate collectors, compound parabolic collectors, evacuated-tube collectors.(	Student understanding of the lecture	Theoretical and practical lecture	Daily and weekly tests
6th , 7th	10	Parabolic trough collectors, Fresnel collectors, parabolic dish reflectors, heliostatic field collectors Solar water heating systems Passive systems (thermosiphon systems, integrated collector storage(	Student understanding of the lecture	Theoretical and practical lecture	Daily and weekly tests
8th , 9th	10	Active systems (direct circulation systems, indirect water heating systems, swimming pool heating systems) Heat storage systems (air system thermal storage, fluid system thermal storage, and thermal analysis of storage systems).	Student understanding of the lecture	Theoretical and practical lecture	Daily and weekly tests
10th	5	Module and Array Design (Module and Array Design) Differential Temperature Controller, Sensor Placement	Student understanding of the lecture	Theoretical and practical lecture	Daily and weekly tests

11th , 12th	10	Hot water consumption Practical considerations (pipes, supports, insulation, pumps, valves, and appliances). Solar space heating and cooling, heat load calculations	Student understanding of the lecture	Theoretical and practical lecture	Daily and weekly tests

13th , 14th	10	Solar space heating and cooling (heating and water heating, ventilation systems, water systems, auxiliary heater locations, heat pump systems(Solar cooling (adsorption units, absorption units(	Student understanding of the lecture	Theoretical and practical lecture	Daily and weekly tests
15th,	5	Industrial heat (solar industrial air and water systems, solar steam generation systems(	Student understanding of the lecture	Theoretical and practical lecture	Daily and weekly tests

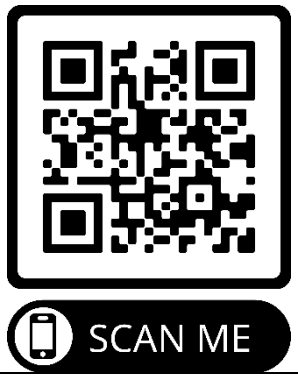
11. Curriculum development plan	
Continuously updating the curriculum to keep pace with labor market developments (Curriculum Update Committee, Scientific Committee), such as: 1. Developing curricula that are appropriate for the labor market 2. Holding scientific seminars and conferences aimed at updating curricula 3. Monitoring scientific developments in the field of specialization	
12. Infrastructure	
Classrooms, laboratories, and workshops a	**Available**
Required textbooks	**Available**
Main references (sources)	**Solar Energy Engineering: Processes and Systems**, 2nd edition, By Soteris A. Kalogirou, 2013.
A-Recommended books and references (scienti journals, reports, etc.	Solar Photovoltaic Technology and Systems: A Manual for Technicians, Trainers and Engineers, by , Chetan Singh Solanki, 2013.
B-Electronic references, websites..... ,	**https://www.nrel.gov/research/re-solar** **https://www.energy.gov/eere/wind/advantages-and-challenges-wind-energy**

1. Course Name:
Combustion engineering
2. Course Code:
RE402
3. Semester / Year:
First semester 2024/2025
4. Description Preparation Date:
6/10/2024
5. Available Attendance Forms:
6. Number of Credit Hours (Total) / Number of Units (Total)
2/2
7. Course administrator's name (mention all, if more than one name)
Name: Dr.omar mohammed yousif Email: omar.m.yousif@ntu.edu.iq
8. Course Objectives
Students will learn about the types of combustion. • Students will be able to calculate the adiabatic flame temperature and energy generated from burning hydrocarbon fuels. • Students will learn to classify types of internal combustion engines. • Students will be able to calculate the performance and engine efficiency coefficients.
9. Teaching and Learning Strategies

Strategy	Attendant education, e-learning, course participation, discussion, seminars, and lab teaching.

