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 Guide

2025/2026

Introduction:

The educational program is a well-planned set of courses that include procedures and experiences arranged in the form of an academic syllabus. Its main goal is to improve and build graduates' skills so they are ready for the job market. The program is reviewed and evaluated every year through internal or external audit procedures and programs like the External Examiner Program.

The academic program description is a short summary of the main features of the program and its courses. It shows what skills students are working to develop based on the program's goals. This description is very important because it is the main part of getting the program accredited, and it is written by the teaching staff together under the supervision of scientific committees in the scientific departments.

This guide, in its second version, includes a description of the academic program after updating the subjects and paragraphs of the previous guide in light of the updates and developments of the educational system in Iraq, which included the description of the academic program in its traditional form (annual, quarterly), as well as the adoption of the academic program description circulated according to the letter of the Department of Studies T 3/2906 on 3/5/2023 regarding the programs that adopt the Bologna Process as the basis for their work.

In this regard, we can only emphasize the importance of writing an academic programs and course description to ensure the proper functioning of the educational process.

Concepts and terminology:

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

Course Description: Provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the students to achieve, proving whether they have made the most of the available learning opportunities. It is derived from the program description.

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

Program Mission: Briefly outlines the objectives and activities necessary to achieve them and defines the program's development paths and directions.

Program Objectives: They are statements that describe what the academic program intends to achieve within a specific period of time and are measurable and observable.

Curriculum Structure: All courses / subjects included in the academic program according to the approved learning system (quarterly, annual, Bologna Process) whether it is a requirement (ministry, university, college and scientific department) with the number of credit hours.

Learning Outcomes: A compatible set of knowledge, skills and values acquired by students after the successful completion of the academic program and must determine the learning outcomes of each course in a way that achieves the objectives of the program.

Teaching and learning strategies: They are the strategies used by the faculty members to develop students' teaching and learning, and they are plans that are followed to reach the learning goals. They describe all classroom and extra-curricular activities to achieve the learning outcomes of the program.

Academic Program Description Form

University Name: Al–Turath University
Faculty/Institute: College of Engineering
Scientific Department: Department of Aircraft Engineering
Academic or Professional Program Name: Aircraft Engineering
Final Certificate Name: B.Sc. in Aircraft Engineering
Academic System: Bologna Process
Description Preparation Date: 15/9/2025
File Completion Date: 1/10/2025

Signature:
Head of Department Name:
Assit. Prof. Dr Aamer Aldabagh
Date:

Signature:
Scientific Associate Name:
Prof. Dr. Jamal Mani Ali
Date:

جامعة التراث
قسم هندسة الطائرات

The file is checked by:
Department of Quality Assurance and University Performance
Director of the Quality Assurance and University Performance Department:
Assist. Lecturer Farah Ghazi Fahad
Date:
Signature:

Approval of the Dean
Prof. Dr. Mohammad Fadhil Abid

4

1. Program Vision

The academic staff of the Department of Aircraft Engineering/College of Engineering at the Al-Turath University believe that students come to understand the engineering topics through focusing on introducing modern methods in the learning system that increase the students' ability to design, creativity and innovation. Our vision in the foreseeable future is to follow up the rapid developments in the field of Aircraft Engineering and its applications in the curriculum of the department and graduate highly qualified and competent in the field of mechanical science.

2. Program Mission

The mission statement of the Collage of Engineering - Department of Aircraft Engineering is:

• Prepare engineers with bachelor's degree in Aircraft engineering sciences according to society's need and keeping up with technical and scientific advances through upgrading teaching staff, laboratories, libraries and curriculum.

• Developing courses quantitatively and qualitatively in accordance with the mission of the Al-Turath University to achieve quality assurance and academic accreditation in accordance with the discreet standards universally adopted in engineering and scientific curriculum with a commitment to engineering and scientific ethics.

3. Program Objectives

• Preparing engineers in Mechanical Engineering / Aircraft Engineering, able to develop their skills in the fields of engineering knowledge.

• Focusing on introducing modern methods in the learning system that increase the students' ability to design, creativity and innovation.

• Paying more attention to students in various aspects, able to engage in life-long learning to advance professionally through continuing education and training.

4. Program Accreditation

The department seeks to meet the requirements of program accreditation.

5. Other external influences

- Ministerial Instructions
- Labor market.
- Technological developments.
- Twinning

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	7	14	%5.7	Basic
College Requirements	19	92	%38.7	Basic
Department Requirements	26	126	%52.2	Basic
Summer Training	Required			
Other	Elective 8			

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

Program Description					
Year/Level	Course Code	Course Name	Credit Hours		
			theoretical	practical	ECTS
Level 1/ Semester 1	MATH112	Mathematics I رياضيات I	4	-	6
Level 1/ Semester 1	PHYS113	Physics فيزياء	3	1	8
Level 1/ Semester 1	THER114	Thermodynamics I ديناميك حرارة I	3	1	7
Level 1/ Semester 1	WSHE106	Workshops معامل	-	6	4
Level 1/ Semester 1	COMP108	Computer الحاسوب	1	2	3
Level 1/ Semester 1	HRDE105	Democracy and Human Rights الديمقراطية وحقوق الانسان	2	-	2
Level 1/ Semester 2	MATH122	Mathematics II رياضيات II	4	-	6
Level 1/ Semester 2	ENME123	Engineering Mechanics ميكانيك هندسي	3	1	7
Level 1/ Semester 2	EDDG124	Eng. Drawing and Descriptive Geometry رسم هندسي و هندسة وصفية	2	3	7
Level 1/ Semester 2	ELEN125	Electrical Engineering هندسة كهربائية	2	1	4
Level 1/ Semester 2	WSHE106	Workshops معامل	-	6	4
Level 1/ Semester 2	ENLA107	English Language اللغة الإنكليزية	2	-	2
Level 2/ Semester 1	MATH231	Mathematics III رياضيات III	2	-	5
Level 2/ Semester 1	FLME232	Fluid Mechanics ميكانيك موائع	3	1	6
Level 2/ Semester 1	THER233	Thermodynamics II ديناميك حرارة II	2	1	5
Level 2/ Semester 1	MEDC234	Mechanical Drawing and CAD رسم ميكانيكي ورسم معزز بالحاسوب	-	4	5
Level 2/ Semester 1	MAPR235	Materials Properties خواص مواد	2	-	3
Level 2/ Semester 1	WSHE206	Workshops II معامل II	-	3	2
Level 2/	ENLA207	English Language	2	-	2

Semester 1		اللغة الإنكليزية			
Level 2/ Semester 1	CBRI201	Crimes of the Baath Regime in Iraq جرائم نظام البعث في العراق	2	-	2
Level 2/ Semester 2	ENNA241	Engineering and Numerical Analysis تحليلات هندسية وعددية	4	1	6
Level 2/ Semester 2	STMA242	Strength of Materials مقاومة مواد	3	1	6
Level 2/ Semester 2	AIEN243	Aircraft Engines I محركات الطائرات I	3	1	5
Level 2/ Semester 2	FUAE244	Fundamentals of Aeronautics أساسيات الطيران	2	1	3
Level 2/ Semester 2	MAPR245	Manufacturing Processes عمليات تصنيع	2	-	3
Level 2/ Semester 2	WSHE206	Workshops II معامل II	-	3	2
Level 2/ Semester 2	PROG208	Programming برمجة	1	2	3
Level 2/ Semester 2	ARLA204	Arabic Language اللغة العربية	2	-	2
Level 3/ Semester 1	MEDE351	Mechanical Design I تصميم ميكانيكي I	2	2	5
Level 3/ Semester 1	HETR352	Heat Transfer I انتقال حرارة I	2	-	4
Level 3/ Semester 1	AERO353	Aerodynamics ديناميك هواء	3	1	5
Level 3/ Semester 1	THMA354	Theory of Machines نظرية مكائن	3	1	6
Level 3/ Semester 1	AIEN355	Aircraft Engines II محركات الطائرات II	3	1	6
Level 3/ Semester 1	SCMM356	Science of Mathematical Modelling علم النمذجة الرياضية	3	-	4
Level 3/ Semester 2	MEDE361	Mechanical Design II تصميم ميكانيكي II	2	2	5
Level 3/ Semester 2	HETR362	Heat Transfer II انتقال حرارة II	2	1	5
Level 3/ Semester 2	GADY363	Gas Dynamics ديناميك غازات	3	1	5
Level 3/Semester 2	THFL364	Theory of Flight نظرية طيران	3	-	5
Level 3/ Semester 2	AIEN365	Aircraft Engines III محركات الطائرات III	3	-	6
Level 3/ Semester 2	APNA366	Applications of Numerical Analysis	2	2	4

		تطبيقات التحليلات العددية			
Level 4/ Semester 1	AISD471	Aircraft Structures and Design I هياكل وتصميم الطائرات I	4	-	6
Level 4/ Semester 1	AUCO472	Automatic Control سيطرة طوعية	3	1	5
Level 4/ Semester 1	AISY473	Aircraft Systems منظومات الطائرة	3	-	5
Level 4/ Semester 1	UNAV474	Unmanned Aerial Vehicles الطائرات المسيرة	2	1	5
Level 4/ Semester 1	PROJ405	Project مشروع	1	2	3
Level 4/ Semester 1	PREE411	Professional Ethics and Entrepreneurship اخلاقيات المهنة وريادة الاعمال	2	-	2
Level 4/ Semester 2	AISD481	Aircraft Structures and Design II هياكل وتصميم الطائرات II	4	-	6
Level 4/ Semester 2	AISC482	Aircraft Stability & Control استقراريه وسيطرة الطائرة	3	-	5
Level 4/ Semester 2	AIMA483	Aircraft Maintenance صيانة الطائرة	2	1	5
Level 4/ Semester 2	AIVI484	Aircraft Vibrations اهتزازات الطائرات	3	1	5
Level 4/ Semester 2	PROJ406	Project مشروع	1	2	3
Level 4/ Semester 2	ARLA404	Arabic Language اللغة العربية	2	-	2

7. Expected learning outcomes of the program

Knowledge

A1- Ability to identify, formulate, analyze and solve complex engineering problems in the field of aircraft engineering by applying the principles of mathematics, science, and engineering, and using modern analytical and numerical methods to evaluate the performance of various aeronautical systems and components.

A2- Ability to design, develop and improve engineering systems and components for aircraft and unmanned aircraft, to achieve the requirements of performance, efficiency, safety, reliability, sustainability and economic feasibility, while adhering to relevant engineering, national and international standards and regulations.

A3- Ability to describe the structure and function of mechanical, electrical and electronic systems of modern aircraft.

A4- Knowledge of national and international legislation and regulations related to civil aviation.

Skills
B1- Ability to plan and implement appropriate engineering experiments and tests, collect, analyze and interpret data using modern engineering tools and techniques, draw conclusions and make technical decisions based on scientific evidence and sound engineering judgment.
B2- Ability to communicate effectively with various professional and non-professional groups through the preparation of technical reports, engineering drawings, presentations and specialized documents, and employing modern means of communication to efficiently transfer engineering knowledge and results.
B3- Ability to continuously self-learn and develop professional skills, and keep pace with modern scientific and technological developments in the fields of aerospace engineering, unmanned aircraft, aerospace electronics, artificial intelligence, engineering simulation, and advanced digital technologies, in a way that promotes innovation and professional excellence..
B4- Ability to maintain mechanical, electrical and electronic systems for modern aircraft.
Ethics
C1- Ability to understand ethical and professional responsibilities in the field of aircraft engineering, and to make responsible engineering decisions that take into account air safety, environmental protection, sustainability, and the impact of engineering solutions on society, the economy, and sustainable development.
C2- Ability to work effectively within multidisciplinary engineering teams, manage engineering projects and resources, and contribute to the achievement of team goals through leadership, planning, organization, and decision-making in professional work environments.
C3- Ability to withstand the pressures of working at airports under various conditions.
C4- Professional integrity and responsibility towards the environment and society.

8. Teaching and Learning Strategies

The program adopts a modern combination of problem-based learning (PBL) across real-world cases from the aviation industry (wing weight reduction, flutter mitigation, compressor/turbine map optimization, noise reduction, heat management), along with project-based learning and design for structure, propulsion and control courses. Courses are delivered via interactive lectures supported by specialized laboratories. A wide range of digital simulations are used: CAD/CAE, CFD, MATLAB/Simulink and SolidWorks for design integration. Strategies are complemented by field visits and summer training with airlines, maintenance centers and stakeholders, with continuous evaluation and standardized protocols to ensure that program outputs, quality standards and accreditation are achieved..

9. Evaluation methods

The assessment is divided into midterm exam (10%), formative assessment (40%), and final exam (50%)

10. Faculty

Professional Development

Mentoring new faculty members

The scientific committee in the department guides the faculty members through:

1- Entering the classrooms with the new faculty members to follow up on the progress of the lectures.

2. Participating in a training period in the field of university education for new faculty members.

3- Discussion of performance appraisal in the first year.

Professional development of faculty members

Professional Development of the Aircraft Engineering Department:

The department adopts a three-pronged course-based plan to ensure that teaching, research and industrial knowledge is updated in line with aviation standards and safety.

1) Preparation of new members:

- Career counseling with an expert member for two terms, including mutual classroom visits and documented feedback.
- Introduction to laboratories and operational safety.

2) Teaching Development

- Mainstreaming PBL problem-based learning.
- Semester workshops: designing an evaluation based on the outputs, preparing the rubrics, analyzing the exam items, and calibrating the grades between the courses.
- Digital tools: Adopt CAD/CAE, CFD, MATLAB/Simulink and SolidWorks for design integration.

3) Development of industrial research and engagement

- Research tracks: aerodynamics and CFD, turbopropellant, structures and composite materials, opioids and control, and drones.
- Publication and Conferences: Stimulating indexed publication and participation in regional and international scientific conferences, and activating research and design student teams.

11. Acceptance Criterion

Students are admitted to the Aircraft Engineering program from graduates of the preparatory study (scientific branch) or its equivalent, in accordance with the central admission regulations issued by the Ministry of Higher Education and Scientific Research and the instructions approved at the university. Admission is subject to the criteria of academic differentiation and the absorptive capacity of the department, in order to ensure the selection of academically qualified students who are able to achieve the requirements of the program and its educational outcomes. In addition to the decision of the admission committee regarding the student's eligibility.

12. The most important sources of information about the program

1. Feedback from alumni.

2. Labor market.

3. Description of the Academic Program.

13. Program Development Plan

First: General Objectives

1- Keeping pace with global developments in manned and unmanned aviation technologies.

2- Enhancing learning outcomes in line with the local, regional, and international labor market. (Airlines, maintenance centers, manufacturers, regulators).

3- Linking the program to scientific research and industrial application.

4- Supporting sustainability, energy efficiency, and reducing emissions and noise in accordance with aviation standards.

Second: Development Axes

1. Curricula.

2- Laboratories and infrastructure.

3- Research and innovation aspect.

4. Qualifying the academic staff.

5. Obtain academic accreditation.

6. Tracking alumni and employers' questionnaires.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
Level 1/ Semester 1	MATH112	Mathematics I رياضيات I	Basic	√				√							
	PHYS113	Physics فيزياء	Basic	√				√							
	THER114	Thermodynamics I ديناميك حرارة I	Basic	√				√							
	WSHE106	Workshops معامل	Basic					√		√			√		
	COMP108	Computer الحاسوب	Basic					√	√						
	HRDE105	Democracy and Human Rights	Basic									√			

		الديمقراطية وحقوق الانسان													
Level 1/ Semester 2	MATH122	Mathematics II رياضيات II	Basic	√				√							
	ENME123	Engineering Mechanics ميكانيك هندسي	Basic	√				√							
	EDDG124	Eng. Drawing and Descriptive Geometry رسم هندسي وهندسة وصفية	Basic		√				√						
	ELEN125	Electrical Engineering هندسة كهربائية	Basic	√				√							
	WSHE106	Workshops معامل	Basic					√		√			√		
	ENLA107	English Language اللغة الإنكليزية	Basic						√				√		
Level 2/ Semester 1	MATH231	Mathematics III رياضيات III	Basic	√				√							

	FLME232	Fluid Mechanics ميكانيك موائع	Basic	√				√							
	THER233	Thermodynamics II ديناميك حرارة II	Basic	√				√							
	MEDC234	Mechanical Drawing and CAD رسم ميكانيكي ورسم معزز بالحاسوب	Basic		√			√	√						
	MAPR235	Materials Properties خواص مواد	Basic	√				√							
	WSHE206	Workshops II معامل II	Basic					√		√			√		
	ENLA207	English Language اللغة الإنكليزية	Basic						√				√		
	CBRI201	Crimes of the Baath Regime in Iraq جرائم نظام البعث في العراق	Basic									√			

Level 2/ Semester 2	ENNA241	Engineering and Numerical Analysis تحليلات هندسية وعددية	Basic	√				√							
	STMA242	Strength of Materials مقاومة مواد	Basic	√				√							
	AIEN243	Aircraft Engines I محركات الطائرات I	Basic	√	√							√			
	FUAE244	Fundamentals of Aeronautics أساسيات الطيران	Basic	√	√			√							
	MAPR245	Manufacturing Processes عمليات تصنيع	Basic	√				√							
	WSHE206	Workshops II معامل II	Basic					√		√			√		
	PROG208	Programming برمجة	Basic					√	√						

	ARLA204	Arabic Language اللغة العربية	Basic						√				√		
Level 3/ Semester 1	MEDE351	Mechanical Design I تصميم ميكانيكي I	Basic	√	√								√		
	HETR352	Heat Transfer I انتقال حرارة I	Basic	√				√							
	AERO353	Aerodynamics ديناميك هواء	Basic	√	√			√							
	THMA354	Theory of Machines نظرية مكائن	Basic	√				√							
	AIEN355	Aircraft Engines II محركات الطائرات II	Basic	√	√							√			
	SCMM356	Science of Mathematical Modelling علم النمذجة الرياضية	Basic	√				√							
Level 3/	MEDE361	Mechanical Design II	Basic	√	√								√		

Semester 2		تصميم ميكانيكي II													
	HETR362	Heat Transfer II انتقال حرارة II	Basic	√				√							
	GADY363	Gas Dynamics ديناميك غازات	Basic	√				√							
	THFL364	Theory of Flight نظرية طيران	Basic	√	√			√							
	AIEN365	Aircraft Engines III محركات الطائرات III	Basic	√	√							√			
	APNA366	Applications of Numerical Analysis تطبيقات التحليلات العددية	Basic	√				√							
Level 4/ Semester 1	AISD471	Aircraft Structures and Design I هياكل وتصميم الطائرات I	Basic	√	√			√							
	AUCO472	Automatic Control سيطرة طوعية	Basic	√				√							

	AISY473	Aircraft Systems منظومات الطائرة	Basic		√	√						√			
	UNAV474	Unmanned Aerial Vehicles الطائرات المسيرة	Basic	√	√	√									
	PROJ405	Project مشروع	Basic		√			√					√	√	
	PREE411	Professional Ethics and Entrepreneurship اخلاقيات المهنة وريادة الاعمال	Basic				√		√			√			√
Level 4/ Semester 2	AISD481	Aircraft Structures and Design II هياكل وتصميم الطائرات II	Basic	√	√			√							
	AISC482	Aircraft Stability & Control استقراريه وسيطرة الطائرة	Basic	√	√			√							
	AIMA483	Aircraft Maintenance	Basic			√					√	√	√		

		صيانة الطائرة													
	AIVI484	Aircraft Vibrations اهتزازات الطائرات	Basic	√	√			√							
	PROJ406	Project مشروع	Basic		√			√					√	√	
	ARLA404	Arabic Language اللغة العربية	Basic						√				√		

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

Course Description Form

	**Ministry of Higher Education and Scientific Research - Iraq** **Al-Turath University** **College of Engineering** **Department of Aircraft Engineering** Four years (Eight semesters) - 240 ECTS credits 1 ECTS = 25hr	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	Mathematics I I رياضيات	**Module Delivery**	
Module Type	CORE	**Theory**	
Module Code	MATH112		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	1	**Semester of Delivery**	1
Administering Department	ME	**College**	ME
Module Leader	Dr.	**e-mail**	
Module Leader's Acad. Title	Dr.	**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	Dr.	**e-mail**	
Review Committee Approval	01/10/2023	**Version Number**	2023

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To provide a course of high academic quality in Mathematics in a challenging and supportive learning environment that encourages students to reach their full potential, personally and academically. 2. To provide a course that is suitable both for students aiming to pursue research and for students going into other careers. 3. To provide an integrated system of teaching which can be tailored to the needs of individual students. 4. To develop in students the capacity for learning and clear logical thinking. 5. To continue to attract and select students of outstanding quality. 6. To provide an intellectually stimulating environment in which students have the opportunity to develop their skills and enthusiasm to their full potential.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Knowledge and Understanding: This Course will develop learners' ability to: 1. Understand and use mathematical concepts and relationships 2. Select and apply operational skills in algebra, geometry, trigonometry and statistics within mathematical contexts 3. Select and apply skills in numeracy 4. Use mathematical models 5. Use mathematical reasoning skills to interpret information, select a strategy to solve a problem, and communicate solutions. Subject-specific skills: It is expected that learners will develop the following: 6. Broad, generic skills through this Course. 7. Skills for Learning, and drawn from the main skills areas listed below. 8. Skills for Life 9. and Skills for Work These must be built into the Course where there are appropriate opportunities.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Vector and the geometry of space:** Three-Dimensional Coordinate Systems, Vector Algebra Operations, unit Vectors, the Midpoint of a Line Segment, The Dot Product, The angle between Vectors, and The Cross Product. [12 hrs] **Matrices:** Types of matrices. Elementary operations with matrices and vectors. Determinants. Linear equations. Row reduction method. Cramer's rule. Applications. [18 hrs]

	Limits and continuity: Rates of Change and Limits, calculating limits using the limit law, infinite limits and vertical asymptotes, continuity, tangents and derivatives. [12 hrs] **Differentiation:** Inverse Functions and Their Derivatives. Natural Logarithms. The Exponential and Logarithm Functions. Trigonometric Functions. Inverse Trigonometric Functions. Hyperbolic Functions. Inverse Hyperbolic Functions. Calculating Derivatives from the Definition. Differentiation Rules for (functions). Derivatives of Trigonometric Functions. The Chain Rule. Implicit Differentiation. Derivatives of Higher Order. [22 hrs] **Applications of derivatives:** Extreme Values of Functions. Increasing and Decreasing Functions. Concavity and Curve Sketching. Applied Optimization Problems. L'Hôpital's Rule. The Mean Value Theorem. Motion along a Line: Displacement, Velocity, Speed, Acceleration. Related Rates Equations (application on Implicit Differentiation). Approximate calculation. [18 hrs] **General Applications.** [5 hrs]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	All lectures reflect the higher values, purposes and principles. They offer flexibility, provide more time for learning, focus on skills and applying to learn, and scope for personalization and choice. In this Course, and its component Units, there will be an emphasis on skills development and the application of those skills. Assessment approaches will be proportionate, fit for purpose and will promote best practices, enabling learners to achieve the highest standards they can. This course provides learners with opportunities to continue to acquire and develop the attributes and capabilities of the four capacities, as well as skills for learning, skills for life and skills for work.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	20% (20)	3, 6, 9, 12	LO #1, 2, 3,4 and 9
	Assignments	2	10% (10)	5, 10	LO #6, 7
	Projects / Lab.	-	-	-	-
	Report	1	10% (10)	13	LO #8
Summative assessment	Midterm Exam	2 hrs.	10% (10)	7	LO # 1-5
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Vector and the geometry of space:** Three-Dimensional Coordinate Systems. Vector Algebra Operations. Unit Vectors. Midpoint of a Line Segment.
Week 2	The Dot Product. The angle between Vectors. The Cross Product.
Week 3	**Matrices:** Types of matrices. Elementary operations with matrices and vectors.
Week 4	Determinants. Linear equations. Row reduction method. Cramer's rule.
Week 5	Applications.
Week 6	**Limits and continuity:** Rates of Change and Limits. Calculating Limits Using the Limit Law.
Week 7	Infinite Limits and Vertical Asymptotes. Continuity. Tangents and Derivatives.
Week 8	**Differentiation:** Inverse Functions and Their Derivatives. Natural Logarithms. The Exponential and Logarithm Functions.
Week 9	Trigonometric Functions. Inverse Trigonometric Functions. Hyperbolic Functions. Inverse Hyperbolic Functions.
Week 10	Calculating Derivatives from the Definition. Differentiation Rules for (functions).
Week 11	Derivatives of Trigonometric Functions. The Chain Rule. Implicit Differentiation. Derivatives of Higher Order.
Week 12	**Applications of derivatives:** Extreme Values of Functions. Increasing and Decreasing Functions. Concavity and Curve Sketching.
Week 13	Applied Optimization Problems. L'Hôpital's Rule. The Mean Value Theorem. Motion along a Line: Displacement, Velocity, Speed, Acceleration.
Week 14	Related Rates Equations (application on Implicit Differentiation). Approximate calculation.

Week 15	**General Applications**
Week 16	**Preparatory week before the Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Exp. 1:
Week 2	Exp. 2:
Week 3	Exp. 3:
Week 4	Exp. 4:
Week 5	Exp. 5:
Week 6	Exp. 6:
Week 7	Exp. 7:

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	George B. Thomas, Jr., Maurice D. Weir and Joel Hass, Thomas' calculus, 12th edition, Addison Wesley, 2010.	Yes
Recommended Texts	H.S. Gangwar, Prabhakar Gupta. A textbook engineering mathematics-I. Second edition, 2010.	No
Websites		

	**Ministry of Higher Education and Scientific Research - Iraq** **Al-Turath University** **College of Engineering** **Department of Aircraft Engineering** Four years (Eight semesters) - 240 ECTS credits 1 ECTS = 25hr	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	Physics فيزياء	**Module Delivery**	
Module Type	CORE	**Theory** **Lab** **Tutorial**	
Module Code	PHYS113		
ECTS Credits	8		
SWL (hr/sem)	200		
Module Level	1	**Semester of Delivery**	1
Administering Department	ME	**College**	ME
Module Leader	Dr.	**e-mail**	
Module Leader's Acad. Title	Dr.	**Module Leader's Qualification**	Ph.D.
Module Tutor	Dr.	**e-mail**	
Peer Reviewer Name	Dr.	**e-mail**	
Review Committee Approval	01/10/2023	**Version Number**	2023

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To assist students to understand the fundamental principles of engineering mechanics (Statics and Dynamics) as applied to Physics. 2. To develop problem solving skills and understanding of principles of Physics theory through the application of techniques as they relate to the different fields of engineering. 3. To develop problem solving skills and understanding of Newton's law through the application of techniques. 4. To understand how analysis of vectors, forces, resultant, moments, couples, and equilibrium in two and three dimensions' problems. 5. To comprehend how clarification of friction and analysis in two dimensions' problems. 6. To understand the motion of particles (kinematics and kinetic), and the other subjects as it sequenced.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Enable the student to learn and understand the basic physical concepts, mass, forces, quantities and vectors at Mechanical Engineering 2. The student should understand and be able to apply Newton's Laws. 3. The student should Know the analysis of forces in Two Dimensions 4. The student should Know the analysis of System Isolation and the Free-Body Diagram 5. The student should Know how can find the Equilibrium Conditions 6. The student should Know the analysis of forces in Three Dimensions 7. The student should know the analysis of the Friction forces and their types, and the other subjects as it sequenced by the Course Materials and Schedule. 8. The student should understand and be able to relate the kinematics of particles 9- The student should study the Kinematics of particles Introduction and Rectilinear motion of dynamics problems in straight line 10- The student should study the Kinematics of particles as a Curvilinear motion. 11- The student should understand and be able to apply Newton's Laws to particles to solve problems related to dynamic behavior.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A - Introduction to Physics: The basic physical concepts, mass, forces, quantities and vectors at Mechanical Engineering [6 hrs].

