	Ministry of Higher Education and Scientific Research - Iraq University of Warith Al_Anbiyaa Engineering Department Refrigeration and Air Conditioning Techniques Engineering	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Computer Applications 1**			**Module Delivery**	
Module Type	**S**			☐ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MPAC207**				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level	2		**Semester of Delivery**	2	
Administering Department	Refrigeration and Air Conditioning Techniques		**College**	Engineering	
Module Leader	NoorUlhuda Salam Ahmed		**e-mail**	nooralhuda.salam@uowa.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	M.SC	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Name		**e-mail**	None	
Scientific Committee Approval Date	15 / 10/2024		**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	To make the student able to process, program, and solve arithmetic and engineering problems using Matlab
Module Learning Outcomes	1. To apply the knowledge about Matlab. 2. To enable students solve scientific and mathematical problems, write codes, design projects and process images.
Indicative Contents	

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem)	88	**Structured SWL (h/w)**	6
Unstructured SWL (h/sem)	13	**Unstructured SWL (h/w)**	6
Total SWL (h/sem)	75		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	20% (20)	3,5,6,10	LO #1,2,…..10
	Assignments	2	10% (10)	7, 8	LO # 8
	Seminar	1	10% (10)	11	LO # 11
Summative assessment	**Midterm Exam**	2 hr	10% (10)	12	LO # 1-12
	Final Exam	3hr	50% (50)	16	All

Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري محتوى كل اسبوع يجب ان يغطي الوقت المحدد

	Material Covered
Week 1	Introduction to Matlab
Week 2	Mathematical Functions
Week 3	Vectors & Matrices
Week 4	Vectors & Matrices
Week 5	Introduction to Programming in MATLAB
Week 6	Control flow
Week 7	Control flow
Week 8	Debugging
Week 9	Mathematical Equations
Week 10	Graph Plot
Week 11	GUI
Week 12	GUI
Week 13	Image Processing
Week 14	Simulink
Week 15	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Introduction to Matlab and Mathematical Functions
Week 2	Lab 2: Vectors & Matrices
Week 3	Lab 3: Control flow
Week 4	Lab 4: Mathematical Equations
Week 5	Lab 5: GUI
Week 6	Lab 6: Image Processing
Week 7	Lab 7: Simulink

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Recommended Texts (Website)	https://www.mathworks.com/products/matlab.html	

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	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks 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.

	Ministry of Higher Education and Scientific Research - Iraq University of Warith Al_Anbiyaa Engineering Department Refrigeration and Air Conditioning Techniques Engineering	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mechanical Drawing**			**Module Delivery**	
Module Type	**C**			☐ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MPAC201				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	2		**Semester of Delivery**	1	
Administering Department	Refrigeration and Air Conditioning Techniques		**College**	Engineering	
Module Leader	Ali Hammoudi Alwazir		**e-mail**	ali.ham@uowa.edu.iq	
Module Leader's Acad. Title	lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Salma Mahmood Mezhar		**e-mail**	Salma.mahmood@uowa.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	15 / 10/2024		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		**Semester**	
Co-requisites module		**Semester**	
Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية			
Module Aims	To teach the student, 1. the basic skill of reading engineering drawing along with their simples and terms as well as the standards 2. . joining, bolts and gears, knowledge of assembly drawings 3. how to use ACD in mechanical drawing 4. fits and tolerances		
Module Learning Outcomes	Upon completion of the course, students should be able to: 1- Focus on engineering drawing along with their simples and terms as well as the standards 2- joining, bolts and gears, knowledge of assembly drawings. 3- how to use ACD in mechanical drawing 4- fits and tolerances.		
Indicative Contents	Indicative content includes the following. Application on computer, basic of engineering drawing with their simples and terms as well as their standards.[12hrs] using AutoCAD to draw an example of joining by bolts. [10 hrs] Classification of keys, pins and rivets. [10hrs] Application on computer, using AutoCAD to draw an example of joining of keys or pins. [10 hrs] Tolerances, basic size, limits of size and deviation. [10 hrs] Fits , classes of fit/ clearance. Transition. Interference. Calculation of fits & tolerance. [15 hrs] Assembly drawing using AutoCAD to draw general assembly. [10hrs]		

	Application on computer, using AutoCAD to draw an example of spur gear. [10 hrs]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem)	87	**Structured SWL (h/w)**	8
Unstructured SWL (h/sem)	113	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	200		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus) theoretical and practical
المنهاج الاسبوعي النظري والعملي محتوى كل اسبوع يجب ان يغطي الوقت المحدد