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1,2	2	The student understands Thermodynamic of combustion	Thermodynamic of combustion	Presentation, explanation and discussion	H.W
3	2	Understanding the composition of hydrocarbon fuels and types of combustion	Fuel And Combustion	Presentation, explanation and discussion	H.W
4,5	2	Understand the application of the first law of thermodynamics to the combustion process.	Application of 1st law of thermodynamic on combustion process	Presentation, explanation and discussion	Quiz
6,7	2	Understand the Adiabatic flame temperature	Adiabatic flame temperature	Presentation, explanation and discussion	Quiz
8,9	2	Understand Classifications of engines and their performance	Classifications of engines and their performance	Presentation, explanation and discussion	H.W
10	2	Understand Air-Standard cycle	Air-Standard cycle	Presentation, explanation and discussion	H.W
11,12	2	Understand Air-Standard cycle	Air-fuel cycle	Presentation, explanation and discussion	Mid term exam
13,14	2	Understand type	hydrocarbon fuels	Presentation,	Report

		of hydrocarbon fuels		explanation and discussion	
15	2	Understand Octane Number &Cetane Number	Octane Number &Cetane Number	Presentation, explanation and discussion	Quiz

11. Course Evaluation	
Homework 20%, Daily Quizzes 20%, Mid term exam 40%, Reports 20%	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	**Stephen R. Turns-An Introduction to Combustion_ Concepts and Applications-McGraw-Hill (2000)**
Main references (sources)	**Turns an_introduction_to_combustion**
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

1. Course Name:	
Photovoltaic Energy Conversion	
2. Course Code:	
RE 404	
3. Semester / Year:	
2020-2021	
4. Description Preparation Date:	
2024/10/6	
5. Available Attendance Forms:	
2 hours of theory + 2 hours of practical work per week	
6. Number of Credit Hours (Total) / Number of Units (Total):	
60 hours (60 practical + 60 theoretical) / 3	
7. Course administrator's name (mention all, if more than one name)	
Name: Safwan Assaf Hamoodi Email: safwan79azb@ntu.edu.iq	
8. Course Objectives	
This course of photovoltaic energy systems will focus on the fundamentals of solar energy conversion, photovoltaic, and environmental impacts, and cover topics including shading, energy storage, and emerging PV technologies. Stand-alone PV system components. Designing stand-alone PV system and sizing. Analysis of the efficiency of solar cells. PV power system. Grid-connected PV.	
9. Teaching and Learning Strategies	
Strategy	Theoretical lectures + project-based learning + practical experiments + mode technologies + discussion workshops and interactive sessions

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1st, 2nd, 3rd, 4th	16	Student understanding of the lecture	Introduction to PV Energy Conversion Energy from Solar Photovoltaic (PV) Conversion, Solar PV Modules, Solar PV Systems, Advantages and Challenges of Solar Photovoltaic Energy Conversion Fundamentals of Semiconductor Materials - Introduction to semiconductor materials Properties of semiconductors Formation of P-N junctions and basic operation of diodes	Theoretical and practical lecture	Daily and weekly test
5th,6th ,7th	12	Student understanding of the lecture	- Solar Cells, How Solar Cells Are Better than any Conventional Sources of electricity? What is a - Solar Cell? How Solar Cell Generates Electricity? Parameters of Solar Cells, Solar Cell Technologies, Factors Affecting Electricity Generated by a Solar Cell	Theoretical and practical lecture	Daily and weekly test
8th, 9th 10th 11th	16	Student understanding of the lecture	- Solar PV Module Arrays, Connection of Modules in Series, Estimating Number of PV Modules Required in Series and Their Total Power, Connection of Modules in Parallel Combination - Connected in	Theoretical and practical lecture	Daily and weekly test

			Parallel and Their Total Power, Connection of Modules in Series and Parallel (Mixed Combination), Estimation Number of Modules to be		
12th, 13th, 14th, 15th,	16	Student understanding of the lecture	PV Module Shading - Causes and effects of shading in PV systems - Bypass diodes for mitigating shading effects - Strategies for minimizing shading effects	Theoretical and practical lecture	Daily and weekly test
16th, 17th, 18th, 19th, 20th	20	Student understanding of the lecture	- Applications of Batteries in Solar PV Systems, why to Connect Batteries Together? Estimating Number of Batteries Required in Series, Estimating Total Energy Stored in Series Connected Battery Array - Charge Controller, MPPT and Inverters, Need for BoS, Power Converters and Their Efficiency, AC to DC Converters - Grid-connected Solar PV Power Systems, Introduction to Grid-connected PV Systems, Grid-connected PV Systems for Small Power Applications, Grid-connected PV Systems for Large Power Applications,	Theoretical and practical lecture	Daily and weekly test
11. Course Evaluation					
Daily preparation (10%), daily oral tests (10%), monthly or written tests (40%), reports					

