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

Academic Program and Course Description

2022 - 2023

وزارة التعليم العالي والبحث العلمي
جامعة بغداد
كلية الهندسة
شعبة ضمان الجودة والاداء الجامعي

Ministry of Higher Education & Scientific Research
UNIVERSITY OF BAGHDAD
College of Engineering
Quality Assurance and Academic Performance Division

العدد: ٢٢/١/٢٢٨١ No.:
التاريخ: ٤/٤/٢٠٢٤ Date:

الى/ رئاسة جامعة بغداد

قسم ضمان الجودة والاداء الجامعي

م/ وصف البرنامج الاكاديمي والمقرر الدراسي

تحية طيبة....

اشارة الى كتابكم ذي العدد 1012 في 2024/1/28 الخاص بدليل وصف البرنامج الاكاديمي والمقرر الدراسي للعام الدراسي (2023/2022).

نرفق لكم طياً نسخة من وصف البرنامج الاكاديمي للاقسام العلمية كافة والمصادق عليها من قبل السيد عميد كلية الهندسة وعلى قرص مدمج (CD).

للتفضل بالاطلاع.

مع التقدير.

المرفقات/

- قرص مدمج (CD).

أ.د.غسان حميد عبد المجيد

عميد كلية الهندسة

نسخة منه الى/

- مكتب السيد العميد/ للتفضل بالاطلاع مع التقدير.
- شعبة ضمان الجودة وتقويم الاداء/ مع الاوليات.

السيد عميد كلية الهندسة المحترم
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Academic Program Description Form

University Name: University of Baghdad
Faculty/Institute: College of Engineering
Scientific Department: Department of Mechanical Engineering
Academic or Professional Program Name: Bachelor of Science in Mechanical Engineering
Final Certificate Name: Bachelor's degree in Mechanical Engineering
Academic System: Annual
Description Preparation Date:
File Completion Date: 13/10/2022

Signature:
Head of Department Name:
Assist. Prof. Dr. Karim Hassan Ali
Date: 5/9/2024

Signature:
Scientific Associate Name:
Prof. Deyaa Jasim Kadum
Date:

The file is checked by:
Department of Quality Assurance and University Performance
Director of the Quality Assurance and University Performance Department: Mervat Altaee
Date:
Signature:

Approval of the Dean

1. Program Vision

The Department of (Mechanical Engineering) endeavors to be one of the leading mechanical departments in Iraq and the region.

2. Program Mission

1. Graduating highly qualified ethical mechanical engineers.
2. Building the leadership qualities in its graduates through teaching how to lead, problem-solving, teamwork, quality considerations, and professionalism at work.
3. Instilling in graduates the spirit and commitment to acquiring knowledge and community service.
4. Contributing ideas for projects and carrying out research for the benefit and development of the community.
5. Nurturing and caring for outstanding students and encouraging them to use their skills.
6. Student counseling, guidance, and strengthening of citizenship spirit.
7. Providing a good working environment for students, faculty, and other personnel with emphasis on high academic, professional, and ethical standards within the university campus. Freedom of opinions respect of others' opinions and encouragement in exchanging knowledge.

3. Program Objectives

1. Graduate mechanical engineers to serve in industry, construction and other sectors of the mechanical engineering labor market.
2. Improving the teaching and administrative activities to meet international accreditation standards and the mission of the department.
3. Improving the academic abilities of the faculty and attracting highly skilled personnel.
4. Improve the abilities of management and technical supporting staff and attract the highly skilled for employment.
5. Optimum use of resources and potentials of the department.
6. Cooperation, academic exchange programs, and partnerships with other universities and academic centers in developed countries.
7. Establishing viable applied research that generates knowledge for local and foreign markets.

4. Program Accreditation

Does the program have program accreditation? And from which agency?
Application for program accreditation was done through a Readiness Review prepared by the Iraqi Council for Accreditation of Engineering Education (ICAEE)

5. Other external influences

Is there a sponsor for the program?
The program is subject to the requirements of the national criteria of the Iraqi Council for Accreditation of Engineering Education (ICAEE)

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	6	12	0.16	Basic
College Requirements	3	17	0.083	Basic
Department Requirements	27	140	0.75	Basic
Summer Training	Yes			
Other	/			

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

Program Description

Level/Year	Course Code	Course Name	Credit rating	Credit Hours	
				Theo.	Exp.
First / 2023	MEC 101	Mathematics / I	6	3	/
	MEC 102	Static & Dynamic	8	4	/
	MEC 103	Engineering Drawing and Descriptive Geometry	7	2	3
	MEC 104	Production Engineering	6	2	2
	MEC 105	Electrical Eng. / I	5	2	1
	MEC 106	Programming / I	5	2	1
	MEC 107	Human Rights	2	1	/
	MEC 108	Arabic	2	1	/
	MEC 109	English/ I	2	1	/
Second / 2023	ME201	Mathematics / II	6	3	/
	ME202	Fluid Mechanics / I	6	3	/

	ME203	Thermodynamics	4	2	/
	ME204	Mechanics of Materials and Machines	6	3	/
	ME205	Eng. of Metallurgy	4	2	/
	ME206	Mechanical Drawing	4	1	2
	ME207	Programming / II	8	3	2
	ME208	Mechanical Eng. Laboratories / II	3	/	3
Third / 2023	ME301	Eng. and Numerical Analysis	7	3	1
	ME302	Fluid Mechanics / II	6	3	/
	ME303	Heat Transfer	4	2	/
	ME304	Strength of Materials	4	2	/
	ME305	Mechanics of Machines and Vibrations	4	2	/
	ME306	Principles of Manufacturing Processes	7	3	1
	ME307	Electrical Engineering / II	5	2	1
	ME308	Mechanical Eng. Laboratories / III	3	3	3
Forth / 2023	ME401	Design of Machine Elements	9	4	1
	ME402	Control and Measurements	4	2	/
	ME403	Air-Conditioning and Refrigeration	6	3	/
	ME404	Power Eng.	6	3	/
	ME405	Industrial Eng.	4	2	/
	ME406	Engineering Materials	4	2	/
	ME407	Engineering Project	5	1	3
	ME408	Mechanical Eng. Laboratories / IV	3	/	3

7. Expected learning outcomes of the program

Graduate Outcomes (GOs) for engineering from ICAEE,

1. An ability to identify, formulate, and solve engineering in energy and renewable energies engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply the engineering design process to produce solutions that meet specified needs with consideration for public health and safety, and global, cultural, social, environmental, economic, and other factors as appropriate to the discipline.
3. An ability to develop and conduct appropriate experimentation, analysis and interpret data, and use engineering judgment to draw conclusions.
4. An ability to communicate effectively with a range of audiences
5. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
6. An ability to recognize the ongoing need to acquire new knowledge, to choose appropriate learning strategies, and to apply this knowledge.
7. An ability to function effectively as a member or leader of a team that establishes goals, plans tasks, meets deadlines, and creates a collaborative and inclusive environment.

Knowledge	
Learning Outcomes (GO1)	An ability to identify, formulate, and solve engineering in energy and renewable energies engineering problems by applying principles of engineering, science, and mathematics.
Learning Outcomes (GO2)	An ability to apply the engineering design process to produce solutions that meet specified needs with consideration for public health and safety, and global, cultural, social, environmental, economic, and other factors as appropriate to the discipline.
Learning Outcomes (GO3)	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
Learning Outcomes (GO6)	An ability to recognize the ongoing need to acquire new knowledge, to choose appropriate learning strategies, and to apply this knowledge.

Skills	
Learning Outcomes (GO4)	An ability to communicate effectively with a range of audiences
Learning Outcomes (GO7)	An ability to function effectively as a member or leader of a team that establishes goals, plans tasks, meets deadlines, and creates a collaborative and inclusive environment.
Ethics	
Learning Outcomes (GO5)	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

8. Teaching and Learning Strategies

Problem-Based Learning (PBL) is part of the new teaching and learning strategy and is being adopted in the overall program implementation. The method is to divide the students into groups and each group solves the problem. Each group member will have a task and then they will discuss the results and report back. They will have the same mark and the students will learn through learning outcomes (GOs). Students will learn how to work as a group (GO 7), be able to interpret and analyze data (GO 3), write a report and give a seminar (GO 4), solve complex engineering problems (Output 1), use software, techniques and skills (GO 6), and design a problem (GO 1). GO 2), The problem of moral responsibilities (GO 5).

9. Evaluation methods

with lab,

Annual exam 25%, student activities 5%, lab 10%, final exam 60%.

without lab,

Annual exam 15%, student activities 5%, final exam 70%.

Engineering and mechanical drawing

Annual exam 45%, student activities 5%, lab 10%, final exam 40%.

10. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Prof.	Mechanical Eng.	Fluid & Thermals			6	
Assist. Prof.	Mechanical Eng.	Fluid & Thermals			6	
Lect.	Mechanical Eng.	Fluid & Thermals			3	
Assist. Lect.	Mechanical Eng.	Fluid & Thermals			2	
Prof.	Mechanical Eng.	Applied Mechanics			6	
Assist. Prof.	Mechanical Eng.	Applied Mechanics			7	
Lect.	Mechanical Eng.	Applied Mechanics			4	
Assist. Lect.	Mechanical Eng.	Applied Mechanics			3	
Prof.	Mechanical Eng.	Manufacturing & Industrial Eng.			2	
Assist. Prof.	Mechanical Eng.	Manufacturing & Industrial Eng.			3	
Lect.	Mechanical Eng.	Manufacturing & Industrial Eng.			4	
Assist. Lect.	Mechanical Eng.	Manufacturing & Industrial Eng.			/	
Lect.	Education	Mathematics			1	

Professional Development

Mentoring new faculty members

The scientific committee in the department mentors the new faculty by:

1. Enter the class with the previous two faculties for two months as an observer.E
2. nter a period of training in a continuous education center (teaching authority)in the university for a month.
3. Mentor by the chair of the department in the first year.

Professional development of faculty members

The scientific committee in the department has a plan for developing the faculty:

1. Periodically scientific lecture by one of the staff on developing in his professional field for all faculty.
2. Periodically lecture in the social field for all faculty and students.
3. Yearly conference in the college with contributions from all faculty (2020, 2021, 2022) and 2023).
4. Contribution to conferences in different universities inside and outside Iraq.
5. Contribution to publishing papers in local, regional, and international journals (Scopus and Science Direct).
6. Participates in different committees in university and ministry.
7. Participate all faculty in the workshop for Problem Based Learning (new teaching method).

11. Acceptance Criterion

Admission to the Bachelor's program in the Department of Mechanical Engineering is listed in the following words:

1. The applicant or what follows from the Iraqi high school diploma. Students must obtain a high average to qualify for admission to colleges of engineering.
2. The distribution of students is based on the 13 engineering departments of the College of Engineering at the University of Baghdad, including the Department of Computer Engineering, and a winding of the ability plan and average evaluation of applicants and their aspirations or selection. The capacity plan of the Department of Computer Engineering in the last triennium was 100 - 150 students.
3. The number of students accepted for admission is registered in centers states and ministries.

4. There is a specific time for admission.
5. An applicant who graduated from the secondary school system outside Iraq has to complete twelve years of combined elementary and secondary schools and studies from a recognized school.
6. An equivalent certificate from the Iraqi Ministry of Education is also required.

12. The most important sources of information about the program

1. The department page on the website of the College of Engineering - University of Baghdad.
2. Mechanical Engineering Department Guide.
3. Seminars and introductory meetings of the department at public forums and exhibitions annually

13. Program Development Plan

The field of engineering discipline has evolved globally, so some of the program courses are changed every four years. The development of the program depends on two criteria, the first due to the development of the field globally and the second to the requirements of the Iraqi ministries. The contents of the courses are reviewed by the Scientific Committee at each meeting and updated

Program Skills Outline										
Year/Level	Course Code	Course Name	Basic or optional	Required program Learning outcomes						
				Knowledge				Skills		Ethics
				GO1	GO2	GO3	GO6	GO4	GO7	GO5
2023 / First	ME101	Mathematics / I	Basic	√						
	ME102	Static & Dynamic	Basic	√	√					
	ME103	Engineering Drawing and Descriptive Geometry	Basic	√		√				√
	ME104	Production Engineering	Basic	√		√	√			
	ME105	Electrical Eng. / I	Basic	√		√	√	√		
	ME106	Programming / I	Basic	√						√
	ME107	Human Rights	Basic	√						√
	ME108	Arabic	Basic							√
	ME109	English/ I	Basic							√

2023 / Second	ME201	Mathematics / II	Basic	√						
	ME202	Fluid Mechanics / I	Basic	√		√			√	
	ME203	Thermodynamics	Basic	√			√			
	ME204	Mechanics of Materials and Machines	Basic	√	√	√	√			
	ME205	Eng. of Metallurgy	Basic		√					
	ME206	Mechanical Drawing	Basic	√		√				√
	ME207	Programming / II	Basic	√			√	√		√
	ME208	Mechanical Eng. Laboratories / II	Basic					√		√
	ME209	English/ II	Basic					√		√

2023 / Third	ME301	Eng. and Numerical Analysis	Basic	√		√				
	ME302	Fluid Mechanics / II	Basic	√		√	√			
	ME303	Heat Transfer	Basic	√						
	ME304	Strength of Materials	Basic	√						
	ME305	Mechanics of Machines and Vibrations	Basic			√				
	ME306	Principles of Manufacturing Processes	Basic	√		√	√	√		
	ME307	Electrical Engineering / II	Basic		√	√	√			
	ME308	Mechanical Eng. Laboratories / III	Basic	√	√	√		√	√	√
	ME309	English/ III	Basic					√		√

2023 / Fourth	ME401	Design of Machine Elements	Basic	√						
	ME402	Control and Measurements	Basic	√		√				
	ME403	Air-Conditioning and	Basic	√		√	√			
	ME404	Power Eng.	Basic	√			√			
	ME405	Industrial Eng.	Basic		√					
	ME406	Engineering Materials	Basic		√					
	ME407	Engineering Project	Basic	√		√				√
	ME408	Mechanical Eng. Laboratories / IV	Basic	√		√				√
	ME409	English / IV	Basic							√

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

Mathematics / I / ME 101

1. Course Name:
Mathematics / I
2. Course Code:
ME 101
3. Semester / Year:
4
4. Description Preparation Date:
2024-03-01
5. Available Attendance Forms:
Theoretical - electronic lectures - seminars
6. Number of Credit Hours (Total) / Number of Units (Total)
125/5
7. Course administrator's name (mention all, if more than one name)
Name: Hanan mahmood hasoon Email: Hanan. mahmood @coeng.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	1- Introduce the definition of integration 2- Introduce the methods of integration. 3- Introduce rules of integration and its applications 3- Introduce concepts of matrices, determinates 4- Introduce to vectors. 5- Introduce to complex numbers

9. Teaching and Learning Strategies	
Strategy	1. Lecture plan and in-class activities. 2. Each class will commence with a summary of the previous lecture. 3. Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-2	8	The student's			

3-4-5 6-7-8 9-10-12 12-13 14-15	12 12 12 8 8	ability to understand t concept of integration The student should be able to calculate integration The student's ability t employ integration in his specialty Understanding the typ of matrices and how t find the determinant with learning Solve a system of equations Using arrays Learn the concept of vector projection and operations on vectors For the student to understand what is meant by a complex number, perform operations on comple numbers, and write th complex number in polar form			

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)	Calculus
Main references (sources)	Calculus Early Transcendentals (Thirteen Edition}
Recommended books and references (scientific journals, reports…)	Calculus Early Transcendentals (fourth Edition}
Electronic References, Websites	https://www.youtube.com/@hananm mood61

Engineering Mechanics / Dynamics/ ME102

1. Course Name:

Engineering Mechanics / Dynamics

2. Course Code:

ME126

3. Semester / Year:

Semester

4. Description Preparation Date:

1/4/2024

5. Available Attendance Forms:

Class

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

- Credit Hours (Total) 4 hours per week (Lecture and Tutorial)/60 hours per semester
- 4 units

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

Name: Assist Prof. Dr. Waleed Al-Ashtari
Email: Waleed.Al.Ashtari@coeng.uobaghdad.edu.iq
Name: Lect. Dr. Riham Ali Neamah
Email: dr.rihamali@coeng.uobaghdad.edu.iq

8. Course Objectives

Course Objectives	**1.** Grasping the core principles of Engineering Mechanics/Dynamics to proficiently analyze and resolve intricate engineering challenges related to motion, forces, and structural mechanics. **2.** Developing leadership skills essential for orchestrating effective problem-solving efforts and team collaboration within the context of engineering dynamics projects. **3.** Instilling a commitment to continual learning and adaptation to stay abreast of evolving engineering dynamics methodologies and advancements. **4.** Acquiring expertise in executing advanced engineering tasks, including the planning, management, and implementation of dynamic systems and projects of varying scales. **5.** Integrating scientific theories and technological innovations to tackle industry-specific dynamics problems and optimize engineering solutions. **6.** Utilizing analytical tools, computational techniques, and systems thinking to contribute to the enhancement and sustainability of industrial operations through efficient dynamics analysis and design.

	7. Embracing ethical principles and professional standards integral to the practice of Engineering Mechanics/Dynamics, ensuring integrity and responsibility in engineering endeavors. 8. Enhancing teamwork and communication proficiencies crucial for effective collaboration in diverse, multidisciplinary dynamics engineering teams. 9. Committing to continuous professional development and lifelong learning to uphold technical excellence and relevance in the ever-evolving field of Engineering Mechanics/Dynamics. 10. Advocating for the societal significance and impact of engineering dynamics, emphasizing its role in driving innovation, progress, and safety across various sectors.

9. Teaching and Learning Strategies

Strategy	**Teaching Strategy:** Course requirements include providing teaching materials such as course vocabulary lists, textbooks, and samples of student work. Samples of student work for all assignments, including homework, tests, exams, lab reports, design projects, etc., are also required. **Learning strategy:** The Problem-Based Learning (PBL) method is extensively utilized across various courses, wherein students independently tackle engineering challenges drawing from prior coursework. Nearly all faculty members are proficient in employing this approach. PBL involves dividing students into groups, each tasked with solving a designated problem. Within these groups, each member assumes specific responsibilities, contributing to collaborative problem-solving. Evaluation is uniform across groups, emphasizing achievement of specific learning outcomes (GOs). Through PBL, students develop skills in complex problem-solving (GO 1), problem design (GO 2), data interpretation and analysis (GO 3), technical report writing and seminar presentation (GO 4), ethical considerations in engineering (GO 5), and teamwork (GO 6).

10. Course Structure

Week	Hours	Required Graduate Outcomes	Unit or subject name	Learning method	Evaluation method
1	4 hrs.	GOs (1, 2, 4, 5, 6)	Introduction to Dynamics	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
2	4 hrs	GOs (1, 2, 5, 6)	Kinematics of Particles	Lectures, assignments, discussions.	Exams, quizzes, oral quizzes, questionnaires

3	**4 hrs**	**GOs (1, 2, 5, 6)**	**Rectilinear Motion**	**Lectures, assignments, discussions.**	**Exams, quizzes, oral quizzes, questionnaires**
4	**4 hrs**	**GOs (1, 2, 5, 6)**	**Dependent and Relative Motions**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
5	**4 hrs**	**GOs (1, 2, 5, 6)**	**Curvilinear motion / Projectile**	**Lectures, assignments, discussions.**	**Exams, quizzes, oral quizzes, questionnaires**
6	**4 hrs**	**GOs (1, 2, 5, 6)**	**Curvilinear motion / Normal and Tangential Coordinates**	**Lectures, assignments, discussions.**	**Exams, quizzes, oral quizzes, questionnaires**
7	**4 hrs**	**GOs (1, 2, 5, 6)**	**Curvilinear motion / Radial and Transverse Coordinates**	**Lectures, assignments, discussions.**	**Exams, quizzes, oral quizzes, questionnaires**
8	**4 hrs**	**GOs (1, 2, 3, 4, 5, 6)**	**Kinetics**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
9	**4 hrs**	**GOs (1, 2, 4, 5, 6)**	**Newton's 2nd Law**	**Lectures, assignments, discussions.**	**Exams, quizzes, oral quizzes, questionnaires**
10	**4 hrs**	**GOs (1, 2, 5, 6)**	**Work and Energy**	**Lectures, assignments, discussions.**	**Exams, quizzes, oral quizzes, questionnaires**
11	**4 hrs**	**GOs (1, 2, 5, 6)**	**Conservation of Energy**	**Lectures, assignments, discussions.**	**Exams, quizzes, oral quizzes, questionnaires**
12	**4 hrs**	**GOs (1, 2, 5, 6)**	**Impulse and Momentum**	**Lectures, assignments, discussions.**	**Exams, quizzes, oral quizzes, questionnaires**
13	**4 hrs**	**GOs (1, 2, 5, 6)**	**Impact**	**Lectures, assignments, discussions.**	**Exams, quizzes, oral quizzes, questionnaires**
14	**4 hrs**	**GOs (1, 2, 3,4, 5, 6)**	**Rigid Body**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
15	**4 hrs**	**GOs (1, 2, 5, 6)**	**Rotational Movement**	**Lectures, assignments, discussions.**	**Exams, quizzes, oral quizzes, questionnaires**

11.Course Evaluation

The total marks for the semester amount to 100, distributed as follows:

1- Quizzes: 6-8 quizzes, totaling 15 marks.
2- Mid-term Exam: Worth 10 marks.
3- Classwork Activities: Account for 10 marks.
4- Homework: Worth 10 marks.
5- Report and Presentation: Account for 5 marks.

6- Final Exam: - The final exam will be comprehensive and closed-book, taking place on June 2023 from 9:00 AM to 12:00 PM in room (M12 + M13). It will contribute 50% towards the total course mark.	
Learning and Teaching Resources	
Required textbooks (curricular books, if any)	1- Beer F. P. and Johnston E. R. "Vector Mechanics for Engineers (Statics and Dynamics)"; 2010. 2- Meriam J. L and Kraige L. G, "Engineering Mechanics: Vol. 2. Dynamics", 2006.
Main references (sources)	Beer F. P. and Johnston E. R. "Vector Mechanics for Engineers (Statics and Dynamics)"; 2010.
Recommended books and references (scientific journals, reports...)	• Available websites related to the subject. • Extracurricular activities.
Electronic References, Websites	• Field and scientific visits. • https://t.me/+4–wldp0OjBoyOTcy

Engineering mechanics – statics/ ME102

1. Course Name:

Engineering mechanics – statics

2. Course Code:

ME 102

3. Semester / Year:

semester

4. Description Preparation Date:

13/4/2024

5. Available Attendance Forms:

Class

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

- Credit Hours (Total) 4 hours per week (3 theory + 1 tutorial) /60 hours per semester
- 4 units

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

Name: Prof. Dr. Ahmed Abdul Hussein Ali
Email: Dr.ahmed.ali@coeng.uobaghdad.edu.iq
Name: Lct. M.Sc. Ban Hussein Kassab
Email: ban.alibadi@coeng.uobaghdad.edu.iq

8. Course Objectives

Course Objectives	1. Introduce basic definitions and introductory concepts of equilibrium and internal forces. 2. Introduce the description of force vectors and position vectors. 3. Introduce the description of equilibrium of particles and rigid body's. 4. Explain and derive the equations for moments of a force in scalar and vector form. 5. Introduce the principles of structural analysis. 6. Introduce the principles of the method of joints and sections. 7. Enable the student to analyze trusses and finding longitudinal forces in its members. 8. Enable the student to find the shear force and bending moments in beams subjected to different loads. 9. Provide a strong physical and analytical understanding of friction forces in dry friction, wedges, screws, flat belts, pivot bearings and disks. 10. Provide a background in finding center of gravity and centroid for a system of particles and rigid bodies.

	11. Enable the student to find the moment of inertia for area and bodies.

9. Teaching and Learning Strategies

Strategy

Teaching Strategy:

Course requirements, teaching materials (course vocabulary, textbook, sample student work, etc.), and samples of student work for all assignments (homework, tests, exams, lab reports, design projects, etc.).