	Material Covered
Week 1	Symbols, expressions, general review
Week 2	Screws, bolts, studs and nuts, Keys.
Week 3	Screws, bolts, studs and nuts, Keys.
Week 4	pulleys
Week 5	Gears(bevel gear, warm gear, spur gear)
Week 6	Fit and tolerance
Week 7	Surface finishing and part tables
Week 8	Surface finishing and part tables

Week 9	Assembly drawing and working drawing for advanced mechanisms
Week 10	Assembly drawing and working drawing for advanced mechanisms
Week 11	Pipes and tubes
Week 12	Pipes and tubes
Week 13	Gears assembly
Week 14	Advanced machine assembly
Week 15	Advanced machine assembly

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Recommended Texts	➢ AutoCAD reference book	Yes

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	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks 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.

	Ministry of Higher Education and Scientific Research - Iraq University of Warith Al_Anbiyaa Engineering Department Refrigeration and Air Conditioning Techniques Engineering	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	English 2			**Module Delivery**	
Module Type	S			☒ **Theory** ☐ **Lecture** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MPAC208				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level	2		**Semester of Delivery**	**2**	
Administering Department	BSc-MPAC		**College**	**Engineering**	
Module Leader	**Zainab Abd El Karim**		**e-mail**	zainab.abdelkarim@uowa.edu.iq	
Module Leader's Acad. Title	**Lecturer. Assist**		**Module Leader's Qualification**	**M.Sc**	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	15 / 10/2024		**Version Number**	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MPAC104	**Semester**	L1,S1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	The goal is to study English language and gain knowledge of it as benefit engineers in general, and to develop speaking skills and understand its basic rules taking the way to the acquisition of the ability to use technical key words in their work and the capability of communicating with other engineers correctly
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Developing speaking skills and understanding its basic rules to take the way to the acquisition of the ability to use technical keywords in their work and the capability of communicating with other engineers correctly .
Indicative Contents المحتويات الإرشادية	Through the prepared syllabus, the student acquires the ability to understand grammar English language through weekly lectures and classes in a gradual and sequential manner for a period of four years, starting from the first stage, such as interrogative, negative, formation of sentences, parts of speech, and others.

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	44	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	6	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6

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**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	20% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Revision, vocabulary and comprehension
Week 2	Present continuous, comparative and superlative adjective, vocabulary.
Week 3	Time clauses, this and that, vocabulary and comprehension.
Week 4	If clauses, vocabulary and comprehension
Week 5	This and that, expletive there, prepositions
Week 6	Past perfect, past perfect continuous , vocabulary and comprehension
Week 7	Relative pronouns, relative clauses
Week 8	Past perfect, Past perfect continuous, vocabulary and comprehension
Week 9	Used to, Infinitives, passive voice
Week 10	Passive voice, coordinating conjunctions, subordinating conjunction
Week 11	Future perfect, future perfect continuous, vocabulary and comprehension
Week 12	Writing a composition, comprehension
Week 13	Technical English (1), Keywords, English use
Week 14	**Revision**
Week 15	**Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Headway plus for pre intermediate	Yes
Recommended Texts	Any Grammar and comprehension for technical learning	No
Websites		

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	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks 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.

	Ministry of Higher Education and Scientific Research - Iraq University of Warith Al_Anbiyaa Engineering Department Refrigeration and Air Conditioning Techniques Engineering	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Fundamentals of Air Conditioning and Refrigeration**			**Module Delivery**	
Module Type	**C**			☐ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MPAC205**				
ECTS Credits	**13**				
SWL (hr/sem)	**300**				
Module Level	2		**Semester of Delivery**	2	
Administering Department	Refrigeration and Air Conditioning Techniques		**College**	Engineering	
Module Leader	Mohammed Hassan Abbood		**e-mail**	mohammed.hassan@mtu.edu.iq	
Module Leader's Acad. Title	Ass. Prof.Dr		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	15 / 10/2024		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MPAC108	**Semester**	L1, S2
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Introduce the student to the basic processes of refrigeration and conditioning 2. Identifying the properties of air and the processes that take place on the moisture content of air. 3. Learn about the different cooling media and how to use their tables and curves. 4. Learn about the refrigeration compression system and its accessories
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- The student will be able to complete basic operations calculations on the content of moisture air content 2- The student will be able to determine the internal and external conditions for the design of the air conditioning system according to the conditions of human comfort. 3- The student will be able to complete all the operations of the compression refrigeration system, its components and accessories.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – Air Conditioning The basic properties of a mixture of air and water vapor: components of atmospheric air, general equation of gases, Dalton's law of partial pressures, saturated vapor pressure, water vapor pressure in moist air, relative humidity, moisture content, humidification percentage, dew point, enthalpy, The psychometric scheme and adaptation processes: a general explanation of the psychometric chart and the basis for its construction. [15 hrs] Sensible cooling, sensible heating, dehumidification, humidification by water injection, adiabatic humidification, humidification efficiency, humidification by constant wet bulb temperature, contact factor, and bypass factor. [15 hrs]