(20%), projects (20%).	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Solanki, Chetan Singh. Solar photovoltaic technology and systems: a manual for technicians, trainers and engineers. PHI Learning Pvt. Ltd., 2013
Main references (sources)	Shepherd, William, and David William Shepherd. *Energy studies*. World Scientific Publishing Company, 2014.
Recommended books and references (scientific journals, reports...)	Conversion photovoltaic energy
Electronic References, Websites	www. Solar energy

1. Educational institution
Technical Engineering College\Mosul
2. Scientific Department
Mechanical Power Engineering
3. Course name/code
Thermal Power Plants RE 405
4. Available forms of attendance
presence
5. Semester/Year
Second /2024-2025
6. Number of study hours (total)
75 hours
7. Date this description was prepared
6/10/2024
8. Course objectives (general objectives of the course)

- Power Plant Engineering deals with the study of energy, its sources and the use of energy to generate power.
- Power is generated by prime movers (e.g. hydraulic turbines, steam turbines, diesel engines)
- A large amount of power is generated by prime movers at a site or layout called power plants, where all the equipment and machinery required for generating power are located
- Energy can be defined as the ability to do work. Energy exists in various forms, such as mechanical energy, thermal energy, electrical energy, solar energy, etc.
- Energy can be defined as the ability to do work. Energy exists in various forms, such as mechanical energy, thermal energy, electrical energy, solar energy, etc..

9-Course outcomes, teaching, learning and assessment methods

Definition: It is a set of knowledge, skills, and values that the course seeks to achieve in students.

Its importance: It provides the learner with a clear idea of what he will be able to do after completing the course, and it helps in designing and evaluating academic courses.

How they are determined: Course outcomes are determined based on the objectives of the academic program to which the course belongs.

Outcomes	Teaching and Learning Methods	Evaluation Methods
A- Knowledge	Daily exams,	Conducting theoretical and

A1 - The ability to segment and analyze the components of mechanical devices and determine the function of each component. A2 - The ability to diagnose faults in various mechanical equipment. A3 -- The ability to provide appropriate solutions to faults in various mechanical devices.	semester exams, daily attendance, laboratory reports, annual evaluation.	practical lectures, operating laboratories, workshops, and summer training during the summer vacation.
B - Skills B1 - Training and developing engineering personnel to operate and maintain various mechanical equipment B2 - Designing mechanical equipment with high efficiency and cost-effectiveness B3 - Providing scientific and practical consultations in the field of mechanical engineering	Daily exams, semester exams, daily attendance, laboratory reports, annual evaluation	Holding theoretical and practical lectures, operating laboratories and workshops, and conducting summer training during the summer vacation

10. Course structure (theoretical and practical vocabulary)

Week	Hour	Desired Learning Outcomes	Unit/Or Topic Name	Teaching Method	Assessment Method
1st , 2nd	10	Introduction to steam cycles, learning objectives, course content - Introductory concepts, basic concepts of steam cycles	Student understanding of the lecture	Theoretical and practical lecture	Daily and weekly tests
, 3rd 4th , 5th	15	Introductory concepts for reheating cycles - Introductory concepts for feed cycles - Introductory concepts for gaseous cycles	Student understanding of the lecture	Theoretical and practical lecture	Daily and weekly tests
6th, 7th 8th ,	15	- Dual Introductory Concepts for Cycles Combustion and Fuel	Student understanding of the lecture	Theoretical and practical lecture	Daily and weekly tests
9th	5	condensers	Student understanding of the lecture	Theoretical and practical lecture	Daily and weekly tests

10th, 11th	10	Turbine	Student understanding of the lecture	Theoretical and practical lecture	Daily and weekly tests
12th	5	The pumps	Student understanding of the lecture	Theoretical and Practical lecture	Daily And Weekly tests
, 13th 14th ,	10	The nozzles	Student understanding of the lecture	Theoretical And Practical lecture	Daily and weekly tests
15th	5	Water treatment	Student understanding of the lecture	Theoretical And Practical lecture	Daily and weekly tests

11. Curriculum development plan

Continuously updating the curriculum to keep pace with labor market developments (Curriculum Update Committee, Scientific Committee), such as:
1. Developing curricula that are appropriate for the labor market
2. Holding scientific seminars and conferences aimed at updating curricula
3. Monitoring scientific developments in the field of specialization