Learning strategy:

At the end of the class, the student will be able to:

1. Define and finding the resultant of system of forces effecting on any engineering system.
2. Calculate; the un non internal forces in any system by using the principals of equilibrium and newton's low.
3. Be familiar with friction forces that effect the motion of bodies and its role in equilibrium conditions.
4. Understand and apply the principles of equilibrium to find the internal forces in tools and machines.
5. Be able to apply modern knowledge and to apply mathematics, science, engineering and technology to mechanical problems and applications.
6. Design and conduct experiments of in engineering mechanics, as well as analyze, interpret data and apply the experimental results for the services.
7. Work in groups and function on multi-disciplinary teams.
8. Identify, formulate and solve engineering related to mechanical problems.
9. Understand professional, social and ethical responsibilities.
10. Communicate effectively.
11. Use the techniques, skills, and modern engineering tools necessary for engineering practice in mechanical applications.

10. Course Structure

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

1	**4 hrs.**	**GOs (1, 2)**	Vectors analysis & international system of units	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
2	**4 hrs.**	**GOs (1, 2)**	Force system in two dimensions	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
3	**4 hrs.**	**GOs (1, 2)**	Force system in three dimensions	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
4	**4 hrs.**	**GOs (2, 3)**	Moment system resultants in three dimensions	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
5	**4 hrs.**	**GOs (3,4)**	Equilibrium of particles -2Dim	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
6	**4 hrs.**	**GOs (3,4)**	Equilibrium of particles-3Dim	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
7	**4 hrs.**	**GOs (5, 6)**	Equilibrium of rigid body- 2Dim	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
8	**4 hrs.**	**GOs (5, 6)**	Equilibrium of rigid body-3Dim	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
9	**4 hrs.**	**GOs (7, 8)**	Truss analysis-2Dim. Joint method	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
10	**4 hrs.**	**GOs (7,8)**	Truss analysis-2Dim. Section method	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
11	**4 hrs.**	**GOs (8,9)**	Frames and machines	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
12	**4 hrs.**	**GOs (8,9)**	Friction analysis	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
13	**4 hrs.**	**GOs (10,11)**	Center of gravity and centroid	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
14	**4 hrs.**	**GOs (10,11)**	Moment of Inertia of area	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
15	**4 hrs.**	**GOs (10,11)**	Moment of Inertia of Mass	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
16	**4 hrs.**	**GOs (1-11)**	Overall Review and Tutorial	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires

11.Course Evaluation

1. **Quizzes:**
   - There will be (8 – 10) closed books and notes quizzes during the academic semester.
   - The quizzes will count 50% of the total course grade.
2. Quizzes, 1-2 questions, and will count 10%.
3. Extracurricular Activities, this is optional and will count extra marks (1 – 5 %) for the student, depending on the type of activity.

4. **Final Exam:**
   - Final exam will be comprehensive, with closed books and notes, and will take place on June 2023 from 9:00 AM - 12:00 PM in room (M12 + M13)
5. The final exam will count 50% of the total course grade.

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	1- Engineering Mechanics (Statics) by J.L. Meriam and L.G. Kriage 2002.. 2- Vector analysis for engineers(statics) by Fedinand P.Beer,E. Russell Johunston and Elliot R. Eisenberg 2004
Main references (sources)	Engineering Mechanics (Statics) by R.C. Hibbler and S.C. Fan 2014**.**
Recommended books and references (scientific journals, reports...)	• Available websites related to the subject. • Extracurricular activities.
Electronic References, Websites	• Field and scientific visits. • Extra lectures by foreign guest lecturers.

Engineering drawing/ ME103

1. Course Name:
Engineering drawing
2. Course Code: ME103
3. Semester / Year:
year
4. Description Preparation Date:
1/4/2024
5. Available Attendance Forms:
class
6. Number of Credit Hours (Total) / Number of Units (Total)
Credit Hours (Total) 3 hours per week: (75) hours per year : total units (3)
7. Course administrator's name (mention all, if more than one name)
Name: prof. Dr. hussein yussef Email: dr.husseinafm@coeng.uobaghdad.edu.iq Name: Lecture makki hachem Email: makki.hachem@coeng.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	• The objectives of this course is to introduce students the basic concepts and the use of engineering drawing in the design and manufacturing field. • The students acquaint with the basic knowledge and skills in engineering drawings and the capability to read and interpret blue prints for manufacturing. • The students can also develop an understanding of 2D and 3D computer aided drafting with the requirements of good engineering drawings and be able to apply them to their work.
9. Teaching and Learning Strategies	
Strategy	Teaching Strategies: Lectures + classwork + homework + Extracurricular Activities Learning Strategies: Lectures + classwork + homework + Extracurricular Activities

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Be able to the Lines and circles.	Homework Lines and circles+ exercises	Lectures + classwork + homewor Extracurricular Activities	Quizzes;H.W; C.W
2	3	Be able to the Lines a circles	=	Lectures + classwork + homewor Extracurricular Activities	Quizzes;H.W; C.W
3	3	Be able to the Lines a circles	=	Lectures + classwork + homework + Extracurricular Activities	Quizzes;H.W; C.W
4	3	Be able to the Geometric operation	Quiz+ Geometric operation+ exercises	Lectures + classwork + homework + Extracurricular Activities	Quizzes;H.W; C.W
5	3	Be able to the Geometric operation	exercises	Lectures + classwork + homework + Extracurricular Activities	Quizzes;H.W; C.W
6	3	Be able to the Geometric operation	Ellipse+ exercises	Lectures + classwork + homework + Extracurricular Activities	Quizzes;H.W; C.W
7	3	Be able to the Geometric operation	exercises	Lectures + classwork + homework + Extracurricular Activities	Quizzes;H.W; C.W
8	3	Be able to the views	Quiz + Views+ exercises	Lectures + classwork + homework + Extracurricular Activities	Quizzes;H.W; C.W
9	3	Be able to the views	=	Lectures + classwork + homework + Extracurricular Activities	Quizzes;H.W; C.W
10	3	Be able to the views	=	Lectures + classwork + homework + Extracurricular Activities	Quizzes;H.W; C.W
11	3	able to the sections	Quiz + Sections+ exercises	Lectures + classwork + homework + Extracurricular Activities	Quizzes;H.W; C.W
12	3	able to the sections	=	Lectures + classwork + homework + Extracurricular Activities	Quizzes;H.W; C.W
13	3	able to the sections	=	Lectures + classwork + homework + Extracurricular Activities	Quizzes;H.W; C.W

14	3	able to the sections	=	Lectures + classwork + homework + Extracurricular Activities	Quizzes;H.W; C.W
15	3	ble to the Dimensions	Quiz + Dimensions+ exercises	Lectures + classwork + homework + Extracurricular Activities	Quizzes;H.W; C.W
16	3	Be able to the Isometric	Isometric+ exercises	Lectures + classwork + homework + Extracurricular Activities	Quizzes;H.W; C.W
17	3	Be able to the Isometric	exercises	Lectures + classwork + homework + Extracurricular Activities	Quizzes;H.W; C.W
18	3	Be able to the Isometric	=	Lectures + classwork + homework + Extracurricular Activities	Quizzes;H.W; C.W
19	3	Be able to the Third view.	Third view+ exercises	Lectures + classwork + homework + Extracurricular Activities	Quizzes;H.W; C.W
20	3	Be able to the Third view.	=	Lectures + classwork + homework + Extracurricular Activities	Quizzes;H.W; C.W
21	3	Be able to the Third view.	=	Lectures + classwork + homework + Extracurricular Activities	Quizzes;H.W; C.W
22	3	Be able to the Third view.	=	Lectures + classwork + homework + Extracurricular Activities	Quizzes;H.W; C.W
23	3	Be able to the oblique	Quiz + Oblique+ exercises	Lectures + classwork + homework + Extracurricular Activities	Quizzes;H.W; C.W
24	3	Be able to the oblique	=	Lectures + classwork + homework + Extracurricular Activities	Quizzes;H.W; C.W
25	3	Be able to the oblique	=	Lectures + classwork + homework + Extracurricular Activities	Quizzes;H.W; C.W
26	3	Be able to the oblique	Total exam	Lectures + classwork + homework + Extracurricular Activities	Quizzes;H.W; C.W

11. Course Evaluation

The final exam will count 30% of the total course grade (40).

The quizzes will count
The homework will count
The classwork will count
} (40 marks) from (60)

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	-Engineering drawing (abd al- rasool al-khafaf) -Machine drawing (S.C. SHARMA)-Standard lisheDistributors – f first edition 2004. -Graphics for engineers (JAMES H. EARLE) – Addison Wesley Pub Company- second edition 1989.
Main references (sources)	Engineering drawing (abd al-rasool al-khafaf)
Recommended books and references (scientific journals, reports…)	/
Electronic References, Websites	classroom

Principles of production processes/ ME104

1. Course Name:
Principles of production processes
2. Course Code:
ME104
3. Semester / Year:
Year
4. Description Preparation Date:
1/4/2024
5. Available Attendance Forms:
Class
6. Number of Credit Hours (Total) / Number of Units (Total)
- Credit Hours (Total) 5 hours per week (2 hours theory + 3 hours workshop)/ about130 hours per year, The fact that students enroll one month or more late in the academic year - 6 units
7. Course administrator's name (mention all, if more than one name)
Name: Prof. Dr. Ahmed Abdulrasool Ahmed Email: dr.ahmed.a.ahmed@coeng.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	**11.** The ability to improve operations by solving complex engineering problems. Education and training of students to the basic concepts of engineering materials and principles of production processes. **12.** The development of the student in the asymptotic Joe to the reality of the workshops productivity.. **13.** How decision-making in the production processes in terms of identifying the type of operation and the type of engineering materials processing. **14.** The measurement and identification, types the number used in the workshops. **15.** The as being educated on how to put technological tract operations productivity. **16.** Contribute to the profitable growth of the industrial sectors using analytical tools, effective computational approaches, methodology, and systems thinking.

	17. Maintaining high standards of professional and ethical responsibility. **18.** Work effectively, diverse, and multicultural emphasis on the application of skills, teamwork, and communication. **19.** Practice and lifelong learning to maintain technical operation and excellence in various fields.

9. Teaching and Learning Strategies

Strategy	**Teaching Strategy:** Course requirements, teaching materials (course vocabulary, textbook, sample student work, etc.), and samples of student work for all assignments (homework, tests, exams, lab reports, design projects, etc.). **Learning strategy:** The Problem-Based Learning (PBL) method is used in various courses. PBL is how students solve an engineering problem independently using previous courses. Almost all faculty are trained to use this method. The method simply divides the students into groups and each group solves the problem. Each group member will have a task and then they will discuss the results and report back. They will have the same mark and the students will learn through learning outcomes (GOs). Students will learn how to work as a group (GO 7), be able to interpret and analyze data (GO 3), write a report and give a seminar (GO 4), solve complex engineering problems (GO 1), use software techniques and skills (GO 6), design a problem (GO 2), the problem of moral responsibilities (GO 5).

10. Course Structure

Week	Hours	Required Graduate Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 hrs.	GOs (1, 6)	Extractive industries and manufacturing of iron, copper, aluminum, lead	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
2	2 hrs.	GOs (1, 6)	Extractive industries and manufacturing of iron, copper, aluminum, lead	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
3	2 hrs.	GOs (1, 6)	Extractive industries and manufacturing of iron, copper, aluminum, lead	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires

4	**2 hrs.**	**GOs (1, 6)**	**Extractive industries and manufacturing of iron, copper, aluminum, lead**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
5	**2 hrs.**	**GOs (6, 5, 2)**	**Engineering tests**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
6	**2 hrs.**	**GOs (6, 5, 2)**	**Engineering tests**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
7	**2 hrs.**	**GOs (5, 3, 1)**	**Casting processes**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
8	**2 hrs.**	**GOs (5, 3, 1)**	**Casting processes**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
9	**2 hrs.**	**GOs (5, 3, 1)**	**Casting processes**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
10	**2 hrs.**	**GOs (5, 3, 1)**	**Metal forming processes**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
11	**2 hrs.**	**GOs (5, 3, 1)**	**Metal forming processes**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
12	**2 hrs.**	**GOs (5, 3, 1)**	**Metal forming processes**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
13	**2 hrs.**	**GOs (3, 1)**	**Metal forming processes**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
14	**2 hrs.**	**GOs (3, 1)**	**Machining of metals**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
15	**2 hrs.**	**GOs (3, 1)**	**Machining of metals**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
16	**2 hrs.**	**GOs (5, 3, 1)**	**Machining of metals**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
17	**2 hrs.**	**GOs (1, 2)**	**Machining of metals**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
18	**2 hrs.**	**GOs (1, 2)**	**Joining of metals**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
19	**2 hrs.**	**GOs (1, 2)**	**Joining of metals**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**

20	**2 hrs.**	**GOs (1, 2)**	**Joining of metals**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
21	**2 hrs.**	**GOs (1, 2, 3)**	**plastic**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
22	**2 hrs.**	**GOs (1, 2, 3)**	**plastic**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
23	**2 hrs.**	**GOs (1, 2, 3)**	**classes**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
24	**2 hrs.**	**GOs (1, 2, 3)**	**classes**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
25	**2 hrs.**	**GOs (1, 2, 3)**	**Ceramics**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
26	**2 hrs.**	**GOs (1, 2, 3)**	**Industrial safety**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**

- Students are trained every week for three hours in the department's workshops after dividing them into groups. These groups are distributed into five sections within the workshop for a period of four weeks. These sections are: - 1. Lathing 2. Welding 3. Carpentry 4. Measurements 5. Removing metals with hand tools During which the student undergoes theoretical and practical training, submits a report and takes an exam

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11.Course Evaluation

6. **Quizzes:**
   - There will be (8 – 10) closed books and notes quizzes during the academic year.
   - The quizzes will count 40% (20% theory + 20 %workshop) of the total course grade.
7. Quizzes, 2-3 questions, and will count 10%.
8. Extracurricular Activities, this is optional and will count extra marks (1 – 5 %) for the student, depending on the type of activity.
9. **Final Exam:**
   - Final exam will be comprehensive, with closed books and notes for theory only , and will take place on June 2023 from 9:00 AM - 12:00 PM in room (M12 + M13)
10. The final exam will count 60% of the total course grade.

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	**1. kahtan khalf, & Adil mahmod," Principles of Production Engineering",1987.**

Main references (sources)	**1. Dr. Salah Ameen, Dr. Waleed Mohamed, and Dr. Talab Hussain,"Material Engineering Properties", 1990.** **2. Dr. Qahtan Al-Khazraji, and Abdaljowad Sharif, "Welding Technology", 1989.** **3. Dr. Mohamed Al-Tornechi, and Dr. Mahdy Saeed, "Cutting Tool's Principles",1988.** **4.Dr.Shakir K. Al- Saammrai, and Dr.Qahtan Al-Khazraji,"Fundamentals of Metallurgy Engineering", 1990**
Recommended books and references (scientific journals, reports...)	• Available websites related to the subject. • Extracurricular activities.
Electronic References, Websites	• Field and scientific visits. .

PROGRAMMING / I / ME106

1. Course Name:
PROGRAMMING / I
2. Course Code:
ME106
3. Semester / Year:
Year
4. Description Preparation Date:
1/4/2024
5. Available Attendance Forms:
Class
6. Number of Credit Hours (Total) / Number of Units (Total)
- Credit Hours (Total) 3 hours per week (theoretical and experimental)/120 hours per year 3 units
7. Course administrator's name (mention all, if more than one name)
Name: Asst. Lect. Sahar Imad Abd-Ullah Email: s.alkhasaki@coeng.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	To create a basic fundamental knowledge for the student in the subject of programming in computer and its applications in engineering and industry Entering data in large numbers with the possibility of applying ready-made functions or building complex functions manually on this data to obtain the required results Filtering data, arranging data, searching to detect the presence of a specific value, linking cell values to each other, or linking cell content to an external file of another type.

9. Teaching and Learning Strategies	
Strategy	**Teaching Strategy:** Course requirements, teaching materials (course vocabulary, textbook, sample student work, etc.), and samples of student work for all assignments (homework, tests, exams, lab reports, design projects, etc.).

	Learning strategy: The Problem-Based Learning (PBL) method is used in various cours PBL is how students solve an engineering problem independently usi previous courses. Almost all faculty are trained to use this method. T method simply divides the students into groups and each group solves t problem. Each group member will have a task and then they will disc the results and report back. They will have the same mark and the stude will learn through learning outcomes (GOs). Students will learn how work as a group (GO 7), be able to interpret and analyze data (GO 3), wr a report and give a seminar (GO 4), solve complex engineering proble (GO 1), use software techniques and skills (GO 6), design a problem (G 2), the problem of moral responsibilities (GO 5)..

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1–5	3 hrs.	GOs (3,4)	Computer, its components and applications	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
6–10	3 hrs.	GOs (3,4)	Word 2010	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
11–15	3 hrs.	GOs (3,4)	Power point 2020	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
16–22	3 hrs.	GOs (3,4)	Excel 2010	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
23–30	3 hrs.	GOs (3,4)	Algorithms and Flow Charts	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires

11. Course Evaluation

11. Quizzes:

- There will be (8 – 12) closed books and notes quizzes during the academic year.
- The quizzes will count 40% of the total course grade.

12. Quizzes, 2-3 questions, and will count 10%.

13. Extracurricular Activities, this is optional and will count extra marks (1 – 5 %) for the student, depending on the type of activity.

14. Final Exam:

- Final exam will be comprehensive, with closed books and notes, and will take place on June 2023 from 9:00 AM - 12:00 PM
- final exam will count 70% of the total course grade.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• "Computer Basics & Applications"
Main references (sources)	"Salah Rassol Hamza University of Technology
Recommended books and references (scientific journals, reports…)	• Available websites related to the subject. • Extracurricular activities.
Electronic References, Websites	• Field and scientific visits. • Extra lectures by foreign guest lecturers.

Mathematics / II / ME201

1. Course Name:
Mathematics / II
2. Course Code:
ME201
3. Semester / Year:
Year
4. Description Preparation Date:
1/4/2024
5. Available Attendance Forms:
Class
6. Number of Credit Hours (Total) / Number of Units (Total)
- Credit Hours (Total) 4 hours per week /120 hours per year - 6 units
7. Course administrator's name (mention all, if more than one name)
Name: Lect. Dr. Raed Gatea Saihood Email: raed.hassan@coeng.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	**20.** Able to use polar coordinates system. **21.** Develop the knowledge about vectors. **22.** Understand the fundamentals of functions of several variables. **23.** Able to solve all the types of first and second order ordinary differential equations. **24.** Able to evaluate the double and triple integral. **25.** Analyze how the infinite series converges or diverges. **26.** Develop the knowledge about complex numbers.

9. Teaching and Learning Strategies

Strategy	**Teaching Strategy:** Course requirements, teaching materials (course vocabulary, textbook, sample student work, etc.), and samples of student work for all assignments (homework, tests, exams, lab reports, design projects, etc.).

	Learning strategy: The Problem-Based Learning (PBL) method is used in various courses. PBL is how students solve an engineering problem independently using previous courses. Almost all faculty are trained to use this method. The method simply divides the students into groups and each group solves the problem. Each group member will have a task and then they will discuss the results and report back. They will have the same mark and the students will learn through learning outcomes (GOs). Students will learn how to work as a group (GO 7), be able to interpret and analyze data (GO 3), write a report and give a seminar (GO 4), solve complex engineering problems (GO 1), use software techniques and skills (GO 6), design a problem (GO 2), the problem of moral responsibilities (GO 5)..

10. Course Structure

Week	Hours	Required Graduate Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 hrs.	GOs (1, 6)	Polar Coordinates	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
2	2 hrs.	GOs (1, 6)	Polar Coordinates	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
3	2 hrs.	GOs (1, 6)	Polar Coordinates	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
4	2 hrs.	GOs (1, 6)	Polar Coordinates	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
5	2 hrs.	GOs (6, 5, 2)	Vectors	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
6	2 hrs.	GOs (6, 5, 2)	Vectors	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
7	2 hrs.	GOs (5, 3, 1)	Planes	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
8	2 hrs.	GOs (5, 3, 1)	Planes	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
9	2 hrs.	GOs (5, 3, 1)	Vector Valued Functions	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
10	2 hrs.	GOs (5, 3, 1)	Vector Valued Functions	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires

11	**2 hrs.**	**GOs (5, 3, 1)**	**Vector Valued Functions**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
12	**2 hrs.**	**GOs (5, 3, 1)**	**Vector Valued Functions**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
13	**2 hrs.**	**GOs (3, 1)**	**Functions of Several Variables**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
14	**2 hrs.**	**GOs (3, 1)**	**Functions of Several Variables**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
15	**2 hrs.**	**GOs (3, 1)**	**Functions of Several Variables**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
16	**2 hrs.**	**GOs (5, 3, 1)**	**Ordinary Differential Equations**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
17	**2 hrs.**	**GOs (1, 2)**	**Ordinary Differential Equations**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
18	**2 hrs.**	**GOs (1, 2)**	**Ordinary Differential Equations**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
19	**2 hrs.**	**GOs (1, 2)**	**Ordinary Differential Equations**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
20	**2 hrs.**	**GOs (1, 2)**	**Ordinary Differential Equations**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
21	**2 hrs.**	**GOs (1, 2, 3)**	**Double Integral**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
22	**2 hrs.**	**GOs (1, 2, 3)**	**Double Integral**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
23	**2 hrs.**	**GOs (1, 2, 3)**	**Triple Integral**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
24	**2 hrs.**	**GOs (1, 2, 3)**	**Triple Integral**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
25	**2 hrs.**	**GOs (1, 2, 3)**	**Infinite Series**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
26	**2 hrs.**	**GOs (1, 2, 3)**	**Infinite Series**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
27	**2 hrs.**	**GOs (1, 2, 3)**	**Infinite Series**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**

28	**2 hrs.**	**GOs (1, 2, 3)**	**Complex Functions**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
29	**2 hrs.**	**GOs (1, 2, 3)**	**Complex Functions**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
30	**2 hrs.**	**GOs (1, 2, 3)**	**Complex Functions**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**

11. Course Evaluation

15. **Quizzes:**
    There will be a (16 – 20) closed books and notes quizzes during the academic year. The quizzes will count 20% of the total course grade.
16. **Tests,** 2-3 Nos. and will count 10% of the total course grade.
17. **Extracurricular Activities,** this is optional and will count extra marks (1 – 5 %) for the student, depending on the type of activity.
18. **Final Exam:**
    The final exam will be comprehensive, closed books and notes, and will take place on June 2023 from 9:00 AM - 12:00 PM in rooms (M12 + M13). The final exam will count 70% of the total course grade.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	**4.** "Calculus II"; by Paul Dawkins, 2007. **5.** "Advanced Calculus"; by Robert Wrede, and Murray R. Spiegel, Second Edition, McGraw-Hill Companies, 2002.
Main references (sources)	"Thomas Calculus" G. Thomas, M. Weir, et al., 11th edition, 2004.
Recommended books and references (scientific journals, reports...)	• Available websites related to the subject. • Extracurricular activities.
Electronic References, Websites	• Field and scientific visits. • Extra lectures by foreign guest lecturers.

Fluid Mechanics / I / ME202

1. Course Name:
Fluid Mechanics / I
2. Course Code:
ME202
3. Semester / Year:
Year
4. Description Preparation Date:
1/4/2024
5. Available Attendance Forms:
Class
6. Number of Credit Hours (Total) / Number of Units (Total)
- Credit Hours (Total) 5 hours per week /150 hours per year. - 5 units
7. Course administrator's name (mention all, if more than one name)
Name: Assist Prof. Dr. Munther Abdullah Mussa Email: munther@coeng.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	**27.** Introduce basic definitions and introductory concepts of fluid mechanics.. **28.** Introduce the description of pressure distribution in a static fluid and its effects on submerged surfaces and bodies. **29.** Introduce the description of phenomena associated with fluid flow phenomena. **30.** Explain and derive the conservation laws that govern fluid motion (continuity, energy, and momentum equations). **31.** Introduce the principles of "Dimensional Analysis" and "Similitude" and their application to fluid mechanics problems. **32.** Introduce the principles of viscous flow, boundary layer, drag and lift, primary and secondary losses in pipe flow. **33.** Enable the student to analyze and design pipes network and pumps connection.