	Humidification by steam injection, adiabatic air mixing, cooling, and dehumidification with reheating, preheating with humidification and reheat. [10 hrs] Air mixing and adiabatic humidification with reheating, summer cycle and winter cycle, practical applications for the case of summer, and practical applications for the case of winter. [15 hrs] Selection of supplied air conditions: removal of sensible heat, specific heat capacity of moisture air, removal of latent heat, inclination of the sensible heat ratio line, heat generated by fan motors, waste reheating, selection of appropriate air supply conditions [6 hrs] Part B – Refrigeration cycle Fundamentals Refrigerants, types of old and modern refrigerants, side effects of refrigerants on the ozone layer and global warming, secondary refrigerants, concept of refrigeration: uses of refrigeration and refrigeration methods, second law of thermodynamics, heat pump, reverse Carnot cycle, simple vapor compression cycle, simple vapor compression cycle parts.. [15 hrs] Mathematical analysis of the simple vapor compression cycle, the factors affecting the performance parameter of the vapor compression cycle (the impact of suction temperature, the impact of condensation temperature, the impact of sub-cooling, the impact of superheating, and the impact of pressure losses). Theoretical vapor compression cycle and its comparison with the real one, Improving the vapor compression cycle, Using flash tank, Supercooling of refrigerant.. [7 hrs] Multistage compression: flash gas removal, intercooler, one evaporator and one compressor, two evaporators and one compressor, two compressors and one evaporator. multi-stage compression: two compressors and evaporators, multi-stage compression with several types of inter-cooling (water intercooler, liquid flash intercooler, flash gas intercooler) [15 hrs] Vapor Compression refrigeration cycle components: compressors type, positive displacement compressors, reciprocating compressors, volumetric efficiency, mechanical efficiency, rotary compressors, screw compressors, scroll compressors,

	centrifugal compressors. Condensers, evaporators, and cooling towers Expansion tools, accessories for vapor compressor cooling system. [15 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	144	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	10
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	206	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	11
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	350		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	The basic properties of a mixture of air and water vapor: components of atmospheric air, general equation of gases, Dalton's law of partial pressures, saturated vapor pressure, water vapor pressure in moist air, relative humidity, moisture content, humidification percentage,

	dew point, enthalpy, The psychometric scheme and adaptation processes: a general explanation of the psychometric chart and the basis for its construction
Week 2	Sensible cooling, sensible heating, dehumidification, humidification by water injection, adiabatic humidification, humidification efficiency, humidification by constant wet bulb temperature, contact factor, and bypass factor.
Week 3	Humidification by steam injection, adiabatic air mixing, cooling and dehumidification with reheating, preheating with humidification and reheat.
Week 4	Air mixing and adiabatic humidification with reheating, summer cycle and winter cycle, practical applications for the case of summer, and practical applications for the case of winter.
Week 5	Comfort and internal conditions: Metabolism and human comfort, body mechanics in heat transfer and thermoregulation, metabolic rate, clothing, the effect of the environment on human comfort, other factors affecting human comfort, and selection of internal conditions.
Week 6	Climate and external conditions: climate, wind, local winds, dew formation, seasonal temperature change, seasonal humidity change, meteorological measurements, seasonal change of the psychometric condition of the external outdoor conditions, selection of external conditions (the three methods).
Week 7	Selection of supplied air conditions: removal of sensible heat, specific heat capacity of moisture air, removal of latent heat, inclination of the sensible heat ratio line, heat generated by fan motors, waste reheating, selection of appropriate air supply conditions
Week 8	Refrigerants, types of old and modern refrigerants, side effects of refrigerants on the ozone layer and global warming, secondary refrigerants, concept of refrigeration: uses of refrigeration and refrigeration methods, second law of thermodynamics, heat pump, reverse Carnot cycle, simple vapor compression cycle, simple vapor compression cycle parts.
Week 9	Mathematical analysis of the simple vapor compression cycle, the factors affecting the performance parameter of the vapor compression cycle (the impact of suction temperature, the impact of condensation temperature, the impact of sub-cooling, the impact of superheating, and the impact of pressure losses).
Week 10	Theoretical vapor compression cycle and its comparison with the real one, Improving the vapor compression cycle, Using flash tank, Supercooling of refrigerant.
Week 11	Multistage compression: flash gas removal, intercooler, one evaporator and one compressor, two evaporators and one compressor, two compressors and one evaporator.
Week 12	Multi-stage compression: two compressors and evaporators, multi-stage compression with several types of intercooling (water intercooler, liquid flash intercooler, flash gas intercooler)
Week 13	Vapor Compression refrigeration cycle components: compressors type, positive displacement compressors, reciprocating compressors, volumetric efficiency, mechanical