	Part B - Statics Two-Dimensional Force Systems: External and Internal Effects, Principle of Transmissibility, Force Classification, Rectangular Components, Moments and Couples, and Resultants [18 hrs]. Equilibrium in Two Dimensions: System Isolation, the Free-Body Diagram, and Equilibrium Conditions [12 hrs]. Friction: Introduction, and type of friction, and Dry Friction [6 hrs]. Three-Dimensional Force Systems: Rectangular Components, Moments and Couples, and Resultants [12 hrs]. Equilibrium in Three Dimensions: System Isolation, the Free-Body Diagram, Equilibrium Conditions and the Categories of Equilibrium [7 hrs]. Part C - Kinematics of particles: Rectilinear motion [5 hrs]. Curvilinear motion: x-y coordinates, Normal – tangential coordinates, and Polar – coordinates [5 hrs]. Relative Motion (Translating Axes) Relative motion, Motion relative to a frame in translation, and Constrained Motion of Connected Particles [5 hrs]. Part D - Kinetics of Particles: Newton's 2nd law, Rectangular Components, Tangential and normal components, Radial and transverse components [6 hrs]. Kinetics of particles: Introduction, Force, Mass, Acceleration, Newton's 2nd law, Rectangular components, Tangential and normal components, Radial and transverse components and problems [10 hrs].
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	108	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	92	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation تقييم المادة الدراسية					
		Time/ Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	20% (20)	3, 6, 9, 12	LO #1-11
	Assignments	2	10% (10)	5, 10	LO #1-11
	Projects / Lab.	Lab. 5	10% (10)	Continuous	LO #1, 2, 3, 4, 7, 10, 11
	Report	-	-	-	-
Summative assessment	**Midterm Exam**	2 hrs.	10% (10)	7	LO #1-11
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction to Physics:** Basic concepts, Newton's Law, and Vectors
Week 2	**Two-Dimensional Force Systems:** External and Internal Effects , Principle of Transmissibility, and Force Classification
Week 3	**Two-Dimensional Force Systems:** Rectangular Components, and Moments and Couples.
Week 4	**Two-Dimensional Force Systems:** Resultants
Week 5	**Equilibrium in Two Dimensions:** System Isolation and the Free-Body Diagram

Week 6	**Equilibrium in Two Dimensions:** Equilibrium Conditions
Week 7	**Friction:** Introduction, and type of friction, and Dry Friction.
Week 8	**Three-Dimensional Force Systems:** Rectangular Components, and Moments and Couples.
Week 9	**Three-Dimensional Force Systems:** Resultants
Week 10	**Equilibrium in Three Dimensions:** System Isolation and the Free-Body Diagram, and Equilibrium Conditions and the Categories of Equilibrium
Week 11	**kinematics particles:** Introduction and Rectilinear motion.
Week 12	**Curvilinear motion:** Plane Curvilinear Motion Rectangular Coordinates (x-y), Normal – tangential coordinates (n-t) , and Polar – coordinates (r-Θ).
Week 13	**Relative Motion (Translating Axes)** Motion relative to a frame in translation, Constrained Motion of Connected Particles
Week 14	**Kinetics of particles:** Introduction, Force, Mass, and Acceleration Newton's 2nd law. Rectangular components.
Week 15	**Kinetics of particles:** Tangential and normal components. Radial and transverse components.
Week 16	**Preparatory week before the Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Exp. 1: THE STIFFNESS OF LINEAR SPRING (HOOKE'S LAW)
Week 2	Exp. 2: FORCE RESULTANT OF TWO-DIMENSIONAL FORCE SYSTEMS
Week 3	Exp. 3: STATIC FRICTION COEFFICIENT OF SIMILAR AND DISSIMILAR SURFACES
Week 4	Exp. 4: ACHIEVING THE BASIC LAW OF THE ROTATIONAL MOVEMENT
Week 5	Exp. 5:
Week 6	Exp. 6:
Week 7	Exp. 7:

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	ENGINEERING MECHANICS VOLUME 1 STATICS EIGHTH EDITION (2016) VOLUME 2 DYNAMICS EIGHTH EDITION (2015) Publisher: John Wiley & Sons Singapore Pte. Ltd By James L. Meriam (Author), L. G. Kraige (Author), J. N. Bolton (Author)	Yes
Recommended Texts	VECTOR MECHANICS FOR ENGINEERS: STATICS AND DYNAMICS Publisher : McGraw Hill; 12th edition (2018) by Ferdinand Beer (Author), E. Johnston (Author), David Mazurek (Author), Phillip Cornwell (Author), Brian Self (Author)	No
Websites		

	**Ministry of Higher Education and Scientific Research - Iraq** **Al-Turath University** **College of Engineering** **Department of Aircraft Engineering** Four years (Eight semesters) - 240 ECTS credits 1 ECTS = 25hr	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	Thermodynamics I ديناميك حرارة I		**Module Delivery**	
Module Type	CORE			
Module Code	THER114 / THER124			
ECTS Credits	7			
SWL (hr/sem)	175			
Module Level	1	**Semester of Delivery**	1 / 2	
Administering Department	ME	**College**	ME	
Module Leader	Dr.	**e-mail**		
Module Leader's Acad. Title	Dr.	**Module Leader's Qualification**	Ph.D.	
Module Tutor	Dr.	**e-mail**		
Peer Reviewer Name	Dr.	**e-mail**		
Review Committee Approval	01/10/2023	**Version Number**	2023	

Theory
Lab
Tutorial

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. This course deals with the fundamentals of Thermodynamics including thermodynamic systems and properties, and relationships among the thermos-physical properties. 2. Description of the substance and phases including the theories dealing with the analytical formulation of their properties. 3. Description of the thermal system and its surroundings with interaction characteristics between them. 4. Awareness of units and dimensions in standard systems of units. 5. Definition of Energy and its forms, transformation means and tools. 6. Mathematical formulation of the First and Second laws of thermodynamics, their limitations and applications of these basic laws in thermodynamic systems. 7. Application of the physical and mathematical concepts to thermodynamic processes and evaluating their impacts on performance and developing techniques.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Identify fundamental concepts relevant to thermodynamics. 2. Students will know the definition of adiabatic, isobaric, isothermal and isometric processes. 3. Students will be familiar with the concept of a reversible engine and the Carnot cycle. 3. To understand and analyze the influence of fluid properties on the behaviour of engineering systems and to be able to analyze systems using the concepts of conservation of mass and energy. 4. Students will be able to find the maximum possible efficiency of heat engines and calculate the maximum coefficient of performance of a heat pump or refrigerator. 5. On successful completion of the module, students should be able to show experience and enhancement of discipline-specific practical skills in using appropriate modelling and analytical methods to solve thermodynamics problems. 6. To understand the thermodynamic behaviour of different fluids and their importance in a heat pump or a refrigerator. 7. An understanding of the everyday implications of the laws of thermodynamics and an ability to communicate these implications to a lay audience.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: **<u>Part A - Basic concepts</u>** **- Systems of units & dimensions**. Force, Pressure. Mass, volume, sp. volume & density. **- Thermodynamic equilibrium.**

	Conditions of equilibrium, Temperature and the Zeroth law of thermodynamics. Thermometers and Temperature scales. [4hrs] **- Energy:** Types of thermodynamic system. Conventional and renewable sources of energy.Stored and transported energy. Internal energy. Potential and kinetic energy. Elastic energy (springs). [8hrs] Heat energy and the Specific heat capacity. Work energy and Power. Equivalent forms of work.Sign convention of heat & work.[8hrs] **- Properties of working substance:** Intensive & extensive properties. Single-phase system (Ideal gas), Equation of state for ideal gases, Real gas behavior.[4hrs] **Part B- First law of thermodynamics:** Conservation of energy principle, Statements of first law, Energy as system property, Non-flow energy equation, Practical applications of First law of thermodynamics. [4 hrs] **- Thermodynamic processes in closed system:** State function & path function. Constant volume process. Constant pressure process. Constant temperature process. Adiabatic &Polytropic process. [4hrs] **Flow systems:** Energy equation of flow systems. Steady & unsteady process.Boiler & condenser. Compressor & turbine. [8hrs] Nozzle & diffuser.Throttling valves. [9hrs] Reversible & irreversible process for flow systems (Frection, Temperature difference Free unrestrained explantion… etc.). [8hrs] **- Entropy:** Entropy & energy degradation, Entropy as system property. Fundamental entropy equations. [8hrs] Construction of (T – s) diagram for gases, Carnot cycle on (T – s) diagram. General entropy equations for gases. [8hrs] Entropy change in reversible processes.Entropy change in irreversible processes. [12hrs] **Part C- Second law of thermodynamics:** Relation between first & second laws, Statements of the second law. Heat engine & thermal efficiency, Carnot power cycle, Work & efficiency in Carnot power cycle, Reversed heat engine & COP., Reversed Carnot cycle for cooling (Work and COP in Carnot cooling cycle).[12hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Teaching Method 1 – Lectures (Description: Attendance Recorded: Yes) • Teaching Method 2 – Tutorials (Description: Attendance Recorded: Yes) • Teaching Method 3 – Practical (Description: Practical homework assignments. Attendance Recorded: No) • Teaching Method 4 – Unscheduled Directed Student Hours (time spent away from the timetabled sessions but directed by the teaching staff). • Teaching Method 5- Laboratory sessions(Providing experimental supplementary to promote the engineering sense of students)

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	97	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation تقييم المادة الدراسية					
		Time/ Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	20% (20)	3, 6, 9, 12	LO #1-7
	Assignments	2	10% (10)	5, 10	LO #1-7
	Projects / Lab.	Lab. 5	10% (10)	Continuous	LO #1, 2, 3, 4, 5, 6
	Report	-	-	-	-
Summative assessment	**Midterm Exam**	2 hrs.	10% (10)	7	LO #1-7
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Basic concepts**: **Systems of units & dimensions**: Force, Pressure,Mass, volume, sp. volume & density.**Thermodynamic equilibrium**: Conditions of equilibrium, Temperature and the Zeroth law of thermodynamics, Thermometers and Temperature scales.
Week 2	**Energy:** Types of thermodynamic system, Conventional and renewable sources of energy, Stored and transported energy, Internal energy, Potential and kinetic energy, Elastic energy (springs).
Week 3	Heat energy and the Specific heat capacity,Work energy and Power, Equivalent forms of work, Sign convention of heat & work.
Week 4	**Properties of working substance:** Intensive & extensive properties, Single-phase system (Ideal gas), Equation of state for ideal gases, Real gas behavior.
Week 5	**First law of thermodynamics:** Conservation of energy principle, Statements of first law, Energy as system property, Non-flow energy equation, Practical applications of First law of thermodynamics.
Week 6	**Thermodynamic processes in closed system:** State function & path function, Constant volume process, Constant pressure process.
Week 7	Constant temperature process, Adiabatic &Polytropic process.
Week 8	**Flow systems:** Energy equation of flow systems, Steady & unsteady process, Boiler & condenser, Compressor & turbine.
Week 9	Nozzle & diffuser, Throttling valves, Reversible & irreversible process for flow systems (Friction, Temperature difference, Free unrestrained expansion… etc.).
Week 10	**Entropy:** Entropy & energy degradation, Entropy as system property, Fundamental entropy equations.
Week 11	Construction of (T – s) diagram for gases, Carnot cycle on (T – s) diagram, General entropy equations for gases.
Week 12	Entropy change in reversible processes, Entropy change in irreversible processes.
Week 13	**Second law of thermodynamics:** Relation between first & second laws, Statements of the second law, Heat engine & thermal efficiency.
Week 14	Carnot power cycle, Work & efficiency in Carnot power cycle.
Week 15	Reversed heat engine & COP, Reversed Carnot cycle for cooling (Work and COP in Carnot cooling cycle).
Week 16	**Preparatory week before the Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Exp. 1: Boyle's Law
Week 2	Exp. 2: Gas thermometer
Week 3	Exp. 3: Specific Heat
Week 4	Exp. 4: Ratio of specific heat
Week 5	Exp. 5: Reversed heat engine
Week 6	Exp. 6: Calorific value of gaseous fuel
Week 7	Exp. 7:

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Yuns A. and Michael A. Boles and Mehmet Kanoğlu, "Thermodynamics: An Engineering Approach", 10th Edition., 2024, ISBN 978-1-266-15211-5	Yes
	Rajput, R. K. A textbook of engineering thermodynamics. Laxmi Publications, 2005.	Yes
Recommended Texts	Estop T. and McConckyA., "Applied thermodynamics for engineering technologists", 2008.	Yes
Websites	--	

	Ministry of Higher Education and Scientific Research - Iraq **Al-Turath University** **College of Engineering** **Department of Aircraft Engineering** Four years (Eight semesters) - 240 ECTS credits 1 ECTS = 25hr	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information			
Module Title	Workshops		Module Delivery
Module Type	Basic		☐ Theory ☐ Lecture ☐ Lab ☐ Tutorial ■ Practical ☐ Seminar
Module Code	WSHE106		
ECTS Credit/year	8		
SWL/year	200		
Module level	1	Semester of Delivery	1, 2
Module Leader	Training and Workshops Center	College	
Module Leader Academic Title	Prof.	e-mail	twc@uotechnology.edu.iq
Module Tutor		Module Leader's Qualification	Ph.D.
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	1/6/2023	e-mail	
		Version Number	1

Relation with other Modules			
Prerequisite Module	-	Semester	-
Co-requisite Module	-	Semester	-

Module Aims, Learning Outcomes and Inductive Contents	
Module Aims	1-Preparing applied engineers in the field of engineering sciences who are distinguished by a high level of knowledge and technological creativity, in line with the strict standards adopted globally in quality assurance and academic accreditation of the corresponding engineering

	programs, while adhering to the ethics of the engineering profession. 2. Enable the student to know and understand work systems, risks, and the factors surrounding them. 3. Enable the student to know and understand theoretical principles in handicrafts and measurements.
Module Learning Outcomes	1- To familiarize the student with the vocabulary of occupational safety and its importance in the field of work. 2- Acquisition of the student's manual operation skills, for example (Filings and Tinsmith workshops), and mechanical operation skills, for example (Turning). 3- Acquisition of the student's mechanical forming skills, for example (Casting and Blacksmithing). 4- The student acquires basic engineering skills such as Welding, Carpentry, and Electrical installations that serve him in the professional field. 5- Enabling the student to operate the various machines and devices in mechanical operations and formation. 6- Cooperative learning by working collectively.
Inductive Contents	1. Introducing the student to the basics of the art of turning and milling, types of cold working machines, the skill of dealing with them, choosing metals, operational tools, and methods of measurement and standardization 2. Introducing the student to the basics of the art of casting, hot forming, metal selection, method of working on casting furnaces and tools, and manufacturing casting molds 3. Familiarize students with the basics of cars and the systems they use, as well as maintenance, disassembly, and assembly processes. 4. Introducing students to the basics of household and industrial electrical appliances, the skill of using tools, and designing electrical circuits and control panels 5. Introducing the student to the basics of the art of plumbing, leveling surfaces, the skill of using tools, manufacturing and installing geometric shapes, and methods of measurement and standardization 6. Introducing the student to the basics of the art of blacksmithing, cold and hot forming of metals, the method of hardening them, and the skills

	of dealing with hand tools, forming machines, and heating furnaces 7. Introducing the student to the basics of the art of filing and manual operation of metals with the help of manual, electrical, and mechanical tools, the skills of dealing with them, and the methods of measurement and standardization 8. Introducing the student to the basics of the art of welding, the installation and assembly of metals, the types of welding machines, the skills of dealing with them, the types of welding, and the methods of measurement and standardization 9. Introducing the student to the basics of the art of carpentry and woodworking with the help of manual, electrical, and mechanical tools, the skills of dealing with them, and methods of measurement and standardization

Learning and Teaching Strategies	
Strategies	

Student Workload (SWL)			
Structured SWL (h/sem)	92	Structured SWL (h/w)	6.00
Unstructured SWL (h/sem)	8	Unstructured SWL (h/w)	0.53
Total SWL (h/sem)	100		
Structured SWL (h/year)	184	Structured SWL (h/w)	6.00
Unstructured SWL (h/year)	16	Unstructured SWL (h/w)	0.53
Total SWL (h/year)	200		

Module Evaluation					
		Time/No.	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative Assessment	Quizzes	5	5% (5)	Continuous	All
	Assignments	5	5% (5)	Continuous	All

	Projects / Practice	5	25% (25)	Continuous	All
	Report	5	5% (5)	Continuous	All
Summative Assessment	Midterm Exam	1 hr.	10% (10)	7	All
	Exam	2 hrs.	50% (50)	16	All
Total assessment			100%		

Delivery Plan (Weekly Syllabus)	
	Materials Covered
Week 1	Welding workshop. -Occupational safety and its importance in welding workshops. -Introduction to the basics of welding. -Electric arc exercise. -An exercise for welding straight lines in a circular motion (helical).
Week 2	Welding workshop - An exercise for welding straight lines with a crescent movement and other welding methods -Construction welding exercise.
Week 3	Welding workshop. -Welding two pieces together. -Written exam in practical exercises. -
Week 4	Casting workshop -Occupational safety and its importance in plumbing workshops. -Introduction to the basics of metal casting. -Simple wooden disc exercise. Half workout.
Week 5	Casting workshop Wheel exercise. Pushing arm exercise.
Week 6	Casting workshop. -Complete pulley exercise. -Circular pole exercise.

	-Written exam in practical exercises.
Week 7	Blacksmith Workshop -Occupational safety and its importance in blacksmithing workshops. -Introduction to the Basics of Blacksmithing. - Barbell adjustment exercise. -Eight-star exercise. - Exercise forming the number eight in English. -Six formation exercises in English.
Week 8	Blacksmith Workshop -An exercise forming the number five in English. - Exercise forming the number nine in English. -An exercise in forming an iron model in the form of a circle .
Week 9	Blacksmith Workshop - S-shape exercise. - Air hammer hot barbell exercise. - Exercise to form a circle on an electric bending machine. - Exercising cold and hot ornament formation. - A written exam in practical exercises .
Week 10	Automotive Workshop -Occupational safety and its importance in car maintenance workshops. -An introduction to cars and their basic parts. -Parts of the engine, how it works, types of engines, and methods of classification.
Week 11	Automotive Workshop - Open the engine and identify the parts -Lubrication system -Cooling system.
Week 12	Automotive Workshop -The fuel system. -The old and new ignition circuits. -Written exam in practical exercises.
Week 13	Turning Workshop -Introduction to lathe machines and identifying their parts -Measuring tools and the use of an oven measuring instrument -Circular column lathing exercise on different diameters.

Week 14	Turning Workshop -Exercise using the pen (semicircular R) brackets. An exercise in making different angles using a pen (square + angle pen 55).
Week 15	Turning Workshop - Making shaft with different diameter exercises using (left and right pen) - Workout (Tube Connection). -Written exam in practical exercises.
Week 16	Fitting workshop Occupational safety and its importance in filing workshops -An introduction to the basics of filing -Pen holder exercise “preparation and preparation”
Week 17	Fitting workshop Pencil holder exercises finishing and assembling.
Week 18	Fitting workshop -The catcher exercise. - Clamping exercise. Written exam in practical exercises.
Week 19	Carpentry workshop -Occupational safety and its importance in carpentry workshops. - An introduction to carpentry, its types, types of wood, tools used, and preparation Preparing the tools used Face modification exercise using the reindeer
Week 20	Carpentry workshop Garden fence work and how to connect its parts, the eight-star exercise
Week 21	Carpentry workshop - Wood smoothing exercise using smoothing paper - Wood dyeing exercise in three stages Final smoothing and varnishing exercise Written exam in practical exercises
Week 22	The tinsmith workshop Occupational safety and its importance in plumbing workshops An introduction to plumbing, its tools, and plumbing stages Planning and marking exercise on metal plates

Week 23	The tinsmith workshop Geometric shapes Types of individuals and methods of individuals Geometric shape individuals exercise on a metal board
Week 24	The tinsmith workshop Cone members exercise - Exercise of cylinders with an oblique cut Roll forming operations Connection without the use of an intermediary Written exam in practical exercises
Week 25	Electric Workshop Occupational Safety and its importance in electrical workshops An introduction to the basics of electrical installations - Linking a simple circuit consisting of a lamp to the control of a single-way switch. Connect two lamps in series with one-way switch control. Connecting two lamps in parallel with the control of a single road switch. Connect two lights with one-way dual switch control.
Week 26	electric Workshop Connect a fluorescent lamp circuit to a one-way switch control Connecting an electric supply socket circuit to the control of a separate or combined one-way switch Written exam in practical exercises
Week 27	electric Workshop Occupational Safety and its importance in blacksmithing workshops Introduction to the basics of Blacksmithing - Barbell adjustment exercise Eight-star exercise - Exercise forming the number eight in English Exercise forming the number six in English
Week 28	supplementary training curriculum Welding workshop Plumbing workshop Blacksmith's workshop

Week 29	supplementary training curriculum - Automotive workshop - Turning workshop Fitting workshop
Week 30	supplementary training curriculum Carpentry workshop The plumbing workshop electric Workshop

Learning and Teaching Resources		
	Text	Available in the library
Required Texts	Workshop technology and measurements, Ahmed Salem Al-Sabbagh,	yes
Recommended Texts		
Websites		

	Ministry of Higher Education and Scientific Research - Iraq **Al-Turath University** **College of Engineering** **Department of Aircraft Engineering** Four years (Eight semesters) - 240 ECTS credits 1 ECTS = 25hr	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	Computer الحاسوب	**Module Delivery**	
Module Type	BASIC	**Theory** **Lab**	
Module Code	COMP108		
ECTS Credits	3		
SWL (hr/sem)	75		
Module Level	1	**Semester of Delivery**	1
Administering Department	ME	**College**	ME
Module Leader	Dr.	**e-mail**	
Module Leader's Acad. Title	Dr.	**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	Dr.	**e-mail**	
Review Committee Approval	01/10/2023	**Version Number**	2023

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. This course teaches the student how to apply fundamental procedural programming concepts to the programming language C++. Programming principles and constructs, such as data types, common control flow structures, basic data structures, and console input/output will be explained. 2. To provide sufficient knowledge of programming Language C++ to write straightforward programs. 3. The development of the student's ability to apply the knowledge in order to be able to correct analysis of the question and thus put the appropriate assumptions and interpretation to reach a solution. Through textbooks and lectures, in addition to the (programming I) Laboratory experiments. 4. Knowledge and Understanding • Use a special programming language C++ compiler with the issuance of a modern software solves all the complex questions. • Solution of different equations and problems using C++ language. • Model Description Terms of solution for each and every way mathematical operation. 5. To develop the student to have specific skills • Logical thinking when solving problems • The use of mathematical equations. • Determine the appropriate method of solution. • Explain ways to enter matrices and vectors
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Enable the student to learn and understand the basic of: • Evolution of Computers, Generation of Computers, Super Computers, Mainframe Computers, Personal Computers (Different Types)) • Classification of Computers Analog Digital and Hybrid Computers, Classification of Computers according to size • Characteristics of Computers, Block Diagram of a Digital Computer. 2. The student should Know the general information of Operating systems (OS), Types of OS, and the other subjects as it sequenced by

	the Course Materials and Schedule. 3. Understanding the Programming Concepts, such as: • Global concept in any programming languages. • Structured Programming. • Algorithms and Flowcharts with Examples 4. The ability to make and build programs in different ME applications. 5. Enable the student to learn the Variables, Data Types, Arithmetic operators, Assignment operators, Comparison operators, Logical operators. 6. The student should understand and be able to relate Basic Input / Output, Control Structures, and Functions.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Introduction to Computers I+ II (History)</u> Evolution of Computers, Generation of Computers, Super Computers, Mainframe Computers, Personal Computers (Different Types)), Classification of Computers Analog Digital and Hybrid Computers, Classification of Computers according to size, Characteristics of Computers, Block Diagram of a Digital Computer, Operating systems (OS), Types of OS, Dos and Windows operating systems. [3 hrs] <u>Introduction to Programming Concepts I</u>, Global concept in any programming languages, Structured Programming Algorithms and Flowcharts with Examples. [3 hrs] <u>Introduction for C++ programming language</u> Instructions for using (Dev) software, Basics of C++, Program Structure. [3 hrs] <u>Variables, Data Types</u> int • double • float • string • bool • Constants • , Arithmetic operators Assignment operators, Comparison operators, Logical operators. [4 hrs] <u>Basic Input / Output</u> Course input cin>>, Course output cout<< [4 hrs] <u>Control Structures</u> if statement, if…else Statement, if...else if...else Statement, switch Statement Iteration structures (loops), For loop, While Loop [5 hrs] <u>Functions (I)+ (II)</u> [5 hrs]

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

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	27	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	5	10% (10)	3,5, 8, 12, 14	LO # 1 to 6
	Assignments	15	15% (15)	Continuous	LO # 1 to 6
	Projects / Lab.	Lab. 10	10% (10)	Continuous	LO # 1 to 6
	Report	1	5% (5)	13	LO # 1 to 6
Summative assessment	**Midterm Exam**	2 hrs.	10% (10)	7	LO # 1 to 6
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Computers I (History) • Evolution of Computers, Generation of Computers, Super Computers, Mainframe Computers, Personal Computers (Different Types). • Classification of Computers Analog Digital and Hybrid Computers, Classification of Computers according to size. • Characteristics of Computers, Block Diagram of a Digital Computer.
Week 2	Introduction to Computers II (History) • Operating systems (OS). • Types of OS, Dos and Windows operating systems.
Week 3	Introduction to Programming Concepts I, • Global concept in any programming languages. • Structured Programming. • Algorithms and Flowcharts with Examples.
Week 4	Introduction for C++ programming language • Instructions for using (Dew) software • Basics of C++ • Structure of a program
Week 5	Variables, Data Types • int • double • float • string • bool • Constants • • Arithmetic operators • Assignment operators • Comparison operators • Logical operators
Week 6	Basic Input / Output • Course input cin>> • Course output cout<<
Week 7	Control Structures • if statement • if…else Statement • if...else if...else Statement • switch Statement
Week 8	
Week 9	Applications and case study.
Week 10	Control Structures • Iteration structures (loops) • For loop • While Loop • Applications
Week 11	
Week 12	Functions (I) + Applications
Week 13	

Week 14	Functions (II) + Applications
Week 15	
Week 16	**Preparatory week before the Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Exp. 1: Practical learning of computers types moreover to software and hardware's.
Week 2	Exp. 2: Practical learning of operating systems types.
Week 3	Exp. 3: Simple code and flowchart about Program structure.
Week 4	Exp. 4: Simple code of C++.
Week 5	Exp. 5: Basics code with variables and data types.
Week 6	Exp. 6: Basic code with Input / Output.
Week 7	Exp. 7: C++ code with control structures as if statement.
Week 8	Exp. 8: C++ code with control structures as switch statement.
Week 9	Exp. 9: Applications and case study.
Week 10	Exp. 10: C++ code with control structures as loops, for, and While statements.
Week 11	Exp. 11: Applications of control structures as loops, for, and While statements.
Week 12	Exp. 12: C++ code with Functions (I)
Week 13	Exp. 13: Functions (I) applications.
Week 14	Exp. 14: C++ code with Functions (II)
Week 15	Exp. 15: Functions (II) applications.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Lecture notes from the Module Leader	Yes
Recommended Texts	STARTING OUT WITH C++ From Control Structures through Objects. EIGHTH EDITION Tony Gaddis, Haywood Community College. Copyright © 2015, 2012, 2009 Pearson Education, Inc., publishing as Addison-Wesley. ISBN 13: 978-0-13-376939-5 ISBN 10: 0-13-376939-9	No
Websites	https://cplusplus.com/doc/	

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MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Democracy and Human Rights الديمقراطية وحقوق الانسان			**Module Delivery**	
Module Type	BASIC			**Theory**	
Module Code	DEHR105				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level	1		**Semester of Delivery**	1	
Administering Department	ME		**College**	ME	
Module Leader	Dr.		**e-mail**		
Module Leader's Acad. Title	Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Dr.		**e-mail**		
Review Committee Approval	01/10/2023		**Version Number**	2023	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. التعرف على الحرية والديمقراطية في المجتمعات المتعددة وعلى مر العصور 2. التعرف على أنواعها وكيف تحولت أنظمة بعض الدول من نظام الى آخر 3. النسبية في معنى الحرية 4. معرفة مفهوم حقوق الإنسان وخصائصه وفئاته 5. التعرف على حقوق الإنسان في التاريخ والتراث الإنساني 6. معرفة حقوق الإنسان في الأديان السماوية 7. معرفة الحقوق المدنية والسياسية والاقتصادية
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. التعرف على الحرية والديمقراطية في المجتمعات المتعددة وعلى مر العصور 2. التعرف على أنواعها وكيف تحولت أنظمة بعض الدول من نظام الى آخر 3. معرفة مفهوم حقوق الإنسان وخصائصه وفئاته 4. التعرف على حقوق الإنسان في التاريخ والتراث الإنساني 5. معرفة الحقوق المدنية والسياسية والاقتصادية
Indicative Contents المحتويات الإرشادية	**المحتويات الإرشادية تتضمن ما يلي :-** 1. مفهوم حقوق الإنسان وخصائصه وفئاته(2 ساعة) 2. حقوق الإنسان في التاريخ والتراث الإنساني(2 ساعة) 3. حقوق الإنسان في الأديان السماوية و الحقوق المدنية(2 ساعة) 4. حظر اسلحة الدمار الشامل (2 ساعة) 5. الحقوق السياسية والاقتصادية والاجتماعية والثقافية(2 ساعة) 6. الانتخابات وحقوق الإنسان(2 ساعة) 7. الاعتراف الدولي بحقوق الإنسان و المصادر القانونية لحقوق الإنسان 8. المنظمات غير الحكومية ودورها في الدفاع عن حقوق الإنسان(2 ساعة) 9. الديمقراطية والأنظمة السياسية (2 ساعة) 10. الديمقراطية في الحضارة الإغريقية ومقارنتها بالديمقراطية الحديثة (2 ساعة) 11. مفاهيم عن الديمقراطية (2 ساعة) 12. أنواع الديمقراطية (2 ساعة) 13. العلاقة بين حقوق الانسان والديمقراطية (2 ساعة) 14. ضمانات الحريات العامة (2 ساعة) 15. مراجعة عامة (2 ساعة)
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	يتم إعطاء المحاضرات بشكل القاء مباشر بالإضافة إلى مشاهدة مادة صورية أو فلمية مساعدة.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	20% (20)	3, 6, 9, 12	LO #1 - 5
	Assignments	2	10% (10)	5, 10	LO #1 - 5
	Projects / Lab.	-	-	-	-
	Report	1	10% (10)	13	LO #1 - 5
Summative assessment	**Midterm Exam**	2 hrs.	10% (10)	7	LO #1 - 5
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	مفهوم حقوق الإنسان وخصائصه وفئاته
Week 2	حقوق الإنسان في التاريخ والتراث الإنساني
Week 3	حقوق الإنسان في الأديان السماوية و الحقوق المدنية
Week 4	حظر اسلحة الدمار الشامل
Week 5	الحقوق السياسية والاقتصادية والاجتماعية والثقافية
Week 6	الانتخابات وحقوق الإنسان
Week 7	الاعتراف الدولي بحقوق الإنسان و المصادر القانونية لحقوق الإنسان
Week 8	المنظمات غير الحكومية ودورها في الدفاع عن حقوق الإنسان
Week 9	الديمقراطية والأنظمة السياسية
Week 10	الديمقراطية في الحضارة الإغريقية ومقارنتها بالديمقراطية الحديثة
Week 11	مفاهيم عن الديمقراطية

Week 12	أنواع الديمقراطية
Week 13	العلاقة بين حقوق الانسان والديمقراطية
Week 14	ضمانات الحريات العامة
Week 15	مراجعة عامة
Week 16	أسبوع تحضيري قبل الامتحان النهائي

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Exp. 1:
Week 2	Exp. 2:
Week 3	Exp. 3:
Week 4	Exp. 4:
Week 5	Exp. 5:
Week 6	Exp. 6:
Week 7	Exp. 7:

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. ميثاق الأمم المتحدة في مجال حقوق الإنسان 2. الدساتير العالمية المعتمدة 3. المواثيق والمعاهدات الدولية 4. كراسات وإصدارات منظمة حقوق الإنسان الدورية	Yes
Recommended Texts	- كتيبات واصدارات دورية لمنظمات حقوق الأنسان	Yes
Websites	- https://www.amnesty.org/ar/ - https://www.un.org/ar/about-us/un-charter - https://www.ohchr.org/sites/default/files/Documents/Publications/CoreTreatiesar.pd	

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MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	Mathematics II II رياضيات	**Module Delivery**	
Module Type	CORE	**Theory**	
Module Code	MATH122		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	1	**Semester of Delivery**	2
Administering Department	ME	**College**	ME
Module Leader	Dr.	**e-mail**	
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	Dr.	**e-mail**	
Review Committee Approval	01/10/2023	**Version Number**	2023