	34. Enable the student to measure the fluid properties and flow parameters, and to design and conduct experiments of fluid mechanics. **35.** Provide a strong physical and analytical understanding of fluid flows to function in the capacity of mechanical engineer in an engineering company dealing with fluid machinery. **36.** Provide a background to higher level courses involving fluid flow and heat transfer.

9. Teaching and Learning Strategies

Strategy	**Teaching Strategy:** Lecture plan and in-class activities: each class will commence with a summary of the previous lecture, questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. **Learning strategy:** The Problem-Based Learning (PBL) method is used in various courses. PBL is how students solve an engineering problem independently using previous courses. Almost all faculty are trained to use this method. The method simply divides the students into groups and each group solves the problem. Each group member will have a task and then they will discuss the results and report back. They will have the same mark and the students will learn through learning outcomes (GOs). Students will learn how to work as a group (GO 7), be able to interpret and analyze data (GO 3), write a report and give a seminar (GO 4), solve complex engineering problems (GO 1), use software techniques and skills (GO 6), design a problem (GO 2), the problem of moral responsibilities (GO 5)..

10. Course Structure

Week	Hours	Required Graduate Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 hrs.	GOs (1, 6)	Introductory Concepts to Fluid Mechanics	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
2	2 hrs.	GOs (1, 6)	Introductory Concepts to Fluid Mechanics	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
3	2 hrs.	GOs (1, 6)	Fluid Statics : Pressure Distribution in Static Fluids	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
4	2 hrs.	GOs (1, 6)	Pressure Measurements	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires

5	**2 hrs.**	**GOs (6, 5, 2)**	**Forces on Immersed Surfaces**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
6	**2 hrs.**	**GOs (6, 5, 2)**	**Forces on Immersed Surfaces**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
7	**2 hrs.**	**GOs (5, 3, 1)**	**Buoyancy And Floatation**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
8	**2 hrs.**	**GOs (5, 3, 1)**	**Buoyancy And Floatation**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
9	**2 hrs.**	**GOs (5, 3, 1)**	**Buoyancy And Floatation**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
10	**2 hrs.**	**GOs (5, 3, 1)**	**Accelerated Fluid and Relative Motion**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
11	**2 hrs.**	**GOs (5, 3, 1)**	**Introduction To Fluid Motion**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
12	**2 hrs.**	**GOs (5, 3, 1)**	**Continuity Equation**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
13	**2 hrs.**	**GOs (3, 1)**	**Energy Equation**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
14	**2 hrs.**	**GOs (3, 1)**	**Momentum Equation**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
15	**2 hrs.**	**GOs (3, 1)**	**Momentum Equation**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
16	**2 hrs.**	**GOs (5, 3, 1)**	**Dimensional Analysis and Similitude**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
17	**2 hrs.**	**GOs (1, 2)**	**Dimensional Analysis and Similitude**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
18	**2 hrs.**	**GOs (1, 2)**	**Dimensional Analysis and Similitude**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
19	**2 hrs.**	**GOs (1, 2)**	**Laminar Viscous Flow Between Parallel Plates**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
20	**2 hrs.**	**GOs (1, 2)**	**Laminar Viscous Flow Through Circular Tubes**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**

21	**2 hrs.**	**GOs (1, 2, 3)**	**Boundary Layer Theory, Drag & Lift**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
22	**2 hrs.**	**GOs (1, 2, 3)**	**Losses In Pipes : Moody Diagram**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
23	**2 hrs.**	**GOs (1, 2, 3)**	**Losses In Pipes : Moody Diagram**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
24	**2 hrs.**	**GOs (1, 2, 3)**	**Losses In Pipes : Moody Diagram**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
25	**2 hrs.**	**GOs (1, 2, 3)**	**Measurements Of Fluid Flow**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
26	**2 hrs.**	**GOs (1, 2, 3)**	**Measurements Of Fluid Flow**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
27	**2 hrs.**	**GOs (1, 2, 3)**	**Measurements Of Fluid Flow**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
28	**2 hrs.**	**GOs (1, 2, 3)**	**Analysis Of Piping and Pumping Networks**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
29	**2 hrs.**	**GOs (1, 2, 3)**	**Analysis Of Piping and Pumping Networks**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
30	**2 hrs.**	**GOs (1, 2, 3)**	**Analysis Of Piping and Pumping Networks**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**

11. Course Evaluation

19. Quizzes:

- There will be (8 – 15) closed books and notes quizzes during the academic year.
- The quizzes will count 30% of the total course grade.

20. Quizzes, 2-3 questions, and will count 10%.

21. Extracurricular Activities, this is optional and will count extra marks (1 – 5 %) for the student, depending on the type of activity.

22. Final Exam:

- Final exam will be comprehensive, with closed books and notes, and will take place on June 2023 from 9:00 AM - 12:00 PM in room (M10)

23. The final exam will count 70% of the total course grade.

12. Learning and Teaching Resources

Required textbooks (curriculum books, if any)	"Fluid Mechanics"; by Victor L. Streeter and E. Benjamin Wylie, First SI Metric Edition, M G. GNW Hill , 1988.
Main references (sources)	1. "Fundamental of Fluid Mechanics"; by Bruce E. Munson, Theodore H. Okiishi, and Wade W. Huesch, Benjamin Wylie, Sixth Edition, 2009 2. "Fluid Mechanics : Fundamentals and Applications"; by Yunus A. Çengel and John M. Cimbala, M G. GNW Hill Higher Education, 2006 "Introductory Fluid Mechanics" ; by Joseph Katz, Cambridge University Press, 2010 3. "Elementary Fluid Mechanics", by John K. Vennard and Robert L. Streat, 5th ed., John Wiley and Sons, 1976. 4. "Engineering Fluid Mechanics by John A. Robert and Clayton T. Crow, 2nd ed., Houghton Mifflin Coo, 1988
Recommended books and references (scientific journals, reports...)	• Available websites related to the subject. • Extracurricular activities.
Electronic References, Websites	• Field and scientific visits. • Extra lectures by foreign guest lecturers.

Thermodynamics / ME203

1. Course Name:	
Thermodynamics	
2. Course Code:	
ME203	
3. Semester / Year:	
Year	
4. Description Preparation Date:	
13/4/2024	
5. Available Attendance Forms:	
Class	
6. Number of Credit Hours (Total) / Number of Units (Total)	
- Credit Hours (Total) 3 hours per week /90 hours per year - 4 units	
7. Course administrator's name (mention all, if more than one name)	
Name: Assist Prof. Dr. Mohammed A. Nima Email: dralsafi@coeng.uobaghdad.edu.iq Name: Assist Prof. Dr. Sarmad A. Abdul Hussein Email: sarmad.alsaraf@coeng.uobaghdad.edu.iq	
8. Course Objectives	
Course Objectives	1. Introduce an efficient treatment of classical thermodynamics by designing the course in such a manner that prepares the student to participate in the real engineering work. 2. Illustrate the basic principles and definitions. 3. Explain the importance of the use of thermodynamic tables and charts to identify the state and process. 4. Define the first and the second law of thermodynamics with their engineering applications. 5. Introduce the concept of entropy and show its use for thermodynamic analysis. 6. Employ the basic knowledge in the real world energy systems that including gas power cycles and vapor power cycles.
9. Teaching and Learning Strategies	
Strategy	**Teaching Strategy:**

Lecture recap and in-class activities: each class will commence with a recap of the previous lecture, questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. In addition, homework will be given and the answers of the preceding exams will be reviewed and discussed.

Learning strategy:

1. The student will be able to understand and define the following terms: thermodynamic system, surrounding, boundary, closed system, open system, isolated system, control mass, control volume, process, cycle, extensive and intensive properties. To identify units of pressure, temperature, density, and mass, SI and English, and to use conversions.
2. The student will be able to explain what is meant by saturated liquid, compressed liquid, saturated vapor, super heated vapor, saturated liquid-vapor mixture, critical point and triple point, and be able to identify them on T-v and P-v diagrams. To know how to use thermodynamic tables and diagrams and how to obtain specific volume, enthalpy, and internal energy from them directly or interpolate the data using linear interpolation. To understand and apply the ideal gas equation of state.
3. The student will be able to understand what is meant by process and path of the process and be able to define isothermal, isobaric, isochoric processes. To understand that the area under the process curve on a P-v diagram represent the boundary work, and how to calculate the boundary work.
4. The student will be able to understand that heat and work are energies in transition i.e. a boundary phenomenon and they will be able to apply mass and energy balances (First Law of thermodynamics) to a variety of simple processes and circumstances. To understand that the magnitude of heat and work depend on the path followed by the process i.e. a path function.
5. The student will be able to solve problems using steady flow energy equation (first law of thermodynamics) for different devises such as: nozzle, diffuser, turbine, compressor, pump, heat exchanger, mixing chamber, and throttling valve. To analyze the unsteady state problems.
6. The student will be able to define the Kelvin and Clausius statements of second law of thermodynamics and appreciate that a process will not occur unless it satisfies both the first and the second law of thermodynamics. To identify heat engines, refrigerator and heat pump, and calculate the thermal efficiency and the COP of heat engine and refrigerators. To describe the four reversible processes of Carnot cycle

	on a P-v diagram and to compare its efficiency with the actual cycle to compute the maximum possible efficiency of the actual cycle. 7. The student will be able to state the Clausius inequality and know that any process violates clausius inequality will also violate the second law of thermodynamics. To know that entropy is a thermodynamic property and how to obtain it from thermodynamic tables and diagrams. To know the meaning of isentropic processes. To know the increase of entropy principle. 8. The student will be able to define the meaning of efficiencies in nozzles, turbines, compressors, and pumps, and use them to solve problems.

10. Course Structure

Week	Hours	Required Graduate Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 hrs.	GOs (1, 6)	Introduction	Lectures, assignments, discussions, reports.	Exams, quizzes, oral quizzes.
2	2 hrs.	GOs (1, 6)	Definitions and Concepts	Lectures, assignments, discussions, reports.	Exams, quizzes, oral quizzes, homework
3	2 hrs.	GOs (1, 6)	Thermodynamic Property of Pure Substance	Lectures, assignments, discussions, reports.	Exams, quizzes, oral quizzes, homework
4	2 hrs.	GOs (1, 6)	Tables of Thermodynamic Properties	Lectures, assignments, discussions, reports.	Exams, quizzes, oral quizzes, homework
5	2 hrs.	GOs (6, 5, 2)	The Ideal-Gas Equation of State	Lectures, assignments, discussions, reports.	Exams, quizzes, oral quizzes, homework
6	2 hrs.	GOs (6, 5, 2)	Compressibility Chart	Lectures, assignments, discussions, reports.	Exams, quizzes, oral quizzes, homework
7	2 hrs.	GOs (5, 3, 1)	Moving Boundary Work	Lectures, assignments, discussions, reports.	Exams, quizzes, oral quizzes, homework
8	2 hrs.	GOs (5, 3, 1)	Other Work Modes	Lectures, assignments, discussions, reports.	Exams, quizzes, oral quizzes, homework
9	2 hrs.	GOs (5, 3, 1)	Definition of Heat	Lectures, assignments, discussions, reports.	Exams, quizzes, oral quizzes, homework
10	2 hrs.	GOs (5, 3, 1)	First Law of Thermodynamics and Its Consequences	Lectures, assignments, discussions, reports.	Exams, quizzes, oral quizzes, homework

11	**2 hrs.**	**GOs (5, 3, 1)**	**The First Law of Thermodynamics for Closed Systems**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, homework**
12	**2 hrs.**	**GOs (5, 3, 1)**	**Internal Energy, Enthalpy, and Specific Heats of Ideal Gases**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, homework**
13	**2 hrs.**	**GOs (3, 1)**	**The First Law of Thermodynamics for Control Volumes**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, homework**
14	**2 hrs.**	**GOs (3, 1)**	**Control Volume analysis**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, homework**
15	**2 hrs.**	**GOs (3, 1)**	**The Steady-State, Steady Flow Processes with Applications**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, homework**
16	**2 hrs.**	**GOs (5, 3, 1)**	**Second Law of Thermodynamics/ The Reversible Process**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, homework**
17	**2 hrs.**	**GOs (1, 2)**	**Carnot Cycle**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, homework**
18	**2 hrs.**	**GOs (1, 2)**	**Thermodynamic-Temperature Scale**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, homework**
19	**2 hrs.**	**GOs (1, 2)**	**Entropy- Clausius Inequality**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, homework**
20	**2 hrs.**	**GOs (1, 2)**	**Calculation of Entropy Change**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, homework**
21	**2 hrs.**	**GOs (1, 2, 3)**	**Entropy Generation**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, homework**
22	**2 hrs.**	**GOs (1, 2, 3)**	**Entropy Change of an Ideal Gas**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, homework**
23	**2 hrs.**	**GOs (1, 2, 3)**	**Second Law Analysis for a Control Volume**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, homework**
24	**2 hrs.**	**GOs (1, 2, 3)**	**The Steady-State, Steady Flow Process and Uniform-State Uniform-Flow Process**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, homework**

25	**2 hrs.**	**GOs (1, 2, 3)**	**Vapor Power Systems / Modeling Vapor Power Systems**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, homework**
26	**2 hrs.**	**GOs (1, 2, 3)**	**Ideal Rankine Cycle**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, homework**
27	**2 hrs.**	**GOs (1, 2, 3)**	**Ideal Regenerative & Reheat Cycle**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, homework**
28	**2 hrs.**	**GOs (1, 2, 3)**	**Gas Power Systems / The Air-Standard Diesel Cycle**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, homework**
29	**2 hrs.**	**GOs (1, 2, 3)**	**The Air-Standard Otto Cycle**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, homework**
30	**2 hrs.**	**GOs (1, 2, 3)**	**The Air-Standard Refrigeration Cycle**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, homework**

11.Course Evaluation

1. Quizzes:
   - There will be a minimum of twenty closed books and notes quizzes during the academic year.
   - The quizzes will count 25% of the total course grade.
2. Homework:
   - There will be a minimum of eight sets of homework during the academic year.
   - The homework will count 5% of the total course grade.
3. Final Year Exam:
   - The final exam will be comprehensive, closed books and notes on January / 2024) from 9:00 AM - 12:00 PM in rooms (M5 + M6)
   - The final exam will count 70% of the total course grade

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	• Sonntag, Borgnakke, and Van Wylen, "Fundamentals of Thermodynamics" , 7th edition, John Wiley & Sons, Inc., 2009. • Y.A.Cengel &M.A.Boles "Thermodynamics An Engineering Approach",(5th Edition), 2008.
Main references (sources)	1. Moran, M.J. & Shapiro H.N."Fundamentals of Engineering Thermodynamics", 5th ed. Wiley – 2006. 2. Y.V.C Rao "Engineering Thermodynamics Through Examples" ,Universities Press (India) Privet Limited,2005.

	3. Merle C. Potter,Craig W,Somerton, "Theory and Problems of Engineering Thermodynamics" ,SCHAUM'S OUTLINE SERIES Mcgraw-HILL,1993. 4. R.K. RAJPUT "Engineering Thermodynamics", LAXMI PUBLICATIONS (P) LTD, 3rd edition, 2007.
Recommended books and references (scientific journals, reports...)	• Available websites related to the subject. • Extracurricular activities.
Electronic References, Websites	• Field and scientific visits. • Extra lectures by foreign guest lecturers.

Mechanics of Machine / ME204

1. Course Name:
Mechanics of Machine
2. Course Code:
ME204
3. Semester / Year:
Year
4. Description Preparation Date:
1/4/2024
5. Available Attendance Forms:
Class
6. Number of Credit Hours (Total) / Number of Units (Total)
- Credit Hours (Total) 4 hours per week (Theory of machine+ Mechanics of materials)/120 hours per year - 6 units
7. Course administrator's name (mention all, if more than one name)
Name: Prof. Dr. Fathi.abdulsahib. Alshamma Email: fathi_alshamma@coeng.uobaghdad.edu.iq Name: Asst.Prof.Dr. Thaier J. Ntayeesh Email: thaier-aljabeery@coeng.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	**37.** Be aware of the mathematical background for the different topics of strength of materials introduced in this course. **38.** Understanding of stress concept and types of stresses. **39.** Understanding of stress strain relationship and solving problems. **40.** Understanding of internal forces in beams, how to draw shear force and bending moment diagrams. **41.** Understanding of beam analysis, stresses in beams, beam theory and shear stresses. **42.** Understanding of torsion in shafts, determination of shear stresses and twisting angle due to torsion. **43. To study the relative motion between the various parts of a machine** **44. To withstand the dynamic motion of different parts which take into consideration the forces or other factors such as mass, weight of them.**

	45. To understand the velocity and acceleration analysis of parts in the mechanism which plays a very important role in development of mechanisms **46. Given the relation between the turning moment diagram which is known the crank effort with the design of the flywheel .** **47. To evaluate the cam profile for proper rotating machine element which gives reciprocating or oscillating motion to the follower** **48. The friction in the mechanism of machine is very important factor which applied in the screw jack , pivot bearings and clutches , and belts .**

9. Teaching and Learning Strategies

Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students. This will be achieved throw the following strategies: 1. Explaining the Lecture plan and in-class activities. 2. Each class will commence with a summary of the previous lecture. 3. Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. Oral and power point presentations by the students are made to participate in the lecture.

10. Course Structure

Week	Hours	Required Graduate Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hrs.**	**- Knowledge acquisition - Critical thinking - Effective communication**	**Kinematics motion of four bar mechanism**	**Lectures, assignments, discussions, reports**	**Mixed Quantitative/Qualitative Evaluation**
2	**2 hrs.**	**- Knowledge acquisition - Critical thinking - Effective communication**	**Kinetics motion of four bar mechanism**	**Lectures, assignments, discussions, reports**	**Mixed Quantitative/Qualitative Evaluation**
3	**2 hrs.**	**- Knowledge acquisition - Critical thinking**	**Velocity diagram in mechanism**	**Lectures, assignments, discussions, reports**	**Mixed Quantitative/Qualitative Evaluation**

		- Effective communication			
4	2 hrs.	- Knowledge acquisition - Critical thinking - Effective communication	Acceleration diagram in mechanism	Lectures, assignments, discussions, reports	Mixed Quantitative/Qualitative Evaluation
5	2 hrs.	- Knowledge acquisition - Critical thinking - Effective communication	Application of turning moment diagram for single cylinder double acting engine	Lectures, assignments, discussions, reports	Mixed Quantitative/Qualitative Evaluation
6	2 hrs.	- Knowledge acquisition - Critical thinking - Effective communication	Application of turning moment diagram of four stroke cycle	Lectures, assignments, discussions, reports	Mixed Quantitative/Qualitative Evaluation
7	2 hrs.	- Knowledge acquisition - Critical thinking - Effective communication	Application of the turning moment diagram to find the dimensions of the flywheel	Lectures, assignments, discussions, reports	Mixed Quantitative/Qualitative Evaluation
8	2 hrs.	- Knowledge acquisition - Critical thinking - Effective communication	Introduction to the types of the motion of the follower	Lectures, assignments, discussions, reports	Mixed Quantitative/Qualitative Evaluation
9	2 hrs.	- Knowledge acquisition - Critical thinking - Effective communication	Application to cam profile	Lectures, assignments, discussions, reports	Mixed Quantitative/Qualitative Evaluation
10	2 hrs.	- Knowledge acquisition - Critical thinking - Effective communication	Velocity and acceleration in cam mechanism	Lectures, assignments, discussions, reports	Mixed Quantitative/Qualitative Evaluation
11	2 hrs.	- Knowledge acquisition - Critical thinking	Introduction to friction in screw jack and pivot	Lectures, assignments, discussions, reports	Mixed Quantitative/Qualitative Evaluation

		- Effective communication	bearing and clutch		
12	2 hrs.	- Knowledge acquisition - Critical thinking - Effective communication	Application to friction in the screw jack	Lectures, assignments, discussions, reports	Mixed Quantitative/Qualitative Evaluation
13	2 hrs.	- Knowledge acquisition - Critical thinking - Effective communication	Application to friction in pivot bearing and clutches	Lectures, assignments, discussions, reports	Mixed Quantitative/Qualitative Evaluation
14	2 hrs.	- Knowledge acquisition - Critical thinking - Effective communication	Introduction to friction belt , rope, and chain drive	Lectures, assignments, discussions, reports	Mixed Quantitative/Qualitative Evaluation
15	2 hrs.	- Knowledge acquisition - Critical thinking - Effective communication	Application to Friction belt , rope and chain drives	Lectures, assignments, discussions, reports	Mixed Quantitative/Qualitative Evaluation
16	2 hrs.	- Knowledge acquisition - Critical thinking - Effective communication	Introduction into Mechanics od deformable solids	Lectures, assignments, discussions, reports	Mixed Quantitative/Qualitative Evaluation
17	2 hrs.	- Knowledge acquisition - Critical thinking - Effective communication	Definition of stress and strain	Lectures, assignments, discussions, reports	Mixed Quantitative/Qualitative Evaluation
18	2 hrs.	- Knowledge acquisition - Critical thinking - Effective communication	Hooke´s law for axial loads	Lectures, assignments, discussions, reports	Mixed Quantitative/Qualitative Evaluation
19	2 hrs.	- Knowledge acquisition - Critical thinking - Effective communication	Constants of elasticity: Young's modulus, shear	Lectures, assignments, discussions, reports	Mixed Quantitative/Qualitative Evaluation

			modulus, Poisson's ratio		
20	2 hrs.	- Knowledge acquisition - Critical thinking - Effective communication	Shear stress and shear strain.	Lectures, assignments, discussions, reports	Mixed Quantitative/Qualitative Evaluation
21	2 hrs.	- Knowledge acquisition - Critical thinking - Effective communication	compound bars: calculation of stress and strain	Lectures, assignments, discussions, reports	Mixed Quantitative/Qualitative Evaluation
22	2 hrs.	- Knowledge acquisition - Critical thinking - Effective communication	design of bars for axial load	Lectures, assignments, discussions, reports	Mixed Quantitative/Qualitative Evaluation
23	2 hrs.	- Knowledge acquisition - Critical thinking - Effective communication	Statically indeterminate structures	Lectures, assignments, discussions, reports	Mixed Quantitative/Qualitative Evaluation
24	2 hrs.	- Knowledge acquisition - Critical thinking - Effective communication	Thermal effects on axial deformation	Lectures, assignments, discussions, reports	Mixed Quantitative/Qualitative Evaluation
25	2 hrs.	- Knowledge acquisition - Critical thinking - Effective communication	Shear and Moments in Beams	Lectures, assignments, discussions, reports	Mixed Quantitative/Qualitative Evaluation
26	2 hrs.	- Knowledge acquisition - Critical thinking - Effective communication	Shear and Moments Diagrams, Stresses in Beams	Lectures, assignments, discussions, reports	Mixed Quantitative/Qualitative Evaluation

27	**2 hrs.**	**- Knowledge acquisition - Critical thinking - Effective communication**	**Bending: first moments of area; centroid, moments of inertia of an area, principal moments of inertia, flexural stress in linearly elastic beams**	**Lectures, assignments, discussions, reports**	**Mixed Quantitative/Qualitative Evaluation**
28	**2 hrs.**	**- Knowledge acquisition - Critical thinking - Effective communication**	**Slope and deflection of beams**	**Lectures, assignments, discussions, reports**	**Mixed Quantitative/Qualitative Evaluation**
29	**2 hrs.**	**- Knowledge acquisition - Critical thinking - Effective communication**	**Springs**	**Lectures, assignments, discussions, reports**	**Mixed Quantitative/Qualitative Evaluation**
30	**2 hrs.**	**- Knowledge acquisition - Critical thinking - Effective communication**	**Torsion of circular bars: computation of shear stress; Hooke's law for shear; design of circular bars.**	**Lectures, assignments, discussions, reports**	**Mixed Quantitative/Qualitative Evaluation**

11. Course Evaluation

24. Quizzes:

- There will be (8 – 12) closed books and notes quizzes during the academic year.
- The quizzes will count 30% (15% theory of machines + 15% mechanics of materials) of the total course grade.