	efficiency, rotary compressors, screw compressors, scroll compressors, centrifugal compressors.
Week 14	Condensers, evaporators, and cooling towers
Week 15	Expansion tools, accessories for vapor compressor cooling system.
Week 16	**The preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Air velocity measuring devices - measuring air velocity using a Petot tube and a manometer.
Week 2	Applications to the air properties Psychometric Chart.
Week 3	Sensible cooling
Week 4	Sensible heating
Week 5	Dehumidification process
Week 6	Air Humidification by Direct Injection of Water Drops
Week 7	Humidify the air with a jet of steam
Week 8	Air mixing process
Week 9	Cooling and dehumidifying with reheating
Week 10	Preheating, cooling and dehumidifying with reheating
Week 11	Mixing and adiabatic saturation with reheating
Week 12	Theoretical calculations for compressor performance
Week 13	Condenser calculations for vapor compression cycle
Week 14	Calculations of capacity and performance factor for vapor compression cycle
Week 15	Calculations of the coefficient of performance for the real vapor compression cycle

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	***Jan F. Kreider, Peter S. Curtiss " Heating and cooling of Building" Mc Graw Hill, 2000*** ***ASHRAE, Fundamental . 1997.***	Yes

Recommended Texts	***Sapali, S.N., 2009."Refrigeration and air conditioning". PHI Learning Pvt. Ltd.***	No
Websites		

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	راسب (قيد المعالجة)	(45-49)	More work is required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks 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.

	Ministry of Higher Education and Scientific Research - Iraq University of Warith Al_Anbiyaa Engineering Department Refrigeration and Air Conditioning Techniques Engineering	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Ba'th regeem crimes**			**Module Delivery**	
Module Type	**S**			☐ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MPAC204**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	2		**Semester of Delivery**	2	
Administering Department	Refrigeration and Air Conditioning Techniques		**College**	Engineering	
Module Leader	Musa Ali		**e-mail**	mousa.ali@uowa.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	M.SC	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	15-10-2024		**Version Number**		
Relation With Other Modules العالقة مع المواد الدراسية ألخرى					
Prerequisite module	None		**Semester**		

Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات اإلرشادية

Module Aims أهداف المادة الدراسية	تعريف الطلبة باهم جرائم نظام البعث في العراق التصدي للحملة الممنهجة التي تهدف الى التمجيد بنظام البعث المجرم وتلميع صورته. تسليط الضوء على انتهاكات البعث لحقوق الانسان. بيان حقاق الجرائم المرتكبة من قبل النظام البائد.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	دراسة اهم الجرائم المرتكبة من قبل نظام البعث - الكشف عن طبيعة النظام البعثي المجرم. - التركيز على الاليات المتبعة في ارتكاب الجرائم. -توضيح اثار جرائم النظام البائد على المجتمع العراقي
Indicative Contents المحتويات اإلرشادية	المحتويات اإلرشادية تتضمن ما يلي :- 1. مفهوم حقوق اإلنسان وخصائصه وفئاته .(2 ساعة) 2. حقوق اإلنسان في التاريخ والتراث اإلنساني (2 ساعة) 3. حقوق اإلنسان في ألديان السماوية و الحقوق المدنية(2 ساعة) 4. حظر اسلحة الدمار الشامل (2 ساعة) 5. الحقوق السياسية واالقتصادية واالجتماعية والثقافية(2 ساعة) 6. االنتخابات وحقوق اإلنسان(2 ساعة) 7. االعتراف الدولي بحقوق اإلنسان و المصادر القانونية لحقوق اإلنسان 8. المنظمات غير الحكومية ودورها في الدفاع عن حقوق اإلنسان(2 ساعة) 9. الديمقراطية وألنظمة السياسية (2 ساعة) 10.الديمقراطية في الحضارة اإلغريقية ومقارنتها بالديمقراطية الحديثة (2 ساعة) 11.مفاهيم عن الديمقراطية (2 ساعة) 12.أنواع الديمقراطية (2 ساعة) 13.العالقة بين حقوق االنسان والديمقراطية (2 ساعة) 14.ضمانات الحريات العامة (2 ساعة) 15.مراجعة عامة