12. Infrastructure	
Classrooms, laboratories, and workshops a	Available
1- Required textbooks	Available
1- Main references (sources)	Thermal engineering (eighth edition) R. K. RAJPUT
a) A-Recommended books and references (scienti journals, reports, etc(.	Applied thermodynamics .
B-Electronic references, websites..... ,	https://www.sfu.ca/~mbahrami/ENSC%2046 1/Notes/Vapor%20Power%20Cycles.pdf https://www.e3s-conferences.org/articles/e3sconf/pdf/2021/21/e3sconf_aeecs2021_03015.pdf

1. Course Name:	
English language 4	
2. Course Code:	
NTU 400	
3. Semester / Year:	
Second semester - Fourth year	
4. Description Preparation Date:	
6/10/2024	
5. Available Attendance Forms:	
In-person - mandatory	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours / 2 units	
7. Course administrator's name (mention all, if more than one name)	
Name: Shaima Salem Younis Email: shaima.salem@ntu.edu.iq	
8. Course Objectives	
Course Objectives	**1- Developing basic English language skills:** The course aims to develop students' skills in the four aspects of the English language: reading, listening, speaking, and writing, in an integrated manner. **2- Supporting the student's academic specialization:** Through mastering the English language, students are expected to acquire language proficiency that aligns with their university majors in the fields of science, technology, culture, and the arts. **3- Enhancing motivation to learn the language:** The course encourages students to develop their English language skills through activities and content that motivate them to participate and engage effectively**.** **4- Expanding general knowledge:** The course seeks to expand students' horizons not only linguistically, but also cognitively, through diverse educational topics such as government, economics, technology, and health. **5- Developing character and building values:** The course is part of the character development curriculum, contributing to enhancing communication skills, appreciating different cultures, and developing critical thinking among students

9. Teaching and Learning Strategies	
Strategy	1- **Interactive Learning**: This strategy relies on engaging students in activities such as pair work, small group work, and role-playing. The goal is to break down barriers and build confidence in using the language. Students are asked to introduce themselves, conduct interviews, or exchange information. 2- **Integrated Skills Approach**: This approach combines reading, listening, speaking, and writing skills within a single learning unit. This integration helps students use the language more comprehensively and naturally, as it occurs in real life. 3- **Contextualized Learning**: Activities are based on real-life situations from university students, such as "daily routine," "education," "health," and "jobs." Linking language to everyday contexts contributes to making the learning process more effective. ٤- **Task-Based Learning:** This involves engaging in goal-oriented activities such as arranging sentences to form a paragraph, writing formal letters, or simulating a job interview. 5- **Developing Critical Thinking and Expressing Opinions**: This course asks students to express their opinions on social and educational issues (e.g., "Is free education possible?") and justify their positions using English. "Agree, Somewhat, Agree, disagree" activities are also used to support dialogue and discussion skills, developing analytical thinking alongside language skills.

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
FIRST	2	- Introducing yourself and others using simple sentences - Understanding the use of possessive pronouns and possessive adjectives	Unit one Introduction of English	Interactive lecture + Presentation	Class participation homework
Second	2	Forming questions using interrogative words (W h-questions)	Unit one (W h-questions)	Interactive lecture + group discussion	Class participation homework
Third	2	Describe daily routine using the simple present tense.	Unit two Daily Routines	Interactive lecture + brainstorming	Class participation + individual exercise
Fourth	2	Using Adverbs of Frequency (always, sometimes, never).	Unit two Daily Routines	Interactive Lecture + Educational Video	Class Participation
Fifth	2	Measuring Student Comprehension of Basic Concepts (1-4)	Daily Test	Interactive Review + Paper Test	Paper Test
Sixth	2	Identify different professions and describe their duties.	unit three Professions	Interactive lecture	Open discuss + real-life examples and practical exercises
Seventh	2	Use possessive forms ('s) and possessive pronouns. Write a paragraph about the family's profession.	unit three Professions	Interactive Lecture Group Activity: Professional Interview	Oral Test
Eighth	2	Discussing educational issues using modal verbs (Could).	Unit four Education	Interactive lecture + case study	Homework
Ninth	2	Expressing agreement and disagreement. Write a paragraph about an educational experience.	Unit four Education	Interactive Lecture	Class Participation
Tenth	2	Comprehensive	Semester Exam	Interactive	Paper-based

		assessment of student understanding of topics from Weeks 1 to 9		Lecture	Test
Eleventh	2	Using the Future Tense (will/be going to)	Unit Five Government	Interactive Lecture	Class Participation
Twelfth	2	Write a paragraph about your opinion on a public opinion issue.	Unit Five Government	Interactive lecture	Class participation paper-based t
Thirteenth	2	Depends on the type of noun (numerical/nonnumeric al) and context (positive, negative, interrogative).	Unit Six Noun Un & Noun Quantifiers	Interactive Lecture + Open-ended Questions	Class Participation Paper-Based Test
Fourteenth	2	Comprehensive assessment of student understanding of topics from weeks 1 to 14	Comprehensive review	Interactive lecture	Class participatio n
Fifteenth	2	The student will summarize the course's key concepts and answer comprehensive questions.	Final Exam	Group Review + Open-Ended Questions	Final Exam