25. Quizzes, 2-3 questions, and will count 10%.

26. Extracurricular Activities, this is optional and will count extra marks (1 – 5 %) for the student, depending on the type of activity.

27. Final Exam:

- Final exam will be comprehensive, with closed books and notes, and will take place on June 2023 from 9:00 AM - 12:00 PM in room (M5 + M6)

28. The final exam will count 70% of the total course grade.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	"Strength of Materials", by F. L. Singer and A. Pytel, 3rdEdition, 2008 "mechanics of machines " , by john Hannah and R.C.STEPHENS , FOURTH EDITION , 2004
Main references (sources)	"Mechanics of Materials", by E. J. Hearn, volume 1 , 2nd Edition, 1985. " theory of machins " , by R.S.KHURMI and J.K.GUPTA , fourteenth edition , 2010 .
Recommended books and references (scientific journals, reports...)	• Available websites related to the subject.
Electronic References, Websites	• Field and scientific visits.

Eng. of Metallurgy / ME205

1. Course Name:
Metallurgy
2. Course Code:
ME205
3. Semester / Year:
Year
4. Description Preparation Date:
14/4/2024
5. Available Attendance Forms:
Class
6. Number of Credit Hours (Total) / Number of Units (Total)
• Credit Hours (Total) 2 hours per week/60 hours per year • 2 units
7. Course administrator's name (mention all, if more than one name)
Name: Assist Prof. Dr.Bassim Shaheen Bachy Email: b.bachy0903@coeng.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	• Introduce basic definitions to the Physics of the Metallurgy. • Descript and define the crystal structure of metals and its types. • Define the crystal planes and directions and explain how we could describe them. • Provide deep details about the solidification process of metals and crystals formation as well as their effect on the properties of the metals including (physical, mechanical…. etc.). With focusing on the crystal and casting defects. • Introduce the description of the eutectic and the peritectic reaction and their effect on the final properties. • Introduce the Iron-carbon phase diagram, Physical reactions and phases formation and the microstructures of Iron-carbon alloys. • Introduce basic definitions to the Phase diagram of the Iron-carbon alloy. • Descript and define the principles for the heat treatments of any materials. • Define the principal for classification of steel-heat treatments as well as the reasons behind the using of these treatments.

	• Provide deep details about how to perform all types of annealing treatments and the main objectives and/or results for each one of them. • Explain how to use the Normalizing treatment as an important step to support the annealing treatment and produce the best combination for the properties of the treated steel. • Introduce the hardinning treatments and their results as well as how to support these treatments using the tempering treatments. • Identify the transformation, temperature, time diagram (T.T.T) and how to prepare and use them. • Provide deep details about surface treatments including types, methods, results and final results and objectives.

9. Teaching and Learning Strategies

Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students. This will be achieved throw the following strategies: • Explaining the Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. • Oral and power point presentations by the students are made to participate in the lecture.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 hrs.	GOs (1, 6)	Crystal structure of metals	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
2	2 hrs.	GOs (1, 6)	Crystal planes and directions	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
3	2 hrs.	GOs (1, 6)	Solidification of metals and crystals formation	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
4	2 hrs.	GOs (1, 6)	Crystal defects	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires

5	2 hrs.	GOs (6, 5, 2)	Casting defects	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
6	2 hrs.	GOs (6, 5, 2)	The formation of alloys	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
7	2 hrs.	GOs (5, 3, 1)	Cooling curves of pure metals and alloys	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
8	2 hrs.	GOs (5, 3, 1)	Equilibrium phase diagrams for binary alloys	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
9	2 hrs.	GOs (5, 3, 1)	Complete solubility and complete miscibility in solid state	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
10	2 hrs.	GOs (5, 3, 1)	Partial solubility of eutectic reaction	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
11	2 hrs.	GOs (5, 3, 1)	Partial solubility of peritectic reaction	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
12	2 hrs.	GOs (5, 3, 1)	Intermetallic compound	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
13	2 hrs.	GOs (3, 1)	Iron-carbon phase diagram	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
14	2 hrs.	GOs (3, 1)	Physical reactions and phases formation	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
15	2 hrs.	GOs (3, 1)	Microstructures of iron carbon alloys	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
16	2 hrs.	GOs (5, 3, 1)	Heat treatment of carbon steel: – homogenizing and full annealing	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
17	2 hrs.	GOs (1, 2)	Normalizing and spearoidizing	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
18	2 hrs.	GOs (1, 2)	Stress relieving	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
19	2 hrs.	GOs (1, 2)	Quench hardening and martisite formation	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires

20	2 hrs.	GOs (1, 2)	Tempering of hardened steel	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
21	2 hrs.	GOs (1, 2, 3)	Time temperature transformation of the austenite	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
22	2 hrs.	GOs (1, 2, 3)	Effect of variables on the shape and position of t.t.t diagram	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
23	2 hrs.	GOs (1, 2, 3)	The austemper and martemper treatment and its applications	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
24	2 hrs.	GOs (1, 2, 3)	Hardenability of steel	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
25	2 hrs.	GOs (1, 2, 3)	Dislocations and metals deformation	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
26	2 hrs.	GOs (1, 2, 3)	Effect of deformation on structure and properties of metals	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
27	2 hrs.	GOs (1, 2, 3)	Recrystallization	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
28	2 hrs.	GOs (1, 2, 3)	Precipitation hardening	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
29	2 hrs.	GOs (1, 2, 3)	Surface hardening by flame and induction	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
30	2 hrs.	GOs (1, 2, 3)	Preparatory week before the final Exam	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires

11. Course Evaluation

1. Quizzes:

   -There will be (8-10) closed books and notes quizzes during the academic semester. The quizzes will count 10% of the total course grade.

2. Exams:

   - There will be two closed books and notes exam during the academic year. The mid-term exam will count 20% of the total course grade.

3. Final Exam:

   - The final exam will be comprehensive, closed books and notes, The final exam will count 70% of the total course grade.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	An Introduction To Materials Engineering A Science, For Chemical And Materials Engineers, Br S. Mitchell, A John Wiley & Sons, Inc., Publicati 2004.
Main references (sources)	Materials Science and Engineering An Introducti William D. Callister, Jr.E I G H T H E D I T I O 2009, John Wiley.
Recommended books and references (scientific journals, reports...)	ل هندسة المعادن، تاليف كايسر، ترجمة د-شاكر السامرائى، د- قحطان الخزرجى
Electronic References, Websites	Engineering metallurgy, R. A. HIGGINS (2(Edition).

PROGRAMMING / II/ ME207

1. Course Name:
PROGRAMMING / 2
2. Course Code:
ME207
3. Semester / Year:
Year
4. Description Preparation Date:
1/4/2024
5. Available Attendance Forms:
Class
6. Number of Credit Hours (Total) / Number of Units (Total)
- Credit Hours (Total) 3 hours per week (theoretical and experimental)/120 hours per year 6 units
7. Course administrator's name (mention all, if more than one name)
Name: Asst. Lect. Sahar Imad Abd-Ullah Email: s.alkhasaki@coeng.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	To create a basic fundamental knowledge for the student in the subject of programming in computer and its applications in engineering and industry To provide basic Fundamentals in Programming using Fortran Language Entering data in large numbers with the possibility of applying ready-made functions or building complex functions manually on this data to obtain the required results

9. Teaching and Learning Strategies

Strategy	**Teaching Strategy:** Course requirements, teaching materials (course vocabulary, textbook, sample student work, etc.), and samples of student work for all assignments (homework, tests, exams, lab reports, design projects, etc.).

Learning strategy:

The Problem-Based Learning (PBL) method is used in vario courses. PBL is how students solve an engineering probl independently using previous courses. Almost all faculty are train to use this method. The method simply divides the students i groups and each group solves the problem. Each group member v have a task and then they will discuss the results and report ba They will have the same mark and the students will learn throu learning outcomes (GOs). Students will learn how to work as a gro (GO 7), be able to interpret and analyze data (GO 3), write a rep and give a seminar (GO 4), solve complex engineering proble (GO 1), use software techniques and skills (GO 6), design a probl (GO 2), the problem of moral responsibilities (GO 5)..

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-2	3 hrs.	GOs (3,4)	Algorithms and Flow Charts	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
3-9	3 hrs.	GOs (3,4)	Fortran 90 language	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
10-15	3 hrs.	GOs (3,4)	If statement and factorial	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
16-24	3 hrs.	GOs (3,4)	Matrices or array	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
25-30	3 hrs.	GOs (3,4)	Subprograms	Lectures, assignments, discussions, reports,	Exams, quizzes, oral quizzes, questionnaires

				presentations, posters.	

11. Course Evaluation

29. Quizzes:

- There will be (8 – 12) closed books and notes quizzes during the academic year.
- The quizzes will count 24% of the total course grade.

30. Quizzes, 2-3 questions, and will count 10%.

31. Extracurricular Activities, this is optional and will count extra marks (1 – 5 %) for the student, depending on the type of activity.

32. Final Exam:

- Final exam will be comprehensive, with closed books and notes, and will take place on June 2023 from 9:00 AM - 12:00 PM
- final exam will count 36% of the total course grade.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• /
Main references (sources)	"Fortran 77 Fundamentals and Style", Walters S. Brainard, Boyd & Fraser Company 1985
Recommended books and references (scientific journals, reports…)	• Available websites related to the subject. • Extracurricular activities.
Electronic References, Websites	• Field and scientific visits. • Extra lectures by foreign guest lecturer

Engineering and Numerical Analysis / ME301

1. Course Name:
Engineering and Numerical Analysis
2. Course Code:
ME301
3. Semester / Year:
Year
4. Description Preparation Date:
15/4/2024
5. Available Attendance Forms:
Class
6. Number of Credit Hours (Total) / Number of Units (Total)
5 hours \ 7 units
7. Course administrator's name (mention all, if more than one name)
1. Name: Prof. Dr. Mohsin Abdullah Al-Shammari Email: dr.alshammari@uobaghdad.edu.iq 2. Name: Dr. Wail Sami Sarsam Email: wail_sarsam@coeng.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	**Engineering Analysis** • Introduce basic definitions and introductory concepts of ordinary differential equations. • Introduce the description of engineering problems such as heat transfer, fluid mechanics and kinematics with their solutions by solving the first order differential equation describes these problems. • Introduce the description of an engineering problem such as mechanical vibration with its solutions by solving the second order differential equation describes this problem. • Introduce the description of engineering problems such as deflections of beams with its solution by solving the higher order differential equation describes these problems. • Introduce the principles of differential equations with variable coefficient and the procedure of solving them using power series solution. • Enable the student to solve the ODE of higher order using variation of parameters and power series methods.

	• Introduce the phenomena of Laplace transformation and applying this method on a given functions. • Provide all the theorems of LT involving the transformation of ODE from time domain to the s domain. • Enable the student to solve the ODE and simultaneous ODE using Laplace transform method. • Introduce Partial differentiation and well known PDE's. • Enable the student to solve three types of PDE using separation of variables method. **Numerical Analysis** • Understanding the difference between truncation and round-off errors and locate the roots of algebraic equations. Furthermore, recognizing the relation between error analysis and the numerical method covered and the implications of approximations. • To obtain an understanding of numerical methods and how they can be used to solve mechanical engineering problems. The topics covered in this module are Introduction to numerical analysis; Roots of equations; System of linear algebraic equations; Curve fitting; Numerical integration and differentiation; Ordinary differential equations; and Partial differential equations. • To apply all the above-mentioned methods on computer using MATLAB software.
9. Teaching and Learning Strategies	
Strategy	**Teaching Strategy:** Course requirements, teaching materials (course vocabulary, textbook, sample student work, etc.), and samples of student work for all assignments (homework, tests, exams, lab reports, design projects, etc.). • Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked, and the responses will be used to evaluate the students' understanding of the topics covered. • Oral and power point presentations are made by the students to participate in the lecture. **Learning strategy:** The Problem-Based Learning (PBL) method is used in various courses. PBL is how students solve an engineering problem independently using previous courses. Almost all faculty are trained to use this method. The method simply divides the students into groups and each group solves the problem. Each group member will have a task and then they will discuss the results and report back. They will have the same mark and the students will learn through learning outcomes (GOs). Students will learn how to work as a group (GO 7), be able to interpret and analyze data (GO 3), write a report and give a seminar (GO 4), solve complex engineering problems (GO 1), use software techniques and skills (GO 6), design a problem (GO 2), the problem of moral responsibilities (GO 5).

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
Engineering Analysis					
1	**3**	GO1, GO2, GO3 & GO6	**1st order ODE applications (Heat transfer app.)**	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. Oral and power point presentations by the students are made to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
2	**3**	GO1, GO2, GO3 & GO6	**1st order ODE applications (Heat transfer app.)**	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. Oral and power point presentations by the students are made to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
3	**3**	GO1, GO2, GO3 & GO6	1st order ODE applications (Leaking Tanks app.)	• Lecture plan and in-class activities. • Each class will commence with a summary of the	• In-class questions and discussion. • Quizzes.

				previous lecture. • Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. Oral and power point presentations by the students are made to participate in the lecture.	• Homework and assignments. • Seminars. • Oral and ppt. presentations.
4	**3**	GO1, GO2, GO3 & GO6	1st order ODE applications (Leaking Tanks app.)	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. Oral and power point presentations by the students are made to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
5	**3**	GO1, GO2, GO3 & GO6	1st order ODE applications (Falling objects app.)	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. Oral and power point presentations by the students are made to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.

6	**3**	GO1, GO2, GO3 , GO6, &GO7	1st order ODE applications (Falling objects app.)	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. Oral and power point presentations by the students are made to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
7	**3**	GO1-GO6	2nd order ODE applications (Mass-Spring-Damper system)	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. Oral and power point presentations by the students are made to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
8	**3**	GO1-GO6	2nd order ODE applications (Mass-Spring-Damper system)	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.

				Oral and power point presentations by the students are made to participate in the lecture.	
9	**3**	GO1-GO6	Variation of Parameters method for 2nd ODE and higher order ODE	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. Oral and power point presentations by the students are made to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
10	**3**	GO1-GO7	Variation of Parameters method for 2nd ODE and higher order ODE	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. Oral and power point presentations by the students are made to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
11	**3**	GO1-GO6	Fourier series representation of periodic function	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked and the responses will be used to evaluate	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars.

				the students' understanding of the topics covered. Oral and power point presentations by the students are made to participate in the lecture.	• Oral and ppt. presentations.
12	**3**	GO1-GO6	Fourier series representation of periodic function	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. Oral and power point presentations by the students are made to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
13	**3**	GO1-GO6	Odd and even function representation by Fourier series	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. Oral and power point presentations by the students are made to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
14	**3**	GO1-GO6	Odd and even function representation by Fourier series	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture.	• In-class questions and discussion. • Quizzes.

				• Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. Oral and power point presentations by the students are made to participate in the lecture.	• Homework and assignments. • Seminars. • Oral and ppt. presentations.
15	**3**	GO1-GO6	Half range cosine and sine series	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. Oral and power point presentations by the students are made to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
16	**3**	GO1-GO6	Half range cosine and sine series	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. Oral and power point presentations by the students are made to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
17	**3**	GO1-GO4	Laplace transformation (Definition)	• Lecture plan and in-class activities.	• In-class questions

			and LT of familiar functions	• Each class will commence with a summary of the previous lecture. • Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. Oral and power point presentations by the students are made to participate in the lecture.	and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
18	**3**	GO1-GO4	Laplace transformation (Definition) and LT of familiar functions	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. Oral and power point presentations by the students are made to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
19	**3**	GO1-GO6	LT theorems	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. Oral and power point presentations by the students are made to	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.

				participate in the lecture.	
20	**3**	GO1-GO6	LT theorems	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. Oral and power point presentations by the students are made to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
21	**3**	GO1-GO6	LT of differentiation and integration	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. Oral and power point presentations by the students are made to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
22	**3**	GO1-GO6	LT of differentiation and integration	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked and the responses will be used to evaluate the students' understanding of the topics	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.

				covered. Oral and power point presentations by the students are made to participate in the lecture.	
23	**3**	GO1-GO7	Mechanical applications of LT related to second and higher order ODE	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. Oral and power point presentations by the students are made to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
24	**3**	GO1-GO7	Mechanical applications of LT related to second and higher order ODE	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. Oral and power point presentations by the students are made to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
25	**3**		Partial Differential equations and separation of variables method of solution	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked and the responses will be	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars.

				used to evaluate the students' understanding of the topics covered. Oral and power point presentations by the students are made to participate in the lecture.	• Oral and ppt. presentations.
26	**3**	GO1-GO6	Partial Differential equations and separation of variables method of solution	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. Oral and power point presentations by the students are made to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
27	**3**	GO1-GO7	Solution of 1-D heat conduction equation and Laplace Equation	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. Oral and power point presentations by the students are made to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
28	**3**	GO1-GO7	Solution of 1-D heat conduction equation and Laplace Equation	• Lecture plan and in-class activities. • Each class will commence with a summary of the	• In-class questions and discussion. • Quizzes.

				previous lecture. • Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. Oral and power point presentations by the students are made to participate in the lecture.	• Homework and assignments. • Seminars. • Oral and ppt. presentations.
29	**3**	GO1-GO6	Solution of 1-D Wave equation	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. Oral and power point presentations by the students are made to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
30	**3**	GO1-GO7	Solution of 1-D Wave equation	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. Oral and power point presentations by the students are made to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
Numerical Analysis					

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2**	GO 1-GO 3, GO 5-GO 7	Introductory Concepts to Numerical Methods and Errors + MATLAB Computer Lab.	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked, and the responses will be used to evaluate the students' understanding of the topics covered. • Oral and power point presentations are made by the students to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
2	**2**	GO 1-GO 3, GO 5-GO 7	Introductory Concepts to Numerical Methods and Errors + MATLAB Computer Lab.	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked, and the responses will be used to evaluate the students' understanding of the topics covered. • Oral and power point presentations are made by the students to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
3	**2**	GO 1-GO 3, GO 5-GO 7	Roots of equations + MATLAB Computer Lab.	• Lecture plan and in-class activities. • Each class will commence with a	• In-class questions and discussion. • Quizzes.

				summary of the previous lecture. • Questions will be asked, and the responses will be used to evaluate the students' understanding of the topics covered. • Oral and power point presentations are made by the students to participate in the lecture.	• Homework and assignments. • Seminars. • Oral and ppt. presentations.
4	**2**	GO 1-GO 3, GO 5-GO 7	Roots of equations + MATLAB Computer Lab.	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked, and the responses will be used to evaluate the students' understanding of the topics covered. • Oral and power point presentations are made by the students to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
5	**2**	GO 1-GO 3, GO 5-GO 7	Roots of equations + MATLAB Computer Lab.	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked, and the responses will be used to evaluate the students' understanding of the topics covered. • Oral and power point presentations	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.

				are made by the students to participate in the lecture.	
6	**2**	GO 1-GO 3, GO 5-GO 7	Roots of equations + MATLAB Computer Lab.	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked, and the responses will be used to evaluate the students' understanding of the topics covered. Oral and power point presentations are made by the students to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
7	**2**	GO 1-GO 3, GO 5-GO 7	System of linear algebraic equations + MATLAB Computer Lab.	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked, and the responses will be used to evaluate the students' understanding of the topics covered. • Oral and power point presentations are made by the students to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
8	**2**	GO 1-GO 3, GO 5-GO 7	System of linear algebraic equations + MATLAB Computer Lab.	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked, and the	• In-class questions and discussion. • Quizzes. • Homework and assignments.

				responses will be used to evaluate the students' understanding of the topics covered. • Oral and power point presentations are made by the students to participate in the lecture.	• Seminars. • Oral and ppt. presentations.
9	**2**	GO 1-GO 3, GO 5-GO 7	System of linear algebraic equations + MATLAB Computer Lab.	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked, and the responses will be used to evaluate the students' understanding of the topics covered. • Oral and power point presentations are made by the students to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
10	**2**	GO 1-GO 3, GO 5-GO 7	System of linear algebraic equations + MATLAB Computer Lab.	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked, and the responses will be used to evaluate the students' understanding of the topics covered. • Oral and power point presentations are made by the students to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.

11	**2**	GO 1-GO 3, GO 5-GO 7	Curve fitting + MATLAB Computer Lab.	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked, and the responses will be used to evaluate the students' understanding of the topics covered. • Oral and power point presentations are made by the students to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
12	**2**	GO 1-GO 3, GO 5-GO 7	Curve fitting + MATLAB Computer Lab.	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked, and the responses will be used to evaluate the students' understanding of the topics covered. • Oral and power point presentations are made by the students to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
13	**2**	GO 1-GO 3, GO 5-GO 7	Curve fitting + MATLAB Computer Lab.	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked, and the responses will be used to evaluate the students'	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars.

				understanding of the topics covered. • Oral and power point presentations are made by the students to participate in the lecture.	• Oral and ppt. presentations .
14	**2**	GO 1-GO 3, GO 5-GO 7	Curve fitting + MATLAB Computer Lab.	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked, and the responses will be used to evaluate the students' understanding of the topics covered. • Oral and power point presentations are made by the students to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations .
15	**2**	GO 1-GO 3, GO 5-GO 7	Numerical integration and differentiation + MATLAB Computer Lab.	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked, and the responses will be used to evaluate the students' understanding of the topics covered. • Oral and power point presentations are made by the students to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations .
16	**2**	GO 1-GO 3, GO 5-GO 7	Numerical integration and	• Lecture plan and in-class activities.	• In-class questions and discussion.

			differentiation + MATLAB Computer Lab.	• Each class will commence with a summary of the previous lecture. • Questions will be asked, and the responses will be used to evaluate the students' understanding of the topics covered. • Oral and power point presentations are made by the students to participate in the lecture.	• Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
17	**2**	GO 1-GO 3, GO 5-GO 7	Numerical integration and differentiation + MATLAB Computer Lab.	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked, and the responses will be used to evaluate the students' understanding of the topics covered. • Oral and power point presentations are made by the students to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
18	**2**	GO 1-GO 3, GO 5-GO 7	Numerical integration and differentiation + MATLAB Computer Lab.	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked, and the responses will be used to evaluate the students' understanding of the topics covered.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.

				• Oral and power point presentations are made by the students to participate in the lecture.	
19	**2**	GO 1-GO 3, GO 5-GO 7	Numerical integration and differentiation + MATLAB Computer Lab.	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked, and the responses will be used to evaluate the students' understanding of the topics covered. • Oral and power point presentations are made by the students to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
20	**2**	GO 1-GO 7	Ordinary differential equations + MATLAB Computer Lab.	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked, and the responses will be used to evaluate the students' understanding of the topics covered. • Oral and power point presentations are made by the students to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
21	**2**	GO 1-GO 7	Ordinary differential equations + MATLAB Computer Lab.	• Lecture plan and in-class activities. • Each class will commence with a	• In-class questions and discussion. • Quizzes.

				summary of the previous lecture. • Questions will be asked, and the responses will be used to evaluate the students' understanding of the topics covered. • Oral and power point presentations are made by the students to participate in the lecture.	• Homework and assignments. • Seminars. • Oral and ppt. presentations.
22	**2**	GO 1-GO 7	Ordinary differential equations + MATLAB Computer Lab.	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked, and the responses will be used to evaluate the students' understanding of the topics covered. • Oral and power point presentations are made by the students to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
23	**2**	GO 1-GO 7	Ordinary differential equations + MATLAB Computer Lab.	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked, and the responses will be used to evaluate the students' understanding of the topics covered. • Oral and power point presentations	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.

				are made by the students to participate in the lecture.	
24	**2**	GO 1-GO 7	Ordinary differential equations + MATLAB Computer Lab.	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked, and the responses will be used to evaluate the students' understanding of the topics covered. • Oral and power point presentations are made by the students to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
25	**2**	GO 1-GO 7	Ordinary differential equations + MATLAB Computer Lab.	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked, and the responses will be used to evaluate the students' understanding of the topics covered. • Oral and power point presentations are made by the students to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
26	**2**	GO 1-GO 7	Partial differential equations + MATLAB Computer Lab.	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture.	• In-class questions and discussion. • Quizzes.