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	يتم إعطاء المحاضرات بشكل القاء مباشر بالاضافة إلى مشاهدة مادة صورية أو فلمية مساعدة.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خالل الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خالل الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خالل 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**	1.5 hr	10% (10)	7	LO #1 - 5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج االسبوعي النظري

	Material Covered
Week 1	مقدمة في جرائم نظام البعث
Week 2	مفهوم الجرائم
Week 3	اقسام الجرائم
Week 4	الجريمة لغة واصطلاحًا
Week 5	أنواع الجرائم الدولية
Week 6	المحكمة الجنائية العليا
Week 7	اهم قرارات المحكمة الجنائية العليا
Week 8	الجرائم الاجتماعية والنفسية والبيئية
Week 9	اليات الجرائم النفسية والاجتماعية والبيئية
Week 10	اثار جرائم البعث المقبور

Week 11	انتهاك النظام البعثي للقوانين العراقية
Week 12	صور انتهاكات البعث لحقوق الانسان
Week 13	احداث الانتفاضة الشعبانية
Week 14	المقابر الجماعية
Week 15	احداث 1963-2003
Week 16	أسبوع تحضيري قبل االمتحان النهائي

Delivery Plan (Weekly Lab. Syllabus)
المنهاج السبوعي 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	جرائم نظام البعث في العراق/ اعداد لجنة مختصة في وزارة التعليم العالي والبحث العلمي	Yes
Recommended Texts	١- ارشيف مؤسسة السجناء السياسيين ٢- ارشيف مؤسسة الشهداء ٣- ارشيف المركز العراقي لتوثيق جرائم التطرف في العتبة العباسية المقدسة ٤- سليم مطر / موسوعة البيئة العراقية ٥- حضارة وادي الرافدين رائد عبيس ود .عباس عطية / تقارير الامم المتحدة في ادانة نظام البعث	Yes

	بانتهاكات حقوق الانسان للمدة من 1991 م- 2003م ... . ومصادر اخرى	
Websites	- اية مواقع الكترونية	

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.

	Ministry of Higher Education and Scientific Research - Iraq University of Warith Al_Anbiyaa Engineering Department Refrigeration and Air Conditioning Techniques Engineering	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Thermodynamics 2			**Module Delivery**	
Module Type	C			☐ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	MPAC203				
ECTS Credits	10				
SWL (hr/sem)	250				
Module Level	2		**Semester of Delivery**	TCB	
Administering Department	Refrigeration and Air Conditioning Techniques		**College**	Engineering	
Module Leader	Amin Sami Amin		**e-mail**	aminsami2000@yahoo.com	
Module Leader's Acad. Title	Asst.Lecturer		**Module Leader's Qualification**	M.Sc	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	15 / 10 /2024		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MPAC108	**Semester**	L1,S1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	To study the principles of applied thermodynamics, as the basis of refrigeration & air conditioning engineering and power plant subjects
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. To know the type of steam power plants 2. To know the regenerative cycle – dual cycle, High speed gas flow 3. To know the properties of isentropic flows, Shock waves 4. To know the supersonic nozzles, single and multi-stage reciprocating compressors 5. To know the multistage gas turbines and velocity triangles 6. To know the steam turbines. Internal combustion engines, Thermodynamics relations 7. To know the Maxwell relations, Clausius Clapyron relations 8. To know the gas mixtures, Gibbs- equations 9. To know the gravimetric analysis, Combustion, heat of reaction.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – Steam Power Plans Regenerative cycle – dual cycle, High speed gas flow. [24 hrs.] Part B – Gas Flow Isentropic flows, shock waves, supersonic nozzles. [16 hrs.] Part C – Compressors and Turbines Single and multi-stage reciprocating compressors, multistage gas turbines, velocity triangles, steam turbines, internal combustion engines. [32 hrs.] Part D – Thermodynamics Relations

	Maxwell relations, Clausius Clapeyron relations, gas mixtures, Gibbs-equations. [48 hrs.]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Assessment is based on hand-in assignment, written exams, case study, quizzes, seminars and practical testing.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	158	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	11
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	92	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	10
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	250		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	5	5 % (5)	2,5,8,10,13	LO # 1, 4, 5, 7,8
	Assignments	5	5 % (5)	1,4,7,11,15	LO # 1-15
	Lab.	10	10 % (10)	1-9	LO # 1-15
	Report	10	10 % (10)	1-8	LO # 1-15
Summative assessment	**Midterm Exam**	3 hr.	20 % (20)	9	LO # 1-15
	Final Exam	3 hr.	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	An overview of steam, dryness fraction measurements
Week 2	Steam power plants, Rankine - reheat cycle
Week 3	Regenerative cycle – dual cycle, High speed gas flow
Week 4	Properties of isentropic flows, Shock waves