11. Course Evaluation
1- Yearly work (10) including: (paper test + attendance + daily participation + classwork) 2- Semester exam (30) 3- Annual effort (10 + 30) = 40 4- Final exam (60) 6- Final grade (annual effort out of 40 + final exam out of 60) = 100

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Lectures prepared by the instructor according the prescribed educational package
Main references (sources)	English for University Students: A Handbook of Activities & Classroom Teaching (Revi Edition)
Recommended books and references (scientific journals, reports...)	"Academic Writing: A Handbook International Students" – Stephen Bailey
Electronic References, Websites	https://www.oxfordonlineenglish.com/freeen sh-grammar-lessons

1. Course Name
Automatic Control Systems
2. Course Code
PM401
3. Semester / Year
Second Semester / 2025
4. Date of Description Preparation
6/10/2024
5. Available Attendance Modes
In-person
6. Total Credit Hours / Units
Theory Hours (2) + Practical Hours (2) = Total Hours (4) / Total Units (3)
7. Course Coordinator(s)
Name: Karam Hashim Mohammed Email: karam.hashim@ntu.edu.iq Name: Ashraf Emad Abdulrazzaq Email: ashroo.emad@ntu.edu.iq
8. Course Objectives

This course aims to provide students with theoretical and practical foundations of automatic control systems through:	▯ Developing a deep understanding of feedback control principles and system types (open-loop/closed-loop). ▯ Enabling students to model mechanical and electrical systems using transfer functions and block diagrams. ▯ Building skills in analyzing system stability and performance using tools like “signal flow graphs” and “Mason’s rule.” ▯ Developing the ability to design effective controllers capable of addressing real-world engineering challenges. ▯ Linking theoretical concepts to industrial applications such as motor control systems and thermal systems.

9. Teaching and Learning Strategies

Theoretical Lectures	Conveying core concepts (transfer functions, feedback, stability).
Practical Exercises (Simulink)	Applying theories through simulation software.

Group Projects	Designing simplified control systems (e.g., thermal control).
Industrial Case Studies	Analyzing control systems in real-world applications (motors, cooling).
Interactive Discussions	Stimulating critical thinking in solving control problems.
Group Projects	Enhancing teamwork skills and applying principles in realistic contexts.
Use of Technology	Simulation software, electronic resources, interactive assessments.

10. Course Structure

Week	Hours	Learning Outcomes	Unit/Topic	Teaching Method	Assessment Method
1	4	Distinguish between OLCS and CLCS with examples.	Introduction to Control Systems	Lecture + Discussion	Quiz
2	4	Analyze components of feedback systems.	Feedback Control Systems (I)	Case Study	Report
3	4	Calculate transfer functions of mechanical systems.	Feedback Control Systems (II)	Applied Exercises	Quiz
4	4	Derive transfer functions for springs and dampers.	Transfer Functions & Block Diagrams	Simulink Workshop	Report
5	4	Model mechanical series and parallel structures.	Mechanical Modeling: Series/Parallel	Lecture + Exercises	Seminar
6	4	Calculate equivalent impedance of electrical circuits.	Electrical Modeling: Series/Parallel	Electronic Simulation	Midterm Exam
7	12	Simplify complex block diagrams using algebra.	Block Diagrams & Transfer Functions	Group Projects	Report + Quiz
8	12	Apply Mason's rule to compute transfer functions.	Signal Flow Graphs	Example Solving	Seminar
9	12	Design simple controllers using analysis tools.	Mason's Rule & Applications	Review + Project	Final Project

11. Course Assessment

Details	Weight	Assessment Method
Weekly evaluation of basic concept understanding.	20%	Quizzes
System analysis using Simulink.	25%	Practical Reports
Engagement in lectures/workshops.	15%	Participation/Activities
Covers weeks 1–6.	20%	Midterm Exam
Design a control system and submit a report.	20%	Final Project