				• Questions will be asked, and the responses will be used to evaluate the students' understanding of the topics covered. • Oral and power point presentations are made by the students to participate in the lecture.	• Homework and assignments. • Seminars. • Oral and ppt. presentations.
27	**2**	GO 1-GO 7	Partial differential equations + MATLAB Computer Lab.	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked, and the responses will be used to evaluate the students' understanding of the topics covered. • Oral and power point presentations are made by the students to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
28	**2**	GO 1-GO 7	Partial differential equations + MATLAB Computer Lab.	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked, and the responses will be used to evaluate the students' understanding of the topics covered. • Oral and power point presentations are made by the students to	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.

				participate in the lecture.	
29	**2**	GO 1-GO 7	Partial differential equations + MATLAB Computer Lab.	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked, and the responses will be used to evaluate the students' understanding of the topics covered. • Oral and power point presentations are made by the students to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.
30	**2**	GO 1-GO 7	Partial differential equations + MATLAB Computer Lab.	• Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked, and the responses will be used to evaluate the students' understanding of the topics covered. • Oral and power point presentations are made by the students to participate in the lecture.	• In-class questions and discussion. • Quizzes. • Homework and assignments. • Seminars. • Oral and ppt. presentations.

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. 1. "Advanced Engineering Mathematics"; by Erwin Kreyszig, 10th Edition, John Wiley & Sons, Inc, 2011.

	2. 2. “Advanced Engineering Mathematics”; by C. Ray Wylie and Louis C. Barrett, 5th International study Edition, M G. GNW Hill International book company, 1982.
Main references (sources)	“Fundamentals of Differential Equations”; by R. Kent Nagle, Edward B. Saff, and Arthur David Snider, Addison - Wesley, Eighth Edition, 2012.
Recommended books and references (scientific journals, reports...)	“Elementary Differential Equations”; by C. Henry Edwards and David E., Sixth Edition Penney, Pearson Prentice Hall, 2008.
Electronic References, Websites	https://www.youtube.com/@WailSarsam/playlists

Mechanical Fluid/ II / ME302

1. Course Name:
Fluid Mechanics /2 (Gas Dynamics)
2. Course Code:
ME 302
3. **Semester / Year:**
Year
4. **Description Preparation Date:**
1/4/2024
5. **Available Attendance Forms:**
Class
6. **Number of Credit Hours (Total) / Number of Units (Total)**
Credit Hours (Total) 4 hours per week (Gas Dynamics + Turbo Machines)/120 hours per year - 7 units
7. Course administrator's name (mention all, if more than one name)
Name: Assist Prof. Dr. Sajida Lafta Ghashim Email: sajeda.l@coeng.uobaghdad.edu.iq Name: Assist Prof. Dr. Ayser Muneer Email: aysar.m @coeng.uobaghdad.edu.iq
8. **Course Objectives**

Course Objectives	Introduces the main concepts of basic principles from fluid dynamics and thermodynamics, introductory concepts to compressible fluid, isentropic flow, normal and oblique shocks, flow in ducts with friction, flow in ducts with heating or cooling, and basic principle of jet and rocket propulsion engines. 1. To learn about the basic concept and importance of Gas dynamics. 2. To understand the physical origin of the equations of compressible one-dimensional flows. 3. To understand the concept of Mach number, and how it relates to compressibility effects, typical flow properties, and wave propagation. 4. To understand the phenomena of shock, Fanno and Rayleigh flows. 5. To formulate and solve problems in one -dimensional steady compressible flow. 6. To teach students to analyze or compute one-dimensional and quasi-one-dimensional flows in typical applications such as supersonic wind tunnels, rocket nozzles, and shock tubes.

9.	**Teaching and Learning Strategies**
Strategy	**Teaching Strategy:** Course requirements, teaching materials (course vocabulary, textbook, sample student work, etc.), and samples of student work for all assignments (homework, tests, exams, lab reports, design projects, etc.). **Learning strategy:** The Problem-Based Learning (PBL) method is used in various courses. PBL is how students solve an engineering problem independently using previous courses. Almost all faculty are trained to use this method. The method simply divides the students into groups and each group solves the problem. Each group member will have a task and then they will discuss the results and report back. They will have the same mark and the students will learn through learning outcomes (GOs). Students will learn how to work as a group (GO 7), be able to interpret and analyze data (GO 3), write a report and give a seminar (GO 4), solve complex engineering problems (GO 1), use software techniques and skills (GO 6), design a problem (GO 2), the problem of moral responsibilities (GO 5)..

10. **Course Structure**

Week	Hours	Required Graduate Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 hrs.	GOs (1, 6)	Introductory Concepts, Basic concepts from fluid dynamics	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
2	2 hrs.	GOs (1, 6)	Definitions , Assumptions	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
3	2 hrs.	GOs (1, 6)	Applications , Methods of Analysis	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
4	2 hrs.	GOs (1, 6)	Compressible Fluid Flow	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
5	2 hrs.	GOs (6, 5, 2)	Velocity of Sound	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
6	2 hrs.	GOs (6, 5, 2)	Velocity of Sound for a Plane	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
7	2 hrs.	GOs (5, 3, 1)	Types of the Flows	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires

8	**2 hrs.**	**GOs (5, 3, 1)**	**Von Karmans Rules of Supersonic Flow**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
9	**2 hrs.**	**GOs (5, 3, 1)**	**Similarity Parameters Types of Flow**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
10	**2 hrs.**	**GOs (5, 3, 1)**	**Isentropic flow , The one dimensional approximation**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
11	**2 hrs.**	**GOs (5, 3, 1)**	**Factors that Produce Variation in the Fluid Properties of Flow are**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
12	**2 hrs.**	**GOs (5, 3, 1)**	**Simple Area Change Converging-diverging Nozzle**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
13	**2 hrs.**	**GOs (3, 1)**	**Formula, Charts and Tables for the Isentropic Flow**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
14	**2 hrs.**	**GOs (3, 1)**	**Reference temperature, pressure and density Reference Speeds Critical States**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
15	**2 hrs.**	**GOs (3, 1)**	**Adiabatic Flow Operation of Nozzle Under Varying Pressure Ratio**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
16	**2 hrs.**	**GOs (5, 3, 1)**	**Pitot – Static Tube**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
17	**2 hrs.**	**GOs (1, 2)**	**Normal shock wave**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
18	**2 hrs.**	**GOs (1, 2)**	**Governing Equations of normal shock wave**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
19	**2 hrs.**	**GOs (1, 2)**	**Operation of Nozzle under Existence of Shock**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**

20	**2 hrs.**	**GOs (1, 2)**	**Pitot- Static Tube in Supersonic Flow**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
21	**2 hrs.**	**GOs (1, 2, 3)**	**Oblique Shock Waves**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
22	**2 hrs.**	**GOs (1, 2, 3)**	**Relations across an Oblique Shock**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
23	**2 hrs.**	**GOs (1, 2, 3)**	**Types of oblique Shock Waves**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
24	**2 hrs.**	**GOs (1, 2, 3)**	**Governing Equations of oblique shock wave**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
25	**2 hrs.**	**GOs (1, 2, 3)**	**Flow in constant area ducts**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
26	**2 hrs.**	**GOs (1, 2, 3)**	**Fanno process**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
27	**2 hrs.**	**GOs (1, 2, 3)**	**Rayleigh process**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
28	**2 hrs.**	**GOs (1, 2, 3)**	**Jet Propulsion**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
29	**2 hrs.**	**GOs (1, 2, 3)**	**Classifications of jet and rocket propulsion engines**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
30	**2 hrs.**	**GOs (1, 2, 3)**	**Basic principle of jet and rocket propulsion engines**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**

11. Course Evaluation

1. **Quizzes:**

   - There will be (12 – 18) closed books and notes quizzes during the academic year.
   - The quizzes will count 30% (15% Gas Dynamics + 15% Turbo Machines) of the total course grade.

2. Quizzes, 2-3 questions, and will count 10%.

3. Extracurricular Activities, this is optional and will count extra marks (1 – 5 %) for the student, depending on the type of activity.

4. **Final Exam:**

- Final exam will be comprehensive, with closed books and notes, and will take place on June 2023 from 9:00 AM - 12:00 PM in room (M12 + M13)

5. The final exam will count 70% of the total course grade.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	**1.** "The dynamics and thermodynamics of compressible fluid flow", by: Shapiro, 1997. **2.** "Foundation of gas dynamics", by Ruey, Hung Chen, Cambridge University Press, 2017. **3.** "Elements of gas dynamics" , by Liepmann, H, W, John Wiley & Sons, Inc., New York, 2014. **4.** "Introduction to gas dynamics", by Rotty, R. M., John Wiley & Sons, Inc., New York, 2013. **5.** "Applied gas dynamics", by Ethirajan Rathakrishnan, John Wiley, Sixth edition , 2017. **6.** "Fundamental of compressible flow with aircraft and rocket propulsion" , by : S. M. Yahya ,2006.
Main references (sources)	منذر اسماعيل الدروبي ، مبادئ ديناميك الغازات ، بغداد ، وزارة التعليم العالي والبحث العلمي ،
Recommended books and references (scientific journals, reports...)	• Available websites related to the subject. • Extracurricular activities.
Electronic References, Websites	• Field and scientific visits. • Extra lectures by foreign guest lecturers.

Heat Transfer / ME303

1. Course Name:
Heat Transfer
2. Course Code:
ME303
3. Semester / Year:
Year
4. Description Preparation Date:
15/4/2024
5. Available Attendance Forms:
Class
6. Number of Credit Hours (Total) / Number of Units (Total)
- Credit Hours (Total) 3 hours per week /90 hours per year - 4 units
7. Course administrator's name (mention all, if more than one name)
Name: Assist Prof. Dr. Luma Fadhil Ali Email: **luma.f@coeng.uobaghdad.edu.iq**
8. Course Objectives

Course Objectives	**49.** Model basic heat transfer processes and identify modes. **50.** Introduce a basic study of the phenomena of heat transfer, to develop methodologies for solving a wide variety of practical engineering problems. **51.** Provide useful information concerning the performance and design of particular systems and processes. **52.** Analyze heat transfer problems in conduction, convection, and radiation. **53.** Formulate the necessary equations and calculate the temperature distributions and rates of conduction heat transfer. **54.** Calculate thermal resistances. **55.** Identify fins and calculate fin performance. **56.** Use shape factors for 2-D conduction. **57.** Solve lumped parameter transient heat transfer problems. **58.** Solve distributed parameter transient heat transfer problems.

	59. Compute steady and unsteady heat conduction problems employing Finite-difference. **60.** Recognize basic convective heat transfer and apply appropriate methods for quantifying convection. **61.** Calculate convective heat transfer coefficients for internal flow. **62.** Calculate convective heat transfer coefficients for external flow. **63.** Design and size heat exchangers. **64.** Teach the physics of the blackbody distribution function and radiation properties, thermal radiation, view factor, and radiation exchange between surfaces. **65.** Teach the fundamental concepts of solar radiation and the basic definitions of the angles.

9. Teaching and Learning Strategies

Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students. This will be achieved throw the following strategies: • Explaining the Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered.

10. Course Structure

Week	Hours	Required Graduate Outcomes	Unit or subject name	Learning method	Evaluation method
1	**3 hrs.**	**GOs (1,3,5,6)**	**Introduction, Thermodynamics and heat transfer, Conduction, Convection, Radiation heat transfer, Thermal conductivity. Simultaneous heat transfer mechanisms.**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
2	**3 hrs.**	**GOs (1,3)**	**One-dimensional heat conduction equation in large plane wall, long cylinder, and sphere.**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**

3	3 hrs.	GOs (1,6)	General heat conduction equation in rectangular, cylindrical, and spherical coordinates, Boundary and Initial conditions.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
4	3 hrs.	GOs (1,2,3)	Solution of Steady one-dimensional heat conduction problems. Heat Generation in a solid, Variable thermal conductivity.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
5	3 hrs.	GOs (1,2,3)	Thermal resistance concept, Thermal resistance network, Multilayer plane walls.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
6	3 hrs.	GOs (1,2,3)	Thermal contact resistance, Multilayered Cylinders and spheres. Critical radius of insulation.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
7	3 hrs.	GOs (1,2,3,6,7)	Fin equation. Fin efficiency and effectiveness, Proper length of a fin.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
8	3 hrs.	GOs (1,2)	Steady two-dimension heat conduction, analytical, graphical, and shape factor methods.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
9	3 hrs.	GOs (1,3,7)	Lumped system analysis, Transient heat conduction in large plane walls, long cylinders, and spheres.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
10	3 hrs.	GOs (1,2,3)	Transient heat conduction in semi-infinite solids and multidimensional systems.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
11	3 hrs.	GOs (1,)	Numerical methods in heat conduction, Finite difference formulation. One- dimensional	Lectures, assignments, discussions,	Exams, quizzes, oral quizzes, questionnaires

			steady heat conduction.	reports, presentations, posters.	
12	3 hrs.	GOs (1,)	Two- dimensional steady heat conduction.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
13	3 hrs.	GOs (1,2,3,7)	Transient heat conduction.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
14	3 hrs.	GOs (1,5,6,7)	Physical mechanism on convection, Thermal boundary layer, Laminar and Turbulent flows.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
15	3 hrs.	GOs (1,6)	Derivation of differential equations. Solutions of convection equations for a flat plate, Non-dimensionalized convection equations and similarity.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
16	3 hrs.	GOs (1,5)	Physical mechanism on convection, Thermal boundary layer, Laminar and Turbulent flows.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
17	3 hrs.	GOs (1,2)	Derivation of differential equations. Solutions of convection equations for a flat plate, Non-dimensionalized convection equations and similarity.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
18	3 hrs.	GOs (1,2,3)	External forced convection, Drag force and heat transfer in external flow. Parallel flow over flat plates.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
19	3 hrs.	GOs (1,2)	Flow across cylinders and spheres, Flow across tube banks. Internal forced convection, Mean velocity and mean temperature.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires

20	3 hrs.	GOs (1,3)	The entrance region. General thermal analysis, Laminar flow in tubes, Turbulent flow in tubes.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
21	3 hrs.	GOs (1,6)	Physical mechanism of natural convection, Equation of motion and the Grashof number.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
22	3 hrs.	GOs (1,2,3)	Natural convection over surfaces. Natural convection inside enclosures.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
23	3 hrs.	GOs (1,3,5,6,7)	Heat exchangers, Types of heat exchangers. The overall heat transfer coefficients.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
24	3 hrs.	GOs (1,2,6,7)	Analysis of heat exchangers. The log mean temperature difference method.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
25	3 hrs.	GOs (1,2,6)	The effectiveness-Ntu method. Selection of heat exchangers	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
26	3 hrs.	GOs (1,5,6,7)	Fundamentals of Thermal Radiation, Radiation Intensity. Radiative Properties. Atmospheric and Solar Radiation.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
27	3 hrs.	GOs (1,2)	The View Factor. View Factor Relations, Radiation Heat Transfer: Black Surfaces.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
28	3 hrs.	GOs (1,2)	Radiation Heat Transfer: Diffuse, Gray Surfaces,	Lectures, assignments, discussions,	Exams, quizzes, oral quizzes, questionnaires

				reports, presentations, posters.	
29	**3 hrs.**	**GOs (1,2,6)**	**Radiation Shields and the Radiation Effect Solar Radiation.**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
30	**3 hrs.**	**GOs (1,2,3,5,7)**	**The Sun, The Solar Constant, Spectral Distribution of Extraterrestrial Radiation. Variation of Extraterrestrial Radiation, Definitions. Beam Radiation, Extraterrestrial Radiation on a Horizontal Surface**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**

11. Course Evaluation

12. Quizzes:

- There will be (8 – 12) closed books and notes quizzes during the academic year.
- The quizzes will count 30% of the total course grade.

13. Quizzes, 2-3 questions, and will count 10%.

14. Extracurricular Activities, this is optional and will count extra marks (1 – 5 %) for the student, depending on the type of activity.

15. Final Exam:

- Final exam will be comprehensive, with closed books and notes, and will take place on June 2023 from 9:00 AM - 12:00 PM in room (M12 + M13)

16. The final exam will count 70% of the total course grade.

13. Learning and Teaching Resources

Required textbooks (curricular books, if any)	**6.** "*Heat and Mass Transfer A Practical Approach*"; by Yunus A. Çengel, McGraw-Hill, Third Edition, 2007. **7.** "*Fundamentals of Heat and Mass Transfer*"; by F.P., Incropera, and D.P., DeWitt, Seventh Edition, 2011.
Main references (sources)	Industrial Engineering, Tawfeeq Almudlel "Heat Transfer" J. P. Holman, McGraw-Hill, Inc., 10th edition, 2010.
Recommended books and references (scientific journals, reports...)	• Available websites related to the subject. • Extracurricular activities.
Electronic References, Websites	• Field and scientific visits. • Extra lectures by foreign guest lecturers.

Strength of Materials II / ME 304

1. Course Name:	
Strength of Materials II	
2. Course Code:	
ME309	
3. Semester / Year:	
Year	
4. Description Preparation Date:	
13/4/2024	
5. Available Attendance Forms:	
Class	
6. Number of Credit Hours (Total) / Number of Units (Total)	
- Credit Hours (Total) 3 hours per week (Strength of Materials II) / 90 hours per year - 4 units	
7. Course administrator's name (mention all, if more than one name)	
Name: Prof. Dr. Majid Habeeb Faidh-Allah Email: dr.majid-habeeb@coeng.uobaghdad.edu.iq	
8. Course Objectives	
Course Objectives	1. Understanding of stress-strain concept and types of stresses. 2. Understanding of stress-strain relationship in elastic limit. 3. Understanding of forces applied in beams and how to draw shear force and bending moment diagrams. 4. Understanding how to solve the slope and deflection in different beams. 5. Understanding how to analyze the torsion stress in shafts. 6. Understanding of the various stresses in thin and thick cylinders and pressure vessels. 7. Understanding of strain energy in different stresses. 8. Understanding of Castigliano's theories for slope and deflection in beams. 9. Understanding the types of springs and how to analyze stresses and strains in them. 10. Understanding of Mohr's method for solving individual and complex stresses and strains in parts subject to stress. 11. Understanding of elastic failure theories. 12. Understanding of buckling theories in struts.

9. Teaching and Learning Strategies

Strategy:	Course requirements, teaching materials (course vocabulary, textbook, sample student work, etc.), and samples of student work for all assignments (homework, tests, exams, lab reports, design projects, etc.).
Learning strategy:	The Problem-Based Learning (PBL) method is used in various courses. PBL is how students solve an engineering problem independently using previous courses. Almost all faculty are trained to use this method. The method simply divides the students into groups and each group solves the problem. Each group member will have a task and then they will discuss the results and report back. They will have the same mark and the students will learn through learning outcomes (GOs). Students will learn how to work as a group (GO 7), be able to interpret and analyze data (GO 3), write a report and give a seminar (GO 4), solve complex engineering problems (GO 1), use software techniques and skills (GO 6), design a problem (GO 2), the problem of moral responsibilities (GO 5)..

10. Course Structure

Week	Hours	Required Graduate Outcomes	Unit or subject name	Learning method	Evaluation method
1	3 hrs.	GOs (1, 6)	Review to strength of materials I : Simple stress and strain, compound bars, shear force, torsion stress and bending moment diagrams of beams, bending stress in beams	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
2	3 hrs.	GOs (1, 6)	Review to strength of materials I : Simple stress and strain, compound bars, shear force, torsion stress and bending moment diagrams of beams, bending stress in beams	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
3	3 hrs.	GOs (1, 6)	Slope and deflection in beams	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires

4	3 hrs.	GOs (1, 6)	Slope and deflection in beams	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
5	3 hrs.	GOs (6, 5, 2)	Built-in beams	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
6	3 hrs.	GOs (6, 5, 2)	Built-in beams	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
7	3 hrs.	GOs (5, 3, 1)	Shear stress distribution in cross sectional beams	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
8	3 hrs.	GOs (5, 3, 1)	Shear stress distribution in cross sectional beams	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
9	3 hrs.	GOs (5, 3, 1)	Thin cylinders pressure vessels	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
10	3 hrs.	GOs (5, 3, 1)	Thin cylinders pressure vessels	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
11	3 hrs.	GOs (5, 3, 1)	Thick cylinders	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
12	3 hrs.	GOs (5, 3, 1)	Thick cylinders	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
13	3 hrs.	GOs (3, 1)	Strain energy in tension or compression, shear, bending and torsion stresses	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
14	3 hrs.	GOs (3, 1)	Strain energy in tension or compression, shear, bending and torsion stresses	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
15	3 hrs.	GOs (3, 1)	Castigliano's theorems for slope and deflection	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
16	3 hrs.	GOs (5, 3, 1)	Castigliano's theorems for slope and deflection	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires

17	3 hrs.	GOs (1, 2)	Springs	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
18	3 hrs.	GOs (1, 2)	Springs	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
19	3 hrs.	GOs (1, 2)	Complex stresses on oblique planes	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
20	3 hrs.	GOs (1, 2)	Complex stresses on oblique planes	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
21	3 hrs.	GOs (1, 2, 3)	Complex stresses on oblique planes	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
22	3 hrs.	GOs (1, 2, 3)	Complex strains and elastic constants	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
23	3 hrs.	GOs (1, 2, 3)	Complex strains and elastic constants	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
24	3 hrs.	GOs (1, 2, 3)	Complex strains and elastic constants	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
25	3 hrs.	GOs (1, 2, 3)	Theories of elastic failure	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
26	3 hrs.	GOs (1, 2, 3)	Theories of elastic failure	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
27	3 hrs.	GOs (1, 2, 3)	Struts : Euler's theory, Rankine Gordon formula, struts with eccentric load, laterally loaded struts	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
28	3 hrs.	GOs (1, 2, 3)	Struts : Euler's theory, Rankine Gordon formula, struts with eccentric load, laterally loaded struts	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
29	3 hrs.	GOs (1, 2, 3)	Struts : Euler's theory, Rankine Gordon formula, struts with eccentric load, laterally loaded struts	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires

30	3 hrs.	GOs (1, 2, 3)	Preparatory week before the final Exam	/	/

11. Course Evaluation

14. Quizzes:

- There will be (12 – 14) closed books and notes quizzes during the academic year.
- The quizzes will count 20% of the total course grade.

15. Extracurricular Activities, this is optional and will count extra marks (10 %) for the student, depending on the type of activity.

16. Final Exam:

- Final exam will be comprehensive, with closed books and notes, and will take place on June 2023 from 9:00 AM - 12:00 PM in room (M12 + M13)

17. The final exam will count 70% of the total course grade.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	"Mechanics of Materials"; by E. J. Hearn, Volume 1 in addition to Struts Chapter of the Volume 2, 2nd Edition, Pergamon Press, 1985.
Main references (sources)	"Strength of Materials"; by Ferdinand L. Singer and Andrew Pytel, Third Edition, Harper & Row Publishers, New York, 1980.
Recommended books and references (scientific journals, reports...)	• Available websites related to the subject. • Extracurricular activities.
Electronic References, Websites	• Field and scientific visits. • Extra lectures by foreign guest lecturers.