Week 5	Supersonic nozzles, Reciprocating compressors
Week 6	Dynamic analysis, Clearance volume
Week 7	Multistage compressors, Gas turbines
Week 8	Velocity triangles, frictional effects, Gas turbines comparison
Week 9	Steam turbines. Internal combustion engines, Thermodynamics relations
Week 10	Maxwell relations, Clausius Clapeyron relations
Week 11	Thermodynamic relations for du, dh, ds, Cp and Cv, Real gases
Week 12	Compressibility factors, Real gas equations of states
Week 13	Gas mixtures, Gibbs- equations
Week 14	Daltons law and molar ratio, Volumetric analysis
Week 15	Gravimetric analysis, Combustion, heat of reaction

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Measurement of specific heat ratio of air
Week 2	Operating parameters of VCR
Week 3	Saturated vapor pressure and temperature relation
Week 4	Steam boiler efficiency
Week 5	Determination the phase of the refrigerant for VCR system components
Week 6	Vapor dryness fraction measurement
Week 7	Determination the latent heat of evaporation
Week 8	Determination of thermal efficiency for VCR cycle
Week 9	EES software training

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	1. Borgnakke, C. and Sonntag, R.E., 2022. *Fundamentals of thermodynamics*. John Wiley & Sons. 2. Cengel, Y.A., Boles, M.A. and Kanoğlu, M., 2011. *Thermodynamics: an engineering*	No

	approach (Vol. 5, p. 445). New York: McGraw-hill. 3. Rajput, R.K., 2005. *A textbook of engineering thermodynamics*. Laxmi Publications.	

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	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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	Ministry of Higher Education and Scientific Research - Iraq University of Warith Al_Anbiyaa Engineering Department Refrigeration and Air Conditioning Techniques Engineering	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Advanced Mathematics			**Module Delivery**	
Module Type	S			☒ Theory ☐ Lecture ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	MPAC200				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	2		**Semester of Delivery**	1	
Administering Department	Refrigeration and Air Conditioning Techniques		**College**	Engineering	
Module Leader	Mohammad Mohsen Jasim		**e-mail**	mooderm042@gmail.com	
Module Leader's Acad. Title	Assistant lecture		**Module Leader's Qualification**	M.Sc	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	15 / 10/2024		**Version Number**	1	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MPAC100	**Semester**	L1,S1
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The aim of this module are : 1. To introduce students to the mathematical concepts and techniques that They will encounter in the various engineering. 2. To develop an awareness of the role of mathematics in the solution of Engineering problems. 3. Solve problems involving differentiation and integration. 4. Solve system of linear equations using matrix method. 5. Apply vector methods to the solution of geometric problems. 6. Uses differential equations in problems of heat transfer and other Engineering systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Apply basic operation in vector algebra(cartesian and geometric representation) to represent lines and planes, calculate the gradient of a scalar field using partial derivatives. 2. Apply the basic rules and techniques of **differential** calculus and its application in engineering. 3. Apply the basic rules and techniques of **integral** calculus and its application in engineering. 4. Demonstrate the basics, rules and techniques for differential equation and partial differentiation. 5. Demonstrate the basics, rules and techniques of complex number algebra and its application in engineering. 6. Use basic operations of matrix algebra, determinants and their application in solving systems of linear equations. 7. Use of software packages for matrix calculations.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Differential and integral calculus of functions of two or more variables and Their applications. Vectors in 3D and their applications, line and surface

	Integrals, infinite and power series ,matrices , functions of complex variables.

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Class activities , homework, quizzes, online testing , written exam .

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	102	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	48	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
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	15%(15)	3,6,9,12	
	Assignments	3	15%(15)	4,8,12	
	Projects / Lab.				
	Report				
Summative assessment	Midterm Exam	2hr	20%(30)	7	
	Final Exam	3hr	50%(50)	16	
Total assessment					

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Overview of differentiation and integration.
Week 2	Vectors in 3D , triple product of vectors (dot and cross), equations of line and plane in space.
Week 3	Complex numbers, De moiver's theory, power and roots of complex numbers, Euler formula, complex functions, Cauchy- Riemann equations.
Week 4	Functions of two or more variables, dependent and independent variables, limits, continuity, partial derivatives.