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	MATH112	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To provide a course of high academic quality in Mathematics in a challenging and supportive learning environment that encourages students to reach their full potential, personally and academically. 2. To provide a course that is suitable both for students aiming to pursue research and for students going into other careers. 3. To provide an integrated system of teaching which can be tailored to the needs of individual students. 4. To develop in students the capacity for learning and clear logical thinking. 5. To continue to attract and select students of outstanding quality. 6. To provide an intellectually stimulating environment in which students have the opportunity to develop their skills and enthusiasm to their full potential.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Knowledge and Understanding: This Course will develop learners' ability to: 1. Understand and use mathematical concepts and relationships 2. Select and apply operational skills in algebra, geometry, trigonometry and statistics within mathematical contexts 3. Select and apply skills in numeracy 4. Use mathematical models 5. Use mathematical reasoning skills to interpret information, select a strategy to solve a problem, and communicate solutions. Subject-specific skills: It is expected that learners will develop the following: 6. Broad, generic skills through this Course. 7. Skills for Learning, and drawn from the main skills areas listed below. 8. Skills for Life 9. and Skills for Work These must be built into the Course where there are appropriate opportunities.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Integration:** Definite integration, basic integration formulas, integration by parts, trigonometric functions integrals, odd and even powers of sine and cosine, trigonometric functions substitutions, completing the square method, integration of rational functions by partial fractions. [34 hrs] **Applications of definite integrals:** The area under the graph of nonnegative functions, mean value theorem for definite integrals, definite integral, polar coordinates, double integral,

	distance, velocity and acceleration, volumes by slicing and rotation about an axis, volumes by cylindrical shells, lengths of plane curves, areas of surfaces of revolution. [25 hrs] **Complex numbers:** Algebra of complex numbers, Argand diagrams, Euler's formula, De Moivre's theorem. Roots. [12 hrs] **Curve fitting:** Simple linear regression, Polynomial regression. [12 hrs] **General Applications** [4 hrs]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	All lectures reflect the higher values, purposes and principles. They offer flexibility, provide more time for learning, focus on skills and applying to learn, and scope for personalization and choice. In this Course, and its component Units, there will be an emphasis on skills development and the application of those skills. Assessment approaches will be proportionate, fit for purpose and will promote best practices, enabling learners to achieve the highest standards they can. This course provides learners with opportunities to continue to acquire and develop the attributes and capabilities of the four capacities, as well as skills for learning, skills for life and skills for work.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	20% (20)	3, 6, 9, 12	LO #1, 2, 3,4 and 9
	Assignments	2	10% (10)	5, 10	LO #6, 7
	Projects / Lab.	-	-	-	-
	Report	1	10% (10)	13	LO #8
Summative assessment	Midterm Exam	2 hrs.	10% (10)	7	LO # 1-5
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Integration:** Definite integration. Basic integration formulas.
Week 2	**Methods of Integration:** Integration by parts.
Week 3	Trigonometric functions integrals.
Week 4	Odd and even powers of sine and cosine.
Week 5	Completing the square method.
Week 6	Partial fractions.
Week 7	**Applications of definite integrals:** The area under the graph of nonnegative functions. Mean value theorem for definite integrals. Definite integral. Double integral.
Week 8	Distance, velocity and acceleration. Volumes by slicing and rotation about an axis.
Week 9	Volumes by cylindrical shells. Lengths of plane curves. Areas of surfaces of revolution.
Week 10	**Polar coordinates**
Week 11	**Complex numbers:** Algebra of complex numbers. Argand diagrams. Euler's formula.
Week 12	De Moivre's theorem. Roots.
Week 13	**Curve fitting:** Simple linear regression.
Week 14	Polynomial regression.
Week 15	**General Applications**
Week 16	**Preparatory week before the Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Exp. 1:
Week 2	Exp. 2:
Week 3	Exp. 3:
Week 4	Exp. 4:
Week 5	Exp. 5:
Week 6	Exp. 6:
Week 7	Exp. 7:

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	George B. Thomas, Jr., Maurice D. Weir and Joel Hass, Thomas' calculus, 12th edition, Addison Wesley, 2010.	Yes
Recommended Texts	H.S. Gangwar, Prabhakar Gupta. A textbook engineering mathematics-I. Second edition, 2010.	No
Websites		

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MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Engineering Mechanics ميكانيك هندسي			**Module Delivery**	
Module Type	CORE			**Theory** **Lab** **Tutorial**	
Module Code	ENME123				
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level	1		**Semester of Delivery**	2	
Administering Department	ME		**College**	ME	
Module Leader	Dr.		**e-mail**		
Module Leader's Acad. Title	Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Dr.		**e-mail**		
Peer Reviewer Name	Dr.		**e-mail**		
Review Committee Approval	01/10/2023		**Version Number**	2023	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	PHYS113	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To assist students to understand the fundamental principles of engineering mechanics (Statics and Dynamics). 2. To develop problem solving skills and understanding of principles of Dynamics Kinematics of rigid bodies: through the application of techniques as they relate to the different fields of engineering. 3. To develop problem solving skills and understanding of Newton's law through the application of techniques. 4. To understand how analysis of Structures, Trusses, Frames, Machines, Centers of Mass and Centroids, and Area Moments of Inertia. 5. To comprehend how clarification of Mass Moments of Inertia and analysis in two dimensions' problems. 6. To understand the motion of bodies (kinematics), and the other subjects as it sequenced.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Enable the student to learn and understand the basic Engineering Mechanics concepts, mass, forces, quantities and vectors at Mechanical Engineering 2. The student should understand and be able to apply Newton's Laws. 3. The student should Know the analysis of Structures, Trusses, Frames, Machines. 4. The student should be able to find the Centers of Mass and Centroids. 5. The student should know how can we find the Area Moments of Inertia, and the other subjects as it sequenced by the Course Materials and Schedule. 6. Understanding the basic principles of particles and solid body's motion 7. The ability to make a mathematical model of the motion of the mechanical systems. 8. Calculating the motion resulting from applying forces and moments, as well as calculating the forces and moments to describe the characteristics of motion. 9. The student should understand and be able to relate the kinematics of bodies to the solution of dynamics problems in impulse and momentum of particles. 10. The student should understand and be able to study the Absolute and relative acceleration

	11. The student should understand and be able to apply Newton's Laws to particles to solve problems related to work and energy of particles.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A - Statics Structures: Plane Trusses, Method of Joints, Method of Sections, and Frames and Machines [9 hrs]. Centers of Mass and Centroids: Centroids of Lines, Centroids of Areas, Centroids of Volumes, and Composite Bodies and Figures [9 hrs]. Area Moments of Inertia: Rectangular Moments of Inertia, Polar Moments of Inertia, Composite Areas, Products of Inertia, and Rotation of Axes [5 hrs]. Part B - Dynamics Work and energy of particles: Work of a force, Kinetic energy of a particle, Principle of work and energy, and Potential energy [8 hrs]. Impulse and momentum of particles: Rate of changed of angular momentum. Conservation of angular momentum, Rate of changed of angular momentum. Conservation of angular momentum [8 hrs]. Impact: Central impact, Oblique Impact [8 hrs]. Kinematics of rigid bodies: Translation and Rotation of rigid bodies, General motion. Absolute and relative velocity in plane motion, Instantaneous center of rotation, and Absolute and relative acceleration [12 hrs]. Mass Moments of Inertia: Rectangular Mass Moments of Inertia, Polar Mass Moments of Inertia, and Composite Masses [8 hrs].
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	108	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	20% (20)	3, 6, 9, 12	LO #1-11
	Assignments	2	10% (10)	5, 10	LO #1-11
	Projects / Lab.	Lab. 5	10% (10)	Continuous	LO #1, 3, 4, 5, 6, 8, 11
	Report	-	-	-	-
Summative assessment	**Midterm Exam**	2 hrs.	10% (10)	7	LO #1-11
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Structures:** Plane Trusses, Method of Joints and Method of Sections
Week 2	**Structures:** Frames and Machines
Week 3	**Centers of Mass and Centroids:** Centroids of Lines, Areas. and Volumes..
Week 4	**Centers of Mass and Centroids:** Centroids of Composite Bodies and Figures.

Week 5	**Area Moments of Inertia:** Rectangular Moments of Inertia. Polar Moments of Inertia. Composite Areas. Products of Inertia Rotation of Axes.
Week 6	**Work and energy of particles:** Work of a force. Kinetic energy of a particle.
Week 7	**Work and energy:** Principle of work and energy. Potential energy.
Week 8	**Impulse and momentum of particles:** Rate of changed of angular momentum.
Week 9	**Impulse and momentum of particles:** Conservation of angular momentum.
Week 10	**Impact:** Central impact.
Week 11	**Impact:** Oblique Impact.
Week 12	**Kinematics of rigid bodies:** Translation and Rotation of rigid bodies.
Week 13	**Absolute motion:** General motion. Absolute and relative velocity in plane motion. Instantaneous center of rotation.
Week 14	**Absolute motion:** Absolute and relative acceleration.
Week 15	**Mass Moments of Inertia:** Rectangular Mass Moments of Inertia. Polar Mass Moments of Inertia. Composite Masses.
Week 16	**Preparatory week before the Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Exp. 1: ACHIEVING THE LAW OF CONSERVATION OF ENERGY (MAXWELL'S WHEEL)
Week 2	Exp. 2: EQUILIBRIUM FORCES IN THREE DIMENSIONS
Week 3	Exp. 3: DETERMINING THE CENTROID FOR DIFFERENT GEOMETRIC SHAPES
Week 4	Exp. 4: DETERMINING THE CENTER OF GRAVITY FOR DIFFERENT GEOMETRIC SHAPES

Week 5	Exp. 5: THE EXPERIMENTAL DETERMINATION OF THE MASS MOMENT OF INERTIA FOR SOLID AND HOLLOW DISKS
Week 6	Exp. 6:
Week 7	Exp. 7:

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	ENGINEERING MECHANICS VOLUME 1 STATICS EIGHTH EDITION (2016) VOLUME 2 DYNAMICS EIGHTH EDITION (2015) Publisher: John Wiley & Sons Singapore Pte. Ltd By James L. Meriam (Author), L. G. Kraige (Author), J. N. Bolton (Author)	Yes
Recommended Texts	VECTOR MECHANICS FOR ENGINEERS: STATICS AND DYNAMICS Publisher : McGraw Hill; 12th edition (2018) by Ferdinand Beer (Author), E. Johnston (Author), David Mazurek (Author), Phillip Cornwell (Author), Brian Self (Author)	No
Websites		

	Ministry of Higher Education and Scientific Research - Iraq **Al-Turath University** **College of Engineering** **Department of Aircraft Engineering** Four years (Eight semesters) - 240 ECTS credits 1 ECTS = 25hr	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	Eng. Drawing and Descriptive Geometry رسم هندسي وهندسة وصفية	**Module Delivery**	
Module Type	CORE	**Theory** **Lab** **Practical**	
Module Code	EDDG114 / EDDG124		
ECTS Credits	7		
SWL (hr/sem)	175		

Module Level	1	**Semester of Delivery**	1 / 2
Administering Department	ME	**College**	ME
Module Leader	Dr.	**e-mail**	
Module Leader's Acad. Title	Dr.	**Module Leader's Qualification**	Ph.D.
Module Tutor	Dr.	**e-mail**	
Peer Reviewer Name	Dr.	**e-mail**	
Review Committee Approval	01/10/2023	**Version Number**	2023

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Training the student in the first stage the usage of Eng. drawing equipment. 2. Educate the student in the first stage the fundamental of mechanical drawing like Lettering, Applied geometry Pictorial drawing (Real model in true dimension), Orthographic projection, first & third angle projection, Dimensions, Sections, Third view estimate.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Identify the components and basics of Engineering drawing. 2. Learn how to read the maps of mechanical engineering drawing. 3. Identify and knowing of all symbols and standers of Engineering drawing. 4. Identify the methods of engineering drawing and applied geometry. 5. Learn how to Pictorial drawing (Real model in true dimension) and Orthographic projection. 6. Identify all types of projection, First and third angle projection and Sections 7. The possibility of the student to draw the subject which explains to him. 8. Linking what his learning with reality. 9. Complete the drawing in specified time. 10. Student ability to learn and understand all the private belongings of mechanical drawing. 11. Develops student ability to using computers programs of drawing and conjugated with manual drawing.
Indicative Contents المحتويات الإرشادية	****Engineering drawing:** Introduction. Standard drawing equipment. **Lettering:** Lines kinds in drawing. Kufi font in the writing of letters and numbers. The paper types and design with title table. Draw lines and circles. [10 hrs] ****Descriptive Geometry:** Introduction to descriptive geometry. Projection theory with standard planes. Methods of projection. Projection of a point. Exercise in projection of a point. [5 hrs] **Introduction to CAD Packages** [4.5 hrs] 1- Menus/ format/ Draw / Tools / Dimension / Modify 2- Tool bars 3-Drawing area 4-Command bar / Task bar 5-Drawing Grid / Snap Mode / Ortho Mode / Object Snap and Tutorials

	<u>Engineering drawing:</u>** **Engineering Processes:** Applied geometry in eng. drawing. Exercise in important eng. geometry (Drawing a perpendicular line to bisector, Dividing a line, Drawing a tangent to circle from point, Drawing an ellipse). [5 hrs] **Introduction to (ISO); Pictorial drawing:** Real model in true dimensions. Draw cube shape with ovals by used four centers method. Exercise in pictorial drawing. [7 hrs] **<u>**Descriptive Geometry:</u>** Projection of straight line. Exercise in projection of straight line. Exercise in projection of straight line by rotation method. The status of the straight line in space. [2 hrs] **<u>** CAD</u>** [5.5 hrs] Coordinate system (absolute and relative coordinate) Cartesian / Polar Coordinates and Tutorials Two Dimensional Drawing (Line , Circle , Rectangle , Arc , Polygon) Modify (Erase , Copy , Rotate , Mirror , Offset) and Tutorials **<u>**Engineering drawing:</u>** Exercises in Engineering Drawing (ISO). **Three Projections:** Three projections definition (front, top and side view). Draw in first angle. Exercises in projection. [14.5 hrs] **<u>**Descriptive Geometry:</u>** Projection of straight line. Exercise in projection of straight line. Exercise in projection of straight line by rotation method. The status of the straight line in space. [1.5 hrs] **<u>** CAD</u>** [3.5 hrs] Two Dimensional Drawing (Polyline , Helix , Donut , Ellipse) Modify (Trim , Join , Chamfer , Fillet) and Tutorials **<u>**Engineering drawing:</u>** **Dimensioning:** Main rules in dimensions position and details in drawing. Rules in dimensions position for arcs and circles. Exercise in applied dimensions on projection view. [6 hrs] **Sections** Sections definition. Find sections and section planes and half section projection. Exercise in half section projection. [8 hrs]

	****Descriptive Geometry:** Definition and Description of the Auxiliary planes. Exercise in auxiliary planes. [3 hrs]. ****CAD** [2.5 hrs] Draw Hatch / Line type / Line width / Color and Tutorials Array (Rectangular and Polar) and Tutorials ****Engineering drawing:** **Third view estimate:** Important steps to estimate third unknown projection depending on the known two projections. Exercise in estimate third unknown projection. [15 hrs] ****Descriptive Geometry:** **Development of surface:** Introduction and describe development of surface. Exercise in projection triangular shape. Exercise in projection quadrilateral shape by rotation method. [2 hrs] ****CAD** [2 hrs] Dimensions and Tutorials
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	-Give the student theoretical lectures prepared by the lecture and explain the subject of drawing in details and draw it in front of the students. -Get some samples of the subject of drawing to the class to conform the understanding and to know how it works. -Discuss some student's mistakes and how to avoid them

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	97	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO # 1-11
	Assignments	15	15% (15)	Continuous	LO # 1-11
	Projects / Lab.	Lab. 5	10% (10)	Continuous	LO # 1-11
	Report	5	5% (5)	Continuous	LO # 1-11
Summative assessment	Midterm Exam	2 hrs.	10% (10)	8	LO # 1-11
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered :
Week 1	****Engineering drawing:** Introduction. Standard drawing equipment. ****Descriptive Geometry:** Introduction to descriptive geometry.
Week 2	****Engineering drawing:** **Lettering:** Lines kinds in drawing. Kufi font in the writing of letters and numbers. The paper types and design with title table. ****Descriptive Geometry:** Projection theory with standard planes.
Week 3	****Engineering drawing:** Draw lines and circles. ****Descriptive Geometry:** Methods of projection. Projection of a point. Exercise in projection of a point.
Week 4	****Engineering drawing:** **Engineering Processes:** Applied geometry in eng. drawing. Exercise in important eng. geometry (Drawing a perpendicular line to bisector, Dividing a line, Drawing a tangent to circle from point, Drawing an ellipse). ****Descriptive Geometry:** Projection of straight line. Exercise in projection of straight line.

Week 5	****Engineering drawing:** **Introduction to (ISO); Pictorial drawing:** Real model in true dimensions. Draw cube shape with ovals by used four centers method. ****Descriptive Geometry:** Exercise in projection of straight line by rotation method.
Week 6	****Engineering drawing:** Exercise in pictorial drawing. ****Descriptive Geometry:** The status of the straight line in space.
Week 7	****Engineering drawing:** Exercises in Engineering Drawing (ISO).
Week 8	****Engineering drawing:** **Three Projections:** Three projections definition (front, top and side view).
Week 9	****Engineering drawing:** Draw in first angle. Exercises in projection.
Week 10	****Engineering drawing:** **Dimensioning:** Main rules in dimensions position and details in drawing. Rules in dimensions position for arcs and circles. Exercise in applied dimensions on projection view. ****Descriptive Geometry:** Definition and Description of the Auxiliary planes. Exercise in auxiliary planes.
Week 11	****Engineering drawing:** **Sections** Sections definition. Find sections and section planes and half section projection. ****Descriptive Geometry:** Exercise in auxiliary planes.
Week 12	****Engineering drawing:** Exercise in half section projection.
Week 13	****Engineering drawing:** **Third view estimate:** **(Part 1)** Important steps to estimate third unknown projection depending on the known two projections. ****Descriptive Geometry:** **Development of surface:** Introduction and describe development of surface. Exercise in projection quadrilateral shape by rotation method.

Week 14	****Engineering drawing:** **(Part 2)** Important steps to estimate third unknown projection depending on the known two projections. ****Descriptive Geometry:** Exercise in projection triangular shape.
Week 15	****Engineering drawing:** Exercise in estimate third unknown projection. ****Descriptive Geometry:** Exercise in projection quadrilateral shape by rotation method.
Week 16	**Preparatory week before the Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	**Introduction to CAD packages** 1- Menus/ format/ Draw / Tools / Dimension / Modify 2- Tool bars
Week 2	**Drawing area** 1- Command bar / Task bar 2- Drawing Grid / Snap Mode / Ortho Mode / Object Snap and Tutorials
Week 3	**Coordinate system** 1- Absolute and relative Coordinate 2- Cartesian and Polar coordinates
Week 4	**Two dimensional drawing** 1- (Line , Circle , Rectangle , Arc , Polygon) 2- Modify (Erase , Copy , Rotate , Mirror , Offset) and Tutorials
Week 5	1 -Two Dimensional Drawing (Polyline , Helix , Donut , Ellipse) 2- Modify (Trim , Join , Chamfer , Fillet) and Tutorials
Week 6	1- Draw Hatch / Line type / Line width / Color and Tutorials 2- Array (Rectangular and Polar) and Tutorials
Week 7	**Dimensions and Tutorials**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1- K. Venkata Reddy, "Text book of Engineering Drawing", BS Publications, 2008. 2- 1986 , كتاب الرسم الهندسي ,عبد الرسول الخفاف 3- الهندسة الوصفية ، د. يوسف نيقولا،	Yes
Recommended Texts		
Websites	https://me.uotechnology.edu.iq/index.php/ar/	

	**Ministry of Higher Education and Scientific Research - Iraq** **Al-Turath University** **College of Engineering** **Department of Aircraft Engineering** Four years (Eight semesters) - 240 ECTS credits 1 ECTS = 25hr	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Electrical Engineering هندسة كهربائية			**Module Delivery**	
Module Type	CORE			**Theory** **Lab**	
Module Code	ELEN125				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	1		**Semester of Delivery**	2	
Administering Department	ME		**College**	ME	
Module Leader	Dr.		**e-mail**		
Module Leader's Acad. Title	Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Dr.		**e-mail**		
Review Committee Approval	01/10/2023		**Version Number**	2023	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To develop problem solving skills and understanding of circuit theory through the application of techniques. 2. To understand how voltage , current and power from a given circuit. 3. This course deals with the basic concept of electrical circuits. 4. This is the basic subject for all electrical and electronic circuits subject. 5. To understand Kirchhoff's current and voltage Laws problems. 6. To perform mesh and Nodal analysis.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how electricity works in electrical circuits. 2. List the various terms associated with electrical circuits. 3. Summarize what is meant by a basic electric circuit. 4. Discuss the reaction and involvement of atoms in electric circuits. 5. Describe electrical power, charge, and current. 6. Define Ohm's law. 7. Identify the basic circuit elements and their applications. 8. Discuss the operations of sinusoid and phasors in an electric circuit. 9. Discuss the various properties of resistors, capacitors, and inductors. 10. Explain the two Kirchoff's laws used in circuit analysis. 11. Identify the capacitor and inductor phasor relationship with respect to voltage and current.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A - Circuit Theory</u> DC circuits – Current and voltage definitions, Passive sign convention and circuit elements, Combining. resistive elements in series and parallel. Kirchhoff's laws and Ohm's law. Anatomy of a circuit, Network reduction, Introduction to mesh and nodal analysis . [8hrs] AC circuits I – Time dependent signals, average and RMS values. Capacitance and inductance, energy storage elements, simple AC steady-state sinusoidal analysis. [8 hrs] AC Circuits II - Phasor diagrams, definition of complex impedance, AC

	circuit analysis with complex numbers. [6 hrs] RL, RC and RLC circuits - Frequency response of RLC circuits, simple filter and band-pass circuits, resonance and Q-factor, use of Bode plots, use of differential equations and their solutions. Time response (natural and step responses). Introduction to second order circuits. [8 hrs] Revision problem classes [3 hrs] <u>Part B - Analogue Electronics</u> Fundamentals Resistive networks, voltage and current sources, Thevenin and Norton equivalent circuits, current and voltage division, input resistance, output resistance, coupling and decoupling capacitors, maximum power transfer, RMS and power dissipation, current limiting and over voltage protection. [8 hrs] Components and active devices – Components vs elements and circuit modeling, real and ideal elements. Introduction to sensors and actuators, self-generating vs modulating type sensors, simple circuit interfacing. [3 hrs] Diodes and Diode circuits – Diode characteristics and equations, ideal vs real. Signal conditioning, clamping and clipping, rectification and peak detection, photodiodes, LEDs, Zener diodes, voltage stabilisation, voltage reference, power supplies. [8 hrs]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	20% (20)	3, 6, 9, 12	LO #1-11
	Assignments	2	10% (10)	5, 10	LO #1-11
	Projects / Lab.	Lab. 7	10% (10)	Continuous	LO #1, 2, 3, 6, 7, 8, 9, 10, 11
	Report	-	-	-	-
Summative assessment	**Midterm Exam**	2 hrs.	10% (10)	7	LO #1-11
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to DC Circuits: Voltage, Current and Resistance. Ohm's Law. Kirchhoff's Laws. Voltage divider rule. Current divider rule. Current and Voltage Sources.
Week 2	Sources conversion. Series and Parallel Circuits. Star-delta and delta-star conversion. Methods of Analysis and Network Theorems: Branch-Current Analysis.
Week 3	Mesh Analysis. Nodal Analysis. Superposition Theorem.

	Thévenin's Theorem. Norton's Theorem.
Week 4	Maximum Power Transfer. Capacitors and Inductors: Capacitance and Capacitors
Week 5	Inductor and Inductance. Sinusoidal Alternating Waveforms: AC Voltage or Current Waveform General Format.
Week 6	Sinusoidal Waveform Format (period, Frequency, peak value and Phase Relations). Average Value and Effective (rms) Values. The Basic Elements (R, L, and C) response to a sinusoidal voltage or current.
Week 7	Magnetic Circuits: Magnetic Field, Flux and flux density. Reluctance and Magnetizing Force.
Week 8	Ohm's Law for Magnetic Circuits. Ampère's Circuital Law.
Week 9	AC Circuits Analysis: Series and Parallel AC Circuits. Power calculation (P, Q, and S).
Week 10	Power Triangle. Power-Factor. Polyphase Systems:
Week 11	Three-phase voltage generation. Generator-Loads connection in three phase systems (Y-Y,Δ-Δ,Y-Δ,Δ-Y). Phase and line voltage and current convertion between Y and Δ.
Week 12	Rotating Machines Principles: Elementary concepts of rotating machines. Direct –current machines. Synchronous machines.
Week 13	Induction machine. Stepper motor. Transformers: Construction and Working principle of transformer.
Week 14	E.M.F. equation of transformer. Voltage transformation ratio. Types of Transformers and Application
Week 15	**Power Electronic Circuits:** **Power electronic elements (dides, switching transistors , Capacitors and Inductor).** **Power electronic circuits (Rectifiers, inverters, converters).**
Week 16	**Preparatory week before the Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Exp. 1: Ohm's Law
Week 2	Exp. 2: Kirchhoff's Laws
Week 3	Exp. 3:Star-Delta and Delta-Star Circuit conversions
Week 4	Exp. 4:Superposition Theorem
Week 5	Exp. 5: Impedance Elements Characteristics
Week 6	Exp. 6: RLC Series Circuit
Week 7	Exp. 7:

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Robert L. Boylestad “Introductory Circuit Analysis” Eleventh Edition	Yes
Recommended Texts	John Hiley, Keith Brown and Ian Mckenzie Smith "Electrical And Electronic Technology" tenth edition	Yes
Websites		

	Ministry of Higher Education and Scientific Research - Iraq **Al-Turath University** **College of Engineering** **Department of Aircraft Engineering** Four years (Eight semesters) - 240 ECTS credits 1 ECTS = 25hr	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	English Language اللغة الإنكليزية			**Module Delivery**	
Module Type	Basic			**Theory**	
Module Code	ENLA107				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level		1	**Semester of Delivery**		2
Administering Department		ME	**College**	ME	
Module Leader			**e-mail**		
Module Leader's Acad. Title		Dr.	**Module Leader's Qualification**		
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		1/10/2023	**Version Number**		2023

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Nowadays English has a special and predominant role in the communicative sphere of the world. It has also a special identity in the field of education. The teaching of English is highly desirable for the English teacher. Before starting his/her teaching, it requires from the teacher to determine his/her aims and objectives. This module aims to enhance the communication skills of students whose level of English is equivalent to pre-intermediate level. There will be a particular focus on the development of the four language skills (speaking, listening, reading and writing) and on broadening students' vocabulary and syntactical range so that they can communicate easily on a wide range of topics.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	This semester will help students through enhancing their Knowledge and Understanding and enabling them to use grammar correctly, analyze the element of language and establish the appropriate relationship among linguistic components, in addition to understanding the meaning of sentences and paragraphs. So the learning outcomes will be: 1. The course covers core language and skills students need to communicate successfully in technical specializations, 2.give their opinions and participate in discussions on a wide range of topical issues, 3. communicate effectively in written format on a range of contemporary topics, especially the technical ones, 4. understand the key points of a range of moderately complex oral and written texts with relative ease, 5. communicate effectively as part of a multicultural group, 6. manage, interpret and create meaning using a variety of digital devices and tools
Indicative Contents المحتويات الإرشادية	**A- Communicative competences** **Listening** - Understand and identify the main points of dialogues of 230-250 words on familiar topics regularly encountered in life, work, school, etc., within the scope of the curriculum. - Listen and guess meanings (through the expressions and feelings of the speakers) in familiar monologues and conversations in everyday life - Understand the main points of news programs, broadcasts, interviews, etc., on familiar topics which are clearly delivered in simple language, or with illustrative images. [3 Hrs.] **Speaking** - Pronounce clearly and relatively accurately short dialogues. - Speak and interact with fellow speakers about familiar topics, express personal views and exchange information about the topics covered in the curriculum. - Describe in simple discourse familiar topics, narrate a short story closely related to the topics covered. - Present preparedly the projects on the topics in the curriculum. [2 Hrs.] **Reading** - Read and comprehend the main points, specific contents of a text of 200 words on current and familiar topics. - Read and understand the argument flow of texts, identify main conclusions in texts using clear language. - Read to

	find and summarize short texts of everyday use such as simple letters, brochures, using words and structures from the original texts. [3 Hrs.] **Writing** – write paragraphs (block and indented styles), Write simple connected and coherent texts of 180-200 words; write short reports based on suggestions, providing factual information and reasons for the recommendations made in the reports; collect short information from several sources and summarize it. - Complete (write/fill) administrative forms such as CVs and resumes, letter of application for employment, emails, etc. - Write descriptive texts of simple charts and tables. [3 Hrs.] **B- Linguistic knowledge** **Pronunciation**: Vowel and consonant syllable, words with different syllables, Words with stress (specials cases) – Words without stress, Sentence stress, assimilation, linking vowels with vowels Question, intonation, Homophones, practicing words and terms, phrases, and sentences related to the students' major. [3 Hrs.] **Vocabulary**: Words related to themes and topics of the course, collocations, words with different meanings and pronunciations. [2 Hrs.] **Grammar**: parts of speech, past, Present, and future tenses, Word structure (compound nouns), Countable and uncountable nouns. Types on sentences: simple, compound, complex sentences, Articles, language function: commands, requests, offers, advice and instructions. Modal verbs, Relative pronouns and Relative clauses with which-that-who-whom-whose-where-when. Prepositions, Phrasal verbs (including verbs, adverbs and prepositions), comparison showing changing things, Sentences of reason and results and Conjunctions: although, however etc, active and passive, Adverbial clauses of condition, Comparatives and superlatives of adjectives. [2 Hrs.]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The teacher should prepare his/her students for listening to academic lectures and academic reading to some extent. In addition to that , students should participate in the lecture through the skills of speaking , writing , reading and listening. **Students are taught by Communicative language teaching (CLT)** in which students are encouraged to communicate with each other in the target language. students need to be exposed to the target language as much as possible to understand and use the target language in real-life situations. A variety of ways will be used to teach students Technical English. For example, work in group, practicing different activities, discussion, presentation to get students to communicate with each other in the target language and to practice using the target language for communication, using pictures, images, and spatial understanding (Visual learning) and Aural (auditory-musical) by using sound and music, and Verbal (linguistic) via using words, both in speech and writing. students need to be confident in their ability to use the target language and develop better interpersonal skills.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية					
		Time/ Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	20% (20)	3, 6, 9, 12	LO #1 - 6
	Assignments	2	10% (10)	5, 10	LO #1 - 6
	Projects / Lab.	-	-	-	-
	Report	1	10% (10)	13	LO #1 - 6
Summative assessment	**Midterm Exam**	2 hrs.	10% (10)	7	LO #1 - 6
	Final Exam	3 hrs.	50 % (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Parts of Speech(Nouns-Verbs-Adjectives-Adverbs-Prepositions-Articles-Pronouns-Conjunctions-Interjections), Unit One of the Book (Headway)
Week 2	The components, Structure and kinds of the sentences, Unit Two (Headway) 1-Simple-compound –complex 2-declarative- interrogative –exclamatory – conditional -imperative
Week 3	Tenses - present tenses, Definite and Indefinite Articles, ways of joining sentences
Week 4	Tenses – Past tenses , reading comprehension, Unit Three (Headway)
Week 5	Tenses- future tenses, writing basics and strategies.
Week 6	Passive and active sentence in scientific writing, Unit Four (Headway)
Week 7	Listening skills- How to participate in different topics- how to avoid silence,