12. Learning and Teaching Resources

Main Textbook	**Dorf & Bishop, Modern Control Systems**
References	**Nagrath, Control Systems Engineering**
Online Resources	**https://www.youtube.com/playlist?list=PLBlnK6fEyqRhqzJT87LsdQKYZBC93ezDo** **https://www.youtube.com/watch?v=LZq3sMEwRyA&list=PL6FPxL5CnQeW-lEQYwCA6vVOOjTg36-5V**

1. Course Name:
Computer Aided Design
2. Course Code:
PM402
3. Semester / Year:
second/2024-2025
4. Description Preparation Date:
6/10/2024
5. Available Attendance Forms:
Weekly Schedule: 1 hour of theoretical lecture and 3 hours of practical/laboratory work
6. Number of Credit Hours (Total) / Number of Units (Total)
60 hours/ 2 units
7. Course administrator's name (mention all, if more than one name)
Name: omar sadoon khaleel/ qias waleed Email: omarsadoon@ntu.edu.iq
8. Course Objectives
• Provide students with fundamental knowledge of concepts and principles of engineering drawing using computers. • Enable students to use CAD software to create accurate three-dimensional engineering drawings. • Develop students' skills in interpreting and analyzing technical engineering drawings. • Enhance students' technical competence within modern engineering work **environments**

9. Teaching and Learning Strategies			
Strategy	Outcomes	Teaching Methods	Assessment Methods
	A. Knowledge □ Understanding traditional and computer-aided drafting basics. □ Familiarity with CAD environments like AutoCAD. □ Knowing symbols and technical terms in mechanical drawings. □ Understanding 3D modeling principles using computers. |	□ Theoretical lectures □ Demonstrations □ Practical software sessions □ Interactive/video lessons	□ Written exams, Homework □ Practical tests □ Group discussions ,Reports □ Projects, Presentations
	B. Skills □ Use AutoCAD tools to create 2D and 3D drawings. □ Ability to edit and revise technical drawings. □ Distinguishing between projection types and sectional views. □ Applying skills in a comprehensive practical project	□ Practical exercises □ CAD lab work □ Manual + computer drawing □ Group projects	□ Lab evaluations □ Practical tests □ Homework review □ Final project presentation
	C. Values		

	□ Commitment to ethics in design work. □ Teamwork and responsibility in projects. □ Time management and deadline compliance. □ Accepting technical feedback and improving work accordingly	□ Class discussions □ Real-world examples □ Group activities □ Weekly tasks ,Feedback sessions	□ Ethics reports □ Team performance evaluations □ Timeline tracking □ Instructor feedback review

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st, 2nd, 3rd,4th	١٦	• Intro to CAD & AutoCAD Interface • Units & Coordinate Systems (UNITS – UCS) • Viewing Tools: View, Zoom, Pan • Grid Setup, Drawing Limits, Basic 2D Drawing	Student Understanding of the Lecture	Theoretical and Practical Lecture	Daily and Weekly Test
5th, 6th	٨	•3D Workspace Introduction •3D Primitives	Student Understanding of the Lecture	Theoretical and Practical Lecture	Daily And Weekly Test
7th, 8th, 9th	١٢	•Create objects: Extrude, Presspul •Revolve,Region,Loft, Helix •.Boolea Operations: Unio Subtract, Intersect	Student Understanding of the Lecture	Theoretical and Practical Lecture	Daily And Weekly Test
10th, 11th,	١٢	•.Modifyobjects: Slice,	Student Understanding	Theoretical	Daily And

12th		•.Shell,Move,Rotate Visual Style&Materials •.Lighting & Rendering |	of the Lecture	and Practical Lecture	Weekly Test
13th, 14th, 15th	١٢	•.Dimensioning&Textin3I •.Full3Dmodelpractice •.Final practical exam + project	Student Understanding of the Lecture	Theoretical and Practical Lecture	Daily and Weekly Test

11. Course Evaluation

- **10 marks**: for daily evaluation (preparation, attendance, class participation).
- **30 marks**: for monthly written exams.
- **10 marks**: for ongoing practical assessment during lab sessions.
- **10 marks**: for the final practical exam.
- **40 marks**: for the final theoretical exam (covering all course topics).