Week 5	Applications of partial derivatives, tangent plane to surface, normal line to surface, tangent line to curve, normal plane to curve, relative maximum and minimum points, directional derivative.
Week 6	Polar coordinate, polar functions, graph polar function, relations between polar and cartesian, cylindrical and spherical coordinate.
Week 7	Double integration ,change of double integration, polar coordinate in double integration.
Week 8	Applications of double integration.
Week 9	Triple integration, cylindrical and spherical coordinate in triple integration, applications.
Week 10	Line integrals, green theory.
Week 11	Sequences and series, finite and infinite series.
Week 12	Types of series, methods test diverge and converge of series.
Week 13	Power series, expansion of functions in power series (Taylor and Maclaurin).
Week 14	Ordinary differential equations, first and second O.D.E .
Week 15	**Solving of first and second O.D.E , applications of O.D.E .**
Week 16	**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. Mu Murray R.Spiegel "Advanced calculus " schaum's outline series, McGraw-Hill company 1974. 2. G. Stephenson, " Mathematical methods for science students " Longman house, 1981 . 3.G. Thomas and R. Finney " calculus and analytical geometry " sixth edition,2000. 4.J. Hass , C. Heil and M. D.Weir " Thomas calculus " fourteenth edition, 2018.	
Recommended Texts		
Websites		

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
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	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	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
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	Ministry of Higher Education and Scientific Research - Iraq University of Warith Al_Anbiyaa Engineering Department Refrigeration and Air Conditioning Techniques Engineering	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Strength of Materials**			**Module Delivery**	
Module Type	**C**			☐ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MPAC206**				
ECTS Credits	**11**				
SWL (hr/sem)	**275**				
Module Level	2		**Semester of Delivery**	2	
Administering Department	BSc-MPAC		**College**	Engineering	
Module Leader	Riyam Abd-Alrazaq Salman		**e-mail**	riyariyam.a@uowa.edu.iq	
Module Leader's Acad. Title	Ass. Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	15/10/2024		**Version Number**	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MPAC107	**Semester**	L1- S2
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 course is the foundation to many advanced techniques that allow engineers to design machine components, mechanisms, predict failure and understand the physical properties of materials. Mechanics of Materials gives the student basic tools for stress, strain and deformation analysis. Methods for determining the stresses, strains and deformations produced by applied loads are presented. Engineering design concepts are integrated throughout the course.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1.To apply the formal theory of solid mechanics to calculate forces, deflections, moments, stresses, and strains in a wide variety of structural members subjected to tension, compression, torsion, bending, both individually and in combination, including : • axially loaded bars • components in pure shear • circular shafts in torsion • beams in bending • thin-walled pressure vessels 2. Determine the stresses and strains in members subjected to combined loading and apply the theories of failure for static loading 3. To determine principal stresses and angles, maximum shearing stresses and angles, and the stresses acting on any arbitrary plane within a structural element. 4. Analyze slender, long columns subjected to axial loads 5. Determine the deflections and rotations produced by the flexural loading.
Indicative Contents المحتويات الإرشادية	***Indicative content includes the following.*** Give the students information about stress and strain, [12 hrs] Thermal stress, [12 hrs] Thin Walled stress torsion, [12 hrs] Thin Walled Torsion, [12 hrs] Shear force and bending moment diagram, [12 hrs] complex stress , [12 hrs] Mohr's circle. [12 hrs]

	Sum. 7*12=84 with lab. Part test for tensile, [4 hrs] impact, [4 hrs] hardness , [4 hrs] creep , [4 hrs] compression, [4 hrs] bending , [4 hrs] buckling , [4 hrs] torsion [4 hrs] sum.4*8=32 **TOTAL Structured SWL (h/sem)=84+32=116**

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	116	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	8
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	159	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	9
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	275		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	

	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Subject
1	Introduction to strength of materials
2	Simple stress and Strain
3	Compound Bars
4	Thermal stresses
5	Shearing force and bending moment diagrams
6	Bending of beam
7	Slope and deflection of beams
8	Shear stresses in beam
9	Torsion of shaft
10	Thin cylinders and shells
11	Complex stresses
12	Mohr's stress circle
13	Buckling of column
14	Strain Energy
15	Theories of Elastic failure
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

Week No.	Material vocabulary
1-2	Tensile
3-4	Torsion
5-6	Impact
7-8	Hardness
9-10	Effect of heat treatment on steel hardness
11-12	Bending
13-14	Compression
15	Buckling

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**

Recommended Texts	1. Mechanics of materials By Hearn 2. Mechanics of materials By Dean Updike 3. Mechanics of materials By R.C. Hibbeler 4. Mechanics of materials By F.P. Beer 5. Mechanics of materials By Goodno and Gere	no

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	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks 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.