	How to answer the questions of the passage in exam (WH Questions), listening and speaking skills (multiple native conversations).
Week 8	Writing Skills (Punctuation – ways to join sentences- principles of paragraph structure- practice writing), Unit Five (Headway)
Week 9	Mid-term Exam .
Week 10	Idioms and idiomatic expression, Unit Six (Headway)
Week 11	Reading skills (skimming, scanning, and intensive reading), Unit Seven + Unit Eight (Headway)
Week 12	Phrasal verbs , speaking skills(participating in a dialogue and turn taking)
Week 13	Conditional in English, speaking skills (how to make presentation)
Week 14	Comparison and modals, participating in group discussion and be active listener/speaker
Week 15	Writing skills (CV, cover letter, and email writing)
Week 16	Preparatory week before the Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1- New Headway, English Course, (beginner), John and Liz Soars and Mike Sayer, Oxford University Press. 2- Selected ESP materials.	Yes
Recommended Texts	Murphy, R. (1985). Grammar in Use, Rapid Review of Grammar, Infotech: English for Computer Users. (4th edition). Cambridge.	No
Websites	Randall's ESL Cyber Listening Lab - English Listening	

	Ministry of Higher Education and Scientific Research - Iraq **Al-Turath University** **College of Engineering** **Department of Aircraft Engineering** Four years (Eight semesters) - 240 ECTS credits 1 ECTS = 25hr	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Mathematics III III رياضيات			**Module Delivery**	
Module Type	CORE			**Theory** **Tutorial**	
Module Code	MATH231				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	2		**Semester of Delivery**	3	
Administering Department	ME		**College**	ME	
Module Leader	Dr.		**e-mail**		
Module Leader's Acad. Title	Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Dr.		**e-mail**		
Review Committee Approval	01/06/2024		**Version Number**	2024	

Relation with Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MATH122	**Semester**	2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To provide a course of high academic quality in Mathematics in a challenging and supportive learning environment that encourages students to reach their full potential, personally and academically. 2. To provide a course that is suitable both for students aiming to pursue research and for students going into other careers. 3. To provide an integrated system of teaching which can be tailored to the needs of individual students. 4. To develop in students the capacity for learning and clear logical thinking. 5. To continue to attract and select students of outstanding quality. 6. To provide an intellectually stimulating environment in which students have the opportunity to develop their skills and enthusiasm to their full potential.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Knowledge and Understanding: This Course will develop learners' ability to: 1. Use mathematical models 2. Understand and use mathematical concepts in solving mathematical differential equations kinds. 3. Select and apply skills in dealing with geometric series, power series and Fourier series. 4. Use mathematical reasoning skills to interpret information, select a strategy to solve a problem, and communicate solutions. Subject-specific skills: It is expected that learners will develop the following: 5. Skills for Learning, and drawn from the main skills areas listed below. 6. Skills for Life 7. and Skills for Work These must be built into the Course where there are appropriate opportunities.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Ordinary Linear Differential Equations:** 1st order differential equations, Separable, Homogeneous, Exact, Linear, Bernoulli, 2nd Order Differential Equations, Homogeneous, Non-Homogeneous. [32 hrs] **Sequences and Series:** Sequence, Series, Geometric Series, Tests of Convergence, Definition, The General Term Test, The Integral Test, The Comparison Test, The Limit

	Comparison Test, The Ratio Test, The Root Test, Alternating Series, Power Series, Interval of Convergence, Taylor Series, Maclaurin Series, Applications. [24 hrs] **Fourier Series:** Periodic Function, Even and Odd Functions, Half Range Expansion Function. [9 hrs] **Partial Differentiation** Definition, Mechanism of Differentiation, Functions of Two Variables, Functions of Higher Variables. [6 hrs] **General Applications.** [6 hrs]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	All lectures reflect the higher values, purposes and principles. They offer flexibility, provide more time for learning, focus on skills and applying to learn, and scope for personalization and choice. In this Course, and its component Units, there will be an emphasis on skills development and the application of those skills. Assessment approaches will be proportionate, fit for purpose and will promote best practices, enabling learners to achieve the highest standards they can. This course provides learners with opportunities to continue to acquire and develop the attributes and capabilities of the four capacities, as well as skills for learning, skills for life and skills for work.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	77	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	20% (20)	3,5,9,11	LO #1, 2, 3, and 4
	Assignments	2	10% (10)	6, 12	LO # 5
	Projects / Lab.	-	-	-	-
	Report	1	10% (10)	8	LO # 6
Summative assessment	Midterm Exam	2 hrs.	10% (10)	7	LO # 1-4
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	**Ordinary Linear Differential Equations** 1st order differential equations Separable Homogeneous
Week 2	Exact Linear Bernoulli
Week 3	2nd Order Differential Equations Homogeneous
Week 4	Non-Homogeneous
Week 5	Higher Order Differential Equations Homogeneous
Week 6	Non-Homogeneous Applications
Week 7	**Sequences and Series** Sequence Series Geometric Series Tests of Convergence
Week 8	Definition The General Term Test The Integral Test The Comparison Test
Week 9	The Limit Comparison Test The Ratio Test The Root Test
Week 10	Alternating Series

	Power Series Interval of Convergence
Week 11	Taylor Series Maclaurin Series Applications
Week 12	**Fourier Series** Periodic Function
Week 13	Even and Odd Functions Half Range Expansion Function
Week 14	**Partial Differentiation** Definition Mechanism of Differentiation Functions of Two Variables Functions of Higher Variables
Week 15	**General Applications**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Exp. 1:
Week 2	Exp. 2:
Week 3	Exp. 3:
Week 4	Exp. 4:
Week 5	Exp. 5:
Week 6	Exp. 6:
Week 7	Exp. 7:

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. George B. Thomas, Jr., Maurice D. Weir and Joel Hass, Thomas' calculus, 12th edition, AddisonWesley, 2010. 2. Erwin Kreyszig,"Engineering mathematics", McGRAW-HILL ,9thedition, 2006.	Yes
Recommended Texts		
Websites		

	**Ministry of Higher Education and Scientific Research - Iraq** **Al-Turath University** **College of Engineering** **Department of Aircraft Engineering** Four years (Eight semesters) - 240 ECTS credits 1 ECTS = 25hr	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	Fluid Mechanics ميكانيك موائع	**Module Delivery**	
Module Type	CORE	**Theory** **Lab** **Tutorial**	
Module Code	FLME232 / FLME242		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	2	**Semester of Delivery**	3 / 4
Administering Department	ME	**College**	ME
Module Leader		**e-mail**	
Module Leader's Acad. Title	Dr.	**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name		**e-mail**	
Review Committee Approval	01/06/2024	**Version Number**	2024

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	**	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To develop problem solving skills and understanding of fluid mechanics theory through the application of techniques. 2. Explain the concept of manometers and apply appropriate equations to determine pressures. 3. Calculate the hydrostatic pressure force on a plane or submerged surface. 4. Understand and describe the fundamental principles and governing equations of fluid. 5. Analysis the Friction losses in pipes. 6. Understand and describe the momentum Equation, applications of momentum, principal Analysis 7. Explain Dimensional analysis and similarity
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how fluid static effect on the system that contain fluid. 2. List the various terms associated with fluid static from pressure and properties of fluid. 3. Summarize the means to calculate the hydrostatic pressure force. 4. Fluid dynamics involves the application of mathematical equations and models to describe fluid behavior. 5. Fluid dynamics enables learners to analyze and interpret fluid flow patterns. They gain the ability to identify and understand different types of flow, including laminar flow, turbulent flow, and transitional flow. This understanding helps in predicting and characterizing fluid behavior in various scenarios. 6. Summarize the means to. The Bernoulli Equation and it Application. 7. Discuss Liner momentum Equation, Applications of momentum principle. 8. Explain Friction losses in pipes and Analysis of piping system
Indicative Contents المحتويات الإرشادية	1. General introduction to fluid science, Dimensions, Dimensional Homogeneity, and Units, Viscosity, Vapor Pressure, cavitation, Surface Tension. [4 hrs] 2. Pressure at a point. Variation of pressure in a static fluid with Depth. Pressure measurement (barometer pressure, Bourdon pressure gages, manometers). Hydrostatic Force on submerged Plane Surface. [16 hrs] 3. Classification of fluid flow, The continuity equation. Euler's equation of motion along streamline. Bernoulli's equation and its applications. Pitot and Pitot static tube, Orifice and Venture Meter (Flow Measurement). Energy equation. [16 hrs] 4. Laminar flow and Turbulent flow. Pump and turbine Major and

	secondary losses in pipes Connecting pipes in series, parallel and mixed. [16hrs] 5. Impact of a jet on a plane surface. Force due to flow round a curved vane. Force due to the flow of fluid round a pipe bend. [10 hrs] 6. The Pi-theorem, Dimensionless parameters. Models study. [10 hrs]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is Encourage students to pay attention to the subject by linking it to the daily reality in which a person lives and the importance of studying this course because of its impact on his real life real world .

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	20% (20)	3,6,9,12	All
	Assignments	2	10% (10)	5,8	All
	Projects / Lab.	Lab. 4	10% (10)	Continuous	All
	Report	-	-	-	-
Summative assessment	**Midterm Exam**	2 hrs.	10% (10)	7	All
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	General definitions, Newton's law of viscosity, Surface tension, Vapor Pressure, cavitation.
Week 2	Pressure at a point in a static fluid, Variation of pressure in a static fluid with depth.
Week 3	Pressure measurement (barometer pressure, Bourdon pressure gauge ,manometers).
Week 4	Hydrostatic Force on submerged Plane Surface.
Week 5	Classification of fluid flow, The continuity equation. Euler's equation of motion along streamline. Bernoulli's equation
Week 6	Bernoulli's equation and its applications. Pitot and Pitot static tube, Orifice and Venture Meter (Flow Measurement).
Week 7	Energy equation.
Week 8	Laminar flow and Turbulent flow.
Week 9	Major and secondary losses in pipes Connecting pipes in series, parallel and mixed.
Week 10	Pump and turbine
Week 11	Impact of a jet on a plane surface.
Week 12	Force due to flow round a curved vane.
Week 13	Force due to the flow of fluid round a pipe bend.
Week 14	The Pi-theorem, Dimensionless parameters.
Week 15	Models study.
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Exp. 1: Determination of coefficient of viscosity for a liquid by stokes method.
Week 2	Exp. 2: Borden gauge calibration.
Week 3	Exp. 3: Center of pressure.
Week 4	Exp. 4: Volume flow rate measurement/Flow through Venturi meter.
Week 5	Exp. 5: Discharge through an orifice.
Week 6	Exp. 6: Impact of jet.
Week 7	Exp. 7: Friction loss along pipes.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	White, "Fluid Mechanics", 7th Edition, McGraw Hill, 2011. 2- Cengel and Cimbala, Fluid Mechanics, Fundamentals and Applications, 2nd Edition, McGraw Hill, 2013.	Yes
Recommended Texts	Fundamentals of Fluid Mechanics, Bruce R. Munson, Ted H. Okiishi,	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/mechanical-engineering	

	Ministry of Higher Education and Scientific Research - Iraq **Al-Turath University** **College of Engineering** **Department of Aircraft Engineering** Four years (Eight semesters) - 240 ECTS credits 1 ECTS = 25hr	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Thermodynamics II II ديناميك حرارة			**Module Delivery**	
Module Type	CORE			**Theory** **Lab** **Tutorial**	
Module Code	THER233				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	2		**Semester of Delivery**	3	
Administering Department	ME		**College**	ME	
Module Leader	Dr.		**e-mail**		
Module Leader's Acad. Title	Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Dr.		**e-mail**		
Review Committee Approval	01/06/2024		**Version Number**	2024	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	THER114 (or) THER124	**Semester**	1 (or) 2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Definition of the second stage students in the Mechanical Engineering Department concepts of science thermodynamic. 1. To develop rules for determining gas mixture properties from knowledge of mixture composition and the properties of the individual components. 2. To define the quantities used to describe the composition of a mixture such as mass fraction, molar fraction, and volume fraction. 3. To understand the concept of pure substance and phase; the process of steam generation and properties of steam; analysis the process of steam; determination of dryness fraction of wet steam and apply the accounts as well as the use of steam and steam schemes. 4. To perform analysis of thermodynamic steam and gas cycles (e.g., Carnot, Rankine, and Brayton cycles). 5. To perform psychrometric analysis for heating/cooling processes. 6. To explain the working and calculations of single and multi-stage reciprocating compressor; clearance volume; volumetric efficiency.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Able to understand the concept of mole and mass fraction; partial pressure; Daltons law of partial pressure, and to setup the relation between partial pressure, mole fraction and volume fraction; the relations for gas constant, molecular mass, specific heats, and entropy of the gas mixture. 2. Able to use steam tables and charts as well as tables and charts cooling. Also, how to work the accounts of steam and use steam schemes. 3. Able to identify the components or parts of steam and gas stations . 4. Able to identify the application of the equations for the flow of energy to the stable parts of the plant steam. 5. Able to know the basic thermodynamic calculations on steam and gas cycles. 6. Able to perform psychrometric analysis for heating/cooling processes. 7. Able to identify all parts of reciprocating air compressors and rotary as well as the accounts.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A - **Mixtures of gases** Physical mixing of pure substances, Avogadro's hypothesis, The mole and the molecular properties, Dalton's law of partial pressures Gibbs-Dalton law of apparent properties of mixture (u,h,s), Volumetric analysis, Gravimetric analysis, Average properties of mixture. [12hrs] Part B - **Two-Phase system** Phase change process, Basic definitions, Property diagram and tables Fundamentals - **Processes on Two-Phase system:** Constant volume process**,** Constant pressure process**,** Constant temperature process**,** Polytropic process**,** Isentropic process. [4hrs] - **Steady flow devices**: Boiler and Condenser, Nozzle and Diffuser, Turbine and Compressor, Mixing chamber. [4hrs] - **Throttling:** Throttling process, Measurement of steam quality**,** Separating and throttling calorimeters, Combined calorimeter. [5hrs] Part C - **Power production cycle by Vapour** Concept of heat engine and Criteria of cycle performance, Carnot cycle for a vapour. [4hrs] **Simple Rankine steam power cycle**, Deviation of actual Rankine steam power Cycle from Idealized One. [10hrs] Part D - **Air standard cycles** Configuration of reciprocating engine, Air standard approximation, Carnot power cycle, Otto standard cycle, Diesel standard cycle, Dual (Mixed) standard cycle, Mean effective pressure, Simple gas turbine cycle (Joule-Brayton cycle), Deviation of actual gas-turbine cycle from idealized one. [14hrs] Part E - **Psychrometrics:** Gas-vapour mixtures, Characteristics of humid air, Adiabatic saturation, Psychrometric chart. [7hrs] Part F - **Reciprocating air compressors:** Description of reciprocating components, Indicated power input, Condition of minimum work and Isothermal efficiency, Effect of clearance volume and volumetric efficiency, Actual indicator diagram, Inter-cooling in multi-stage compressor, Steady flow analysis of a compressor. [14hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Teaching Method 1 – Lectures (Description: Attendance Recorded: Yes) 2. Teaching Method 2 – Tutorials (Description: Attendance Recorded: Yes) 3. Teaching Method 3 – Practical (Description: Practical homework assignments. Attendance Recorded: No) 4. Teaching Method 4 – Unscheduled Directed Student Hours (time spent away from the timetabled sessions but directed by the teaching staff). 5. Teaching Method 5- Laboratory sessions (Providing experimental supplementary to promote the engineering sense of students)

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/ Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	20% (20)	3, 6, 9, 12	All
	Assignments	2	10% (10)	5, 10	All
	Projects / Lab.	Lab. 5	10% (10)	Continuous	All
	Report	-	-	-	-
Summative assessment	**Midterm Exam**	2 hrs.	10% (10)	7	All
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Mixtures of gases:** Physical mixing of pure substances, Avogadro's hypothesis, The mole and the molecular properties, Dalton's law of partial pressures
Week 2	Gibbs-Dalton law of apparent properties of mixture (u,h,s), Volumetric analysis, Gravimetric analysis, Average properties of mixture
Week 3	**Two-Phase system:** Phase change process, Basic definitions, Property diagram and tables
Week 4	**Processes on Two-Phase system:** Constant volume process**,** Constant pressure process**,** Constant temperature process**,** Polytropic process**,** Isentropic process
Week 5	**Steady and unsteady flow processes:** Application of steady unsteady flow energy equation: **Steady flow devices**: Boiler and Condenser, Nozzle and Diffuser, Turbine and Compressor, Mixing chamber
Week 6	**Throttling:** Throttling process, Measurement of steam quality**,** Separating and throttling calorimeters, Combined calorimeter
Week 7	**Power production cycle by Vapour:** Concept of heat engine and Criteria of cycle performance, Carnot cycle for a vapour.
Week 8	**Simple Rankine steam power cycle**, Deviation of actual Rankine steam power Cycle from Idealized One
Week 9	**Air standard cycles:** Configuration of reciprocating engine, Air standard approximation, Carnot power cycle.
Week 10	Otto standard cycle.
Week 11	Diesel standard cycle, Dual (Mixed) standard cycle, Mean effective pressure.
Week 12	Simple gas turbine cycle (Joule-Brayton cycle), Deviation of actual gas-turbine cycle from idealized one
Week 13	**Psychrometrics:** Gas-vapour mixtures, Characteristics of humid air, Adiabatic saturation, Psychrometric chart.
Week 14	**Reciprocating air compressors:** Description of reciprocating components, Indicated power input, Condition of minimum work and Isothermal efficiency.
Week 15	Effect of clearance volume and volumetric efficiency, Actual indicator diagram, Inter-cooling in multi-stage compressor, Steady flow analysis of a compressor.
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Exp. 1: Thermodynamic relation between the saturation pressure and temperature for the pure water.
Week 2	Exp. 2: Measuring the dryness fraction for wet steam.
Week 3	Exp. 3: Study the performance of the steam power plant. Part-1.

Week 4	Exp. 4: Study the performance of the steam power plant. Part-2.
Week 5	Exp. 5: Energy balance of two-stage reciprocating air compressor.
Week 6	Exp. 6:
Week 7	Exp. 7:

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	➢ Yunus A. Cengel Michael A. Boles, "Thermodynamics An Engineering Approach" Fifth Edition, 2006.	Yes
	➢ Rajput, R. K. A textbook of engineering thermodynamics. Laxmi Publications, 2005.	Yes
Recommended Texts	➢ Estop T. and McConckyA., "Applied thermodynamics for engineering technologists", 2009. ➢ Roger's & Mayhew, "Engineering thermodynamics work and heat transfer", 4th Edition, 1992. ➢ Michael J. Moran, Howard N. Shapiro, Daisie D. Buettner, Margaret B. Bailey, "Fundamentals of Engineering Thermodynamics", 5th Edition, 2006.	Yes
Websites		

	**Ministry of Higher Education and Scientific Research - Iraq** **Al-Turath University** **College of Engineering** **Department of Aircraft Engineering** Four years (Eight semesters) - 240 ECTS credits 1 ECTS = 25hr	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	Mechanical Drawing and CAD رسم ميكانيكي ورسم معزز بالحاسوب		**Module Delivery**	
Module Type	CORE			
Module Code	MEDC234		**Lab** **Practical**	
ECTS Credits	5			
SWL (hr/sem)	125			
Module Level	2	**Semester of Delivery**	3	
Administering Department	ME	**College**	ME	
Module Leader	Dr.	**e-mail**		
Module Leader's Acad. Title	Dr.	**Module Leader's Qualification**	Ph.D.	
Module Tutor	None	**e-mail**	None	
Peer Reviewer Name	Dr.	**e-mail**		
Review Committee Approval	01/06/2024	**Version Number**	2024	

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	EDDG114 (or) EDDG124	**Semester**	1 (or) 2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Educate the student in the second stage the fundamental of mechanical drawing. 2. Explore the standard element of mechanical drawing such as bolts, keys, springs, and different types of gears. 3. Draw the assembled mechanical parts and determine the mechanism or method of assembly 4. Helping to understand the map of mechanical drawing and the symbols which it contain such as welding, fit and tolerance, and surface finishing.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Identify the components and fundamentals of mechanical drawing. 2. Learn how to interpret maps in mechanical drawing. 3. Recognize and understand all symbols and standards associated with mechanical drawing. 4. Identify the various methods of mechanical drawing. 5. Learn how to select the optimal parameters for calculations to suit the drawing. 6. Identify all types of gears, such as spur gears, bevel gears, worm gears, and helical gears, and their calculations. 7. Evaluate the student's ability to illustrate the subject explained to them through drawing. 8. Establish connections between what is learned and real-world applications. 9. Complete drawings within specified time frames. 10. Develop the student's abilities to use computers and designated programs in the field of mechanical drawing, linking them to manual drawing. 11. The ability to represent mechanical parts individually, collectively and assembled.
Indicative Contents المحتويات الإرشادية	*** Mechanical Drawing [9 hrs]** **Fastening Tools and Method of Drawing Them:** - Bolts and Screws, Nuts and Washers, Stud Bolts. **Joining by Bolts or Screws** **Assembly Drawing**

	*** CAD [2 hrs]** **Application on computer:** Drawing of primitives: box, cylinder, cone …. etc. *** Mechanical Drawing [3 hrs]** **Rivets:** - Classifications of Rivets, Method of Drawing and Joining Rivets *** Mechanical Drawing [3 hrs]** **Keys:** - Classifications of Keys, Method of Drawing and Joining Keys. *** CAD [2 hrs]** **Application on computer:** Features : extrude , revolve, ……etc. *** Mechanical Drawing [4 hrs]** **Springs:** - Classifications of Springs, Method of Drawing Compression Spring. *** Mechanical Drawing [4 hrs]** **Welding Signs:** - Types of Welding, Representing Welding Signs on Bodies. *** CAD [2 hrs]** **Application on computer:** Boolean operation. Union , subtract and intersect. Applications of Boolean operation. *** Mechanical Drawing [3 hrs]** **Pins:** Classifications of pins **Surface Finishing:** Representing Welding Signs on Bodies *** Mechanical Drawing [4 hrs]** **Tolerances:** - Basic Size, Deviations, Limits of Size, Tolerance, Representing Deviations on Zero Line. *** CAD [2 hrs]** **Application on computer:** Basic concepts on 3D. 3D view. *** Mechanical Drawing [3 hrs]** **Fits:** **-** Types of Fits

	*** CAD [2 hrs]** **Application on computer:** Projection definition *** Mechanical Drawing [12 hrs]** **Gears:** - Classifications of Gears, Drawing of Spur Gear, Bevel Gear and worm gear, Gears Assembly Drawing *** CAD [2 hrs]** **Application on computer:** Modify of 3D solid: move, rotate, array, mirror ….. etc. UCS with applications. *** Mechanical Drawing [3 hrs]** **Detailed Drawing** *** CAD [2 hrs]** **Application on computer:** Draw welding assembly.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	- Provide the student with theoretical lectures prepared by the lecturer, explaining the subject of drawing in detail and demonstrating it in front of the students. - Bring some samples of the drawing subject to the class to confirm understanding and illustrate how it works. - Discuss some students' mistakes and how to avoid them.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO # 1-11
	Assignments	15	15% (15)	Continuous	LO # 1-11
	Projects / Lab.	Lab. 7	10% (10)	Continuous	LO # 1-11
	Report	5	5% (5)	Continuous	LO # 1-11
Summative assessment	**Midterm Exam**	2 hrs.	10% (10)	7	LO # 1-11
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Fastening Tools and Method of Drawing Them:** Bolts and Screws Nuts and Washers Stud Bolts
Week 2	**Joining by Bolts or Screws** **Assembly Drawing**
Week 3	**Rivets:** Classifications of Rivets Method of Drawing and Joining Rivets **Keys:** Classifications of Keys Method of Drawing and Joining Keys
Week 4	**Springs:** Classifications of Springs Method of Drawing Compression Spring
Week 5	**Welding Signs:** Types of Welding Representing Welding Signs on Bodies
Week 6	**Pins:** Classifications of pins **Surface Finishing:** Representing Welding Signs on Bodies
Week 7	**Tolerances:** Basic Size Deviations Limits of Size

	Tolerance Representing Deviations on Zero Line
Week 8	**Fits:** Types of Fits
Week 9	**Gears:** Classifications of Gears **Spur Gear:** Drawing of Spur Gear
Week 10	**Spur Gears Assembly Drawing**
Week 11	**Bevel Gear:** Drawing of Bevel Gear
Week 12	**Bevel Gears Assembly Drawing**
Week 13	**Worm and Worm Wheel** Drawing of Worm and Worm Wheel
Week 14	**Detailed Drawing**
Week 15	**Exercise in Assembly Drawing**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	**Application on computer:** Drawing of primitives: box, cylinder, cone …. etc.
Week 2	**Application on computer:** Features : extrude , revolve, ……etc.
Week 3	**Application on computer:** Boolean operation. Union , subtract and intersect. Applications of Boolean operation.
Week 4	**Application on computer:** Basic concepts on 3D. 3D view.
Week 5	**Application on computer:** Projection definition.
Week 6	**Application on computer:** Modify of 3D solid: move, rotate, array, mirror ….. etc. UCS with applications.
Week 7	**Application on computer:** Draw welding assembly.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. K . MORLING, “Geometric and Engineering Drawing”, Third Edition, ELSEVIER Publications, 2010. 2. David Martin, "Mechanical Drawing Using AutoCAD® 2016" ,1st Edition, Autodesk Publications , 2016.	Yes
Recommended Texts		No
Websites	https://me.uotechnology.edu.iq/index.php/ar/	

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MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Materials Properties خواص مواد			**Module Delivery**	
Module Type	SUPLEMENT			**Theory**	
Module Code	MAPR235				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level	2		**Semester of Delivery**	3	
Administering Department	ME		**College**	ME	
Module Leader	Dr.		**e-mail**		
Module Leader's Acad. Title	Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Dr.		**e-mail**		
Review Committee Approval	01/06/2024		**Version Number**	2024	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. The foundation for understanding classification of engineering material and crystal structure. 2. Topics are designed to explore the mechanical properties of metals and their alloys, composites and advanced material. 3. The means destructive and nondestructive testing, as well as knowing the main testing of material such as tensile and hardness test. 4. The foundation for understanding the heat treatment for steel 5. Concepts of use of ferrous and none ferrous materials for various applications are highlighted.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Describe the mechanical properties of metals, and their alloys and various crystal structures. 2. Understand the microstructures of ferrous and non-ferrous alloy. 3. Apply phase diagrams to read them and from the diagram predict the microstructure after different heat treatments. 4. Explain the processes of heat treatment of various alloys. 5. Explain the different types of non-destructive tests for metal and alloy. 6. Know about composite materials and Nano and smart material as well as applications.
Indicative Contents المحتويات الإرشادية	1. Describe how different kinds of materials (metals including alloys, ceramics and polymers) are structured in terms of atomic bonding and crystal structure and also describe how the structure will affect some of their properties; Recognize product-related problem that requires taking into account the material's microstructure [9 hrs]. 2. Describe how mechanical properties of the materials are influenced by a change of the microstructure; to relate this change to the specific hardening mechanism [9 hrs]. 3. Understand the test mechanisms of different types of hardness test methods and how to select the suitable kind for each material [9 hrs] 4. Apply phase diagrams to read them and from the diagram predict the microstructure after different heat treatments [9 hrs]. 5. Choose suitable heat treatment methods for specific properties and microstructure; discuss the choices of criteria to reach a good result [6hrs].