Theory of machines and vibrations / ME305

1. Course Name:
Theory of machines and vibrations
2. Course Code:
ME305
3. Semester / Year:
Year
4. Description Preparation Date:
1/4/2024
5. Available Attendance Forms:
Class
6. Number of Credit Hours (Total) / Number of Units (Total)
- Credit Hours (Total) 3 hours per week (2 Vibrations +1 Theory of Machines)/S hours per year - 5 units
7. Course administrator's name (mention all, if more than one name)
Name: Prof. Dr. Widad Ibraheem Majeed Email: wedad.ibrahim@coeng.uobaghdad.edu.iq Name: Assist Prof. Dr. Ebtehal Abbas Sadiq Email: ibtehal.abbas@coeng.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	**66.** Introduce basic definitions and introductory concepts of oscillation motion of mechanical system. **67.** Introduce the description of phenomena associated with vibration of mechanical structures. **68.** Introduce the principles of "Mathematical modeling" and "Similitude" and their application to mechanical vibrations problems. **69.** Explain and derive the equation of motion for free and forced vibration of single degree of freedom systems. **70.** Explain and derive the equation of motion of vibration analysis of free and forced vibration of two degree of freedom systems. **71.** Enable the student to measure the vibration characteristics, and to design and conduct experiments of mechanical system vibration. **72.** Provide a strong physical and analytical understanding of mechanical vibrations in order to function in the capacity of mechanical engineer in many industry and transportation company

	73. Provide a background to higher level modules involving vibrations

9. Teaching and Learning Strategies

Strategy	**Teaching Strategy:** Course requirements, teaching materials (course vocabulary, textbook, sample student work, etc.), and samples of student work for all assignments (homework, tests, exams, lab reports, design projects, etc.). **Learning strategy:** The Problem-Based Learning (PBL) method is used in various courses. PBL is how students solve an engineering problem independently using previous courses. Almost all faculty are trained to use this method. The method simply divides the students into groups and each group solves the problem. Each group member will have a task and then they will discuss the results and report back. They will have the same mark and the students will learn through learning outcomes (GOs). Students will learn how to work as a group (GO 7), be able to interpret and analyze data (GO 3), write a report and give a seminar (GO 4), solve complex engineering problems (GO 1), use software techniques and skills (GO 6), design a problem (GO 2), the problem of moral responsibilities (GO 5). 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 type of simple experiments involving some sampling activities that are interesting to the students, this will be achieved throw the following strategies: • Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. • Oral presentations by the students are made to participate in the lecture.

10. Course Structure

Week	Hours	Required Graduate Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hrs.**	**GOs (1, 6)**	**Define oscillatory motion and compare it with other type of**	**Lectures, assignments,**	**Exams, quizzes, oral quizzes, questionnaires**

			dynamic motion of rigid body and define the basic elastic body basic element.	discussions, reports.	
2	2hrs.	GOs (1, 6)	Define oscillatory motion and compare it with other type of dynamic motion of rigid body and define the basic elastic body basic element.	Lectures, assignments, discussions, reports.	Exams, quizzes, oral quizzes, questionnaires
3	2 hrs.	GOs (1, 6)	Built a mathematical model for oscillatory motion of undamped single degree of freedom by applying Newtons Second law or Energy Method to get Keq., Meq., and natural frequency.	Lectures, assignments, discussions, reports.	Exams, quizzes, oral quizzes, questionnaires
4	2 hrs.	GOs (1, 6)	Built a mathematical model for oscillatory motion of undamped single degree of freedom by applying Newtons Second law or Energy Method to get Keq., Meq., and natural frequency.	Lectures, assignments, discussions, reports.	Exams, quizzes, oral quizzes, questionnaires
5	2 hrs.	GOs (1, 6)	Built a mathematical model for oscillatory motion of undamped single degree of freedom by applying Newtons Second law or Energy Method to get Keq.,	Lectures, assignments, discussions, reports.	Exams, quizzes, oral quizzes, questionnaires

			Meq., and natural frequency.		
6	2 hrs.	GOs (1, 6)	Built a mathematical model for oscillatory motion of damped single degree of freedom by applying Newton's Second law or Energy Method to get Keq., Meq., and natural frequency.	Lectures, assignments, discussions, reports.	Exams, quizzes, oral quizzes, questionnaires
7	2 hrs.	GOs (1, 6)	Built a mathematical model for oscillatory motion of damped single degree of freedom by applying Newton's Second law or Energy Method to get Keq., Meq., and natural frequency.	Lectures, assignments, discussions, reports.	Exams, quizzes, oral quizzes, questionnaires
8	2 hrs.	GOs (1, 6)	Built a mathematical model for oscillatory motion of damped single degree of freedom by applying Newton's Second law or Energy Method to get Keq., Meq., and natural frequency.	Lectures, assignments, discussions, reports.	Exams, quizzes, oral quizzes, questionnaires
9	2 hrs.	GOs (1, 6)	Built a mathematical model for oscillatory motion	Lectures, assignments, discussions, reports.	Exams, quizzes, oral quizzes, questionnaires

			of damped single degree of freedom by applying Newton's Second law or Energy Method to get Keq., Meq., and natural frequency.		
10	2 hrs.	GOs (1, 6)	How to obtain the response for undamped and damped single degree of freedom under harmonic or transient load	Lectures, assignments, discussions, reports.	Exams, quizzes, oral quizzes, questionnaires
11	2 hrs.	GOs (1, 6)	Built a mathematical model for oscillatory motion of damped two degree of freedom by applying Newton's Second law and Energy method and obtain mode shapes and their natural frequencies, also obtain response of these system to harmonic excitation.	Lectures, assignments, discussions, reports.	Exams, quizzes, oral quizzes, questionnaires
12	2 hrs.	GOs (1,6, 3)	How to obtain the response for undamped and damped single degree of freedom under harmonic	Lectures, assignments, discussions, reports.	Exams, quizzes, oral quizzes, questionnaires
13	2 hrs.	GOs (1,6, 3)	How to obtain the response for undamped and damped single degree of freedom under harmonic	Lectures, assignments, discussions, reports.	Exams, quizzes, oral quizzes, questionnaires
14	2 hrs.	GOs (1,6, 3)	How to obtain the response for undamped and damped single degree of freedom under harmonic	Lectures, assignments, discussions, reports.	Exams, quizzes, oral quizzes, questionnaires

15	**2 hrs.**	**GOs (1,6, 3)**	**How to obtain the response for undamped and damped single degree of freedom under harmonic**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, questionnaires**
16	**2 hrs.**	**GOs (1,6, 3)**	**How to obtain the response for undamped and damped single degree of freedom under harmonic**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, questionnaires**
17	**2 hrs.**	**GOs (1,6, 3)**	**How to obtain the response for undamped and damped single degree of freedom under harmonic**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, questionnaires**
18	**2 hrs.**	**GOs (1,6)**	**How to obtain the response for undamped and damped single degree of freedom under transient load.**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, questionnaires**
19	**2 hrs.**	**GOs (1,6)**	**How to obtain the response for undamped and damped single degree of freedom under transient load.**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, questionnaires**
20	**2 hrs.**	**GOs (1,6)**	**How to obtain the response for undamped and damped single degree of freedom under transient load.**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, questionnaires**
21	**2 hrs.**	**GOs (1,6)**	**Built a mathematical model for oscillatory motion of undamped two degree of freedom by applying Newtons Second law to obtain mode**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, questionnaires**

			shapes and their natural frequencies.		
22	2 hrs.	GOs (1,6)	Built a mathematical model for oscillatory motion of undamped two degree of freedom by applying Newton's Second law to obtain mode shapes and their natural frequencies.	Lectures, assignments, discussions, reports.	Exams, quizzes, oral quizzes, questionnaires
23	2 hrs.	GOs (1,6)	Built a mathematical model for oscillatory motion of undamped two degree of freedom by applying Newton's Second law to obtain mode shapes and their natural frequencies.	Lectures, assignments, discussions, reports.	Exams, quizzes, oral quizzes, questionnaires
24	2 hrs.	GOs (1,6)	Built a mathematical model for oscillatory motion of undamped two degree of freedom by applying Newton's Second law to obtain mode shapes and their natural frequencies.	Lectures, assignments, discussions, reports.	Exams, quizzes, oral quizzes, questionnaires
25	2 hrs.	GOs (1,6)	Built a mathematical model for oscillatory motion of undamped two degree of freedom	Lectures, assignments, discussions, reports.	Exams, quizzes, oral quizzes, questionnaires

			by applying Energy method to obtain mode shapes and their natural frequencies.		
26	**2 hrs.**	**GOs (1,6)**	**Built a mathematical model for oscillatory motion of undamped two degree of freedom by applying Energy method to obtain mode shapes and their natural frequencies.**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, questionnaires**
27	**2 hrs.**	**GOs (1,6,3)**	**Absorber**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, questionnaires**
28	**2 hrs.**	**GOs (1,6,3)**	**Absorber**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, questionnaires**
29	**2 hrs.**	**GOs (1,6)**	**Built a mathematical model for oscillatory motion of undamped two degree of freedom to obtain response of these system to harmonic excitation.**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, questionnaires**
30	**2 hrs.**	**GOs (1,6)**	**Built a mathematical model for oscillatory motion of undamped two degree of freedom to obtain response of these system to harmonic excitation.**	**Lectures, assignments, discussions, reports.**	**Exams, quizzes, oral quizzes, questionnaires**

11. Course Evaluation

33. Quizzes:

- There will be (8 – 12) closed books and notes quizzes during the academic year.
- The quizzes will count 30% (15% Vibrations + 15% Theory of Machines) of the total course grade.

34. Quizzes, 2-3 questions, and will count 10%.

35. Tutorials, 2-3 questions and will count (1 – 5 %) for the student.

36. Final Exam:

- Final exam will be comprehensive, with closed books and notes, and will take place on May 2024 from 9:00 AM - 12:00 PM in room (M12 + M13)

37. The final exam will count 70% of the total course grade.

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	**8.** Mechanical Vibration (Schoum's Series), William W. Seto, 2nd Edition, Mc Graw Hill book comp **9.** Mechanical Vibrations" Singiresu S. Rao,Fifth Edition, Prentice Hall,USA,2011.
Main references (sources)	Theory of Vibration With Applications by Williams T. Thomson 3rd Edition, London Allen and Unwin, 1988.
Recommended books and references (scientific journals, reports...)	• Available websites related to the subject. • Extracurricular activities.
Electronic References, Websites	• Field and scientific visits. • Extra lectures by foreign guest lecturers.

Mechanics of Machines / ME305

1. Course Name:

Mechanics of Machines and Vibration (Mechanics of Machines)

2. Course Code:

ME305

3. Semester / Year:

Year

4. Description Preparation Date:

15/4/2024

5. Available Attendance Forms:

Class

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

- Credit Hours (Total) 3 hours per week (Mechanics of Machines 1 hr. + Vibration 2 hr.)/ 9 90 hours per year.
- 4 units

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

Name: Assist Prof. Dr. Ibtehal Abbas Sadiq (Mechanics of Machine)
Email: ibtehal.abbas@coeng.uobaghdad.edu.iq
Name: Prof. Dr. Widad Ibraheem Majeed (vibration)
Email: wedad.ibrahim@coeng.uobaghdad.edu.iq

8. Course Objectives (Mechanics of Machine)

Course Objectives	1. The ability to improve operations by solving complex engineering problems and the concepts and principles of Theory of Machine. 2. Provide a physical and analytical understanding of theory of machines in order to function in the capacity of mechanical engineer in an engineering company. 3. Introduce basic definitions and introductory concepts of theory of machines. 4. Introduce the description of phenomena associated with toothed gearing and study the length of arc and path contact, contact ratio and the interference in involutes gears. 5. Introduce the principles of different types of gear trains depending upon the arrangement of wheel (simple, compound, reverted and epicyclic gear train). 6. Introduce the principles of gyroscopic couple and precessional motion with applications. 7. Enable the student to regulate the mean speed of an engine by different types of

	governors. 8. Introduce the principles of balancing of rotating mass in the same and different planes. 9. Introduce the principles of balancing of reciprocating masses of multi-cylinder In-line engine with balancing of V-engines.

9. Teaching and Learning Strategies

Strategy

Teaching Strategy:

Course requirements, teaching materials (course vocabulary, textbook, sample student work, etc.), and samples of student work for all assignments (homework, tests, exams, lab reports, design projects, etc.).

Learning strategy:

The student will be able to:

a. Define the general principle of theory of machine systems.

b. Understand the general terms of gears [spur gear and rack and pinion] to find the contact ratio, path of contact and understand the phenomenon of interference.

c. Introduce the general principle of different types of gear trains depending upon the arrangement of wheel (simple, compound, reverted and epicyclic gear train) with applications.

d. Understand the principle of gyroscopic couple and processional motion in with application [airplane, ships, automobiles, motorcycle].

e. Be familiar of different kinds of governors to control the speed of fuel that supply to the engine.

f. Calculate the balancing mass of the system contain of several masses in the same plane and in different planes numerically and graphically.

g. Draw the primary and secondary forces to study of the balancing of reciprocating masses of in-line engine and V-engine to find and.

h. Be able to apply modern knowledge and to apply mathematics, science, engineering and technology to theory of mechanics problems and applications.

i. Design and conduct experiments of theory of machines, as well as analyze, interpret data and apply the experimental results for the services.

j. Work in groups and function on multi-disciplinary teams.

k. Identify, formulate and solve engineering related theory of mechanics problems.

l. Communicate effectively.

m. Use the techniques, skills, and modern engineering tools necessary for

	engineering practice in theory of machines applications.

10. Course Structure

Week	Hours	Required Graduate Outcomes	Unit or subject name	Learning method	Evaluation method
1	1 hr.	a, k	Introductory Concepts to theory of machines	Lectures, assignments, discussions, reports, presentations, class work.	Exams, quizzes, oral quizzes,
2	1 hr.	a, k	Introductory Concepts to theory of machines	Lectures, assignments, discussions, reports, presentations, class work.	Exams, quizzes, oral quizzes,
3	1 hr.	a, k	Introductory Concepts to theory of machines	Lectures, assignments, discussions, reports, presentations, class work.	Exams, quizzes, oral quizzes,
4	1 hr.	b, m	General terms in gears	Lectures, assignments, discussions, reports, presentations, class work.	Exams, quizzes, oral quizzes,
5	1 hr.	b, m	General terms in gears	Lectures, assignments, discussions, reports, presentations, class work.	Exams, quizzes, oral quizzes,
6	1 hr.	b, m	General terms in gears	Lectures, assignments, discussions, reports, presentations, class work.	Exams, quizzes, oral quizzes,
7	1 hr.	b, m, l	Spur gear , rack and pinion	Lectures, assignments, discussions, reports, presentations, class work.	Exams, quizzes, oral quizzes,
8	1 hr.	b, m, l	Spur gear , rack and pinion	Lectures, assignments, discussions, reports, presentations, class work.	Exams, quizzes, oral quizzes,
9	1 hr.	b, m, l	Spur gear , rack and pinion	Lectures, assignments, discussions, reports, presentations, class work.	Exams, quizzes, oral quizzes,
10	1 hr.	b, m, l, h	Interference	Lectures, assignments, discussions, reports, presentations, class work.	Exams, quizzes, oral quizzes,
11	1 hr.	c, h	Gear train	Lectures, assignments, discussions, reports, presentations, class work.	Exams, quizzes, oral quizzes,

12	1 hr.	c, h	Gear train	Lectures, assignments, discussions, reports, presentations, class work.	Exams, quizzes, oral quizzes,
13	1 hr.	c, h, i	Epicyclic of gear train	Lectures, assignments, discussions, reports, presentations, class work.	Exams, quizzes, oral quizzes,
14	1 hr.	c, h, i	Epicyclic of gear train	Lectures, assignments, discussions, reports, presentations, class work.	Exams, quizzes, oral quizzes,
15	1 hr.	c, h, i	Epicyclic of gear train	Lectures, assignments, discussions, reports, presentations, class work.	Exams, quizzes, oral quizzes,
16	1 hr.	c, h, i	Epicyclic of gear train	Lectures, assignments, discussions, reports, presentations, class work.	Exams, quizzes, oral quizzes,
17	1 hr.	e, m	Governors	Lectures, assignments, discussions, reports, presentations, class work.	Exams, quizzes, oral quizzes,
18	1 hr.	e, m	Governors	Lectures, assignments, discussions, reports, presentations, class work.	Exams, quizzes, oral quizzes,
19	1 hr.	d, h	Gyroscopic couple and precession motion	Lectures, assignments, discussions, reports, presentations, class work.	Exams, quizzes, oral quizzes,
20	1 hr.	d, h	Gyroscopic couple and precession motion	Lectures, assignments, discussions, reports, presentations, class work.	Exams, quizzes, oral quizzes,
21	1 hr.	d, h	Gyroscopic couple and precession motion	Lectures, assignments, discussions, reports, presentations, class work.	Exams, quizzes, oral quizzes,
22	1 hr.	d, h	Application of gyroscopic couple	Lectures, assignments, discussions, reports, presentations, class work.	Exams, quizzes, oral quizzes,
23	1 hr.	d, h	Application of gyroscopic couple	Lectures, assignments, discussions, reports, presentations, class work.	Exams, quizzes, oral quizzes,
24	1 hr.	f, j, k	Balancing of rotating masses in same plane	Lectures, assignments, discussions, reports,	Exams, quizzes, oral quizzes,

				presentations, class work.	
25	1 hr.	f, j, k	Balancing of rotating masses in same plane	Lectures, assignments, discussions, reports, presentations, class work.	Exams, quizzes, oral quizzes,
26	1 hr.	f, j, k	Balancing of rotating masses in different planes	Lectures, assignments, discussions, reports, presentations, class work.	Exams, quizzes, oral quizzes,
27	1 hr.	f, j, k	Balancing of rotating masses in different planes	Lectures, assignments, discussions, reports, presentations, class work.	Exams, quizzes, oral quizzes,
28	1 hr.	v, h, i	Balancing of reciprocating masses of multi-cylinder in-line engine	Lectures, assignments, discussions, reports, presentations, class work.	Exams, quizzes, oral quizzes,
29	1 hr.	v, h, i	Balancing of reciprocating masses of V-engine	Lectures, assignments, discussions, reports, presentations, class work.	Exams, quizzes, oral quizzes,
30	1 hr.	h, j, m	Overall Review	Lectures, assignments, discussions, reports, presentations, class work.	Exams, quizzes, oral quizzes,

11.Course Evaluation

1. **Quizzes:**

- There will be (10 – 15) closed books and notes quizzes during the academic year.
- The quizzes will count 30% (10% Mechanics of Machine + 20% Vibration) of the total course grade.

2. Extracurricular Activities, this is optional and will count extra marks (1 – 5 %) for the student, depending on the type of activity.

3. **Final Exam:**

- Final exam will be comprehensive, with closed books and notes, and will take place on June 2023 from 9:00 AM - 12:00 PM in room (M12 + M13)

4. The final exam will count 70% of the total course grade (24% Mechanics of Machine + 46 % Vibration).

5. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Theory of Machines" by R. S. Khurmi and J. K. Gupta, 2010.
Main references (sources)	"Mechanics of Machines" Advanced Theory and Examples, by John Hannah.
Recommended books and references (scientific journals, reports...)	Mechanics of Machines" Elementary Theory and Examples, by John Hannah.
Electronic References, Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering

English language III/ ME309

1. Course Name:

English language III

2. Course Code:

ME309

3. Semester / Year:

Year

4. Description Preparation Date:

1/4/2024

5. Available Attendance Forms:

Class

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

- Credit Hours (Total) 2 hours per week (60) hours per year

2 units

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

Name : Dr. Ban Baqir Jawad
Email: ban.bakir@coeng.uobaghdad.edu.iq

8. Course Objectives

Course Objectives	❖ Preparing graduates who master the four skills. A-Listening. B- Speaking C-Reading D- Writing. ❖ Enabling Students to rely on themselves in understanding ❖ what they read and hear in the English language . ❖ Creating a stable student behaviorally and emotionally. ❖ Developing literary taste and aesthetic sense of students ❖ through teaching English vocabulary ❖ Understand how literary texts reflect, critique, and produce culture. ❖ Pursue deeper knowledge of particular authors and works. ❖ Understand the structure of language and how language varies over time, across social situations and social groups. ❖ Participate in face-to-face exchanges of ideas with faculty, fellow students, and authors in the classroom and other academic or social settings. ❖ Participate in small seminars where ideas are tested and sharpened.

	❖ Cultivate relational thinking that encourages students to make connections between the arts and humanities and other fields of study. ❖ Sustain a life-long engagement with and delight in literature, art, and culture. ❖ Perpetuate an interest and involvement in aesthetic, cultural, and intellectual matters, including social and political issues. ❖ Draw upon multiple literacies to interpret literary, visual, and cultural texts

9. Teaching and Learning Strategies

Strategy

Teaching Strategy:

Type something like: 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 type of simple experiments involving some sampling activities that are interesting to the students.

This will be achieved throw the following strategies:

- Explaining the Lecture plan and in-class activities.
- Each class will commence with a summary of the previous lecture.
- Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered.

Oral and power point presentations by the students are made to participate in the lecture.

Learning strategy:

The Problem-Based Learning (PBL) method is used in various courses. PBL is how students solve an engineering problem independently using previous courses. Almost all faculty are trained to use this method. The method simply divides the students into groups and each group solves the problem. Each group member will have a task and then they will discuss the results and report back. They will have the same mark and the students will learn through learning outcomes (GOs). Students will learn how to work as a group (GO 7), be able to interpret and analyze data (GO 3), write a report and give a seminar (GO 4), solve complex engineering problems (GO 1), use software techniques and skills (GO 6), design a problem (GO 2), the problem of moral responsibilities (GO 5)..

10. Course Structure

Week	Hours	Required Graduate Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 hrs.	GOs (1, 6)	Chapter 1 Tenses , Auxiliary verbs	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires

2	**2 hrs.**	**GOs (1, 6)**	Chapter 1 short answers , social expressions	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
3	**2 hrs.**	**GOs (1, 6)**	Chapter 2 Present tenses , passive	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
4	**2 hrs.**	**GOs (1, 6)**	Chapter 2 sport , numbers and dates	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
5	**2 hrs.**	**GOs (6, 5, 2)**	Chapter 3 past tenses , art and literature	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
6	**2 hrs.**	**GOs (6, 5, 2)**	Chapter 3 giving opinions	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
7	**2 hrs.**	**GOs (5, 3, 1)**	Chapter 4 Modal verbs , obligation and permission	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
8	**2 hrs.**	**GOs (5, 3, 1)**	Chapter 4 nationality words , requests and offers	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
9	**2 hrs.**	**GOs (5, 3, 1)**	Chapter 5 Future forms , the weather	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
10	**2 hrs.**	**GOs (5, 3, 1)**	Chapter 5 travelling around	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
11	**2 hrs.**	**GOs (5, 3, 1)**	Chapter 6 like, verbs patterns , describing food	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
12	**2 hrs.**	**GOs (5, 3, 1)**	Chapter 6 , towns and people , signs and sounds	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
13	**2 hrs.**	**GOs (3, 1)**	Reading	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
14	**2 hrs.**	**GOs (3, 1)**	Listening	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
15	**2 hrs.**	**GOs (3, 1)**	Presentation	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
16	**2 hrs.**	**GOs (5, 3, 1)**	Chapter 7 Present perfect active and passive	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
17	**2 hrs.**	**GOs (1, 2)**	Chapter 7 phrasal verbs , on the phone	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires

18	**2 hrs.**	**GOs (1, 2)**	Chapter 8 Conditionals , time clauses	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
19	**2 hrs.**	**GOs (1, 2)**	Chapter 8 base and strong adjectives , making suggestions	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
20	**2 hrs.**	**GOs (1, 2)**	Chapter 9 Modal verbs 2 , probability ,	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
21	**2 hrs.**	**GOs (1, 2, 3)**	Chapter 9 character adjectives , so do I neither do	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
22	**2 hrs.**	**GOs (1, 2, 3)**	Chapter 10 Obsessions , present perfect continuous ,	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
23	**2 hrs.**	**GOs (1, 2, 3)**	Chapter 10 time expressions , compound nouns , quality	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
24	**2 hrs.**	**GOs (1, 2, 3)**	Chapter 11 Indirect questions , question tags ,	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
25	**2 hrs.**	**GOs (1, 2, 3)**	Chapter 11 the body , informal English	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
26	**2 hrs.**	**GOs (1, 2, 3)**	Chapter 12 Birth marriage , and death , saying sorry	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
27	**2 hrs.**	**GOs (1, 2, 3)**	Chapter 12 Reported speech , reporting verbs,	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
28	**2 hrs.**	**GOs (1, 2, 3)**	Reading	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
29	**2 hrs.**	**GOs (1, 2, 3)**	Listening	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
30	**2 hrs.**	**GOs (1, 2, 3)**	Presentation	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires

11.