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Available
Main references (sources)	- AutoCAD 2021 for Engineers and Designers – Prof. Sham Tickoo, CADCIM Technologies. - Engineering Drawing and Design – David A. Madsen, Cengage Learning. - Technical Drawing with Engineering Graphics – Frederick E. Giesecke, Pearson. - Mastering AutoCAD 2021 and AutoCAD LT 2021 – Brian C. Benton & George Omura, Sybex. - AutoCAD and Its Applications: Basics and Advanced – Terence Shumaker, Goodheart-Willcox.
Recommended books and references (scientific journals, reports...)	- Computer-Aided Design (Elsevier) – https://www.journals.elsevier.com/computer-aided-design - Engineering with Computers (Springer) – https://www.springer.com/journal/366 - International Journal of CAD/CAM – http://www.ijcc.org - Advanced Engineering Informatics (Elsevier) – https://www.journals.elsevier.com/advanced-engineering-informatics

	- Journal of Mechanical Design (ASME) – https://asmedigitalcollection.asme.org/mechanicaldesign - Computer-Aided Design and Applications – https://www.cadanda.com
Electronic References, Websites	**https://www.autodesk.com** **https://knowledge.autodesk.com** **https://www.cadcim.com** **https://www.youtube.com** **https://www.grabcad.com**

1. Educational institution
Technical Engineering College\Mosul
2. Scientific Department
Mechanical Power Engineering
3. Course name/code
Renewable Energy RE 401
4. Available forms of attendance
presence
5. Semester/Year
Second /2024-2025
6. Number of study hours (total)
75 hour
7. Date this description was prepared
2024/10/6
8. Course objectives (general objectives of the course)
Study all types of clean energy and their sources around the world, and identify the types of th energies that contribute to reducing the use of toxic gas and vapor emissions resulting from burn traditional fuels.
10. Course outcomes, teaching, learning and assessment methods Definition: It is a set of knowledge, skills, and values that the course seeks to achieve in students. Its importance: It provides the learner with a clear idea of what he will be able to do after completing the course, and it helps in designing and evaluating academic courses. How they are determined: Course outcomes are determined based on the objectives of the academic program to which the course belongs.

Outcomes	Teaching and Learning Methods	Evaluation Methods
A- Knowledge A1 - The ability to segment and analyze the components of mechanical devices and determine the function of each component. A2 - The ability to diagnose faults in various mechanical equipment. A3 -- The ability to provide appropriate solutions to faults in various mechanical devices.	Daily exams, semester exams, daily attendance, laboratory reports, annual evaluation.	Conducting theoretical and practical lectures, operating laboratories, workshops, and summer training during the summer vacation.
B - Skills B1 - Training and developing engineering	Daily exams, semester exams,	Holding theoretical and practical lectures, operating

personnel to operate and maintain various mechanical equipment B2 - Designing mechanical equipment with high efficiency and cost-effectiveness B3 - Providing scientific and practical consultations in the field of mechanical engineering	daily attendance, laboratory reports, annual evaluation	laboratories and workshops, and conducting summer training during the summer vacation
C- Values C1- Preparing reliable educational cadres within the specialization within state institutions C2- Developing solutions to the problems facing institutions and systems specialized in mechanical engineering C3- Working to meet labor market requirements and enhance economic capabilities	Daily exams, semester exams, daily attendance, laboratory reports, annual evaluation	Holding theoretical and practical lectures, operating laboratories and workshops, and conducting summer training during the summer vacation

10. Course structure (theoretical and practical vocabulary)

طريقة التقييم	طريقة التعليم	اسم الوحدة / أو الموضوع	مخرجات التعلم المطلوبة	الساعات	الأسبوع
Week	Hour	Desired Learning Outcomes	Unit/Or Topic Name	Teaching Method	Assessment Method
1st , 2nd	10	Solar Desalination Systems, Desalination processes Direct collection systems (Classification of Solar Distillation Systems, Performance of Solar Stills) Solar cells, Structure of Photovoltaic PV System Design of PV system, Hybrid PV/T systems and applications	Student understanding the lecture	Theoretical and practical lecture	Daily and weekly tests
3rd , 4th	10	Solar Thermal Power Systems (Parabolic trough collector systems, Power tower systems) Solar Thermal Power Systems (Dish systems, Solar ponds)	Student understanding the lecture	Theoretical and practical lecture	Daily and weekly tests
5th , 6th, 7th	15	Power available in the Wind Energy, Wind turbine power and torque, Classification of WTs (Horizontal axis WTs, Vertical axis WTs), Characteristics of wind rotors, Aerodynamics of WTs (Airfoil, Aerodynamic theories) Rotor design, Rotor performance, Analysis of wind data. Performance of wind energy conversion system, Power curve of wind turbine Capacity factor	Student understanding the lecture	Theoretical and practical lecture	Daily and weekly tests
8th , 9th	10	Hydropower Plants (Run - of - River Power Plants, Storage Power Plants, Pumped - Storage Power Plants), system design, Hydraulic turbines classifications, hydraulic turbines power and efficiency estimation.	Student understanding the lecture	Theoretical and practical lecture	Daily and weekly tests