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The development of the student's ability to apply the knowledge in order to be able to correct analysis of the question and thus put the appropriate assumptions and interpretation to reach a solution. Through textbooks and lectures, in addition to the seminars.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	42	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	20% (20)	3,5,9,11	All
	Assignments	2	10% (10)	6,12	All
	Projects / Lab.	-	-	-	-
	Report	1	10% (10)	8	All
Summative assessment	**Midterm Exam**	2 hrs.	10% (10)	7	All
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Classification of engineering material** Crystal Structure Unit cell , space lattice Crystal systems Body Centered Cubic Face Centered Cubic, Hexagonal Closed Pack structures. Atomic packing factor,

Week 2	**Mechanical and physical properties** Tensile and compression test Engineering Stress-strain diagram Actual stress strain diagram Toughness Ductility.
Week 3	**Micro and macro hardness test** Types of hardness test Brinell, test Rockwell test Vickers test Knoop hardness test
Week 4	**Impact test** Izod test Charpy test The difference between izod and test Calculate the impact energy
Week 5	**Nondestructive Testing of Materials** Types of NDTs Principle, procedure, advantages, Limitations The non-destructive testing (NDT) methods: X-rays and Gamma-rays Radiography, Magnetic particles inspection Ultrasonic testing, Dye penetrate inspection
Week 6	**Thermal equilibrium diagrams** Solubility in the solid state Phase Solid solutions, compounds and mechanical mixtures Lever rule Applications on binary phase diagrams Components completely soluble, Completely insoluble or partially soluble in the solid state.
Week 7	**Thermal equilibrium diagram for Fe- Fe_3C** Types of transformations:- Eutectic transformation Eutectoid transformation Pertectic transformation Lever rule
Week 8	**Alloy steel** Classification of steel. Effect of alloying elements on the properties of steel. Carbon Steel and alloy steel, stainless steel, tool and die steel, high temperature alloys etc. Selection of steel for power plants Application and various machine components
Week 9	**Heat treatments** The aim of heat treatment

	Types of heat treatments Annealing, Normalizing, Hardening,
Week 10	**Cast Iron** Classification of cast iron. Properties and uses of grey, white, malleable, and spheroidal graphite cast iron. Heat treatment of cast iron. Use of specific grades of cast iron in power plants and different engine parts
Week 11	**Nonferrous alloy –Aluminum alloy and its application** Classification Properties Application of -Aging and precipitation hardening Al-Si, Al-Mg and Al-Cu alloys in industry
Week 12	**Copper alloy and its application** Classification Properties Applications
Week 13	**Composite material** Classification of composites, Metal matrix composite Polymer matrix composite, Ceramic matrix composite Properties and applications of composites.
Week 14	**Ceramic and polymer Materials** Properties of ceramics, types and applications of ceramics. Properties of polymers, types and applications of polymers
Week 15	**Nano materials, Selection of Material and applications Smart materials** Introduction to Nano materials, Smart materials. How to select material in specific application and industrial application
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Exp. 1:
Week 2	Exp. 2:
Week 3	Exp. 3:
Week 4	Exp. 4:

Week 5	Exp. 5:
Week 6	Exp. 6:
Week 7	Exp. 7:

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	William D. Callister "Materials science and engineering: An Introduction", 9th Edition, Willy, 2012	Yes
Recommended Texts	Michael F. Ashby and David R. H. Jones, "Engineering materials: An Introduction their properties and applications", 2nd Edition, 1998	No
Websites		

	Ministry of Higher Education and Scientific Research - Iraq **Al-Turath University** **College of Engineering** **Department of Aircraft Engineering** Four years (Eight semesters) - 240 ECTS credits 1 ECTS = 25hr	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information			
Module Title	Workshops II		Module Delivery
Module Type	SUPLEMENT		☐ Theory ☐ Lecture ☐ Lab ☐ Tutorial ■ Practical ☐ Seminar
Module Code	WSHE206		
ECTS Credit/year	4		
SWL/year	94		
Module level	2	Semester of Delivery	1, 2
Module Leader	Training and Workshops Center	College	
Module Leader Academic Title	Prof.	e-mail	twc@uotechnology.edu.iq
Module Tutor		Module Leader's Qualification	Ph.D.
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	1/6/2024	e-mail	
		Version Number	1

Relation with other Modules			
Prerequisite Module	-	Semester	-
Co-requisite Module	-	Semester	-

Module Aims, Learning Outcomes and Inductive Contents	
Module Aims	1-Preparing applied engineers in the field of engineering sciences who are distinguished by a high level of knowledge and technological creativity, in line with the strict standards adopted globally in quality

	assurance and academic accreditation of the corresponding engineering programs, while adhering to the ethics of the engineering profession. 2. Enable the student to know and understand work systems, risks, and the factors surrounding them. 3. Enable the student to know and understand theoretical principles in handicrafts and measurements.
Module Learning Outcomes	1- To familiarize the student with the vocabulary of occupational safety and its importance in the field of work. 2- Acquisition of the student's manual operation skills, for example (Filings and Tinsmith workshops), and mechanical operation skills, for example (Turning). 3- Acquisition of the student's mechanical forming skills, for example (Casting and Blacksmithing). 4- The student acquires basic engineering skills such as Welding, Carpentry, and Electrical installations that serve him in the professional field. 5- Enabling the student to operate the various machines and devices in mechanical operations and formation. 6- Cooperative learning by working collectively.
Inductive Contents	1. Introducing the student to the basics of the art of turning and milling, types of cold working machines, the skill of dealing with them, choosing metals, operational tools, and methods of measurement and standardization 2. Introducing the student to the basics of the art of casting, hot forming, metal selection, method of working on casting furnaces and tools, and manufacturing casting molds 3. Familiarize students with the basics of cars and the systems they use, as well as maintenance, disassembly, and assembly processes. 4. Introducing students to the basics of household and industrial electrical appliances, the skill of using tools, and designing electrical circuits and control panels 5. Introducing the student to the basics of the art of plumbing, leveling surfaces, the skill of using tools, manufacturing and installing geometric shapes, and methods of measurement and standardization 6. Introducing the student to the basics of the art of blacksmithing, cold

	and hot forming of metals, the method of hardening them, and the skills of dealing with hand tools, forming machines, and heating furnaces 7. Introducing the student to the basics of the art of filing and manual operation of metals with the help of manual, electrical, and mechanical tools, the skills of dealing with them, and the methods of measurement and standardization 8. Introducing the student to the basics of the art of welding, the installation and assembly of metals, the types of welding machines, the skills of dealing with them, the types of welding, and the methods of measurement and standardization 9. Introducing the student to the basics of the art of carpentry and woodworking with the help of manual, electrical, and mechanical tools, the skills of dealing with them, and methods of measurement and standardization

Learning and Teaching Strategies	
Strategies	

Student Workload (SWL)			
Structured SWL (h/sem)	47	Structured SWL (h/w)	3.00
Unstructured SWL (h/sem)	3	Unstructured SWL (h/w)	0.20
Total SWL (h/sem)	50		
Structured SWL (h/year)	94	Structured SWL (h/w)	3.00
Unstructured SWL (h/year)	6	Unstructured SWL (h/w)	0.20
Total SWL (h/year)	100		

Module Evaluation					
		Time/No.	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative	Quizzes	5	5% (5)	Continuous	All

Assessment	Assignments	5	5% (5)	Continuous	All
	Projects / Practice	5	25% (25)	Continuous	All
	Report	5	5% (5)	Continuous	All
Summative Assessment	Midterm Exam	1 hr	10% (10)	7	All
	Exam	2 hr	50% (50)	16	All
Total assessment			100%		

Delivery Plan (Weekly Syllabus)	
	Materials Covered
Week 1	Welding workshop. -Occupational safety and its importance in welding workshops. -Introduction to the basics of welding. -Electric arc exercise. -An exercise for welding straight lines in a circular motion (helical).
Week 2	Welding workshop - An exercise for welding straight lines with a crescent movement and other welding methods -Construction welding exercise.
Week 3	Welding workshop. -Welding two pieces together. -Written exam in practical exercises. -
Week 4	Casting workshop -Occupational safety and its importance in plumbing workshops. -Introduction to the basics of metal casting. -Simple wooden disc exercise. Half workout.
Week 5	Casting workshop Wheel exercise. Pushing arm exercise.
Week 6	Casting workshop. -Complete pulley exercise.

	-Circular pole exercise. -Written exam in practical exercises.
Week 7	Blacksmith Workshop -Occupational safety and its importance in blacksmithing workshops. -Introduction to the Basics of Blacksmithing. - Barbell adjustment exercise. -Eight-star exercise. - Exercise forming the number eight in English. -Six formation exercises in English.
Week 8	Blacksmith Workshop -An exercise forming the number five in English. - Exercise forming the number nine in English. -An exercise in forming an iron model in the form of a circle .
Week 9	Blacksmith Workshop - S-shape exercise. - Air hammer hot barbell exercise. - Exercise to form a circle on an electric bending machine. - Exercising cold and hot ornament formation. - A written exam in practical exercises .
Week 10	Automotive Workshop -Occupational safety and its importance in car maintenance workshops. -An introduction to cars and their basic parts. -Parts of the engine, how it works, types of engines, and methods of classification.
Week 11	Automotive Workshop - Open the engine and identify the parts -Lubrication system -Cooling system.
Week 12	Automotive Workshop -The fuel system. -The old and new ignition circuits. -Written exam in practical exercises.
Week 13	Turning Workshop -Introduction to lathe machines and identifying their parts -Measuring tools and the use of an oven measuring instrument

	-Circular column lathing exercise on different diameters.
Week 14	Turning Workshop -Exercise using the pen (semicircular R) brackets. An exercise in making different angles using a pen (square + angle pen 55).
Week 15	Turning Workshop - Making shaft with different diameter exercises using (left and right pen) - Workout (Tube Connection). -Written exam in practical exercises.
Week 16	Fitting workshop Occupational safety and its importance in filing workshops -An introduction to the basics of filing -Pen holder exercise “preparation and preparation”
Week 17	Fitting workshop Pencil holder exercises finishing and assembling.
Week 18	Fitting workshop -The catcher exercise. - Clamping exercise. Written exam in practical exercises.
Week 19	Carpentry workshop -Occupational safety and its importance in carpentry workshops. - An introduction to carpentry, its types, types of wood, tools used, and preparation Preparing the tools used Face modification exercise using the reindeer
Week 20	Carpentry workshop Garden fence work and how to connect its parts, the eight-star exercise
Week 21	Carpentry workshop - Wood smoothing exercise using smoothing paper - Wood dyeing exercise in three stages Final smoothing and varnishing exercise Written exam in practical exercises
Week 22	The tinsmith workshop Occupational safety and its importance in plumbing workshops An introduction to plumbing, its tools, and plumbing stages

	Planning and marking exercise on metal plates
Week 23	The tinsmith workshop Geometric shapes Types of individuals and methods of individuals Geometric shape individuals exercise on a metal board
Week 24	The tinsmith workshop Cone members exercise - Exercise of cylinders with an oblique cut Roll forming operations Connection without the use of an intermediary Written exam in practical exercises
Week 25	Electric Workshop Occupational Safety and its importance in electrical workshops An introduction to the basics of electrical installations - Linking a simple circuit consisting of a lamp to the control of a single-way switch. Connect two lamps in series with one-way switch control. Connecting two lamps in parallel with the control of a single road switch. Connect two lights with one-way dual switch control.
Week 26	electric Workshop Connect a fluorescent lamp circuit to a one-way switch control Connecting an electric supply socket circuit to the control of a separate or combined one-way switch Written exam in practical exercises
Week 27	electric Workshop Occupational Safety and its importance in blacksmithing workshops Introduction to the basics of Blacksmithing - Barbell adjustment exercise Eight-star exercise - Exercise forming the number eight in English Exercise forming the number six in English
Week 28	supplementary training curriculum Welding workshop Plumbing workshop

	Blacksmith's workshop
Week 29	supplementary training curriculum - Automotive workshop - Turning workshop Fitting workshop
Week 30	supplementary training curriculum Carpentry workshop The plumbing workshop electric Workshop

Learning and Teaching Resources		
	Text	Available in the library
Required Texts	Workshop technology and measurements, Ahmed Salem Al-Sabbagh,	yes
Recommended Texts		
Websites		

	Ministry of Higher Education and Scientific Research - Iraq **Al-Turath University** **College of Engineering** **Department of Aircraft Engineering** Four years (Eight semesters) - 240 ECTS credits 1 ECTS = 25hr	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	English Language اللغة الإنكليزية			**Module Delivery**	
Module Type	BASIC			**Theory**	
Module Code	ENLA207				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level	2		**Semester of Delivery**	3	
Administering Department	ME		**College**	ME	
Module Leader	Dr.		**e-mail**		
Module Leader's Acad. Title	Dr.		**Module Leader's Qualification**	M.A. English	
Module Tutor	Dr.		**e-mail**	None	
Peer Reviewer Name	None		**e-mail**	None	
Review Committee Approval	01/06/2024		**Version Number**	2024	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ENLA107	**Semester**	2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	In the realm of communication today, English plays a unique and important function. It has a distinct character in the realm of education as well. For an English instructor, teaching English is a very desirable job. It is necessary for the instructor to ascertain his or her goals and objectives prior to beginning instruction. The objective of the present module is to improve the communication skills of students whose proficiency in English is at the pre-intermediate level. In order to help students communicate effectively on a variety of themes, there will be a special emphasis on strengthening each of the four language skills—speaking, listening, reading, and writing—as well as expanding their vocabulary and syntactical repertoire.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Students will benefit from the current semester by increasing their understanding of the subject matter, which will allow them to comprehend sentences and paragraphs and use grammar correctly as well as analyze language elements and determine the proper relationships between them. Thus, the following will be the learning objectives: 1. The class addresses the fundamental language and communication skills students require for success in technical areas of specialization; 2. Students will be able to express their viewpoints and take part in debates on a wide variety of current subject matters; 3. efficiently convey ideas in writing on a variety of modern subjects, particularly technological ones, 4. quickly and easily comprehend the main ideas of a variety of somewhat complicated written and spoken sources. 5. interact with others in a multicultural group with effectiveness, 6. using an array of digital tools and gadgets to organize, decipher, and generate meaning
Indicative Contents المحتويات الإرشادية	**Part A - Competencies in communication** **Listening**: Within the parameters of the curriculum, comprehend and list the essential ideas of conversations ranging from 250 to 300 words that cover well-known subjects that are frequently encountered in life, in the workplace, in educational institutions, etc. - Pay attention to well-known monologues and discussions in daily life and infer meanings from the speakers' facial expressions and emotions. - Recognize the essential ideas presented in plain language or with the use of illustrative graphics in news broadcasts, interviews, etc. on well-known subjects. [3 Hours] **Speaking**: Deliver brief discussions with reasonable accuracy and clarity. -

Discuss and engage with other speakers on subjects you are acquainted with, share your personal opinions, and exchange knowledge about the subjects taught in the curriculum. Explain well-known subjects in plain language and tell a little tale that is directly relevant to the subjects discussed. - Prepare and deliver the projects on the subjects covered in the curriculum. [2 Hours]

Reading: Read and understand the major ideas and particular contents of a 250-word passage on themes that are relevant and well-known. - Read and comprehend the writings' argumentative flow; use plain language to identify the texts' primary conclusions. - Use the phrases and structures from the original texts to locate and summarize brief documents that are commonly used, such as basic letters and posters. [2 Hours]

Writing:

- compose paragraphs using block and indented styles. Write 200-250 word simple, logical writings; create brief reports based on recommendations, supporting the recommendations with facts and reasoning; compile brief material from numerous resources and summarize it.
- Fill out (write/fill in) administrative forms, including emails, job application letters, resumes, and CVs.
- Create evocative descriptions for basic tables and charts. [2 Hours]

Part B- Linguistic knowledge

Pronunciation: utterances with distinct syllables, vowel and consonant sounds, Special instances of stressed words: stressed words, Assimilation, sentence stress, and vowel connecting Inquiry, tone, homophones, vocabulary drills, and terminology, phrases, and sentences pertaining to the major of the pupils. [3 hrs]

Vocabulary: this part includes terms with various meanings and pronunciations, collocations, and words linked to the course's themes and subjects, also it entails using a bilingual dictionary and knowing strategies to develop and record vocabulary. [2 hrs].

Grammar:

Tenses- Present time tenses, Parts of speech (Nouns-Verbs-Adjectives-Adverbs), Tenses- Past Time Tenses, Parts of speech (Prepositions-Articles-Pronouns-Conjunctions-Interjections), Tenses- Future time tenses, sentence pattern (nine patterns), Irregular verbs, Passive and Active voice in scientific writing, Conditionals, verbs and nouns go together and verbs used in academic writing, Language Function (requests-suggestions, offers…etc.), Modal and semi modal verbs, Idioms and Idiomatic Expressions, Phrasal verbs, collocations, Comparative and Superlative. (3 hrs)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	There should be some preparation from the instructor for the students to listen to and study academic texts (spoken and written). Together with it, students should use their speaking, writing, reading, and listening skills to engage in the lecture, it is preferable here to create a student-centered class. **Student-Centered class and Communicative Language Teaching (CLT),** which encourages learners to speak and communicate the target language with one another, are used to instruct students. It is imperative that students have maximum exposure to the target language in order to comprehend and utilize it in authentic contexts. The teaching of Technical English to the students will take several forms and the focus should be one student's participation. To help students communicate in the target language, for instance, have them work in groups and practice various activities, discussions, and presentations. They can also use visual aids like pictures, images, and spatial understanding to support their learning. Aural (auditory-musical) learning involves employing sound and music, and verbal (linguistic) learning involves using words in both written and spoken forms. In addition to improving their interpersonal abilities, students must have faith in their ability to utilize the target language.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	20% (20)	3,6,9,12	All
	Assignments	2	10% (10)	5, 10	All
	Project / Lab.	-	-	-	-
	Report	1	10%	8	All
Summative assessment	Midterm Exam	2 hrs.	10% (10)	7	All
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Tenses- Present time tenses, Parts of speech ((Nouns-Verbs-Adjectives-Adverbs), Unit One of the Book (The New Headway-Pre-intermediate level)
Week 2	Tenses- Past time Tenses, Parts of speech (Prepositions-Articles-Pronouns-Conjunctions-Interjections), Unit Two of the Book (The New Headway-Pre-intermediate level)
Week 3	Tenses- Future time tenses , sentence pattern (nine patterns), Irregular verbs, Unit Three of the Book
Week 4	Passive and Active voice in scientific writing, reading comprehension, listening (conversations in shops) , Unit Four of the book .
Week 5	Conditionals, paragraph writing and writing basics, describe places, speaking (talking about plans and ambitions), Unit five of the book
Week 6	verbs and nouns go together and verbs used in academic writing, give directions, reading comprehension, Unit six of the book.
Week 7	Listening skills-engaging in different themes- dialogue starters, speaking skills –Role-play, Unit seven of the book
Week 8	Writing Skills- Punctuation- linking words-emails and formal letters- paragraph writing, Unit eight of the Book
Week 9	Review and Mid-term Exam
Week 10	Language Function(requests-suggestions, offers…etc.), Reading Comprehension, unit ten of the book
Week 11	Modal and semi modal verbs, reading comprehension, exchanging ideas and group discussion , unit eleven of the book
Week 12	Phrasal verbs, collocations, good and bad communicator, unit twelve of the book
Week 13	Comparative and Superlative, making a telephone conversation and news giving , unit thirteen of the book
Week 14	Writing CV-Cover letter, Essay styles and types , unit fourteen of the book

Week 15	Reading comprehension (predicting, guessing the main idea, looking for specific information), Essay writing
Week 16	**Revision and Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1- New Headway, English Course, (pre-intermediate level), John and Liz Soars and Mike Sayer, Oxford University Press. Selected ESP materials and listening extracts.	Yes
Recommended Texts	Murphy, R. (1985). Grammar in Use, Rapid Review of Grammar, Infotech: English for Computer Users. (4th edition). Cambridge. Market Leader (Pre-intermediate English Business Course) by David Cotton, David Falvey, Simon Kent	Online
Websites	Randall's ESL Cyber Listening Lab - English Listening	

	Ministry of Higher Education and Scientific Research - Iraq **Al-Turath University** **College of Engineering** **Department of Aircraft Engineering** Four years (Eight semesters) - 240 ECTS credits 1 ECTS = 25hr	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Crimes of the Baath Regime in Iraq جرائم نظام البعث في العراق			**Module Delivery**	
Module Type	BASIC			**Theory**	
Module Code	CBRI201				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level	2		**Semester of Delivery**	3	
Administering Department	ME		**College**	ME	
Module Leader	Dr.		**e-mail**		
Module Leader's Acad. Title	Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Dr.		**e-mail**	None	
Peer Reviewer Name	Dr.		**e-mail**		
Review Committee Approval	01/10/2023		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. التعرف على جرائم نظام البعث في العراق 2. التعرف على أنواعها وكيف اثرت على الانسان والبيئة والمجمع العراقي بشكل عام
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. التعرف على جرائم نظام البعث في العراق 2. التعرف على أنواعها وكيف اثرت على الانسان والبيئة والمجمع العراقي بشكل عام
Indicative Contents المحتويات الإرشادية	**المحتويات الإرشادية تتضمن ما يلي** :- 1. مفهوم الجرائم وأقسامها (2 ساعة) 2. أنواع الجرائم الدولية (1 ساعة) 3. القرارات الصادرة من المحكمة الجنائية العليا (2 ساعة) 4. الجرائم النفسية (1 ساعة) 5. آليات الجرائم النفسية (1 ساعة) 6. الجرائم الاجتماعية (1 ساعة) 7. عسكرة المجتمع (1 ساعة) 8. انتهاكات القوانين العراقية (1 ساعة) 9. الجرائم البيئية (1 ساعة) 10.التلوث الحربي (1 ساعة) 11.تدمير المدن (1 ساعة) 12.تجفيف الاهوار (1 ساعة) 13.تجريف البساتين (1 ساعة) 14.جرائم المقابر الجماعية (1 ساعة) 15.مراجعة عامة (1 ساعة)
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	يتم إعطاء المحاضرات بشكل القاء مباشر بالإضافة إلى مشاهدة مادة صورية أو فلمية مساعدة.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	20% (20)	3, 6, 9, 12	All
	Assignments	2	10% (10)	5, 10	All
	Projects / Lab.	-	-	-	-
	Report	1	10% (10)	13	All
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	All
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	مفهوم الجرائم وأقسامها
Week 2	أنواع الجرائم الدولية
Week 3	القرارات الصادرة من المحكمة الجنائية العليا
Week 4	الجرائم النفسية
Week 5	آليات الجرائم النفسية
Week 6	الجرائم الاجتماعية
Week 7	عسكرة المجتمع
Week 8	انتهاكات القوانين العراقية
Week 9	الجرائم البيئية
Week 10	التلوث الحربي
Week 11	تدمير المدن
Week 12	تجفيف الاهوار
Week 13	تجريف البساتين
Week 14	جرائم المقابر الجماعية
Week 15	مراجعة عامة
Week 16	أسبوع تحضيري قبل الامتحان النهائي

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Exp. 1:
Week 2	Exp. 2:
Week 3	Exp. 3:
Week 4	Exp. 4:
Week 5	Exp. 5:
Week 6	Exp. 6:
Week 7	Exp. 7:

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. مقرر جرائم نظام البعث في العراق	Yes
Recommended Texts	- كتيبات واصدارات دورية لمنظمات حقوق الأنسان	Yes
Websites		

	Ministry of Higher Education and Scientific Research - Iraq **Al-Turath University** **College of Engineering** **Department of Aircraft Engineering** Four years (Eight semesters) - 240 ECTS credits 1 ECTS = 25hr	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Engineering and Numerical Analysis تحليلات هندسية وعددية			**Module Delivery**	
Module Type	CORE				
Module Code	ENNA241				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	2		**Semester of Delivery**	4	
Administering Department	ME		**College**	ME	
Module Leader	Dr.		**e-mail**		
Module Leader's Acad. Title	Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Dr.		**e-mail**		
Review Committee Approval	01/06/2024		**Version Number**	2024	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MATH231	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To provide a course of high academic quality in Engineering and Numerical Analysis in a challenging and supportive learning environment that encourages students to reach their full potential, personally and academically. 2. To provide a course that is suitable both for students aiming to pursue research and for students going into other careers. 3. To provide an integrated system of teaching which can be tailored to the needs of individual students. 4. To develop in students the capacity for learning and clear logical thinking. 5. To continue to attract and select students of outstanding quality. 6. To provide an intellectually stimulating environment in which students have the opportunity to develop their skills and enthusiasm to their full potential.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Knowledge and Understanding: This Course will develop learners' ability to: 1. Understand and use the relationships to define the principle of Engineering and Numerical analysis 2. Select and apply operational skills in algebra, geometry, and trigonometry within mathematical contexts 3. Select and apply skills in solving the non-linear and linear equations. 4. Use numerical models 5. Use engineering analysis reasoning skills to interpret information, select a strategy to solve a problem, and communicate solutions. 6. To apply the numerical analysis on the data tables, which are obtained from experimental work. Subject-specific skills: It is expected that learners will develop the following: 7. Broad, generic skills through this Course. 8. Skills for Learning, and drawn from the main skills areas listed below. 9. Skills for Life 10. and Skills for Work These must be built into the Course where there are appropriate opportunities.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Engineering Analysis** **Laplace Transformations:** Introduction. Definition of L.T., Definition of I.L.T. Examples. [8hrs] **Solution of differential equations using L.T:** Method of solution. Using L.T. for solving practical problems. [5hrs] **Solution of 2nd order D.E. using power series method:** Solution near the ordinary point. Solution near the singular point. [5hrs] **Solution of partial D.E:** Definition. Solution methods of P.D.E. Examples. [5hrs] **Using of separation method:** Definition of separation method. Examples. [5hrs] **Applications of the solution of P.D.E:** Solution of unsteady one-dimensional heat equation. Solution of vibrating string. [5hrs] **Numerical Analysis** **Solution of non-linear equations:** Simple iteration method, Examples. Newton –Raphson method, Derivation, Square Roots, Reciprocal of any number. [5hrs] **Solution of simultaneously linear equations:** Definition and Methods of Solution. Direct methods: Gauss- Elimination, Gauss -Jordan Elimination. Indirect methods: Jacob's method. Gauss- Seidle method. [5hrs] **Numerical interpolation:** Linear interpolation. Quadratic interpolation. [5hrs] **Newton and Lagrange forms:** Using this method for equal segment and unequal segments. [5hrs] **Numerical differentiation** First derivative**.** Second derivative. [5hrs] **Numerical Integration** trapezoidal rule, Simpson Rule (1/3). Simpson Rule (3/8). [5hrs] **Curve fitting** linear Regression. Applications of linear regression. Polynomial curve fitting. [4hrs] **Solution of ordinary differential equations O.D.E.** Taylor series method. Simple Euler method**.** Runge-kutta method. [5hrs]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	All lectures reflect the higher values, purposes and principles. They offer flexibility, provide more time for learning, focus on skills and applying to learn, and scope for personalization and choice. In this Course, and its component Units, there will be an emphasis on skills development and the application of those skills. Assessment approaches will be proportionate, fit for purpose and will promote best practices, enabling learners to achieve the highest standards they can.

	This course provides learners with opportunities to continue to acquire and develop the attributes and capabilities of the four capacities, as well as skills for learning, skills for life and skills for work.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/ Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	20% (20)	3,5, 7,10	LO #1, 2, 3,4,5 and 10
	Assignments	2	10% (10)	6, 11	LO # 3, 4, 7 and 9
	Projects / Lab.	Lab. 5	10% (10)	Continuous	All
	Report	-	-	-	-
Summative assessment	**Midterm Exam**	2 hrs.	10% (10)	9	LO # 1-7
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	**Laplace Transformations (L.T):** Introduction. Definition of L.T. Examples.
Week 2	**Inverse Laplace Transformations (I.L.T.):** Introduction. Definition of I.L.T. Examples.
Week 3	**Solution of differential equations using L.T:** Method of solution. Using L.T. for solving practical problems Examples.
Week 4	**Solution of 2nd order D.E. using power series method:** Introduction. Solution near the ordinary point. Solution near the singular point.
Week 5	**Solution of partial D.E:** Definition. Solution methods of P.D.E. Examples.
Week 6	**Using of separation method:** Definition of separation method. Examples.
Week 7	**Applications of the solution of P.D.E:** Solution of unsteady one-dimensional heat equation. Solution of vibrating string.
Week 8	**Solution of non- linear equations:** Introduction Simple iteration method, Examples. Newton –Raphson method, Derivation, Square Roots, Reciprocal of any number. Applications.
Week 9	**Solution of simultaneously linear equations:** Definition and Methods of solution. Direct methods: Gauss- Elimination, Gauss -Jordan Elimination. Indirect methods: Jacob's method. Gauss- Seidle method.
Week 10	**Numerical interpolation:** Linear interpolation. Quadratic interpolation.
Week 11	**Newton and Lagrange forms:** Using this method for equal segment and unequal segments
Week 12	**Numerical differentiation** First derivative Second derivative

Week 13	**Numerical Integration** Trapezoidal rule Simpson Rule (1/3) Simpson Rule(3/8)
Week 14	**Curve fitting** Linear Regression Applications of linear regression Polynomial curve fitting
Week 15	**Solution of ordinary differential equations O.D.E.** Taylor series method Simple Euler method Runge-kutta method
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Exp. 1: Solution of non-linear equations by using MATLAB program (Simple iteration method and Newton –Raphson method)
Week 2	Exp. 2: Solution of linear equations by using MATLAB program (Gauss- Elimination and Gauss- Seidle method)
Week 3	Exp. 3: Newton forwards interpolation method for equal segment by using MATLAB program
Week 4	Exp. 4: Solution of Numerical Integration (Simpson Rule (1/3)) by using MATLAB program.
Week 5	Exp. 5: Solution of ordinary differential equations O.D.E. by using MATLAB program (Runge-kutta method).

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Chapra C. S., “Numerical Methods for Engineers”,Mc Graw-Hill, Inc., 2006.	Yes
Recommended Texts	2. د.حسن مجيد الدلفي ود. محمود عطاء الله مشكور, " التحليل الهندسي والعددي التطبيقي" دار انشر الوطنية , الطبعة الثانية 2016. 3. Erwin Kreyszig, “Engineering mathematics”,McGRAW-HILL, 9th edition, 2006.	Yes
Websites		

	Ministry of Higher Education and Scientific Research - Iraq **Al-Turath University** **College of Engineering** **Department of Aircraft Engineering** Four years (Eight semesters) - 240 ECTS credits 1 ECTS = 25hr	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Strength of Materials مقاومة مواد			**Module Delivery**	
Module Type	CORE			**Theory** **Lab** **Tutorial**	
Module Code	STMA232 / STMA242				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	2		**Semester of Delivery**	3 / 4	
Administering Department	ME		**College**	ME	
Module Leader	Dr.		**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Dr.		**e-mail**		
Review Committee Approval	01/06/2024		**Version Number**	2024	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To assist students to understand the fundamental principles of all kind of Stresses. 2. To develop problem solving skills and understanding of principles of Tensile test through the description of material behavior during the test. 3. To develop problem solving skills and understanding of thermal stresses through the application of techniques. 4. To understand how analysis of torsional shear stress and shear strain. 5. To comprehend how clarification of beam, and loading types. Draw the Shear force and Bending Moment diagrams in beams. 6. Analyze the stresses on beam: bending stress, transverse shear stress, combine stress with drawing Mohr's circle. 7. To develop problem solving skills and understanding of Beam Deflection. 8. Study the stress induced in relatively long Columns (Euler's Column Equation).
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Enable the student to learn and understand the simple stress and simple strain 2. The student should understand and be able to apply Hook's Laws. 3. Enable the student to learn and solve the Statically Indeterminate Problems: 4. The student should Know the thermal stress and thermal deformation connecting with simple stress. 5. The student should Know the analysis of Circular shaft which is suffered from torsional shear stress. 6. The student should Know how can find the Stresses and deformations in pressure vessels. 7. The student should Know the beams and loading types on them. Draw the Shear force and Bending Moment diagrams in beams. 8. The student should study the Study the stress induced in beams due to lateral loads and shear stress due to bending induced in beams. 9. The student should understand and be able to apply Equation of elastic curve using double integration method and using Macaulay's Method. 10. Enable the student to learn and understand Stresses at a Point and Complex Stresses and Graphical representation of stress at a point

	using Mohr's circle 11. Enable the student to learn and understand stress induced in relatively long Columns (Euler's Column Equation).
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A - Introduction to Simple Stresses, Strains: Study of simple stresses and strains. To know where the Hooke's law apply. And solved Statically Indeterminate Problems: [9 hrs]. Thermal Strain and Stress: Study the strain and stress induced due to temperature changes. Solve statically indeterminate problems due to temperature changes [5 hrs]. Part B - Torsion of Circular Shaft: Study the pure torsion for solid and hollow circular shafts. Study the stress induced due to torsion. Study the angular deformation induced due to torsion. [10 hrs]. Part C- Pressure Vessels: Stresses and deformations in pressure vessels. [5 hrs]. Part D- Beams: Introduction to beams and loading types. Draw the Shear force and Bending Moment diagrams in beams. [9 hrs]. Bending Stresses in Beams: Study the stress induced in beams due to lateral loads. Calculating the second moment of area. [5 hrs]. Shear Stress due to Bending in Beams: Study the shear stress due to bending induced in beams. [5 hrs]. Deflection in Beams: Equation of elastic curve using double integration method. Finding the elastic curve for complex loading using Macaulay's Method. [9 hrs]. Stresses at a Point and Complex Stresses: Study the stresses at a point. Basic principles for calculating the combined stresses at a point. [5 hrs]. Mohr's Circle: Graphical representation of stress at a point using Mohr's circle. Systematic procedure of graphical representation of stresses at a point using Mohr's circle. [5 hrs].