1. **Quizzes:**

- There will be (8 – 12) closed books and notes quizzes during the academic year.
- The quizzes will count 30% (15% grammar + 5% reading + 5% presentation) of the total course grade.

2. Quizzes, 5 questions, and will count 100%.

3. Extracurricular Activities, this is optional and will count extra marks (5 %) for the student, depending on the type of activity.

4. **Final Exam:**
   - Final exam will be comprehensive, with closed books and notes, and will take place on May 2024 from 10:00 AM - 1:00 PM in room (M12 + M13)
5. The final exam will count 70% of the total course grade.

6. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Headway Plus / Intermediate Students Book - Liz and John Soars / OXFORD
Main references (sources)	Longman / Introductory course for the Toefl test / Deborah , Phillips
Recommended books and references (scientific journals, reports...)	• Top Notch / Joan Saslow. Allen Ascher • My Grammer Lab , Mark Foley , Diane Hall
Electronic References, Websites	https://canadadotnet.files.wordpress.com/2020/05/english-grammar-in-use-intermediate.pdf

Design of Machine Elements / I/ 401

1. Course Name:
Design of Machine Elements / I
2. Course Code:
ME416
3. Semester / Year:
Year
4. Description Preparation Date:
1/4/2024
5. Available Attendance Forms:
Class
6. Number of Credit Hours (Total) / Number of Units (Total)
- Credit Hours (Total) 6 hours per week (Industrial Engineering + Quality Control)/150 hours per year - 5 units
7. Course administrator's name (mention all, if more than one name)
Name: Prof. Dr. Abdullah Dhayea Assi Email: drabdullahdhayea@uobaghdad.edu.iq
8. Course Objectives

Course Objectives	1. The main goal of teaching the machine design course is to introduce the student to how to design machine parts, and then to introduce him to how to connect these parts to an integrated system and deal with them with a comprehensive design vision. 2. Demonstrate professional leadership. 3. Motivation and the ability to achieve a lifelong learning career. 4. Performance of tasks advanced in the industry, and the ability to successfully plan, control, and implementation of large-scale projects. 5. Understand and apply the principles of science, technology, engineering, and mathematics, which include industry-related problems. 6. Contribute to the profitable growth of the industrial sectors using analytical tools, effective computational approaches, methodology, and systems thinking. 7. Maintaining high standards of professional and ethical responsibility.

	8. Work effectively, diverse, and multicultural emphasis on the application of skills, teamwork, and communication. 9. Practice and lifelong learning to maintain technical operation and excellence in various fields. **10.**Promotion of the profession and its benefits to the community.

11.Teaching and Learning Strategies

Strategy	**Teaching Strategy:** Course requirements, teaching materials (course vocabulary, textbook, sample student work, etc.), and samples of student work for all assignments (homework, tests, exams, lab reports, design projects, etc.). **Learning strategy:** The Problem-Based Learning (PBL) method is used in various courses. PBL is how students solve an engineering problem independently using previous courses. Almost all faculty are trained to use this method. The method simply divides the students into groups and each group solves the problem. Each group member will have a task and then they will discuss the results and report back. They will have the same mark and the students will learn through learning outcomes (GOs). Students will learn how to work as a group (GO 7), be able to interpret and analyze data (GO 3), write a report and give a seminar (GO 4), solve complex engineering problems (GO 1), use software techniques and skills (GO 6), design a problem (GO 2), the problem of moral responsibilities (GO 5)..

12. Course Structure

Week	Hours	Required Graduate Outcomes	Unit or subject name	Learning method	Evaluation method
1	3 hrs.	GOs (1, 6)	Engineering Material	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
2	3 hrs.	GOs (1, 6)	Stress & Strain Principal	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
3	3 hrs.	GOs (1, 6)	Solve the problems in the chapter above	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
4	3 hrs.	GOs (1, 6)	Simple and Combined Stresses	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
5	3 hrs.	GOs (6, 5, 2)	Solve the problems in the chapter above	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires

6	3 hrs.	GOs (6, 5, 2)	Stress & Strain Tensor	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
7	3 hrs.	GOs (5, 3, 1)	Solve the problems in the chapter above	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
8	3 hrs.	GOs (5, 3, 1)	Mohr Circle in 3D Principal Stress	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
9	3 hrs.	GOs (5, 3, 1)	Solve the problems in the chapter above	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
10	3 hrs.	GOs (5, 3, 1)	Theories of Elastic Failure or Static Failure	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
11	3 hrs.	GOs (5, 3, 1)	Solve the problems in the chapter above	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
12	3 hrs.	GOs (5, 3, 1)	Theories of Fatigue Failure	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
13	3 hrs.	GOs (3, 1)	Solve the problems in the chapter above	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
14	3 hrs.	GOs (3, 1)	Curved Beam or Bars	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
15	3 hrs.	GOs (3, 1)	Solve the problems in the chapter above	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
16	3 hrs.	GOs (5, 3, 1)	Design of Shafts	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
17	3 hrs.	GOs (1, 2)	Solve the problems in the chapter above	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
18	3 hrs.	GOs (1, 2)	Introduction in Gears Design	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
19	3 hrs.	GOs (1, 2)	Design of Spur Gears	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
20	3 hrs.	GOs (1, 2)	Solve the problems in the chapter above	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
21	3 hrs.	GOs (1, 2, 3)	Design of Helical Gears	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
22	3 hrs.	GOs (1, 2, 3)	Solve the problems in the chapter above	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires

23	**3 hrs.**	**GOs (1, 2, 3)**	**Design of Bevel Gears**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
24	**3 hrs.**	**GOs (1, 2, 3)**	**Solve the problems in the chapter above**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
25	**3 hrs.**	**GOs (1, 2, 3)**	**Design of Worm Gears**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
26	**3 hrs.**	**GOs (1, 2, 3)**	**Solve the problems in the chapter above**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
27	**3 hrs.**	**GOs (1, 2, 3)**	**Design of Brakes**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
28	**3 hrs.**	**GOs (1, 2, 3)**	**Solve the problems in the chapter above**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
29	**3 hrs.**	**GOs (1, 2, 3)**	**Design of Clutches**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
30	**3 hrs.**	**GOs (1, 2, 3)**	**Solve the problems in the chapter above**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**

13.Course Evaluation

1. **Quizzes:**

- There will be (8 – 12) closed books and notes quizzes during the academic year.
- The quizzes will count 40% (20% Design of Machine Elements / I + 20% Design of Machine Elements / II) of the total course grade.

2. Quizzes, 2-3 questions, and will count 10%.

3. Extracurricular Activities, this is optional and will count extra marks (1 – 5 %) for the student, depending on the type of activity.

4. **Final Exam:**

- Final exam will be comprehensive, with closed books and notes, and will take place on June 2023 from 9:00 AM - 12:00 PM in room (M12 + M13)

5. The final exam will count 60% of the total course grade.

6. Learning and Teaching Resources

Main references (sources)	**Machine Design / KHURMI & GUPTA**
Required textbooks (curricular books, if any)	1- Mechanics of Materials / HEARN 2- Mechanical Engineering Design / **SHIGLEY'S** **3-** Mechanics of Materials / HIBBELER

	4- Advanced Mechanics of Materials and Applied Elasticity / **UGURAL** **5- Machine Design /SCHAUM'S**
Recommended books and references (scientific journals, reports...)	• Available websites related to the subject. • Extracurricular activities.
Electronic References, Website	• Field and scientific visits.

Control of Mechanical Systems/ ME402

1. Course Name:	
Control of Mechanical Systems	
2. Course Code:	
ME402	
3. Semester / Year:	
Year	
4. Description Preparation Date:	
16/4/2024	
5. Available Attendance Forms:	
Class	
6. Number of Credit Hours (Total) / Number of Units (Total)	
- Credit Hours (Total) 3 hours per week (Control of Mechanical Systems + Measurements)/ 90 hours per year - 4 units	
7. Course administrator's name (mention all, if more than one name)	
Name: Assist Prof. Dr. Karim Hassan Ali Email: dr.karimhaliabood@coeng.uobaghdad.edu.iq Name: Lct. Dr. Ali Email: ali.i.mosa@coeng.uobaghdad.edu.iq	
8. Course Objectives	
Course Objectives	1. Introduce basic definitions and introductory concepts of mechanical Engineering control fundamentals. 2. Introduce the description of control elements and components and teach the student how to convert a mechanical component into an electrical or any other system. 3. Introduce the description of phenomena of getting overall mechanical control system and help them to understand the system and how it works. 4. Teach the students how to get the overall block diagram representation of the control systems. 5. Introduce the description of examples of mechanical systems such as speed control system or thermal control systems and obtaining the associated overall transfer function between the inputs and output.

	6. Introduce the principles of mechanical control system when operate under steady-state operation and teach the students the differences between the proportional, integral and PI systems.

7. Teaching and Learning Strategies

Strategy	**Teaching Strategy:** Course requirements, teaching materials (course vocabulary, textbook, sample student work, etc.), and samples of student work for all assignments (homework, tests, exams, lab reports, design projects, etc.). **Learning strategy:** The Problem-Based Learning (PBL) method is used in various courses. PBL is how students solve an engineering problem independently using previous courses. Almost all faculty are trained to use this method. The method simply divides the students into groups and each group solves the problem. Each group member will have a task and then they will discuss the results and report back. They will have the same mark and the students will learn through learning outcomes (GOs). Students will learn how to work as a group (GO 7), be able to interpret and analyze data (GO 3), write a report and give a seminar (GO 4), solve complex engineering problems (GO 1), use software techniques and skills (GO 6), design a problem (GO 2), the problem of moral responsibilities (GO 5)..

8. Course Structure

Week	Hours	Required Graduate Outcomes	Unit or subject name	Learning method	Evaluation method
1	3 hrs.	GOs (1, 6)	Introduction to automatic control systems + measurements	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
2	3 hrs.	GOs (1, 6)	Introduction to automatic control systems + measurements	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
3	3 hrs.	GOs (1, 6)	Representation of control components + measurement historical view	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
4	3 hrs.	GOs (1, 6)	Representation of control components + measurement theory	Lectures, assignments, discussions, reports,	Exams, quizzes, oral quizzes, questionnaires

				presentations, posters.	
5	3 hrs.	GOs (6, 5, 2)	Grounded chair representation techniques and analogies + measurement structure	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
6	3 hrs.	GOs (6, 5, 2)	Grounded chair representation techniques and analogies + measurement units	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
7	3 hrs.	GOs (5, 3, 1)	Representation of control system with block diagram algebra + measurement instrument and types	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
8	3 hrs.	GOs (5, 3, 1)	Representation of control system with block diagram algebra + measurement instrument and types	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
9	3 hrs.	GOs (5, 3, 1)	Speed control system + passive instruments	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
10	3 hrs.	GOs (5, 3, 1)	Incompressible fluid control systems + active instruments	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
11	3 hrs.	GOs (5, 3, 1)	Steady-state operation analysis + Null type instruments	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
12	3 hrs.	GOs (5, 3, 1)	Steady-state operation analysis + deflection type instruments	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
13	3 hrs.	GOs (3, 1)	Control systems with proportional and integral controllers + Analog and digital instruments	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires

14	**3 hrs.**	**GOs (3, 1)**	**Control systems with proportional and integral controllers + Analog and digital instruments**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
15	**3 hrs.**	**GOs (3, 1)**	**Dynamic response with Laplace transforms + Instruments construction and calibrations**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
16	**3 hrs.**	**GOs (5, 3, 1)**	**Dynamic response with Laplace transforms + Instruments construction and calibrations**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
17	**3 hrs.**	**GOs (1, 2)**	**Dynamic response with Laplace transforms + senility of measurements**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
18	**3 hrs.**	**GOs (1, 2)**	**Steady-state error with error coefficients + threshold and resolution**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
19	**3 hrs.**	**GOs (1, 2)**	**Steady-state error with error coefficients + sensor elements**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
20	**3 hrs.**	**GOs (1, 2)**	**Transient response of control systems + types of sensing elements**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
21	**3 hrs.**	**GOs (1, 2, 3)**	**Transient response of control systems + types of sensing elements**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
22	**3 hrs.**	**GOs (1, 2, 3)**	**Routh's stability criterion + types of sensing elements**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
23	**3 hrs.**	**GOs (1, 2, 3)**	**Principles of root locus plot + measurement of sound and noise**	**Lectures, assignments, discussions, reports,**	**Exams, quizzes, oral quizzes, questionnaires**

				presentations, posters.	
24	**3 hrs.**	**GOs (1, 2, 3)**	**Principles of root locus plot + measurement of sound and noise**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
25	**3 hrs.**	**GOs (1, 2, 3)**	**Variation of parameters and sensitivity + measurement of sound and noise**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
26	**3 hrs.**	**GOs (1, 2, 3)**	**Variation of parameters and sensitivity + octave bands**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
27	**3 hrs.**	**GOs (1, 2, 3)**	**Frequency response method + types of noise**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
28	**3 hrs.**	**GOs (1, 2, 3)**	**Frequency response method + types of noise**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
29	**3 hrs.**	**GOs (1, 2, 3)**	**Bode and Nyquist plot + Sound Pressure Evaluation Criteria**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
30	**3 hrs.**	**GOs (1, 2, 3)**	**Bode and Nyquist plot + Sound absorption coefficient**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**

9. Course Evaluation

1. **Quizzes:**
   - There will be (8 – 12) closed books and notes quizzes during the academic year.
   - The quizzes will count 30% (20% Control of mechanical systems + 10% measurement) of the total course grade.
2. Quizzes, 2-3 questions, and will count 10%.
3. Extracurricular Activities, this is optional and will count extra marks (1 – 5 %) for the student, depending on the type of activity.
4. **Final Exam:**

- Final exam will be comprehensive, with closed books and notes, and will take place on June 2023 from 9:00 AM - 12:00 PM in room (M12 + M13)

5. The final exam will count 70% of the total course grade. (46% control of mechanical systems, 24% measurements)

10. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. "Automatic Control Engineering"; by Francis H. Raven, Third Edition, Mc Graw Hill, Inc , 1978. 2. "Modern Control Engineering"; by Katsuhiko Ogata, First Edition, Prentice-Hall Inc, 1970. 3. "Feedback Control system Analysis & Synthesis "by J.J. D'Azzo and C. H. Houpis, second edition, Mc Graw Hill, Inc , 1966. 4. "Measurement Systems application and Design" by Ernest O. Doebelin, fourth addition, Mc Graw Hill, Inc , 1990.
Main references (sources)	"Control Systems Engineering" by Norman S. Nise, six edition, John Wiley & Sons, Inc, 2011.
Recommended books and references (scientific journals, reports...)	• Available websites related to the subject. • Extracurricular activities.
Electronic References, Website	• Field and scientific visits. • Extra lectures by foreign guest lecturers.

Air Conditioning and Refrigeration / ME403

1. Course Name:
Air Conditioning and Refrigeration
2. Course Code:
ME415
3. Semester / Year:
Year
4. Description Preparation Date:
14/4/2024
5. Available Attendance Forms:
Class
6. Number of Credit Hours (Total) / Number of Units (Total)
- Credit Hours (Total) 4 hours per week (Air conditioning + Refrigeration) / 120 hours per year. - 6 units
7. Course administrator's name (mention all, if more than one name)
Name: Najim Abid Jassim Email: dr.najim-almozani@coeng.uobaghdad.edu.iq Name: Wail Sami Sarsam Email: wail_sarsam@coeng.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	**<u>Air Conditioning</u>** 1. Learning the fundamental principles and different methods of air conditioning. 2. Understanding the basic air conditioning processes on psychometric charts, that is represented by different air conditioning systems practically by applying the conservation laws for these processes by conducting the laboratory experiments. 3. Study of various refrigeration cycles and evaluate performance using Mollier charts and/ or refrigerant property tables with respect to properties, applications, and environmental issues. 4. Capable of calculating the heating and cooling loads of building for the specified factors such as ambient climate data

	and building materials that are affecting the thermal comfort in air conditioning zones. 5. Capable of designing the air and water distribution systems and selecting the specified air fans and water pumps. 6. Finally an ability to use the modern engineering tools necessary for engineering practice to identify, formulate, and solve engineering problems. **Refrigeration** 1. Provide basic definitions, introductory concepts of refrigeration, classification of refrigerants, and thermophysical properties of refrigerants with their environmental effects. 2. Introduce the principle, operation, analysis, components, and capacity control methods of vapor compression refrigeration cycles (VCRC). 3. Provide a strong physical and analytical understanding of the various types of safety equipment, compressors, evaporators, condensers, and expansion devises used in vapor compression refrigeration cycles (VCRC). 4. Introduce the principle, operation, analysis, components, and capacity control methods of absorption-refrigeration systems (ARS).
9. Teaching and Learning Strategies	
Strategy	**Teaching Strategy:** Course requirements, teaching materials (course vocabulary, textbook, sample student work, etc.), and samples of student work for all assignments (homework, tests, exams, lab reports, design projects, etc.). **Learning strategy:** The Problem-Based Learning (PBL) method is used in various courses. PBL is how students solve an engineering problem independently using previous courses. Almost all faculty are trained to use this method. The method simply divides the students into groups and each group solves the problem. Each group member will have a task and then they will discuss the results and report back. They will have the same mark and the students will learn through learning outcomes (GOs). Students will learn how to work as a group (GO 7), be able to interpret and analyze data (GO 3), write a report and give a seminar (GO 4), solve complex engineering problems (GO 1), use software techniques and skills

	(GO 6), design a problem (GO 2), the problem of moral responsibilities (GO 5).

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4 hrs.	GOs (1, 6)	Introduction to air conditioning and refrigeration.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
2	4 hrs.	GOs (1, 6)	The main properties of moist air and refrigerants.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
3	4 hrs.	GOs (1, 6)	The main properties of moist air and refrigerants.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
4	4 hrs.	GOs (1, 6)	The conservation laws for air conditioning processes.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
5	4 hrs.	GOs (1, 6)	The psychrometry of air conditioning processes.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
6	4 hrs.	GOs (1, 6)	The psychrometry of air conditioning processes.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
7	4 hrs.	GOs (6, 5, 2)	Theoretical and actual vapor refrigeration cycle.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
8	4 hrs.	GOs (6, 5, 2)	Theoretical and actual vapor refrigeration cycle.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
9	4 hrs.	GOs (6, 5, 2)	Human and comfort and environment conditions.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
10	4 hrs.	GOs (5, 3, 1)	Absorption refrigeration cycle and processes of	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires

			homogeneous binary mixtures.		
11	4 hrs.	GOs (5, 3, 1)	Absorption refrigeration cycle and processes of homogeneous binary mixtures.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
12	4 hrs.	GOs (5, 3, 1)	Thermal resistance of materials and heating load calculation.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
13	4 hrs.	GOs (5, 3, 1)	Thermal resistance of materials and heating load calculation.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
14	4 hrs.	GOs (5, 3, 1)	Theoretical aqua-ammonia absorption refrigeration cycle.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
15	4 hrs.	GOs (5, 3, 1)	Theoretical aqua-ammonia absorption refrigeration cycle.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
16	4 hrs.	GOs (5, 3, 1)	Heat gain through building envelope and cooling load calculation.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
17	4 hrs.	GOs (5, 3, 1)	Heat gain through building envelope and cooling load calculation.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
18	4 hrs.	GOs (5, 3, 1)	Heat gain through building envelope and cooling load calculation.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires

19	4 hrs.	GOs (5, 3, 1)	Theoretical lithium bromide-water absorption refrigeration cycle.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
20	4 hrs.	GOs (5, 3, 1)	Theoretical lithium bromide-water absorption refrigeration cycle.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
21	4 hrs.	GOs (5, 3, 1)	Design of air ducting systems.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
22	4 hrs.	GOs (5, 3, 1)	Design of air ducting systems.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
23	4 hrs.	GOs (5, 3, 1)	Design of air ducting systems.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
24	4 hrs.	GOs (3, 1)	Design of water piping systems.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
25	4 hrs.	GOs (3, 1)	Design of water piping systems.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
26	4 hrs.	GOs (3, 1)	Design of water piping systems.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
27	4 hrs.	GOs (3, 1)	Air conditioning and refrigeration equipment's.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
28	4 hrs.	GOs (3, 1)	Air conditioning and refrigeration equipment's.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
29	4 hrs.	GOs (3, 1)	Air conditioning systems.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
30	4 hrs.	GOs (5, 3, 1)	General review to air conditioning and refrigeration.	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires

11.Course Evaluation

1. **Quizzes:**

- There will be (8 – 12) closed books and notes quizzes during the academic year.

- The quizzes will count 30% (20% Conditioning + 10% Refrigeration) of the total course grade.

2. Quizzes, 2-3 questions, and will count 10%.
3. Extracurricular Activities, this is optional and will count extra marks (1 – 5 %) for the student, depending on the type of activity.
4. **Final Exam:**

- Final exam will be comprehensive, with closed books and notes, and will take place on June 2023 from 9:00 AM - 12:00 PM in room (M12 + M13)

The final exam will count 70% of the total course grade (46% Conditioning + 24% Refrigeration).