	Ministry of Higher Education and Scientific Research - Iraq University of Warith Al_Anbiyaa Engineering Department Refrigeration and Air Conditioning Techniques Engineering	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	**Fluid Mechanics**	**Module Delivery**	
Module Type	**C**	☐ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MPAC202**		
ECTS Credits	**6**		
SWL (hr/sem)	**116**		

Module Level	**2**	**Semester of Delivery**	2
Administering Department	**BSc-MPAC**	**College**	**Engineering**
Module Leader	**Ahmad Aliwi Samarmad**	**e-mail**	**ahmed.eleiwi@gmail.com**
Module Leader's Acad. Title	lecturer.	**Module Leader's Qualification**	**PhD**
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	15 / 10/2024	**Version Number**	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		**Semester**	2
Co-requisites module		**Semester**	1

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. This module fluid mechanics is intended to develop a deeper understanding of the relationship between design and analysis processing as this module discusses various fluid systems.. 2. The student will be able to analyze simplified fluid problems with the aim of reduction of energy losses and manpower. The student will be able to identify/control the appropriate process parameters, and possible defects of processes malfunctions so as to remove them. 3. For each fluid process, the aspects covered include: aesthetics, principles, choices of materials, choice of processes, properties of materials, advantages and disadvantages, process economics. Examples are drawn from practical processes mainly used in aerospace, automotive and air-conditioning industries. 4. To introduce the theory and practice of fluid machines parts and assemblies using a wide range of technologies. 5. To allow processes to be chosen appropriately for any given application with any given fluid material. 6. To develop group working, research and writing skills. 7. To provide knowledge on the influence of thermal and mechanical parameters on system structure.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Examine fluid processes to describe the system properties of fluid devices. 2. Calculate and measure the fluid behavior in thermal processes. 3. Define the characteristics of various fluid operations. 4. Choose appropriate processes for different parts. 5. Design parts such that they are suitable for energy utilization using appropriate techniques. 6. Graduates from this module will be skilled in the methods of scientific investigation. 7. They will be able to think as a fluid engineer, critically evaluating scientific information and solving scientific problems. 8. will be able to effectively communicate scientific information.
Indicative Contents المحتويات الإرشادية	1) Introduction to Fluid Mechanics. 1. Fluid Properties. 2. density. 3. viscosity. 4. pressure. 5. Shear stress. 2) Fluid Statics. a) Pressure Distribution. b) Forces.

	c) Buoyancy. d) Manometers. 3) Fluid Dynamics a) Momentum b) Control Volume c) Energy d) Continuity 4) Fluid machines and hydraulics

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	1. Quizzes and tests throughout the semester to check understanding and knowledge 2. Examinations, both written and practical, that assess learners' understanding of concepts, principles, and theories related to Fluid Processes 3. Observation of learners' practical skills in laboratory and workshop based or simulated settings. 4. Peer evaluation and feedback tools used as part of group projects or reciprocal feedback assignments. 5. Assignments and essays used to assess learners' comprehension of theoretical concepts. 6. Presentation and demonstration of acquired knowledge in real-world scenarios.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	116	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	8
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	34	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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	2	10%	5, 10	
	Assignments	1	5%	9	
	Projects / Lab.	1	10%	continuous	
	Report	1	5%	12	
Summative assessment	Midterm Exam	2hr	10%	7	
	Final Exam	3hr	60%	15	All
Total assessment			100%		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Fluid Properties
Week 2	Deriving Pressure equation in fluids
Week 3	Manometry and pressure measurements.
Week 4	fluid forces on vertical surfaces
Week 5	Force on inclined surfaces and center of pressure
Week 6	fluid forces on curved surfaces
Week 7	Buoyancy and metastable center
Week 8	Fluid dynamics applications
Week 9	Control volume concept
Week 10	Continuity
Week 11	Momentum of fixed control volume
Week 12	momentum of moving control volume and inertial systems
Week 13	Energy equation as applied to fluid systems
Week 14	Fluid machinery and hydraulics.

Week 15	**Final exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Fluid properties (density)
Week 2	Fluid properties (viscosity)
Week 3	Pressure distribution
Week 4	Vertical gates
Week 5	inclined gates
Week 6	fluid forces on different types of surfaces
Week 7	improving metastable center
Week 8	Introduction fluid dynamics (laminar flow)
Week 9	Introduction fluid dynamics (turbulent flow)
Week 10	Continuity
Week 11	fixed turbomachines blades
Week 12	moving turbomachines blades
Week 13	Report
Week 14	**Final exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	1. Streeter, Mikell P. Fluid Mechanics. 2. Fox, Fluid Mechanics. 3. F. White, Elementary Fluid Mechanics.	yes
Recommended Texts	None	
Websites	None	

Grading Scheme

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