	Part E - Buckling of Columns: Study the stress induced in relatively long Columns (Euler's Column Equation). Buckling for medium columns using Rankine method. [5 hrs].

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

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

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	20% (20)	3,6 ,9,11	All
	Assignments	2	10% (10)	5, 8	All
	Projects / Lab.	Lab. 4	10% (10)	Continuous	All
	Report	-	-	-	-
Summative assessment	**Midterm Exam**	2 hrs.	10% (10)	7	All
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Stresses, Strains, Hooke's Law:** Study of simple stresses and strains, to know where the Hooke's law apply
Week 2	**Statically Indeterminate Problems:** Basic principles for solving statically indeterminate Problems.
Week 3	**Thermal Strain and Stress:** Study the strain and stress induced due to temperature changes. Solve statically indeterminate problems due to temperature changes
Week 4	**Torsion of Circular Shaft:** Study the angular deformation induced due to torsion.
Week 5	**Torsion of Circular Shaft:** Study the angular deformation induced due to torsion.
Week 6	**Pressure Vessels:** Stresses and deformations in pressure vessels.
Week 7	**Beams: S.F. and B.M. Diagrams:** Introduction to beams and loading types.
Week 8	**Beams: S.F. and B.M. Diagrams:** Draw the Shear force and Bending Moment diagrams in beams.
Week 9	**Bending Stresses in Beams:** Study the stress induced in beams due to lateral loads. Calculating the second moment of area.
Week 10	**Shear Stress due to Bending in Beams:** Study the shear stress due to bending induced in beams.
Week 11	**Deflection in Beams:** Equation of elastic curve using double integration method.
Week 12	**Deflection in Beams:** Finding the elastic curve for complex loading using Macaulay's Method.
Week 13	**Stresses at a Point and Complex Stresses:** Study the stresses at a point. Basic principles for calculating the combined stresses at a point.
Week 14	**Mohr's Circle:** Graphical representation of stress at a point using Mohr's circle. Systematic procedure of graphical representation of stresses at a point using Mohr's circle.
Week 15	**Buckling of Columns:** Study the stress induced in relatively long Columns (Euler's Column Equation). Buckling for medium columns using Rankine method.
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Exp. 1: Tensile test
Week 2	Exp. 2: Torsion test
Week 3	Exp. 3: Thick pressure vessel
Week 4	Exp. 4: Bending test
Week 5	Exp. 5:
Week 6	Exp. 6:
Week 7	Exp. 7:

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Hibbeler R.C., "*Mechanics of Materials*", Prentice Hall, Eighth Edition, 2011.	Yes
Recommended Texts	Hearn E.J., "*Mechanics of Materials*", Butterworth, Third Edition, 1997.	Yes
Websites		

	Ministry of Higher Education and Scientific Research - Iraq **Al-Turath University** **College of Engineering** **Department of Aircraft Engineering** Four years (Eight semesters) - 240 ECTS credits 1 ECTS = 25hr	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Aircraft Engines I محركات الطائرات I			**Module Delivery**	
Module Type	CORE				
Module Code	AIEN243				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	2		**Semester of Delivery**	4	
Administering Department	ME		**College**	ME	
Module Leader	Dr.		**e-mail**		
Module Leader's Acad. Title	Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Dr.		**e-mail**		
Review Committee Approval	01/06/2024		**Version Number**	2024	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	THER233	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Knowledge of the basics concepts in constructing and modifying piston type aircraft engines. 2. Awareness of theoretical concepts dealing with the operating cycle analysis and improving performance. 3. Providing the knowledge in the engine testing under various conditions and identifying the evaluation parameters. 4. Understanding the concepts of engagement between the normal engines with supercharging aiming higher outputs. 5. Providing the knowledge of the different types of compressors encountered in turbocharged piston type aircraft engines.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Applying the concepts of thermodynamic cycles according to the second law of thermodynamics. 2. Achieving the principle of energy conservation and the thermal balance for different aircraft engines involving piston type. 3. Complete awareness of the determination techniques of each kind of piston engines using basic formulation with testing procedures. 4. Applying the first and second law concepts to the thermodynamic processes associated with the combustion systems in piston type engines. 5. Exploitation of the acquired knowledge in turbocharged engines including description and cycle analysis of various kinds of compressors involved.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Applying the governing laws in cycle analysis of piston type aircrafts. Realizing thermodynamics processes and subject it to energy production procedures. [9 hrs] • Using the basic concepts of evaluation procedures on piston engines to formulate the tests conducted and providing the design parameters and selection procedure. [9 hrs] • Using the air-standard cycles to approximate the actual internal combustion aircraft engines and driving the evaluation approach related to them. [9 hrs] • Formulation for heat and work transfer in thermodynamic Fuel-Air cycles and deriving the performance characteristics. [9 hrs] • The engineering application of thermodynamics and fluid dynamics in various processes in work and heat exchange in piston type engines. [9 hrs]

	• Applying the operational concepts of supercharging on the cycle analysis of piston type aircraft engines. [9 hrs] • Providing the essential knowledge in design and operating various kinds of compressors used in turbocharged aircraft engines. [8 hrs]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	1. Class active discussions during comprehensive presentations. 2. Home works and technical reports related to the explored course items. 3. Quizzes and prepared exams to motivate student's realization. 4. Organization of semester examinations. 5. Laboratory oral discussions.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	20% (20)	3, 6, 9, 12	All
	Assignments	2	10% (10)	5, 10	All
	Projects / Lab.	Lab. 4	10% (10)	Continuous	All
	Report	-	-	-	-
Summative assessment	**Midterm Exam**	2 hrs	10% (10)	7	All
	Final Exam	3 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to the piston type aircraft engines
Week 2	Two and four stroke operation cycles in reciprocating internal combustion engines.
Week 3	Description of Otto standard cycles, and actual cycle spark ignition engine.
Week 4	Deviation in operational characteristics between ideal and actual cycles.
Week 5	Basic parameters involved in testing piston type aircraft engines.
Week 6	Energy balance and performance evaluation of piston type engines.
Week 7	Constant speed and variable speed test procedures
Week 8	Fuels used in aircraft engines along with combustion theory.
Week 9	Calculation formulae of the heat of combustion of fuels.
Week 10	Combustion process involved in piston type aircraft engines, exhaust gas analysis.
Week 11	Concept of supercharging applied to piston type aircraft engines.
Week 12	Turbocharging theory and analysis.
Week 13	Methods and limitations applied to the turbocharged piston type aircraft engines.
Week 14	Roots blower and its indicator diagram, cycle analysis of Roots blower.
Week 15	Vane type compressor and its indicator diagram, cycle analysis of vane type compressor.
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Exp. 1: Study parts of the different engine types & determination of valve timing diagram.
Week 2	Exp. 2: Diesel engine test at constant speed
Week 3	Exp. 3: Diesel engine test at variable speed
Week 4	Exp. 4: Petrol engine test at constant speed
Week 5	Exp. 5: Petrol engine test at variable speed
Week 6	Exp. 6:
Week 7	Exp. 7:

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	J.B. Heywood, "Internal combustion engine fundamentals", McGraw-Hill publications, 1988.	Yes
Recommended Texts	• R.J. Rajput, "A text book for internal combustion engines", 2nd Edition, Laximi publications Ltd, 2008. • Sadhu Singh, "Internal combustion engines and gas turbines", Kataria & Sons Co, 2012	No
Websites		

	Ministry of Higher Education and Scientific Research - Iraq **Al-Turath University** **College of Engineering** **Department of Aircraft Engineering** Four years (Eight semesters) - 240 ECTS credits 1 ECTS = 25hr	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Fundamentals of Aeronautics أساسيات الطيران			**Module Delivery**	
Module Type	CORE			**Theory** **Lab**	
Module Code	FUAE244				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level	2		**Semester of Delivery**	4	
Administering Department	ME		**College**	ME	
Module Leader			**e-mail**		
Module Leader's Acad. Title	Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Dr.		**e-mail**		
Review Committee Approval	01/06/2024		**Version Number**	2024	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	FLME232	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To help students learn as much introduction to flight and flight theory principle as possible in which this subject is regarded as the base for all aeronautic subjects. 2. The development of the basic principles of aeronautics is the entry point for consolidating the necessary principles of specialized aircraft mechanics engineering subjects and providing the necessary materials for them, which include topics of aerodynamic, flight theory, design, control and stability of aircraft, gas dynamic, jet propulsion theory and aircraft performance.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Knowledge and understanding. - Standard Atmosphere. - Principles of Aviation. - Aerodynamic forces and moments on the aircraft. - Wings and infrasound sections - and ultrasonic / characterization and characteristics. - Aerodynamic forces in stable horizontal flight. - Performance curves in terms of propulsion and performance curves in terms of power. 2. Subject-specific skills. - Explanation of the flight principles of fixed-wing and rotary-wing aircraft (helicopters). - Determination of the anaerobic forces acting on a fixed-wing and rotary-wing aircraft. - Determining the required thrust, the available thrust, the lift to drag ratio. 3. Thinking Skills. - To fully comprehend the scientific material and develop students' engineering sense. - Understand and comprehend the applications of the scientific material on the fuselage (structure), power station (engines), control surfaces, wing, aircraft systems and instrumentation. - Understand the limits of the aircraft's performance. - To prepare students for psychological connection and a feeling of satisfaction, happiness and reassurance for the department and the branch in which they are studying 4. General and Transferable Skills. Develop the student's ability to use software, modern equipment, information technology, and the use of the Internet to obtain advanced, promising and future knowledge, assimilate and understand and link its relationship to engineering applications.

Indicative Contents المحتويات الإرشادية	Lectures are used to deliver the fundamental knowledge in relation to various aspects of aerodynamic characteristics for aircraft as well as their influence in determining the aircraft performance for atmospheric flight (All Outcomes). Indicative content includes the following. <u>Part A - Fundamentals Aircraft Nomenclature</u> History of aeronautics; Physical properties of atmosphere; Airfoil lift, drag and moments; Airfoil data; Compressibility correction; Finite wing aerodynamics; Induced drag; High-lift mechanisms. [12 hrs] <u>Part B - Aircraft Performance</u> Drag polar; Typical steady level flight; Thrust and power requirements for cruising flight; Altitude effects; Indicated and True Air Speed. [15 hrs]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Develop the student's ability to understand aircraft theory and arrange knowledge related to aircraft mechanics from a correct and logical understanding and analysis of the various sciences related to aircraft, understanding hypotheses, and interpreting the performance of the aircraft physically, to obtain the initial knowledge necessary to understand the specialized topics in the field of aircraft mechanics engineering. Develop the student's ability and familiarize him with the pattern of exam questions and the arrangement and sequence of the solution in order to be able to correctly analyze the question and thus outline the appropriate solution sequence through method books, auxiliary books and theoretical lectures, in addition to solving exercises and getting used to the method of reaching the correct solution.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	27	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	20% (20)	3,6,9,12	All
	Assignments	2	10% (10)	5, 10	All
	Projects / Lab.	Lab. 4	10% (10)	Continuous	All
	Report	-	-	-	-
Summative assessment	Midterm Exam	2 hrs.	10% (10)	7	All
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Fundamentals:** Introduction History of aeronautics Pilot's Operating Handbook
Week 2	**Standard atmosphere (ISA):** The atmosphere. Physical properties of gases in atmosphere.
Week 3	**Airplane types:** Airplane classification. Airplane parts.
Week 4	**Nomenclature:** Airfoils-Nomenclature. Wings-Nomenclature. Flaps. Types of airfoils. Modern airfoils.
Week 5	**Wings and airfoils characteristics:** Mean aerodynamic chord. Wing Area. Aerodynamic center. Center of pressure.
Week 6	**Aerodynamic forces and moments on airplane:** The airplane as a rigid body. Airplane axis system. Forces and moments.
Week 7	**Flight principles:** Bernoulli's principle. Venturi effect. Relative wind.

Week 8	**Lift:** Lift coefficient. Lift curves characteristics. Change of lift coefficient with the angle of attack.
Week 9	**Drag:** Drag estimation at low speeds. Drag estimation at high speeds. **Types of drag:** Parasite drag. Induced drag. Wave drag.
Week 10	**Aerodynamic forces on steady level flight:** Lift force. Drag force. Gravity force. Thrust force.
Week 11	**Level flight Performance:** Steady level flight. Typical steady level flight. Cruise flight.
Week 12	Holding flight. Mach number. Indicated Air Speed. True Air Speed.
Week 13	**Performance curves in terms of thrust:** Change of required thrust with airspeed. Change of required thrust with altitude. Change of available thrust with airspeed and altitude.
Week 14	**Performance curves in terms of power:** Change of required power with airspeed. Change of required power with altitude.
Week 15	Change of available power with airspeed and altitude. Minimum power required.
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Exp. 1: Atmosphere calculator
Week 2	Exp. 2: Airfoil design and analysis
Week 3	Exp. 3: Wing design and analysis
Week 4	Exp. 4: Airplane Performance
Week 5	Exp. 5: Wind Tunnel
Week 6	Exp. 6:

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	John D. Anderson, "Introduction to Flight", McGraw-Hill, 7th Edition, 2012	Yes
Recommended Texts	W. Austyn Mair, David L. Birdsall, "Aircraft performance", Cambridge University Press, 2003	Yes
Websites		

	Ministry of Higher Education and Scientific Research - Iraq **Al-Turath University** **College of Engineering** **Department of Aircraft Engineering** Four years (Eight semesters) - 240 ECTS credits 1 ECTS = 25hr	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Manufacturing Processes عمليات تصنيع			**Module Delivery**	
Module Type	SUPLEMENT			**Theory**	
Module Code	MAPR245				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level	2		**Semester of Delivery**	4	
Administering Department	ME		**College**	ME	
Module Leader	Dr.		**e-mail**		
Module Leader's Acad. Title	Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Dr.		**e-mail**		
Review Committee Approval	01/06/2024		**Version Number**	2024	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MAPR235	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Describe the various manufacturing processes that are used for the production of Mechanical parts and products. 2. Classify manufacturing processes according to the needs of products construction. 3. Understand how to use the theoretical knowledge of various manufacturing processes 4. Analyze, compare and finally gain theoretical experience for the advantages and limitations of different manufacturing processes. 5. Evaluate the better way of manufacturing and construction of mechanical parts or products by means of various manufacturing processes and the corresponding manufacturing Machines. 6. Design the production of a mechanical component or a specific product using the Manufacturing processes of casting, bulk deformation, sheet metal forming, joining CNC machine.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**Knowledge and Understanding** 1. Classification of the different types of manufacturing processes. 2. Distinguish between different types of casting and differentiate between their output product characteristics. 3. Knowledge of, the sheet metal forming such as bending ,starching squeezing ,plunge and the bulk forming methods such as rolling, extrusion ,forging . 4. Characterize the major machining operations of turning, milling, and drilling via description of cutting tools used and basic components of the machine tools. 5. Have a thorough knowledge of the different operating processes such as turning, milling and cutting by describing the cutting tools used and the basic components of the machine tools. 6. Knowledge of cutting tools and various traditional and advanced cutting processes. 7. Knowledge and distinction between different welding methods such as gas welding, resistance welding, different types of electric arc welding and advanced welding methods such as laser welding and plasma welding. 8. Knowing the types, and how to operate automated CNC machines. **Specific skills** 1. How to choose the suitable type of manufacturing process. 2- Enable the student to learn and understand the Classification and the

	major of the manufacturing processes 3- Correlate the material type with the possible fabrication processes. 4- Describe the operations and tools for major manufacturing processes. 5- Highlight the process design parameters to eliminate defective products. 6- Enable the student to know the traditional and non-traditional manufacturing process
Indicative Contents المحتويات الإرشادية	1. Describe the various manufacturing processes that are used for the production of Mechanical parts and products [6 hrs]. 2. Understand the different types of casting process types such as: sand casting, shell casting, pressure die casting, and continuous casting [6 hrs]. 3. Understand the different types of defects that occurs in sand casting and the methods to prevent defects generation [9 hrs] 4- Understand the metal forming methods that used with the mechanical parts such as rolling process, extrusion process, wire drawing, sheet drawing and deep drawing processes [9 hrs]. 5- Evaluate the better way of welding techniques that used with metals and how to select the suitable welding type for each kind of materials with understanding their welding mechanism [6 hrs]. 6- Understand the non-traditional cutting methods that available and how to use [6 hrs].
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The development of the student's ability to apply the knowledge in order to be able to correct analysis of the question and thus put the appropriate assumptions and interpretation to reach a solution. Through textbooks and lectures, in addition to the seminars.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	42	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	20% (20)	4, 6,10,12	All
	Assignments	2	10% (10)	5,11	All
	Projects / Lab.	-	-	-	-
	Report	1	10% (10)	8	All
Summative assessment	Midterm Exam	2 hrs.	10% (10)	7	All
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**metal process** Introduction of metal process. Classification of the main types of manufacturing process
Week 2	**Casting process** Sand Casting : Sand mold Type of patterns Pattern Materials Pattern allowances
Week 3	Molding sand Properties Cores –Types and applications Molding machines– Types and applications; Melting furnaces : Blast and Cupola Furnaces;
Week 4	**Principle of special casting processes :** Shell casting Investment casting Continues casting Pressure die casting Centrifugal Casting
Week 5	**Defects** General defects in all casting methods. Defects in Sand casting.
Week 6	**Metal forming** Introduction for cold and hot working Recrystallization temperature effect Rolling process Types of rolling mill

Week 7	**Extrusion process** Direct extrusion Indirect extrusion Impact extrusion Hydrostatic extrusion
Week 8	**Forging process**
Week 9	**Drawing processes:** Wire drawing. Tube drawing. Deep drawing
Week 10	**Machining operations (Cutting):** Cutting conditions. Cutting tools. Turning operations. Milling operations. Drilling operations
Week 11	**Welding processes:** Classification of welding processes. Fusion welding processes. Electric Arc Welding. Metal Arc Welding. Tungsten and Metal Inert gas welding
Week 12	**Fusion welding:** Oxy acetylene welding. Thermite welding. Laser welding. Diffusion welding. Brazing and soldering
Week 13	**Welding by pressure:** Electric resistance welding. Friction welding. Explosion welding
Week 14	**Non-traditional cutting processes:** Cutting with ultrasonic pulses.
Week 15	Electrochemical operation process. Operation process by laser
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Exp. 1:
Week 2	Exp. 2:
Week 3	Exp. 3:
Week 4	Exp. 4:
Week 5	Exp. 5:
Week 6	Exp. 6:
Week 7	Exp. 7:

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	H. C. F. Fritz, Manufacturing Processes 1 and 2, Springler, 2011.	Yes
Recommended Texts	H. N. Gubta, R. C. Gubta and Arun Mittal, Manufacturing Processes, 2nd. Edition, New Age International (P) Limited, Publishers, 2010	No
Websites		

	**Ministry of Higher Education and Scientific Research - Iraq** **Al-Turath University** **College of Engineering** **Department of Aircraft Engineering** Four years (Eight semesters) - 240 ECTS credits 1 ECTS = 25hr	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Programming برمجة			**Module Delivery**	
Module Type	BASIC			**Theory** **Lab**	
Module Code	PROG208				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level	2		**Semester of Delivery**	4	
Administering Department	ME		**College**	ME	
Module Leader	Dr.		**e-mail**		
Module Leader's Acad. Title	Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Dr.		**e-mail**		
Review Committee Approval	01/06/2024		**Version Number**	2024	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	COMP108	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. The course is an intermediate level course that builds on the basic C++ coding skills taught in the C++ Fundamentals course. In this course, students will begin with a discussion of the essential elements of C++ programming: variables, loops, expressions, functions, moreover to learn about the use of Pointers and classes in implementing basic data structures and then using that understanding to implement even more advanced data structures. Also the student will learn how to develop traversing algorithms, File I/O, Object Oriented Programming and more. 2. This level aims to strengthen the students understanding of C++ fundamentals and prepare them for more complex scenarios. 3. To develop the student to have specific skills • Logical thinking when solving problems • The use of more mathematical equations. • Determine the appropriate method of solution.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding the Programming Concepts, such as: Functions which allow to structure programs in segments of code to perform individual tasks using both void and value returning functions. 2. A pointer, which is a variable that stores the memory address of an object. Pointers are compared to and contrasted with reference variables. Moreover, to learn pointer arithmetic, initialization of pointers, relational comparison of pointers, and more. 3. Classes, which is a fundamental block of a program that has its own set of methods and variables which increases the ability to make and build programs in different ME applications. 4. Use C++ String library for Input/ Output and manipulation of strings. Create and use other functions to manipulate strings. 5. Creating input file and output file for different codes. 6. Apply student skills to build projects that demonstrate the practical mechanical engineering applications of C++.
Indicative Contents المحتويات الإرشادية	**Introduction:** Overview about C++ basics Control Structures (if statements), Iteration structures (loops) and functions. [2 hrs] **Arrays II:** Fundamentals of 1-D and 2-D arrays in C++ and more practice with looping [4 hrs]

	Characters: Character Sequences. Character arrays and characters in C++.[2 hrs] **Strings:** Different features of strings, such as manipulations, functions, length, replace, and find. [2 hrs] **Pointers I:** Pointers: how to use them and why. Additional topics include addresses and dereferencing. [3 hrs] **File Input/output:** Inputting and outputting text files in C++.[2 hrs] **Classes & Objects I**: How to declare a class and use accessors and mutators as well as constructors. More detail on member functions, operator overloads [4 hrs] **Templates:** C++ templates applied to the classes. Structs, and functions. [2hrs] **Overview about MATLAB software:** Mathematical and numerical computing commands. Applications. [6 hrs]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	27	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5,10	All
	Assignments	15	15% (15)	Continuous	All
	Projects / Lab.	Lab.10	10% (10)	Continuous	All
	Report	1	5% (5)	8	All
Summative assessment	**Midterm Exam**	2 hrs.	10% (10)	7	All
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction: Overview about C++ basics Control Structures (if statements), Iteration structures (loops)
Week 2	Functions
Week 3	Fundamentals of 1-D array in C++
Week 4	2-D arrays in C++ and more practice with looping
Week 5	Character Sequences. Character arrays and characters in C++.
Week 6	Different features of strings, such as manipulations, functions, length, replace, and find.
Week 7	Pointers I: Pointers: how to use them and why.
Week 8	Pointers I: Additional topics include addresses and dereferencing.
Week 9	File Input/output: Inputting and outputting text files in C++
Week 10	Classes & Objects I: How to declare a class and use accessors.

Week 11	Classes & Objects I: More detail on member functions, operator overloads
Week 12	Templates: C++ templates applied to the classes. Structs, and functions
Week 13	Overview about MATLAB software
Week 14	MATLAB: Mathematical and numerical computing commands
Week 15	MATLAB: Applications
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Exp. 1: C++ code with control structures as if statement and for loop.
Week 2	Exp. 2: C++ code with functions
Week 3	Exp. 3: C++ code using 1-D array
Week 4	Exp. 4: C++ code using 2-D array
Week 5	Exp. 5: Character arrays and characters in C++.
Week 6	Exp. 6: Programs using strings library
Week 7	Exp. 7: Programs using Pointers
Week 8	Exp. 8: Programs using more additional topics Pointers
Week 9	Exp. 9: Programs using Inputting and outputting text files
Week 10	Exp. 10: Programs using Classes I
Week 11	Exp. 11: Programs using Classes II
Week 12	Exp. 12: Applications and case study.
Week 13	Exp. 13: Programs using MATLAB software I
Week 14	Exp. 14: Programs using MATLAB software II
Week 15	Exp. 15: Programs using MATLAB software III
Week 16	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Lecture notes from the Module Leader	Yes
Recommended Texts	STARTING OUT WITH C++ From Control Structures through Objects. EIGHTH EDITION Tony Gaddis, Haywood Community College. Copyright © 2015, 2012, 2009 Pearson Education, Inc., publishing as Addison-Wesley. ISBN 13: 978-0-13-376939-5 ISBN 10: 0-13-376939-9	No
Websites	https://cplusplus.com/doc/	

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MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Mechanical Design I تصميم ميكانيكي I			**Module Delivery**	
Module Type	CORE			**Theory** **Practical**	
Module Code	MEDE351				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	3		**Semester of Delivery**	5	
Administering Department	ME		**College**	ME	
Module Leader	Dr.		**e-mail**		
Module Leader's Acad. Title	Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Dr.		**e-mail**		
Review Committee Approval	01/12/2024		**Version Number**	2024	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	STMA232 (or) STMA242, MEDC234	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1- Learn the general concepts to design necessary mechanical elements for example, bolts, springs, keys, welding, shafts, …… etc. 2- Join the various mechanical elements to reach a mechanical system used in various fields. 3- Establish a set of criteria to develop the imagination of the students to analyze forces and stresses for the elements to be designed and how to use standard tables and graphs, also how to select the suitable material for assumed or given factor of safety. 4- Use tools and subjects that taken in previous years or during this year, such as strength of material, engineering drawing, solid works…etc. to make detail calculations and drawings for mechanical elements and systems. 5- Use Mdesign software for some mechanical elements to describe the importance of computer software to solve certain problems, i.e., spring calculations and others.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Student has the ability to gather all information gained in previous years, such as mechanical drawing, strength of material etc. 2. The student should be able to apply the design steps to build the mechanical systems after learning the mechanical elements. 3. The student should be able to present the design analysis for forces and stresses on mechanical elements. 4. The student should be able to make a neat, clear, reasonable reports with discussion include knowledge in the field of machine design. 5. The student should be able to use some computer software for drawings and calculations. 6. The student may be able to make sketches, draw complete constructions and detail drawings for mechanical elements; also they can use the computer to facilitate the drawings and calculations. 7. The student can join together most mechanical topics, i.e., properties of material, manufacturing process etc. 8. The student can imagine the mechanical system sections, create and analyze the stresses on different mechanical systems. 9. The student can imagine, discuss and develop some mechanical systems, i.e., gear box, clutches, brakes etc. and they can make the

	complete system schemes with important calculations and sections, take the factor of safety in their evaluation.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: Give design example with models to understand the subject [6 hrs] Give practical examples [8 hrs] The equations used in combined stresses [6 hrs] Riveted joint is used as an application of simple stresses [4 hrs] Learn the theories deals with shaft subjected to bending, torsion and axial load combined together [8 hrs] Force analysis for some drives on shaft i.e., gears, belt, chain …. [6 hrs] Learn type of coupling and how to design them [8 hrs] Learn type of keys and how to design them [4 hrs] Learn type of bearings fixation and selection [6 hrs] Learn type of clutches and their design [6 hrs]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Using new techniques to represent the material of subject. 2- Using models for some mechanical elements and systems. 3- Using internet, previous student reports etc. to solve their problems.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	10% (10)	3,5,9,11	All
	Assignments	2	10% (10)	4, 8	All
	Projects / Lab.	Proj. 5	20% (20)	Continuous	All
	Report	-	-	-	-
Summative assessment	**Midterm Exam**	2 hrs.	10% (10)	7	All
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**The Nature of Mechanical Design and Materials Selection:** Steel structural shapes. Units systems. Materials in Mechanical Design. Tensile Strength, Su. Yield Strength, Sy. Shear Strength, Sys and Sus. Steel Designation System. Properties of carburized steel, stainless steel, structural steel…
Week 2 **Week 3**	**Stresses and Deformation Analysis:** Types of stresses. Direct stresses, tension and compression, Direct shear stress, Bearing stress, Torsional shear stress, Vertical shearing stress, Stress due to Bending. Stresses due to combined bending moment with axial load. Keys. Types of keys. Design of keys. Couplings. Type of couplings. Design of couplings. Stress Concentration.
Week 4 **Week 5**	**Combined Stresses, Mohr's Circle & Design for different types of loading:** Maximum normal stresses, Principle stresses. Maximum shear stress. Mohr's circle for different stress conditions
Week 6 **Week 7** **Week 8**	**Design for Variable Loading:** Loading types. Repeated and Reversed Stress Device. Endurance Strength (S_n). Estimated of actual Endurance Strength ($S_{n'}$) Predictions of Failure. Theories of Failure. Goodman, Gerber and Soderberg diagrams and equations.
Week 9 **Week 10** **Week 11**	**Design of Shafts:** Forces on gears. Forces on spur gear. Forces on helical gear. Forces on bevel gear. Belts and Chains. Forces on v belts. Forces of flat belts.

	Forces on chains. Stress concentrations on shafts. Design of shafts. Shafts subjected to bending. Shaft subjected to torsion. Shaft subjected to bending and torsion. Shaft subjected to bending, torsion and axial load. Shaft design procedure. Design remarks.
Week 12 **Week 13**	**Bearings:** Types of bearings (Rolling and Sliding). Types of Rolling bearings. Design of Rolling bearings. Bearings life prediction under variable load
Week 14 **Week 15**	**Fastening elements to shafts:** Retaining rings. Collars. Spacers. Lock nuts. Example of gear box.
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Exp. 1:
Week 2	Exp. 2:
Week 3	Exp. 3:
Week 4	Exp. 4:
Week 5	Exp. 5:
Week 6	Exp. 6:
Week 7	Exp. 7:

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1- Machine Elements in Mechanical Design, by: Robert L. Mott, P. E. 4th Edition, 2006 2- Machine Design by Gupta, 14th revised edition, 2010 3- Mechanical Engineering Design, by: Shigley, 8th Edition, 2008 4- Machine Elements by Gaustav Nimman 5- Machine Design by Black and Adams	Yes
Recommended Texts	Solid works, MDesign software. During lectures videos, images, patents… may be described by supervisor and instructors and other seniors to the students.	No
Websites	Special requirements (include for example workshops, periodicals, IT software, websites)	

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MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Heat Transfer I انتقال حرارة I			**Module Delivery**	
Module Type	CORE			**Theory**	
Module Code	HETR352				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	3		**Semester of Delivery**	5	
Administering Department	ME		**College**	ME	
Module Leader			**e-mail**		
Module Leader's Acad. Title	Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Dr.		**e-mail**		
Review Committee Approval	01/12/2024		**Version Number**	2024	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	***	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To develop problem solving skills and understanding of general heat transfer concepts and definitions. 2. To understand heat transfer modes (conduction, convection and radiation). 3. This course deals with the basic concept of conduction and radiation heat transfer. 4. This is the basic subject for all conduction convection systems like as fins. 5. To understand heat transfer problems in one and two dimensions. 6. To analysis the steady and unsteady heat transfer.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize the types of heat transfer modes. 2. List the various of conduction heat transfer applications in a one-dimension steady state plane wall, Composed wall, Cylinder, and Sphere. 3. Describe the overall heat transfer coefficient. 4. Define the critical thickness of insulation. 5. Summarize what is meant by a basic radiation heat transfer circuit network. 6. Discuss the effect of heat generation during conduction heat transfer modeling. 7. Describe conduction heat transfer in fins. 8. Define Fourier's law, Newton law and Kirchhoff's law in heat transfer. 9. Discuss the two-dimension steady state heat conduction by numerical and energy balance solution 10. Discuss the unsteady state heat conduction by Analytical solution for lumped system, and numerical solution for one and two dimensions. 11. Explain the thermal resistance network in radiation heat transfer analysis. 12. Discuss the Radiation shield effects in radiation heat transfer analysis.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following.