12. Learning and Teaching Resources

Required textbooks (curricular books, if any	"Air Conditioning Engineering"; by W. P.Jones. "Refrigeration and air Conditioning"; by W.P. Stocker & W. P. Jones.
Main references (sources)	"Heating, Ventilating and Air Conditioning- Analysis and Design"; by F.C McQuiston.
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	https://youtube.com/@najmosawe https://www.youtube.com/@WailSarsam/playlists

Power Engineering / ME404

1. Course Name:
Power Engineering
2. Course Code:
ME404
3. Semester / Year:
Year
4. Description Preparation Date:
1/4/2024
5. Available Attendance Forms:
Class
6. Number of Credit Hours (Total) / Number of Units (Total)
- Credit Hours (Total) 4 hours per week (Power Plants +Internal Combustion Engines)/120 hr per year - 8 units
7. Course administrator's name (mention all, if more than one name)
Name: Prof. Dr. Karima Esmael Amori Email: karema.i@coeng.uobaghdad.edu.iq Name: Prof. Dr. Akram Wahbi Ezzat Email: akram.w@coeng.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	**A- <u>Internal combustion engines</u>** 1. Be able to identify engine types and components. 2. Have a basic understanding of engine function and performance. 3. Provide the background in combustion and fuel system chemistry. 4. Demonstrate the application of thermodynamics laws, heat transfer and fluid mechanics underlying the design of combustion engines. 5. Understand the main principles of IC engines air intake, combustion process and power generation. 6. Evaluate the engines different efficiencies and the effect of engines design on such evaluation. **B- <u>Power Plants</u>** 1. Giving the student the basic foundations, concepts, and equations to understand fluid movement and the associated heat transfer and thermodynamic relationships for multiple systems in power stations. 2. Providing the student with basic information about the core and analysis of power stations

	3. Giving the student the skill required to analyze the thermal and thermodynamic systems of various parts of the stations through digital analysis of various issues related to fluid movement, drawn and generated power, and heat transfer within these systems. 4. Giving the student the information required for the thermal design of different parts of power stations

9. Teaching and Learning Strategies

Strategy	**A- <u>Internal Combustion Engines</u>** 1. Introduction: basic definitions and concepts, classifications of internal combustion engines. 2. Engine performance parameters. 3. Cycle's analysis. Air -standard cycles, Air- Fuel cycles and analysis, Otto, Diesel, Dual. Actual cycles and their analysis. 4. Combustion process in S.I and C.I engines and Combustion chambers and Combustion chemistry, Dissociation, normal and abnormal combustion. 5. Fuels and additives characteristics .Carburetion and injection systems, fuel metering and ignition system. 6. Exhaust flow, blow down, exhaust stroke, turbochargers, emissions and pollution, chemical methods to reduce emission. 7. Heat transfer in engines, energy distribution, heat transfer in intake system, heat transfer in combustion chamber, heat transfer in exhaust system. 8. Knock and detonation of the engine, friction and lubrication systems. Exhaust emission analysis. **B- <u>Power Plants</u>** 1. Direct instructions through the explanation of the scientific material by the subject's professor 2. Discussions during the semester by solving a large group of examples and problems that develop the skill of thinking and analysis through discussion hours 3. Design projects 4. Seminars and field visits to local power stations

10. Course Structure / A- Internal Combustion Engines

Week	Hours	Required Graduate Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hrs.**	**GOs (1-6)**	**Introduction: basic definitions and concepts, classifications of internal combustion engines.**	**Lectures, assignments, discussions, reports, project.**	**Exams, quizzes, questionnaires**

2	**2 hrs.**	**GOs (1-6)**	**Introduction: basic definitions and concepts, classifications of internal combustion engines.**	**Lectures, assignments, discussions, reports, project.**	**Exams, quizzes, questionnaires**
3	**2 hrs.**	**GOs (1-6)**	**Operation of internal combustion engines.**	**Lectures, assignments, discussions, reports, project.**	**Exams, quizzes, questionnaires**
4	**2 hrs.**	**GOs (1-6)**	**Operation of internal combustion engines.**	**Lectures, assignments, discussions, reports, project.**	**Exams, quizzes, questionnaires**
5	**2 hrs.**	**GOs (1-6)**	**Operation of internal combustion engines.**	**Lectures, assignments, discussions, reports, project.**	**Exams, quizzes, questionnaires**
6	**2 hrs.**	**GOs (1-6)**	**Engine cycles: Air standard cycles, Otto cycle, diesel cycle, dual cycle, Miller cycle, 2 stroke cycle, Stirling cycle.**	**Lectures, assignments, discussions, reports, project.**	**Exams, quizzes, questionnaires**
7	**2 hrs.**	**GOs (1-6)**	**Engine cycles: Air standard cycles, Otto cycle, diesel cycle, dual cycle, Miller cycle, 2 stroke cycle, Stirling cycle.**	**Lectures, assignments, discussions, reports, project.**	**Exams, quizzes, questionnaires**
8	**2 hrs.**	**GOs (1-6)**	**Engine cycles: Air standard cycles, Otto cycle, diesel cycle, dual cycle, Miller cycle, 2 stroke cycle, Stirling cycle.**	**Lectures, assignments, discussions, reports, project.**	**Exams, quizzes, questionnaires**
9	**2 hrs.**	**GOs (1-6)**	**Engine cycles: Air standard cycles, Otto cycle, diesel cycle, dual cycle, Miller cycle, 2 stroke cycle, Stirling cycle.**	**Lectures, assignments, discussions, reports, project.**	**Exams, quizzes, questionnaires**
10	**2 hrs.**	**GOs (1-6)**	**Engine cycles: Air standard cycles, Otto cycle, diesel cycle, dual cycle, Miller**	**Lectures, assignments, discussions, reports, project.**	**Exams, quizzes, questionnaires**

			cycle, 2 stroke cycle, Stirling cycle.		
11	2 hrs.	GOs (1-6)	Engine cycles: Air standard cycles, Otto cycle, diesel cycle, dual cycle, Miller cycle, 2 stroke cycle, Stirling cycle.	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
12	2 hrs.	GOs (1-6)	Thermo-chemistry and fuels: Hydrocarbon fuel Gasoline, self ignition and Octane number, diesel fuel, alternate fuels.	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
13	2 hrs.	GOs (1-6)	Thermo-chemistry and fuels: Hydrocarbon fuel Gasoline, self ignition and Octane number, diesel fuel, alternate fuels.	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
14	2 hrs.	GOs (1-6)	Thermo-chemistry and fuels: Hydrocarbon fuel Gasoline, self ignition and Octane number, diesel fuel, alternate fuels.	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
15	2 hrs.	GOs (1-6)	Air and Fuel induction: Intake manifold, Volumetric efficiency of SI engines, intake valves, fuel injectors and carburetors, supercharging and turbo-charging.	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
16	2 hrs.	GOs (1-6)	Air and Fuel induction: Intake manifold, Volumetric	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires

			efficiency of SI engines, intake valves, fuel injectors and carburetors, supercharging and turbo-charging.		
17	2 hrs.	GOs (1-6)	Air and Fuel induction: Intake manifold, Volumetric efficiency of SI engines, intake valves, fuel injectors and carburetors, supercharging and turbo-charging.	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
18	2 hrs.	GOs (1-6)	Fluid motion in combustion chamber: Turbulence, Swirl, Squish and Tumble, divided combustion chamber.	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
19	2 hrs.	GOs (1-6)	Fluid motion in combustion chamber: Turbulence, Swirl, Squish and Tumble, divided combustion chamber.	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
20	2 hrs.	GOs (1-6)	Combustion: Combustion in SI engines, Ignition and flame development, Combustion in CI engines	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
21	2 hrs.	GOs (1-6)	Combustion: Combustion in SI engines, Ignition and flame development, Combustion in CI engines	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
22	2 hrs.	GOs (1-6)	Combustion: Combustion in SI engines, Ignition and flame development,	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires

			Combustion in CI engines		
23	2 hrs.	GOs (1-6)	Exhaust Flow	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
24	2 hrs.	GOs (1-6)	Emission and Pollution	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
25	2 hrs.	GOs (1-6)	Heat transfer in engines: Energy distribution, Heat transfer in intake, combustion and exhaust systems	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
26	2 hrs.	GOs (1-6)	Heat transfer in engines: Energy distribution, Heat transfer in intake, combustion and exhaust systems	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
27	2 hrs.	GOs (1-6)	Heat transfer in engines: Energy distribution, Heat transfer in intake, combustion and exhaust systems	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
28	2 hrs.	GOs (1-6)	Heat transfer in engines: Energy distribution, Heat transfer in intake, combustion and exhaust systems	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
29	2 hrs.	GOs (1-6)	Heat transfer in engines: Energy distribution, Heat transfer in intake, combustion and exhaust systems	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
30	2 hrs.	GOs (1-6)	Heat transfer in engines: Energy distribution, Heat	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires

			transfer in intake, combustion and exhaust systems		
Course Structure / B- Power Plant					
Week	Hours	Required Graduate Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 hrs.	GOs (1-6)	Introductory concepts Fluid flow and thermodynamics	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
2	2 hrs.	GOs (1-6)	Introductory concepts Heat transfer	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
3	2 hrs.	GOs (1-6)	Ideal Steam cycles (Carnot Cycle)	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
4	2 hrs.	GOs (1-6)	Steam cycles Rankine Cycle	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
5	2 hrs.	GOs (1-6)	Reheated Steam cycles	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
6	2 hrs.	GOs (1-6)	Regenerative Steam cycles open feedwater heater and closed type feedwater heater With backward feeding	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
7	2 hrs.	GOs (1-6)	Regenerative Steam cycles with closed type feedwater heater and forward feeding	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
8	2 hrs.	GOs (1-6)	Binary cycle	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
9	2 hrs.	GOs (1-6)	Binary cycle	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
10	2 hrs.	GOs (1-6)	Gas cycles	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
11	2 hrs.	GOs (1-6)	Gas cycles with inter cooling	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires

12	2 hrs.	GOs (1-6)	Regenerative Gas cycles Reheated Gas Cycles	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
13	2 hrs.	GOs (1-6)	Regenerative Gas cycles With intercooling	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
14	2 hrs.	GOs (1-6)	combined cycles	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
15	2 hrs.	GOs (1-6)	Gas turbine	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
16	2 hrs.	GOs (1-6)	Gas turbine	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
17	2 hrs.	GOs (1-6)	Steam turbine	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
18	2 hrs.	GOs (1-6)	Steam turbine	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
19	2 hrs.	GOs (1-6)	Steam generators Main components and classification	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
20	2 hrs.	GOs (1-6)	Steam generators Important relations for design	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
21	2 hrs.	GOs (1-6)	Steam generators Thermal design	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
22	2 hrs.	GOs (1-6)	Steam generators Thermal design	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
23	2 hrs.	GOs (1-6)	Heat exchangers condensers Charts and Mathematical relations	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
24	2 hrs.	GOs (1-6)	Design of feed water heaters	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
25	2 hrs.	GOs (1-6)	Thermal calculations for air heaters	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
26	2 hrs.	GOs (1-6)	Deaerators	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires
27	2 hrs.	GOs (1-6)	Hydraulic power plant	Lectures, assignments, discussions, reports, project.	Exams, quizzes, questionnaires

28	**2 hrs.**	**GOs (1-6)**	**Hydraulic power plant**	**Lectures, assignments, discussions, reports, project.**	**Exams, quizzes, questionnaires**
29	**2 hrs.**	**GOs (1-6)**	**Hydraulic power plant**	**Lectures, assignments, discussions, reports, project.**	**Exams, quizzes, questionnaires**
30	**2 hrs.**	**GOs (1-6)**	**Solar power plant**	**Lectures, assignments, discussions, reports, project.**	**Exams, quizzes, questionnaires**

11. Course Evaluation / A- Internal Combustion Engines

1. **Semester exams**
- There will be (2) semester exams for internal combustion engines counts for (6 degrees)
2. **Quizzes:**
- There will be around (8) closed books and notes quizzes during the academic year counts for (4 degrees).
3. **Course Project**
- There will be course project counts for 5 degrees.
4. **Final Exam:**

The final exam counts for 35 degrees of the total course grade.

Course Evaluation / B – Power Plant

Student performance is evaluated through semester exams, class tests, presentations, reports, and class and homework assignments.

1- The grade is 15%, of which 5% is for various activities and 10% for semester exams.

2- 35% is the final exam grade

3- Thus, the share of the power stations subject becomes 50% of the energy engineering subject

12. Learning and Teaching Resources / A- Internal combustion Engines

Required textbooks (curricular books, if any)	**W.W. Pulkrabek, Engineering Fundamentals of the Internal Combustion Engine, 2nd edition, Pearson Prentice Hall, 2004**.
Main references (sources)	1. Richard Stone, Internal Combustion Engines, 3rd edition, SAE 1999. 2. J.B. Heywood, Internal Combustion Engine Fundamentals, McGraw-Hill,1988. 3. V. Ganesan, Internal Combustion Engines, 2nd edition, McGraw-Hill Education, 2002.
Electronic References, Websites	Colin R. Ferguson and A. Kirkpatrick, Internal Combustion Engines: Applied Thermosciences, 2nd edition, John Wiley And Sons Inc.

Learning and Teaching Resources / B- Power Plant

Required textbooks (curricular books, if any)	J. Potter, 1956. Power Plant Theory and Design, John Wily J.H. Keenan, F.G. Keyes, P.G. Hill, J.G. Moore, 1978. Steam Tables
Main references (sources)	W. Li Kam, and A.P. Priddy, 1991. Power Plant system Design. Wiley

	J. Holman, 2009. Heat Transfer, Mcgraw-hill Series in Mechanical Engineering
Electronic References, Websites	Websites, Youtube

Industrial Engineering / ME405

1. Course Name:
Industrial Engineering
2. Course Code:
ME405
3. Semester / Year:
Year
4. Description Preparation Date:
1/4/2024
5. Available Attendance Forms:
Class
6. Number of Credit Hours (Total) / Number of Units (Total)
- Credit Hours (Total) 4 hours per week (Industrial Engineering + Quality Control)/120 hours per year - 4 units
7. Course administrator's name (mention all, if more than one name)
Name: Assist Prof. Dr. IMan Qasim Abdulhussein Email: iman.q.a@coeng.uobaghdad.edu.iq Name: Lct. Dr. Kawakib Abdulraheem Khuja Email: kawakib.mendwi@coeng.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	1. The ability to improve operations by solving complex engineering problems. And the concepts and principles of Quality, Total Quality Management (TQM), ISO, and Reliability. 2. Demonstrate professional leadership. 3. Motivation and the ability to achieve a lifelong learning career. 4. Performance of tasks advanced in the industry, and the ability to successfully plan, control, and implementation of large-scale projects. 5. Understand and apply the principles of science, technology, engineering, and mathematics, which include industry-related problems. 6. Contribute to the profitable growth of the industrial sectors using analytical tools, effective computational approaches, methodology, and systems thinking. 7. Maintaining high standards of professional and ethical responsibility. 8. Work effectively, diverse, and multicultural emphasis on the application of skills, teamwork, and communication. 9. Practice and lifelong learning to maintain technical operation and excellence in various fields. **10.** Promotion of the profession and its benefits to the community.

11.Teaching and Learning Strategies

Strategy

Teaching Strategy:

Course requirements, teaching materials (course vocabulary, textbook, sample student work, etc.), and samples of student work for all assignments (homework, tests, exams, lab reports, design projects, etc.).

Learning strategy:

The Problem-Based Learning (PBL) method is used in various courses. PBL is how students solve an engineering problem independently using previous courses. Almost all faculty are trained to use this method. The method simply divides the students into groups and each group solves the problem. Each group member will have a task and then they will discuss the results and report back. They will have the same mark and the students will learn through learning outcomes (GOs). Students will learn how to work as a group (GO 7), be able to interpret and analyze data (GO 3), write a report and give a seminar (GO 4), solve complex engineering problems (GO 1), use software techniques and skills (GO 6), design a problem (GO 2), the problem of moral responsibilities (GO 5)..

12. Course Structure

Week	Hours	Required Graduate Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 hrs.	GOs (1, 6)	General concepts in industrial engineering	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
2	2 hrs.	GOs (1, 6)	General concepts in industrial engineering	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
3	2 hrs.	GOs (1, 6)	Site and layout of the industrial unit	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
4	2 hrs.	GOs (1, 6)	Site and layout of the industrial unit	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
5	2 hrs.	GOs (6, 5, 2)	Economic and technical feasibility study	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
6	2 hrs.	GOs (6, 5, 2)	Economic and technical feasibility study	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
7	2 hrs.	GOs (5, 3, 1)	Depreciation	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires

8	**2 hrs.**	**GOs (5, 3, 1)**	**Forecasting**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
9	**2 hrs.**	**GOs (5, 3, 1)**	**Breakeven Point**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
10	**2 hrs.**	**GOs (5, 3, 1)**	**Breakeven Point**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
11	**2 hrs.**	**GOs (5, 3, 1)**	**Breakeven Point**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
12	**2 hrs.**	**GOs (5, 3, 1)**	**Add a new design or product**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
13	**2 hrs.**	**GOs (3, 1)**	**Network Analysis**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
14	**2 hrs.**	**GOs (3, 1)**	**Network Analysis**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
15	**2 hrs.**	**GOs (3, 1)**	**Network Analysis**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
16	**2 hrs.**	**GOs (5, 3, 1)**	**Linear Programming**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
17	**2 hrs.**	**GOs (1, 2)**	**Linear Programming**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
18	**2 hrs.**	**GOs (1, 2)**	**Linear Programming**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
19	**2 hrs.**	**GOs (1, 2)**	**Transportation Problems**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
20	**2 hrs.**	**GOs (1, 2)**	**Assignment Problems**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
21	**2 hrs.**	**GOs (1, 2, 3)**	**Time Study**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
22	**2 hrs.**	**GOs (1, 2, 3)**	**Time Study**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
23	**2 hrs.**	**GOs (1, 2, 3)**	**Work Study**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
24	**2 hrs.**	**GOs (1, 2, 3)**	**Maintenance and Replacement**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**

25	**2 hrs.**	**GOs (1, 2, 3)**	**Maintenance and Replacement**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
26	**2 hrs.**	**GOs (1, 2, 3)**	**Maintenance and Replacement**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
27	**2 hrs.**	**GOs (1, 2, 3)**	**Sequences**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
28	**2 hrs.**	**GOs (1, 2, 3)**	**Sequences**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
29	**2 hrs.**	**GOs (1, 2, 3)**	**Inventory**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**
30	**2 hrs.**	**GOs (1, 2, 3)**	**Inventory**	**Lectures, assignments, discussions, reports, presentations, posters.**	**Exams, quizzes, oral quizzes, questionnaires**

13.Course Evaluation

1. **Quizzes:**

- There will be (8 – 12) closed books and notes quizzes during the academic year.
- The quizzes will count 30% (15% Industrial Eng. + 15% QC) of the total course grade.

2. Quizzes, 2-3 questions, and will count 10%.

3. Extracurricular Activities, this is optional and will count extra marks (1 – 5 %) for the student, depending on the type of activity.

4. **Final Exam:**

- Final exam will be comprehensive, with closed books and notes, and will take place on June 2023 from 9:00 AM - 12:00 PM in room (M12 + M13)

5. The final exam will count 70% of the total course grade.

6. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. Operation Research, H. Taha Macmillan Pub. Comp., 1990 2. Automation Production Systems and Oim, M. P. Groover, Penentice Hall,2001. 3. Production and Operation Analysis, S. Nahmias, Irwin, 1997. 4. Manufacturing systems Eng., R. Hitom, Taylor and Francis, 1996
Main references (sources)	Industrial Engineering, Tawfeeq Almudlel
Recommended books and references (scientific journals, reports...)	• Available websites related to the subject. • Extracurricular activities.

Electronic References, Websites	• Field and scientific visits. • Extra lectures by foreign guest lecturers.

Engineering Material / ME406

13.Course Name:
Engineering Materials
14.Course Code:
ME406
15.Semester / Year:
Year
16.Description Preparation Date:
1/4/2024
17.Available Attendance Forms:
Class
18.Number of Credit Hours (Total) / Number of Units (Total)
- Credit Hours (Total) 2 hours per week (60) hours per year Engineering Materials /1 Engineering Materials /2 **4 units**
19.Course administrator's name (mention all, if more than one name)
Name: Dr. Suhair G. Hussein Engineering Materials /1 Email: Suhair.g.hussein@coeng.uobaghdad.edu.iq Name: Dr. Ban Baqir Jawad Engineering Materials /2 Email: ban.bakir@coeng.uobaghdad.edu.iq
20.Course Objectives

Course Objectives	1. Introduce basic definitions and introductory concepts of Engineering materials 2. Introduce the description of classification of engineering materials and use them in engineering applications. 3. Introduce the description of mechanical properties of materials. 4. Analyze and study the failure in materials and prevent it or reduce it during service in work station 5. (fracture, fatigue, and creep). 6. Introduce basic information for corrosion and methods of protection from corrosion. 7. Introduce the specified classification for ferrous metals, and their applications. 8. Introduce the basic definitions of super alloys , their classification, and applications.

21.Teaching and Learning Strategies

Strategy	**Teaching Strategy:** Type something like: 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 type of simple experiments involving some sampling activities that are interesting to the students. This will be achieved throw the following strategies: • Explaining the Lecture plan and in-class activities. • Each class will commence with a summary of the previous lecture. • Questions will be asked and the responses will be used to evaluate the students' understanding of the topics covered. Oral and power point presentations by the students are made to participate in the lecture. **Learning strategy:**

	The Problem-Based Learning (PBL) method is used in various courses. PBL is how students solve an engineering problem independently using previous courses. Almost all faculty are trained to use this method. The method simply divides the students into groups and each group solves the problem. Each group member will have a task and then they will discuss the results and report back. They will have the same mark and the students will learn through learning outcomes (GOs). Students will learn how to work as a group (GO 7), be able to interpret and analyze data (GO 3), write a report and give a seminar (GO 4), solve complex engineering problems (GO 1), use software techniques and skills (GO 6), design a problem (GO 2), the problem of moral responsibilities (GO 5)..

22. Course Structure

Week	Hours	Required Graduate Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hrs.**	**GOs (1, 6)**	Classification of materials	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
2	**2 hrs.**	**GOs (1, 6)**	Review for crystal structure of materials	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
3	**2 hrs.**	**GOs (1, 6)**	Mechanical properties of materials)	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
4	**2 hrs.**	**GOs (1, 6)**	Engineering test of materials Tensile test	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
5	**2 hrs.**	**GOs (6, 5, 2)**	Engineering test of materials Hardness test	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
6	**2 hrs.**	**GOs (6, 5, 2)**	Engineering test of materials Toughness test	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires

7	**2 hrs.**	**GOs (5, 3, 1)**	Failure in materials Fracture	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
8	**2 hrs.**	**GOs (5, 3, 1)**	Failure in materials Fatigue	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
9	**2 hrs.**	**GOs (5, 3, 1)**	Failure in materials Creep	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
10	**2 hrs.**	**GOs (5, 3, 1)**	Corrosion in materials	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
11	**2 hrs.**	**GOs (5, 3, 1)**	Corrosion in materials	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
12	**2 hrs.**	**GOs (5, 3, 1)**	Steel Introduction Carbon steel	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
13	**2 hrs.**	**GOs (3, 1)**	Steel Alloy steel Tool steel	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
14	**2 hrs.**	**GOs (3, 1)**	Steel Stainless steel	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
15	**2 hrs.**	**GOs (3, 1)**	Steel Cast iron	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
16	**2 hrs.**	**GOs (5, 3, 1)**	Materials science selection for engineering application	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
17	**2 hrs.**	**GOs (1, 2)**	Aluminum	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
18	**2 hrs.**	**GOs (1, 2)**	Aluminum alloys	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
19	**2 hrs.**	**GOs (1, 2)**	Copper	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
20	**2 hrs.**	**GOs (1, 2)**	Copper alloys	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
21	**2 hrs.**	**GOs (1, 2, 3)**	Magnesium	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
22	**2 hrs.**	**GOs (1, 2, 3)**	Magnesium alloys	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires

23	**2 hrs.**	**GOs (1, 2, 3)**	Titanium	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
24	**2 hrs.**	**GOs (1, 2, 3)**	Titanium alloys	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
25	**2 hrs.**	**GOs (1, 2, 3)**	Polymers	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
26	**2 hrs.**	**GOs (1, 2, 3)**	Polymers types	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
27	**2 hrs.**	**GOs (1, 2, 3)**	Ceramics	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
28	**2 hrs.**	**GOs (1, 2, 3)**	Advanced materials	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
29	**2 hrs.**	**GOs (1, 2, 3)**	Super alloys	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires
30	**2 hrs.**	**GOs (1, 2, 3)**	Composite materials	Lectures, assignments, discussions, reports, presentations, posters.	Exams, quizzes, oral quizzes, questionnaires

23.Course Evaluation

5. **Quizzes:**
   - There will be (8 – 12) closed books and notes quizzes during the academic year.
   - The quizzes will count 30% (15% steel + 15% light metals) of the total course grade.
6. Quizzes, 2-3 questions, and will count 10%.
7. Extracurricular Activities, this is optional and will count extra marks (1 – 5 %) for the student, depending on the type of activity.
8. **Final Exam:**
   - Final exam will be comprehensive, with closed books and notes, and will take place on May 2024 from 10:00 AM - 1:00 PM in room (M12 + M13)
9. The final exam will count 70% of the total course grade.

24.Learning and Teaching Resources

Required textbooks (curricular books, if any)	Engineering Metallurgy ,R.A.Higgins
Main references (sources)	

Recommended books and references (scientific journals, reports...)	• Materials science and engineering, Callister • Available websites related to the subject. • Extracurricular activities.
Electronic References, Websites	• https://materialstandard.com/wp-content/uploads/2019/06/AshbyEngineering-Materials-1.pdf