10th, 11th	10	Introduction to Biomass (biomass, biogas, biofuel) Biomass Heating (Wood as a Fuel, Fireplaces and Closed Wood burning Stoves, Wood Pellet Heating), Biomass Heat and Power Plants	Student understanding of the lecture	Theoretical and practical lecture	Daily and weekly tests
12th , 13th	10	Introduction to Geothermal Energy, Geothermal Plants (Geothermal Heat Plants, Geothermal Power Plants), Geothermal Heat pump	Student understanding of the lecture	Theoretical and practical lecture	Daily and weekly tests
14th , 15th	10	Tidal Power Plants, Wave Power Plants Ocean waves conversion technologies, OTEC, Ocean Thermal Energy Conversion	Student understanding of the lecture	Theoretical and practical lecture	Daily and weekly tests

11. Curriculum development plan	
Continuously updating the curriculum to keep pace with labor market developments (Curriculum Update Committee, Scientific Committee), such as: 1. Developing curricula that are appropriate for the labor market 2. Holding scientific seminars and conferences aimed at updating curricula 3. Monitoring scientific developments in the field of specialization	
12. Infrastructure	
Classrooms, laboratories, and workshops a	Available
Required textbooks	Available
Main references (sources)	Solar Energy Engineering: Processes and Systems, 2nd edition, By Soteris A. Kalogirou, 2013.
Recommended books and references (scientific journals, reports, etc(.	Solar Photovoltaic Technology and Systems: A Manual for Technicians, Trainers and Engineers, by , Chetan Singh Solanki, 2013.
Electronic references, websites..... ,	**https://www.nrel.gov/research/re-solar** **https://www.energy.gov/eere/wind/advantages-and-challenges-wind-energy**

1. Course Name:	
Air Pollution	
2. Course Code:	
RE40٦	
3. Semester / Year:	
Second semester 2024/2025	
4. Description Preparation Date:	
6/10/2024	
5. Available Attendance Forms:	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2/2	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr.omar mohammed yousif Email: omar.m.yousif@ntu.edu.iq	
8. Course Objectives	
Students will learn about the physical and chemical fundamentals. • Students will be able to calculate concentrations of air pollutants in atmosphere. • Students will learn to classify types of air pollutants. • Students will learn air pollution regulation laws	
9. Teaching and Learning Strategies	
Strategy	Attendant education, e-learning, course participation, discussion, seminars, and lab teaching.

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1,2	2	The student understands pollution	Introduction to pollution	Presentation, explanation and discussion	H.W
٣,٤	2	Understanding the Ambient air quality standards for criteria pollutants	Ambient air quality standards for criteria pollutants	Presentation, explanation and discussion	H.W
٥,٦	2	Understand the hydrocarbons produces.	Transport and air pollution	Presentation, explanation and discussion	Quiz
٧,٨	2	Understand the concentrations of air pollutants in atmosphere	Calculation of concentrations of air pollutants in atmosphere	Presentation, explanation and discussion	Quiz
٩,١٠	2	Understand the Criteria Pollutants	Description of air pollutants	Presentation, explanation and discussion	H.W
11,12	2	Understand type of air pollutants	other type of air pollutants	Presentation, explanation and discussion	H.W
13,14	2	Understand Non-Criteria pollutants	Micro and Macro air pollution	Presentation, explanation and discussion	Mid term exam
15		Understand Greenhouse Gases	Non-Criteria pollutants Global Climate Change -	Presentation, explanation and discussion	Report

			Greenhouse Gases:		

11. Course Evaluation	
Homework 20%, Daily Quizzes 20%, Midterm exam 40%, Reports 20%	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	**Stephen R. Turns-An Introduction to Combustion_ Concepts and Applications-McGraw-Hill (2000**
Main references (sources)	**turns-an_introduction_to_combustion**
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	SCAN ME