	Introduction: General concepts and definitions, Conduction heat transfer. Convective heat transfer, and Radiation heat transfer. [5 hrs] Conduction heat transfer: General heat conduction equation, one-dimension steady state plane wall, and Composed wall. [5 hrs] Cylinder and composed cylinder, and Sphere and composed sphere. [4 hrs] Overall heat transfer coefficient, Critical thickness of insulation. [4 hrs] One-dimension steady state with heat generation. (Plane wall, Solid cylinder, Hollow cylinder, Sphere). [7 hrs] Conduction heat transfer in fins:General equation for temp distribution, Very long fin, Short fin, End insulated fin, Effectiveness of the fin, and Applications. [11 hrs] Two-dimension steady state heat conduction: Numerical solution (nodes), with Applications and examples. [7 hrs] Unsteady state heat conduction: Analytical solution for lumped system, and Numerical solution for one and two dimensions. [7 hrs] Radiation heat transfer: Introduction to thermal radiation, The electromagnetic waves, The black body, and The shape factor, and Two parallel plates (gray body). [6 hrs] Two concentric cylinders, Radiation between more than two bodies, Thermal resistance network, and Radiation shields. [11 hrs]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	20% (20)	3,5,9,11	All
	Assignments	2	10% (10)	2, 12	All
	Projects / Lab.	-	-	-	
	Report	1	10% (10)	13	All
Summative assessment	**Midterm Exam**	2 hrs.	10% (10)	7	All
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction: General concepts and definitions. Conduction heat transfer. Convective heat transfer. Radiation heat transfer.
Week 2	Conduction heat transfer: General heat conduction equation. One dimension steady state plane wall. Composed wall.
Week 3	Cylinder and composed cylinder. Sphere and composed sphere.
Week 4	Overall heat transfer coefficient. Critical thickness of insulation.
Week 5	One-dimension steady state with heat generation. (Plane wall, Solid cylinder, Hollow cylinder, Sphere).

Week 6	Conduction heat transfer in fins: General equation for temp distribution. Very long fin. Short fin.
Week 7	End insulated fin. Effectiveness of the fin. Applications.
Week 8	Two-dimension steady state heat conduction: Numerical solution (nodes).
Week 9	Applications and examples.
Week 10	Unsteady state heat conduction: Analytical solution for lumped system.
Week 11	Numerical solution for one and two dimensions.
Week 12	Radiation heat transfer: Introduction to thermal radiation. The electromagnetic waves. The black body. The shape factor.
Week 13	Two parallel plates (gray body). Two concentric cylinders.
Week 14	Radiation between more than two bodies.
Week 15	Thermal resistance network. Radiation shields.
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts		No
Recommended Texts	1. J. P. Holman, "Heat Transfer", McGraw Hill, tenth Edition 2010. 2. Yunus A. Cengel, " Heat Transfer A practical Approach", McGraw Hill, 2nd Edition, 2002.	Yes
Websites	Any Heat transfer website from international universities.	

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MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Aerodynamics ديناميك هواء			**Module Delivery**	
Module Type	CORE			**Theory** **Lab** **Tutorial**	
Module Code	AERO353				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	3		**Semester of Delivery**	5	
Administering Department	ME		**College**	ME	
Module Leader	Dr.		**e-mail**		
Module Leader's Acad. Title	Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Dr.		**e-mail**		
Review Committee Approval	01/12/2024		**Version Number**	2024	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	FUAE244	**Semester**	4
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Introduce students to the concepts of Aerodynamic. The basic principles of aerodynamic are developed using a differential control volume formulation, and then applied to the study of incompressible flow. The distinction is made between ideal and viscous fluids, and laminar and turbulent flow. Students will also have an introductory knowledge of Navier-Stokes equations and applications. Both integral and differential methods are used to study boundary layers, with both engineering and environmental applications. As well as, introduce principle study of incompressible flow around wings and characteristics and flow control devices. Students successfully completing this course will understand the fundamentals of incompressible aerodynamic theory and be able to predict lift forces, drag forces, and pitching moments of aerodynamics shapes.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Students will be able to: 1. Use the differential equations of fluid motion in Cartesian and cylindrical coordinates to calculate the fluid acceleration, velocity, vorticity, pressure, and shear stress fields. 2. Classify a flow as inviscid, incompressible, irrotational, steady, and fully developed. 3. Simplify the differential equations for the conservation of mass, momentum, and energy for steady incompressible Newtonian viscous flow, and prescribe appropriate boundary conditions, to solve for the velocity profile, pressure gradient, and mass flow rate in problems involving Couette flow, Poiseuille flow, channel flow, and pipe flow. 4. Describe the fundamental properties of laminar and turbulent flows and explain the transition process from laminar to turbulent flow. 5. Use the Karman integral momentum equation and a prescribed velocity profile to solve for the boundary layer thickness, displacement thickness, momentum thickness, and skin friction coefficient for laminar and turbulent boundary layers. 2. Select an appropriate empirical correlation to calculate the skin-friction drag for smooth wall and rough-wall turbulent boundary layers. 3. Explain the concept of boundary layer separation and the effects of pressure gradient. 4. Describe the main distinguishing features of the flow past streamlined and bluff bodies and explain approaches to drag reduction. 5. Calculate the pressure drag and skin-friction drag for the external flow over bodies. 6. Explain and describe the principle of incompressible flow around airfoils and characteristics.

	7. Explain and describe the principle of incompressible flow around wings and stall characteristics. 8. Explain the flow control and lift. 9. Explain computational method.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Navier-Stokes equations. [6 hrs] Boundary layer theory. [12 hrs] Potential flow theory (Ideal fluid). [9 hrs] Incompressible flow over airfoils. [8 hrs] Incompressible flow over wings. [7 hrs] Flow control devices. [5 hrs]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	This module will be delivered by a set of structured lectures and will also contain practical laboratory based exercises supported by introductory lectures and demonstrations. Laboratory work and tutorials will be utilized to support lectures. The students will also be encouraged to undertake self-readings of essential and recommended books.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	20% (20)	3, 6,9,12	All
	Assignments	2	10% (10)	5, 10	All
	Projects / Lab.	Lab. 5	10% (10)	Continuous	
	Report	-	-	-	-
Summative assessment	Midterm Exam	2 hrs.	10% (10)	7	All
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Navier-Stokes Equations:** Introduction. Derivation.
Week 2	Laminar flow between parallel plates.
Week 3	Laminar flow between coaxial rotating cylinders. Laminar flow in pipes.
Week 4	**Boundary Layer Theory:** Introduction. Displacement and Momentum thicknesses. Momentum equation for the boundary layer.
Week 5	Laminar boundary layer. Turbulent boundary layer.
Week 6	Transition from laminar to turbulent flow. Separation and pressure drag. Types of separation on aircraft wings. Boundary layer control techniques. Drag reduction.
Week 7	**Potential flow theory (Ideal Flow):** Introduction Continuity equation. Vorticity equation. Stream function. Potential function. Circulation.
Week 8	**Basic flow patterns:** Uniform flow. Source, Sink. Doublet. Free vortex.
Week 9	**Combination of basic flows:** Flow past a half body. Flow past a Rankine oval.

Week 10	Flow past a cylinder. Flow past a cylinder with circulation.
Week 11	Lift force generated on the cylinder – Magnus effect
Week 12	**Incompressible flow over airfoils:** Introduction. The Kutta condition. Kelvin's circulation theorem.
Week 13	Introduction to thin airfoil theory. Wind tunnel tests. Estimation of aerodynamic coefficients from pressure distribution.
Week 14	**Incompressible flow over wings:** Introduction. Circulation, downwash, lift and induced drag. Introduction to finite wing theory.
Week 15	**Wing stall:** Stall characteristics. Effect of planform and twist. Stall control devices. High lift devices. Spoilers.
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Exp. 1: Air flow inside a smooth, circular-section tube
Week 2	Exp. 2: Turbulent circular jet
Week 3	Exp. 3: The boundary layer
Week 4	Exp. 4: Air flow around a cylinder
Week 5	Exp. 5: Centrifugal pump
Week 6	Exp. 6:
Week 7	Exp. 7:

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Houghton and Carpenter, "Aerodynamics for Engineering Students", Sixth Edition, 2013 Elesevier.	Yes
Recommended Texts	Frank M. White, "Fluid Mechanics", 8th Edition, 2016 McGraw Hill.	Yes
Websites		

	Ministry of Higher Education and Scientific Research - Iraq **Al-Turath University** **College of Engineering** **Department of Aircraft Engineering** Four years (Eight semesters) - 240 ECTS credits 1 ECTS = 25hr	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Theory of Machines نظرية مكائن			**Module Delivery**	
Module Type	CORE			**Theory** **Lab** **Tutorial**	
Module Code	THMA354				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	3		**Semester of Delivery**	5	
Administering Department	ME		**College**	ME	
Module Leader	Dr.		**e-mail**		
Module Leader's Acad. Title	Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Dr.		**e-mail**		
Review Committee Approval	01/12/2024		**Version Number**	2024	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ENME123	**Semester**	2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To make the student conversant with commonly used mechanisms in various machines 2. To develop skills for drawing velocity and acceleration diagram for linkages 3. To address the underlying concepts, methods and application of different machines. 4. To develop skills for drawing forces in machines arise from various sources (static and inertia forces). 5. To understand the concepts of the power transmission by friction belts 6. To understand how to balancing the inertia forces in the system of rotating masses 7. To develop skills for calculate the speed ratio using gear train, such as simple, compound, and epicyclic gear trains. 8. To understand the concepts of the type of governors and how to find the speed of governors 9. To understand the concepts of coefficient of fluctuation and the properties of the rotating flywheel.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how to use the method of drawing diagrams to calculate speed, acceleration, forces, and torque to find the unknown values 2. To understands the relationship between theoretical calculation methods and practical procedures 3. Identify the types of mechanical mechanisms, how to calculate the connection of their parts, and find the relative velocities between them 4. Describe the basic characteristics of using these mechanisms 5. Acquire skill in methods of calculating all the unknowns required in the mechanical system 6. The skill of gaining experience in how to choose mechanical machines for the appropriate work 7. Describe the main distinguishing features of these mechanical mechanisms 8. Explaining and linking the theoretical material to the practical
Indicative Contents المحتويات الإرشادية	Indicative content includes the following.

	Linkages & Mechanisms - Fundamental Concepts - Mechanisms & Linkages - Four bar mechanism / Slider crank mech. / Quick-return Mechanism & others. [6 hrs.] **Velocity in mechanisms by method of relative velocities:** - Velocity polygons or diagrams - Velocity of points on a rolling body - Velocity of points on sliding bodies - Velocities of complex mechanism… - Examples / Problems. [5 hrs.] **Acceleration in mechanisms:** - Absolut & Relative acceleration in Mechanisms/ Angular acceleration/ Acceleration for points in Rolling bodies. - Relative acceleration in Equivalent linkages - Coriolis acceleration. - Examples / Problems. [9 hrs.] **Static & Dynamic (Inertia) forces in machines:** - Transmission of forces in a mechanism/ inertia force & inertia torque - Force in a slider crank mech.& in a four-bar mech., in shaper mechanism - Combine static & inertia force analysis…. - Examples / Problems [9 hrs.] **Friction belts:** - Types of belts/ Length of belt/ Lap angle/ - Flat belt calculation/ V- belt calculation/ Rope belt calculation/ - Power transmission - Centrifugal and initial tension… - Examples/ Problems. [5 hrs.] **Gears (Toothed gears):** - Types of Gears/ Spur Gear (SG)/ Contact specifications in SGs/ Path of contact in SGs / - Length of arc of contact and contact ratio in SGs/ - Velocity of sliding /- Interference in SGs… - Examples/ Problems [9 hrs.] **Gear Trains:** Types of gear Train/ Simple Gear Train/ Compound Gear trains/ Reverted gear train/ Speed ratio / - Simple Compound Epicycles Gear train/ Torques in EGT Examples/ Problems [9 hrs.] **Speed governors:** - Types of Gs / Porter G/ Proell G. Examples/ Problems [5 hrs.]

	Flywheel: Turning moment diagram/ Energy stored in Flywheel/ Coefficient of fluctuation of Speed - Dimensions of Flywheel - Examples/ Problems. [6 hrs.] **Balancing of rotating masses:** - Single rotating mass/ Several rotating masses in single & several transverse planes - Examples/ Problems [9 hrs]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The development of the student's ability to apply the knowledge in order to be able to correct analysis of the question and thus put the appropriate assumptions and interpretation to reach a solution. Through textbooks and lectures, in addition to the Laboratory experiments.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	20% (20)	3, 6,9,12	All
	Assignments	2	10% (10)	5, 10	All
	Projects / Lab.	Lab. 5	10% (10)	Continuous	
	Report	-	-	-	-
Summative assessment	**Midterm Exam**	2 hrs.	10% (10)	7	All
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Linkages & Mechanisms:** Fundamental Concepts / Mechanisms & Linkages/ Four bar mechanism / Slider crank mech. / Quick-return Mechanism & others
Week 2	**Velocity in mechanisms by method of relative velocities:** Velocity polygons or diagrams/ Velocity of points on a rolling body/ Velocity of points on sliding bodies/ Velocities of complex mechanism… Examples / Problems
Week 3	**Acceleration in mechanisms:** Absolut & Relative acceleration in Mechanisms
Week 4	Angular acceleration/Acceleration for points in Rolling bodies. Relative acceleration in Equivalent linkages/ Coriolis acceleration. Examples / Problems
Week 5	**Static & Dynamic (Inertia) forces in machines:** Transmission of forces in a mechanism
Week 6	inertia force & inertia torque/ forces in a slider crank mech.& in a four- bar mech. Combine static & inertia force analysis Examples / Problems
Week 7	**Friction belts:** -Types of belts/ Length of belt/ Lap angle/ Flat belt calculation/ V- belt calculation/ Rope belt calculation / Power transmission / Centrifugal and initial tension. Examples/ Problems
Week 8	**Gears (Toothed gears):** - Types of Gears/ Spur Gear (SG)/ Contact specifications in SGs/ Path of contact in SGs
Week 9	Length of arc of contact and contact ratio in SGs/ Velocity of sliding/ Interference in SGs. - Examples/ Problems
Week 10	**Gear Trains:** Types of gear Train/ Simple Gear Train/ Compound Gear trains/ Reverted gear train/ Speed ratio
Week 11	Simple Compound Epicycles Gear train/ Torques in Epicycles Gear train, Examples/ Problems
Week 12	**Speed governors:** Types of governors / C.G/ W. G/ Porter G/ Proell G. Examples/ Problems
Week 13	**Flywheel:** Turning moment diagram/ Energy stored in Flywheel/ Coefficient of fluctuation of Speed / Dimensions of Flywheel, Examples/ Problems
Week 14	**Balancing of rotating masses:** Single rotating mass/ Several rotating masses in single transverse planes
Week 15	Several rotating masses in several transverse planes / Examples/ Problems
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Exp. 1: (Slider – Crank Mechanism)
Week 2	Exp. 2: (Epicyclic Gear Trains)
Week 3	Exp. 3: (Rope-Belt Friction)
Week 4	Exp. 4: (Balancing of rotating masses)
Week 5	Exp. 5: (Flywheel)
Week 6	Exp. 6:
Week 7	Exp. 7:

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. John Hannah & R. C. Stephens, "Mechanics of Machines: Elementary Theory and Examples", 4th edition, 1999. 2. John Hannah & R. C. Stephens, "Mechanics of Machines: Advanced theory and Examples", 4th edition, 1999.	Yes
Recommended Texts	S. S. Rattan, "Theory of Machines", 3rd edition, 2009.	No
Websites		

	Ministry of Higher Education and Scientific Research - Iraq **Al-Turath University** **College of Engineering** **Department of Aircraft Engineering** Four years (Eight semesters) - 240 ECTS credits 1 ECTS = 25hr	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Aircraft Engines II II محركات الطائرات			**Module Delivery**	
Module Type	CORE			**Theory** **Lab** **Tutorial**	
Module Code	AIEN355				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	3		**Semester of Delivery**	5	
Administering Department	ME		**College**	ME	
Module Leader	Dr.		**e-mail**		
Module Leader's Acad. Title	Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Dr.		**e-mail**		
Review Committee Approval	01/12/2024		**Version Number**	2024	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	AIEN243	**Semester**	4
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Develop the knowledge of the basics concepts in constructing and modifying turbine aircraft engines. 2. Awareness of theoretical concepts dealing with the operating cycle analysis and improving performance. 3. Providing the knowledge in the engine testing under various conditions and identifying the evaluation parameters. 4. Understanding the concepts of engagement between the various components of the turbine aircraft engines. 5. Providing the knowledge of the different types of turbo-engines encountered in aviation sector.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Applying the concepts of thermodynamic cycles according to the second law of thermodynamics. 2. Achieving the principle of energy conservation and the stage analysis for different turbine aircraft engines. 3. Complete awareness of the determination techniques of each kind of turbine engines using basic formulation with testing procedures. 4. Applying the first and second law concepts to the thermodynamic processes associated with the combustion systems in turbo-engines. 5. Exploitation of the acquired knowledge in turbo-engines including description and cycle analysis of various kinds of engines involved.
Indicative Contents المحتويات الإرشادية	**Indicative contents include the following topics:** <u>Part A</u> **Introduction:** Aerostats, Aerodynes**,** Newton's laws of motion**,** Classification of turbo aircraft engines**. Turbine aircraft engines:** Turbine engine components, Intake/Diffuser, Compressor, Combustion chamber, Turbine, Nozzle**. Thermodynamic cycles:** Simple Brayton cycle, Brayton cycle with re-heat.[14hrs] **Flow characteristics through turbomachine:** Compressibility effect**,** Flow momentum through a rotor**. Engine intake:** Flow in varying cross, section ducts**,** Subsonic intakes**,** Supersonic intakes**,** Gas dynamic relations for intakes **Engine nozzle:** Types of nozzles**,** Flow characteristics in a nozzle**,** Gas dynamic relations for nozzles**,** Off-design operation of a nozzle. [14hrs]

	Part B **Centrifugal machines:** Elementary theory of radial turbomachines**,** Centrifugal (Radial) compressor**,** Velocity diagrams**,** Stage analysis Prewhirl, Slip, Rotating stall, Surging, Radial inflow turbine, Radial flow, analysis. [14hrs] **Axial flow machines:** Elementary theory of axial flow turbomachines**,** Blade terminology**,** Axial flow compressor**,** Velocity diagrams**,** Stage analysis of axial compressor**,** Characteristics of axial compressor **,** Axial, flow turbine**,** Velocity diagrams**,** Stage analysis of axial turbine**,** Characteristics of axial turbine. [15hrs] **Combustion system:** Types of aviation fuel, Theory of combustion, Calorific value of fuel, Combustion in turbine engines, Exhaust gas analysis. **Aircraft engines**: Propulsion efficiency , Thrust producing engines, Turbojet engine, Turbofan engine, Afterburning , Power producing engines, Turboprop engine, Turboshaft engine [15hrs]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Deliver well-structured lectures that explain classification of aero-engines performance, the thermodynamic cycles, flow through turbomachines and the main parts of simple turbojet engine including intakes, compressor (axial and centrifugal) , combustion chamber, turbine, and nozzle. Utilize clear visuals like diagrams, animations, and real-world examples to enhance understanding. • Incorporate active learning activities within lectures. This could involve short quizzes, interactive questions, group discussions, or problem-solving exercises to solidify understanding and encourage student participation. • Provide students with a variety of problem-solving exercises, ranging from introductory to more challenging. This caters to different learning styles and allows students to build confidence as they progress. • Whenever possible, connect the theoretical concepts to real-world engineering applications of gas dynamics. • Incorporate regular quizzes and homework assignments to assess student understanding and identify areas needing improvement. Provide timely and constructive feedback to guide student learning. • Utilize well-designed midterm and final exams that test both theoretical knowledge and problem-solving abilities in aircraft engines.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	20% (20)	3, 6,9,12	All
	Assignments	2	10% (10)	5, 10	All
	Projects / Lab.	Lab. 4	10% (10)	Continuous	
	Report	-	-	-	-
Summative assessment	**Midterm Exam**	2 hrs.	10% (10)	7	All
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to the different types of aircraft engines
Week 2	Description of the main components of the turbine aircraft engines
Week 3	Description of Brayton standard cycle and Brayton cycle with afterburning.
Week 4	Describing the flow characteristics through turbomachines.
Week 5	Description, classification and analysis of aircraft engine intakes.
Week 6	Description, classification and analysis of aircraft engine nozzles.
Week 7	Elementary theory of radial turbomachinary.
Week 8	Stage analysis and velocity diagrams involved in centrifugal compressor.
Week 9	Performance characteristics of centrifugal compressors and turbines.
Week 10	Elementary theory of axial flow turbomachinary.
Week 11	Stage analysis and performance characteristics for axial flow compressors.
Week 12	Stage analysis and performance characteristics for axial flow turbines.

Week 13	Combustion system description and analysis in turbo-aircraft engines.
Week 14	Description and analysis of the thrust producing aircraft engines (turbojet and turbofan engines).
Week 15	Description and analysis of the power producing aircraft engines (turboprop and turboshaft engines).
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Exp. 1: Turbo jet engine
Week 2	Exp. 2: Turbo fan engine
Week 3	Exp. 3: Turboprop and Turboshaft engines
Week 4	Exp. 4: Two shaft gas turbine unit
Week 5	Exp. 5:
Week 6	Exp. 6:
Week 7	Exp. 7:

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	H.I.H. Saravanamnttoo, et al. "Gas Turbine Theory" 7th edition, Pearson Education Limited, 2017.	Yes
Recommended Texts	S.L. Dixon and C.A. Hall, "Fluid Mechanics and Thermodynamics of Turbomachinery".7th edition, Butterworth-Heinemann, Elsever, 2014.	No
Websites		

	**Ministry of Higher Education and Scientific Research - Iraq** **Al-Turath University** **College of Engineering** **Department of Aircraft Engineering** Four years (Eight semesters) - 240 ECTS credits 1 ECTS = 25hr	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	Science of Mathematical Modelling علم النمذجة الرياضية	**Module Delivery**	
Module Type	CORE	**Theory**	
Module Code	SMMO356		
ECTS Credits	4		
SWL (hr/sem)	100		
Module Level	3	**Semester of Delivery**	5
Administering Department	ME	**College**	ME
Module Leader	Dr.	**e-mail**	
Module Leader's Acad. Title	Dr.	**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	Dr.	**e-mail**	
Review Committee Approval	01/06/2025	**Version Number**	2025

Relation with Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	MATH231	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Understand Modeling Fundamentals. 2. Comprehend the role of mathematical modeling in mechanical engineering systems. 3. Learn to simplify complex problems using assumptions, dimensional analysis, and governing equations. 4. Formulate and Solve Mechanical Engineering Problems. 5. Develop mathematical models for dynamic systems (ODEs) and continuum mechanics (PDEs). 6. Apply analytical and numerical techniques (e.g., Runge-Kutta, finite difference/element methods) to solve these models. 7. Master Computational Tools Gain proficiency in computational tools Ansys for simulating mechanical systems. 8. Implement numerical methods to analyze vibrations, heat transfer, fluid flow, and structural stresses. 9. Optimize Designs and Processes use optimization techniques (linear/nonlinear programming, genetic algorithms) to enhance mechanical designs. 10. Incorporate Uncertainty and Reliability. 11. Model probabilistic systems (e.g., fatigue failure, tolerance stacks) using statistical methods. 12. Complete a hands-on project (e.g., CFD analysis, robotic arm dynamics, thermal management) to demonstrate end-to-end modeling skills.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this course, students will be able to: 1. Formulate mathematical models for mechanical systems using first principles. 2. Solve ODEs/PDEs analytically and numerically (via Ansys). 3. Apply finite element and finite difference methods to structural/thermal problems. 4. Optimize mechanical designs using constraint-based and stochastic methods. 5. Quantify uncertainty in engineering systems using statistical tools. 6. Develop and present a computational modeling project tied to real-world applications.
Indicative Contents المحتويات الإرشادية	Introduction to Mathematical Modeling, understand the basics of mathematical modeling and its importance in engineering. [7 hrs] Ordinary Differential Equations (ODEs) in Mechanical Systems, First and second-order ODEs (linear & nonlinear), Analytical and numerical solutions (Euler, Runge-Kutta methods). [7 hrs] Partial Differential Equations (PDEs) in Continuum Mechanics, Wave equation (vibrations in rods and beams). [7 hrs]

	Numerical Methods for Mechanical Systems, Finite difference method (FDM) for ODEs/PDEs, Finite element method (FEM) basics (for stress analysis), Introduction to computational fluid dynamics (CFD). [7 hrs] Optimization in Mechanical Design, apply optimization techniques to engineering problems, Linear and nonlinear programming, Constrained optimization (Lagrange multipliers), Genetic algorithms and gradient-based methods. [7 hrs] Statistical and Probabilistic Modeling, Probability distributions in engineering failures, Monte Carlo simulations, Reliability analysis. [7 hrs] Advanced Topics (Select Based on Interest), Nonlinear Dynamics & Chaos (e.g., rotor-bearing systems), Control Theory (modeling PID controllers for mechanical systems), Multibody Dynamics (robot arm modeling), Fluid-Structure Interaction (aeroelasticity, pipe flow vibrations). [7 hrs] Project Presentations & Course Review, Modeling a suspension system for a vehicle, Thermal analysis of a heat exchanger, CFD simulation of airflow over a car body. [3 hrs]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	20% (20)	3,5,8,10	All
	Assignments	2	10% (10)	2, 12	All
	Projects / Lab.	-	-	-	-
	Report	1	10% (10)	13	All
Summative assessment	Midterm Exam	2 hrs	10% (10)	7	All
	Final Exam	3 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1-2	Introduction to Mathematical Modeling, Understand the basics of mathematical modeling and its importance in engineering.
Week 3-4	Ordinary Differential Equations (ODEs) in Mechanical Systems, First and second-order ODEs (linear & nonlinear), Analytical and numerical solutions (Euler, Runge-Kutta methods).
Week 5-6	Partial Differential Equations (PDEs) in Continuum Mechanics, Wave equation (vibrations in rods and beams). **Thermal Analysis steady state using Ansys.** **Thermal Analysis unsteady state using Ansys**
Week 7-8	Numerical Methods for Mechanical Systems, Finite difference method (FDM) for ODEs/PDEs, Finite element method (FEM) basics (for stress analysis), Introduction to computational fluid dynamics (CFD). **Structural Analysis using Ansys.**
Week 9-10	Optimization in Mechanical Design, Linear and nonlinear programming, Constrained optimization (Lagrange multipliers), Genetic algorithms and gradient-based methods. **Buckling Analysis using Ansys.**
Week 11-12	Statistical and Probabilistic Modeling, Probability distributions in engineering failures, Monte Carlo simulations, Reliability analysis.
Week 13-14	Advanced Topics (Select Based on Interest), Nonlinear Dynamics & Chaos (e.g., rotor-bearing systems), Control Theory (modeling PID controllers for mechanical systems), Multibody Dynamics (robot arm modeling), Fluid-Structure Interaction (aeroelasticity, pipe flow vibrations). **Free Vibration Analysis using Ansys.** **Forced Vibration Analysis using Ansys.**
Week 15	Project Presentations & Course Review, Modeling a suspension system for a vehicle,

	Thermal analysis of a heat exchanger, CFD simulation of airflow over a car body. **Fluid Analysis using Ansys.**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• Mathematical Modeling in Mechanical Engineering – Friedrich Pfeiffer. • Advanced Engineering Mathematics– Erwin Kreyszig. • Numerical Methods for Engineers – Steven Chapra.	Yes
Recommended Texts		No
Websites		

	Ministry of Higher Education and Scientific Research - Iraq **Al-Turath University** **College of Engineering** **Department of Aircraft Engineering** Four years (Eight semesters) - 240 ECTS credits 1 ECTS = 25hr	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Mechanical Design II تصميم ميكانيكي II			**Module Delivery**	
Module Type	CORE			**Theory** **Practical**	
Module Code	MEDE361				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	3		**Semester of Delivery**	6	
Administering Department	ME		**College**	ME	
Module Leader	Dr.		**e-mail**		
Module Leader's Acad. Title	Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Dr.		**e-mail**		
Review Committee Approval	01/12/2024		**Version Number**	2024	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MEDE351	**Semester**	5
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1- Learn the general concepts to design necessary mechanical elements for example, bolts, springs, keys, welding, shafts, …… etc. 2- Join the various mechanical elements to reach a mechanical system used in various fields. 3- Establish a set of criteria to develop the imagination of the students to analyze forces and stresses for the elements to be designed and how to use standard tables and graphs, also how to select the suitable material for assumed or given factor of safety. 4- Use tools and subjects that taken in previous years or during this year, such as strength of material, engineering drawing, solid works…etc. to make detail calculations and drawings for mechanical elements and systems. 5- Use Mdesign software for some mechanical elements to describe the importance of computer software to solve certain problems, i.e., spring calculations and others.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Student has the ability to gather all information gained in previous years, such as mechanical drawing, strength of material etc. 2. The student should be able to apply the design steps to build the mechanical systems after learning the mechanical elements. 3. The student should be able to present the design analysis for forces and stresses on mechanical elements. 4. The student should be able to make a neat, clear, reasonable reports with discussion include knowledge in the field of machine design. 5. The student should be able to use some computer software for drawings and calculations. 6. The student may be able to make sketches, draw complete constructions and detail drawings for mechanical elements; also they can use the computer to facilitate the drawings and calculations. 7. The student can join together most mechanical topics, i.e., properties of material, manufacturing process etc. 8. The student can imagine the mechanical system sections, create and analyze the stresses on different mechanical systems. **9.** The student can imagine, discuss and develop some mechanical systems, i.e., gear box, clutches, brakes etc. and they can make the complete system schemes with important calculations and sections, take the factor of safety in their evaluation.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Learn type of clutches and brakes with their design [10 hrs] Learn type of springs and design of helical spring [7 hrs] Learn what fatigue means and how to design certain parts for variable load [6 hrs] Learn types of bolts and their design[8 hrs] Learn application of power screw and their design [8 hrs] Learn type of pressure vessels and their design [7 hrs] Learn type of belts and introduction to V-belt design [6 hrs] Learn type of gears and introduction to spur gear design [10 hrs]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	1- Using new techniques to represent the material of subject. 2- Using models for some mechanical elements and systems. 3- Using internet, previous student reports etc. to solve their problems.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	10% (10)	3,5,9,11	All
	Assignments	2	10% (10)	4, 8	All
	Projects / Lab.	Proj. 5	20% (20)	Continuous	All
	Report	-	-	-	-
Summative assessment	**Midterm Exam**	2 hrs.	10% (10)	7	All
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1 **Week 2**	**Motion Control "Clutches and Brakes":** Types of friction clutches & brakes. Plate-type clutch or brake. Cone clutch or Brake. Short and long shoe drum brakes. Band brakes.
Week 3 **Week 4**	**Springs:** Kinds of springs. Helical compression springs. Stresses on wire diameter of spring, Stresses and deflection for helical springs. Analysis of spring characteristics and design
Week 5 **Week 6**	**Fasteners:** Introduction. Bolt materials and strength. Thread designations and stress area. Externally applied force on a bolted joint.
Week 7 **Week** 8 **Week** 9	**Machine Frames, Bolted Connections and Welded Joints:** Eccentrically loaded bolted joint. Welded joints. General procedure for designing welded joints.
Week 10 **Week 11**	**Linear Motion Elements:** Forms of power screw threads. Design of power Screw.
Week 12	**Pressure Cylinders:** Thin walled cylinder. Thick cylinders. Design of pressure vessels.
Week 13 **Week** 14	**Spur Gear Design:** Procedure of designing a spur gear drive.
Week 15	**V-Belt drives:** Types of belts. Design of belts. Basic belt drive. Standard belt cross sections.
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Exp. 1:
Week 2	Exp. 2:
Week 3	Exp. 3:
Week 4	Exp. 4:
Week 5	Exp. 5:
Week 6	Exp. 6:
Week 7	Exp. 7:

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1- Machine Elements in Mechanical Design, by: Robert L. Mott, P. E. 4th Edition, 2006 2- Machine Design by Gupta, 14th revised edition, 2010 3- Mechanical Engineering Design, by: Shigley, 8th Edition, 2008 4- Machine Elements by Gaustav Nimman 5- Machine Design by Black and Adams	Yes
Recommended Texts	Solid works, MDesign software. During lectures videos, images, patents… may be described by supervisor and instructors and other seniors to the students.	No
Websites	Special requirements (include for example workshops, periodicals, IT software, websites)	

	Ministry of Higher Education and Scientific Research - Iraq **Al-Turath University** **College of Engineering** **Department of Aircraft Engineering** Four years (Eight semesters) - 240 ECTS credits 1 ECTS = 25hr	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Heat Transfer II انتقال حرارة II			**Module Delivery**	
Module Type	CORE			**Theory** **Lab** **Tutorial**	
Module Code	HETR362				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	3		**Semester of Delivery**	6	
Administering Department	ME		**College**	ME	
Module Leader			**e-mail**		
Module Leader's Acad. Title	Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Dr.		**e-mail**		
Review Committee Approval	01/12/2024		**Version Number**	2024	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	HETR352	**Semester**	5
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Defining the Principle of Convective heat transfer. 2. Defining the theoretical basics of the forced convective heat transfer Coincided with a laboratory experiment. 3. This course deals with the empirical relations for pipe and tube. 4. This course deals with the dimensionless numbers like Grashof number, Nusselt number…..etc. 5. Defining the theoretical basics of the free convective heat transfer Coincided with a laboratory experiment. 6. Defining the theoretical basics of the heat exchangers Coincided with a laboratory experiment.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize the types of convection heat transfer modes. 2. The relationship between heat transfer and other Sciences, like fluid mechanics and its direct relationship. 3. Discuss the hydraulic boundary layer growth for external flow and internal flow. 4. Recognize the temperature distribution and heat transfer for Laminar flow over flat plate. 5. Recognize the temperature distribution and heat transfer for Laminar flow for closed conduit. 6. Defining the empirical relations for pipe and tube. 7. Defining the empirical relations for natural convection over surfaces. 8. Explanation the concepts of the dimensionless numbers deals with the subject, like Grashof number, Nusselt number…..etc. 9. Discuss the relation between friction factor and heat transfer. 10. Recognize the types of heat exchangers. 11. Explain the log mean temperature difference . 12. Explain the heat exchanger effectiveness and NTU method.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction:(Principle of Convective heat transfer ,fluid flow background, laminar and turbulent flow, boundary layer growth for external flow and internal flow. [4 hrs] Forced convection heat transfer: Energy equation and thermal boundary layer. [5 hrs]

	Temperature distribution and heat transfer for Laminar flow over flat plate, Temperature distribution and heat transfer for Laminar flow for closed conduit.. [10 hrs] Relation between friction factor and heat transfer, Forced convection over cylinder.. [5 hrs] Empirical relation for pipe and tube. [4 hrs] Dimensional analysis, analytical solution. [5 hrs] External Free convection heat transfer: General concepts, Grashof number, Vertical flat plate, Empirical relations for free convection over surfaces (plate, cylinder and sphere). [4 hrs] Internal free convection heat transfer (vertical tube, rectangular duct), application and examples. [6 hrs] Heat exchangers: General concepts, types of heat exchangers, the log mean temperature difference. [10hrs] Heat exchanger effectiveness NTU method, Condensation and vaporization application. [9 hrs]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	20% (20)	3,6,9,12	All
	Assignments	2	10% (10)	4, 11	All
	Projects / Lab.	Lab. 5	10% (10)	Continuous	
	Report	-	-	-	
Summative assessment	Midterm Exam	2 hrs.	10% (10)	7	All
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction: Principle of Convective heat transfer. Fluid flow background. Laminar and turbulent flow. Boundary layer growth for external flow and internal flow.
Week 2	Forced convection heat transfer: Energy equation and thermal boundary layer.
Week 3	Temperature distribution and heat transfer for Laminar flow over flat plate
Week 4	Temperature distribution and heat transfer for Laminar flow for closed conduit.
Week 5	Relation between friction factor and heat transfer. Forced convection over cylinder.
Week 6	Empirical relation for pipe and tube.
Week 7	Dimensional analysis, analytical solution.
Week 8	External Free convection heat transfer: General concepts. Grashof number. Vertical flat plate. Empirical relations for free convection over surfaces (plate, cylinder and sphere).
Week 9	Internal Free convection heat transfer: Vertical tube. Rectangular duct.
Week 10	Application and examples
Week 11	Heat exchangers: General concepts.

Week 12	Types of heat exchangers.
Week 13	The log mean temperature difference
Week 14	Heat exchanger effectiveness.
Week 15	NTU method, Condensation and vaporization application.
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Exp. 1: Measurement of thermal conductivity coefficient for solid materials.
Week 2	Exp. 2: Study of fins performance.
Week 3	Exp. 3: Study of forced convection heat transfer from a cylinder surface.
Week 4	Exp. 4: Study of natural convection heat transfer from a cylinder surface.
Week 5	Exp. 5: Study the performance of a double-pipe heat exchanger.
Week 6	Exp. 6:
Week 7	Exp. 7:

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts		Yes
Recommended Texts	1. J. P. Holman, "Heat Transfer", McGraw Hill, tenth Edition 2010. 2. Yunus A. Cengel, " Heat Transfer A practical Approach", McGraw Hill, 2nd Edition, 2002.	No
Websites		

	**Ministry of Higher Education and Scientific Research - Iraq** **Al-Turath University** **College of Engineering** **Department of Aircraft Engineering** Four years (Eight semesters) - 240 ECTS credits 1 ECTS = 25hr	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	Gas Dynamics ديناميك غازات		**Module Delivery**	
Module Type	CORE		**Theory** **Lab** **Tutorial**	
Module Code	GADY363 (طائرات)			
ECTS Credits	5			
SWL (hr/sem)	125			
Module Level	3	**Semester of Delivery**	6	
Administering Department	ME	**College**	ME	
Module Leader	Dr.	**e-mail**		
Module Leader's Acad. Title	Dr.	**Module Leader's Qualification**	Ph.D.	
Module Tutor	None	**e-mail**	None	
Peer Reviewer Name	Dr.	**e-mail**		
Review Committee Approval	01/12/2024	**Version Number**	2024	

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	FLME232, THER233	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Establish a strong foundation in the core principles of gas dynamics, including compressibility effects, conservation laws, and ideal gas law. 2. Develop an understanding of different flow regimes in compressible fluids (subsonic, sonic, supersonic, and hypersonic) and their governing equations. 3. Develop an understanding of isentropic flow in a variable area ducts 4. Gain expertise in analyzing shock waves, their formation, properties, and impact on gas flow parameters (pressure, temperature, and velocity). 5. Understands the effect of oblique and expansion waves on the flow. 6. Develop an understanding of the effect of friction and heat addition/rejection on a compressible gas.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explain the fundamental concepts of gas dynamics, including compressibility effects, conservation laws, and the ideal gas law. 2. Distinguish between different flow regimes in compressible fluids (subsonic, sonic, supersonic, and hypersonic) and their characteristics. 3. Solve isentropic flow in a variable area duct such as converge and converge diverge nozzles. 4. Learn to calculate the fluid properties of a compressible gas after different shock types, such as (normal, oblique, and expansion waves) 5. Learn to evaluate the effect of shock waves occurrence on different applications such as supersonic wind, supersonic diffuser, and supersonic airfoils. 6. Evaluate the effect of friction on the flow of a compressible gas in a constant area duct. 7. Develop the ability to investigate the effect of heat on the flow of a compressible gas in a constant area duct analytically.

Indicative Contents المحتويات الإرشادية	**Indicative contents include the following:** **Classification of fluid flow**, Definition of compressible flow, Conservation of mass and momentum, First and second laws of Thermodynamic, Equation of state, Wave propagation, Speed of sound, Mach number, Form of pressure wave propagation, classification of compressible flow, Mach line and angle. Governing equations of Isentropic flow in a varying area duct, Stagnation concept, Isentropic relations, Variation of gas properties with varying area duct, Nozzle and Diffuser, Reference concept, Isentropic flow tables, Effect of upstream and downstream pressures in convergent nozzle, Effect of upstream and downstream. Pressures in convergent divergent nozzle, Chocking condition and mass flow rate, Performance of real nozzles, Thrust unit of Rocket engine.[11hrs] **Normal Shock:** Formation of normal shock waves, Governing equations, Gas properties variation across a normal shock, Stationary normal shockwave, Formation of normal shock waves, Governing equations, Gas properties variation across a normal shock, Normal shock tables. Stationary normal shock wave in convergent-divergent nozzle: Effect of pressure ratio on shock wave location. **Converging-diverging nozzle operation modes:** Determining the location of a normal shock wave in a C-D nozzle. **Moving normal shock wave:** Stationary and moving coordinates, Reflected normal shock, Explosive and pressure wave calculation.[10hrs] **Convergent-divergent supersonic diffusers:** Converging-Diverging supersonic diffuser, Design and off-Design diffuser operation mode, Supersonic wind tunnel, Design and off-Design operation modes, Supersonic wind tunnels types. [6hrs] **2D supersonic flow, Oblique Shock Wave:** Governing equations, Surface deflection, wave angle and Mach number relations, Detached shock wave, Oblique shock reflections, Conical shock waves, Supersonic diffuser types, Supersonic spike diffuser. **Expansion Waves, Prandtl-Meyer flow:** Governing equations, Maximum turning angle for Prandtl Meyer flow, Gradual expansions, Prandtl Meyer flow in smooth compression, Reflections of Prandtl Meyer fan. [6hrs] **Flow in constant area duct with friction:** Effect of friction on flow properties, Fanno line, **Working relations for Fanno flow:** Governing equations for adiabatic flow, **Performance of long ducts at variable pressure ratios:** Choking due to friction. Performance of adiabatic duct of constant area with isentropic nozzles, Performance of adiabatic duct at various pressure ratios.[8hrs] **Flow in ducts with heating or cooling**: Governing equations, Isothermal flow in long ducts, Governing equations. [6hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Deliver well-structured lectures that explain the core concepts of gas dynamics, including compressibility effects, conservation laws, and the ideal gas law. Utilize clear visuals like diagrams, animations, and real-world examples to enhance understanding. • Incorporate active learning activities within lectures. This could involve short quizzes, clicker questions, group discussions, or problem-solving exercises to solidify understanding and encourage student participation. • Provide students with a variety of problem-solving exercises, ranging from introductory to more challenging. This caters to different learning styles and allows students to build confidence as they progress. • Whenever possible, connect the theoretical concepts to real-world engineering applications of gas dynamics. • Incorporate regular quizzes and homework assignments to assess student understanding and identify areas needing improvement. Provide timely and constructive feedback to guide student learning. • Utilize well-designed midterm and final exams that test both theoretical knowledge and problem-solving abilities in gas dynamics.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	20% (20)	3, 6,9,12	All
	Assignments	2	10% (10)	5, 10	All
	Projects / Lab.	Lab. 4	10% (10)	Continuous	
	Report	-	-	-	-
Summative assessment	Midterm Exam	2 hrs.	10% (10)	7	All
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to compressible flow
Week 2	Wave propagation in compressible media
Week 3	Isentropic flow in a varying area duct
Week 4	Isentropic flow in a varying area duct
Week 5	Stationary normal shockwave
Week 6	Stationary normal shock wave in convergent-divergent nozzle
Week 7	Convergent-divergent supersonic diffusers
Week 8	Moving normal shock wave
Week 9	Steady two dimensional supersonic flow, Oblique Shock Wave
Week 10	Expansion Waves, Prandtl-Meyer flow
Week 11	Flow in constant area duct with friction
Week 12	Working relations for Fanno flow
Week 13	Performance of long ducts at variable pressure ratios
Week 14	Flow in ducts with heating or cooling
Week 15	Isothermal flow in long ducts
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Exp. 1: Blow-down of Pressurized Tank
Week 2	Exp. 2: Subsonic Compressible Flow in Variable Area Duct
Week 3	Exp. 3: Supersonic Compressible Flow in Variable Area Duct
Week 4	Exp. 4: Shockwave photography using Schlieren Technique
Week 5	Exp. 5:
Week 6	Exp. 6:
Week 7	Exp. 7:

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. James E. John & P. Theo G. Keith, " Gas Dynamics", 3rd Edition, Pearson Prentice Hall, 2006. 2. Robert D. Zucker & Oscar Biblarz,, "Fundamentals of Gas Dynamics", 2nd Edition, John Wiley & Sons, 2002.	Yes
Recommended Texts	منذر اسماعيل الدروبي، مبادئ ديناميك الغازات، بغداد، وزارة التعليم العالي والبحث العلمي،1980.	No
Websites		

	Ministry of Higher Education and Scientific Research - Iraq **Al-Turath University** **College of Engineering** **Department of Aircraft Engineering** Four years (Eight semesters) - 240 ECTS credits 1 ECTS = 25hr	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Theory of Flight نظرية طيران			**Module Delivery**	
Module Type	CORE			**Theory** **Tutorial**	
Module Code	THFL364				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	3		**Semester of Delivery**	6	
Administering Department	ME		**College**	ME	
Module Leader	Dr.		**e-mail**		
Module Leader's Acad. Title	Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Dr.		**e-mail**		
Review Committee Approval	01/12/2024		**Version Number**	2024	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	AERO353	**Semester**	5
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	This is an introduction to Aeronautics, especially in flight theory. Which lays down the foundations of all of the aeronautical engineering modules that follow in course. It includes: 1. Aircraft operations element, which creates the context against which the later design modules will have to be viewed by the student. 2. Flight mechanics component, an application of the fundamental laws of Newtonian mechanics to the flight of fixed wing aircraft and rotary wings, an essential basis upon which the later mechanics of flight, aerodynamics, propulsion and design modules will be built.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completion of the subject, students will be able to: 1. Design systems, components, or processes to meet desired needs including the aircraft wing aerodynamic forces and their management in cruising flight, aircraft maneuver stability for managing flying qualities, etc.; 2. Use the techniques, skills, and modern computational and information technology necessary for engineering practice (including definition of the combinations of aircraft aerodynamic features and propulsion methods for different cruising requirements, description of relationships between the performance prescriptions and the power and thrust requirements for steady flight); and 3. Function professionally in multidisciplinary teams related to aircraft performance and flight management.
Indicative Contents المحتويات الإرشادية	Lectures are used to deliver the fundamental knowledge in relation to various aspects of flight characteristics for aircraft as well as their influence in determining the aircraft performance for accelerated flight. Indicative content includes the following. <u>Part A – Flight theory</u> Power plant; Steady level turning; climb, glide; Range and Endurance; Take off and Landing. [35 hrs] <u>Part B - Aircraft Performance</u> Accelerated flight and rotary wings (introduction to helicopter). [27 hrs]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Develop the student's ability to understand aircraft theory and arrange knowledge related to aircraft mechanics from a correct and logical understanding and analysis of the various sciences related to aircraft, understanding hypotheses, and interpreting the performance of the aircraft physically, to obtain the initial knowledge necessary to understand the specialized topics in the field of aircraft mechanics engineering. Develop the student's ability and familiarize him with the pattern of exam questions and the arrangement and sequence of the solution in order to be able to correctly analyze the question and thus outline the appropriate solution sequence through method books, auxiliary books and theoretical lectures, in addition to solving exercises and getting used to the method of reaching the correct solution.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	20% (20)	3,5,9,11	All
	Assignments	2	10% (10)	4, 12	All
	Projects / Lab.	-	-	-	
	Report	1	10% (10)	13	All
Summative assessment	**Midterm Exam**	2 hrs.	10% (10)	7	All
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Review for the performance of level flight:** Aerodynamic forces on airplane. Steady level flight. Cruise flight. Holding flight. Performance curves in terms of thrust and power.
Week 2	**Power plant:** Analysis of propulsion. Power plant efficiency. Aircraft engines. Types of aircraft engines. Reciprocating engine, Otto cycle. Gas turbine engine, Brayton cycle. General thrust equation.
Week 3	**Steady level turning performance:** Turn radius. Rate of turn. Thrust in steady turn.
Week 4	**Design performance (Maneuvering flight):** Load factor. Structure limitation. v-n diagram.
Week 5	**Climbing and Drift-Down performance:** Climbing performance. Rate of climb. Steady rate of climb.
Week 6	**Acceleration in climb:** Energy concept. Energy height. Specific excess power. Specific excess power contours.
Week 7	**Gliding performance:** Gliding performance without power. Gliding decent performance.
Week 8	**Range and Endurance (piston a/c):** Derivation of range and endurance relationships. Specific fuel combustion.
Week 9	**Range and endurance (jet a/c):** Range and endurance jet airplanes. Range and endurance of propeller airplanes.

Week 10	**Take off and Landing:** Take off and Landing run way. Time for take off and Landing.
Week 11	**Aerodynamics of helicopter:** Airflow in forward flight. Lift- Drag.
Week 12	**Rotary – Wing aerodynamics:** Balance of forces. Relative wind. Rotational velocity. Airflow during hovering. Hovering.
Week 13	**Required and available power:** Required power. Available power. Change of thrust and power with altitude and airspeed.
Week 14	**Flight range:** Forward flight. Max. forward speed. Range.
Week 15	**Range of climbing:** Maneuvering flight. Best range of climb airspeed. **Flight ceiling:** Max. endurance airspeed. Best-rate-of-climb airspeed. Optimum airspeed. Minimum power required. Maximum forward airspeed. Specific excess power.
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Exp. 1:
Week 2	Exp. 2:
Week 3	Exp. 3:
Week 4	Exp. 4:
Week 5	Exp. 5:
Week 6	Exp. 6:

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	John D. Anderson, "Introduction to Flight", McGraw-Hill, 7th Edition, 2012.	Yes
Recommended Texts	W. A. Mair, and D. L. Birdsall, "Aircraft Performance", Cambridge University Press, 2003.	Yes
Websites		

	Ministry of Higher Education and Scientific Research - Iraq **Al-Turath University** **College of Engineering** **Department of Aircraft Engineering** Four years (Eight semesters) - 240 ECTS credits 1 ECTS = 25hr	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Aircraft Engines III III محركات الطائرات			**Module Delivery**	
Module Type	CORE			**Theory** **Tutorial**	
Module Code	AIEN365				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	3		**Semester of Delivery**	6	
Administering Department	ME		**College**	ME	
Module Leader	Dr.		**e-mail**		
Module Leader's Acad. Title	Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Dr.		**e-mail**		
Review Committee Approval	01/12/2024		**Version Number**	2024	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	AIEN355	**Semester**	5
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Develop a comprehensive understanding of the fundamental thermodynamic, aerodynamic, and mechanical principles that govern aircraft engine operation. 2. Gain in-depth knowledge of different aircraft engine types (piston, turboprop, turbofan, jet) along with their specialized applications in various aircraft categories. 3. Master the ability to analyze and predict engine performance metrics. 4. Investigate the intricacies of key aircraft engine components.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explain the fundamental thermodynamic cycle principles governing aircraft engine operation and engine performance. 2. Distinguish between different types of aircraft engines (piston, turboprop, turbofan, jet) and their suitability for various applications. 3. Understand the effect of compressibility and the principle behind the flow momentum through rotors. 4. Understand the mechanical design of engine main parts including compressors (axial and centrifugal), combustion chambers, axial turbine, Nozzles and Air-intakes. 5. Describe the function and interrelationships of key engine components like compressors, combustors, turbines, and exhaust systems. 6. Explain the principles behind advanced engine technologies like afterburners and thrust vectoring and materials and manufacturing
Indicative Contents المحتويات الإرشادية	Part A **Introduction:** Classification of Propulsion Systems, The Thrust Equation. **Engine Performance:** Engine Performance and A/C Range. **Theory of Jet Propulsion:** Turbo Jet Engine, Turbo Fan Engine, Turbo Prop Engine, Turbo Shaft Engine, Ram Jet Engine. [16hrs] **Design of Axial and Centrifugal flow Compressors:** Compressor Aerodynamics, Repeating Stage and Repeating Raw, Mean Line Design. Axial Variation, Radial Variation, Mechanical Design. **Compressor's Technology:** Materials and Manufacturing Technology. [13hrs] **Compressor Air Flow Control:** Low Speed Stall, Change of Duct Characteristics, Change of Compressor Characteristics, **Design of Combustion System:** The Processes (Ignition, Stability, Length Scaling,

	Diffusers), After Burner Design,Flame Holding, Fuel Injection. **Combustion Chambers Technology:** Materials and Manufacturing Technology. [13hrs] Part B **Design of Axial Flow Turbines:** Turbine Aerodynamics, Zero Exit Swirl, Constant Axial Velocity, Mean Line Stage Design, Other Design Considerations. **Mechanical Design of Axial Flow Turbines:** Rotor Blade Centrifugal Stresses, Rim Web Thickness, Disc of Uniform Stresses, Disc Thermal Stresses, Airfoil Aspect Ratio. **Turbines Technology:** Materials and Manufacturing Technology, Balancing. [8hrs]. **Design and Technology of Air Intakes and Nozzles:** **Inlet Design:** Subsonic Inlets, Supersonic Inlets. **Design of nozzles:** Convergent Nozzle, Convergent- Divergent Nozzle, Thrust Reversing and Thrust Vectoring, Nozzle Coefficients. **Inlets and Nozzles Technology:** Materials & Manufacturing Technology. **Accessory Drives and Engine Control Systems:** Construction of Gearboxes and Drives, Engine/Airframe Interfaces, Control Systems. [12hrs]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Deliver well-structured lectures that explain classification of aero-engines performance, the thermodynamic cycles, flow through turbomachines and the design of engine main parts including intakes, compressor, combustion chamber, turbine, and nozzle. Utilize clear visuals like diagrams, animations, and real-world examples to enhance understanding. • Incorporate active learning activities within lectures. This could involve short quizzes, interactive questions, group discussions, or problem-solving exercises to solidify understanding and encourage student participation. • Provide students with a variety of problem-solving exercises, ranging from introductory to more challenging. This caters to different learning styles and allows students to build confidence as they progress. • Whenever possible, connect the theoretical concepts to real-world engineering applications of gas dynamics. • Incorporate regular quizzes and homework assignments to assess student understanding and identify areas needing improvement. Provide timely and constructive feedback to guide student learning. • Utilize well-designed midterm and final exams that test both theoretical knowledge and problem-solving abilities in aircraft engines.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	20% (20)	3,5,9,11	All
	Assignments	2	10% (10)	4, 10	All
	Projects / Lab.	-	-	-	
	Report	1	10% (10)	13	All
Summative assessment	**Midterm Exam**	2 hrs.	10% (10)	7	All
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Introduction**
Week 2	**Engine Performance**
Week 3	**Theory of Jet Propulsion**
Week 4	**Theory of Jet Propulsion**
Week 5	**Design of Axial and Centrifugal flow Compressors**
Week 6	**Design of Axial and Centrifugal flow Compressors**
Week 7	**Design of Axial and Centrifugal flow Compressors**
Week 8	**Compressor Air Flow Control**
Week 9	**Design of Combustion System**
Week 10	**Design of Combustion System**
Week 11	**Design of Axial Flow Turbines**
Week 12	**Mechanical Design of Axial Flow Turbines**

Week 13	**Design and Technology of Air Intakes and Nozzles.**
Week 14	**Design and Technology of Air Intakes and Nozzles.**
Week 15	**Accessory Drives and Engine Control Systems**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Exp. 1:
Week 2	Exp. 2:
Week 3	Exp. 3:
Week 4	Exp. 4:
Week 5	Exp. 5:
Week 6	Exp. 6:
Week 7	Exp. 7:

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. H.I.H. Saravanamnttoo, et al. "Gas Turbine Theory" 7th edition, Pearson Eduction Limited, 2017. 2. S.L. Dixon and C.A. Hall, "Fluid Mechanics and Thermodynamics of Turbomachinery".7th edition, Butterworth-Heinemann, Elsever, 2014.	Yes
Recommended Texts	1. Philip G. Hill, Carl R. Peterson "Mechanics and thermodynamics of propulsion".	No
Websites		

	Ministry of Higher Education and Scientific Research - Iraq **Al-Turath University** **College of Engineering** **Department of Aircraft Engineering** Four years (Eight semesters) - 240 ECTS credits 1 ECTS = 25hr	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	Applications of Numerical Analysis تطبيقات التحليلات العددية	**Module Delivery**	
Module Type	CORE	**Theory** **Lab.**	
Module Code	APNA366		
ECTS Credits	4		
SWL (hr/sem)	100		

Module Level	3	**Semester of Delivery**	6
Administering Department	GME	**College**	ME
Module Leader	Dr.	**e-mail**	
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	Dr.	**e-mail**	
Review Committee Approval		**Version Number**	

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	ENNA241	**Semester**	4
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	• Understand and apply fundamental concepts of numerical algebra and nonlinear solvers. • Implement and analyze root-finding methods including the Secant Method, False Position Method, and Bairstow's Method. • Solve systems of nonlinear algebraic equations using numerical techniques. • Perform interpolation techniques, including spline and two-dimensional interpolation, for data estimation. • Apply curve fitting methods, such as multiple linear regression and nonlinear regression, to model data sets. • Use finite difference methods to numerically solve ordinary and partial differential equations. • Evaluate the accuracy and stability of numerical methods and understand their applicability to engineering problems. • Develop computational skills to implement numerical algorithms using appropriate software tools.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Knowledge and Understanding: • Understand and use numerical analysis concepts and relationships • Select and apply skills in numeracy. • Use numerical analysis reasoning skills to interpret information, select a strategy to solve a problem, and communicate solutions. • Use of finite difference methods for solving. Subject-specific skills: • Broad, generic skills through this Course. • Skills for Learning, and drawn from the main skills areas listed below. • Skills for Life • and Skills for Work.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: • Review of fundamental numerical methods [2 hrs] • Solutions of Non -Linear Equations [3 hrs] • Solutions of Set of Algebraic Equations[3 hrs] • Interpolation techniques, including: [3 hrs] ▪ Spline interpolation ▪ Two-dimensional interpolation • Curve fitting techniques, including: [4 hrs] ▪ Multiple linear regression ▪ Nonlinear regression • Use of finite difference methods for solving: [6 hrs] ▪ Ordinary Differential Equations (ODEs)

	▪ Partial Differential Equations (PDEs) • Applications and case studies [16 hrs]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	All lectures reflect the higher values, purposes and principles. They offer flexibility, provide more time for learning, focus on skills and applying to learn, and scope for personalization and choice. In this Course, and its component Units, there will be an emphasis on skills development and the application of those skills. Assessment approaches will be proportionate, fit for purpose and will promote best practices, enabling learners to achieve the highest standards they can. This course provides learners with opportunities to continue to acquire and develop the attributes and capabilities, as well as skills for learning, skills for life and skills for work.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	20% (20)	3,5,8,10	All
	Assignments	2	10% (10)	4, 15	All
	Projects / Lab.	4	10% (10)	Continuous	All
	Report	-	-	-	-
Summative assessment	**Midterm Exam**	2 hrs.	10% (10)	8	All
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Solutions of Non-Linear Equations** • Introduction to Nonlinear Solvers Methods • Secant Method
Week 2	• False Position Method • Bairstow's Method
Weeks 3&4	**Solutions of Set of Algebraic Equations** • Review of Linear Simultaneous Algebraic Equations • Solution of Nonlinear Simultaneous Algebraic Equations
Weeks 5&6	**Interpolation** • Spline Interpolation • Two-Dimensional Interpolation
Week 7	**Curves Fitting** • Multiple Linear Regression
Week 8	• Non-Linear Regression
Week 9	**Finite Differences method for solution of differential Equations** • Introduction • The Ordinary Differential Equations
Weeks 10&11	• Partial Differential Equations • Finite Differences Approximation to Partial Derivatives • Partial Difference Equations
Weeks 12-15	• **Applications and case studies**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Applications and case studies
Week 2	Applications and case studies
Week 3	Applications and case studies
Week 4	Applications and case studies
Week 5	Applications and case studies
Week 6	Applications and case studies

Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	**Applied Numerical and Engineering Analysis**, Hassan Majeed & Mahmoud Attallah, 2016.	Yes
Recommended Texts	**Numerical Linear Algebra**, Trefethen & Bau.	No
Websites	-	

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.