Modules Catalogue | 2024-2025 | دليل وصف المادة الدراسية

Al-Furat Al-Awsat Technical University,

Al-Mussaib Technical College,

Power Mechanics Technical Engineering Department

جامعة الفرات الأوسط التقنية
الكلية التقنية المسيب
قسم هندسة تقنيات ميكانيك القدرة

First Cycle – Bachelor's degree (B.Sc.) – Power Mechanics Technical Engineering

بكالوريوس هندسة تقنيات ميكانيك القدرة

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Computer Principals			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATU24012**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	UGI		**Semester of Delivery**	1	
Administering Department	PME		**College**	TCM	
Module Leader	Atheer Saleh Hassoon		**e-mail**	atheer.hassoon@atu.edu.iq	
Module Leader's Acad. Title	Assit.Lecturer		**Module Leader's Qualification**	M.sc	
Module Tutor	Zaid .M.Farid		**e-mail**	Zaidaldabagh8@gmail.com	
Peer Reviewer Name	Name		**e-mail**	Nona	
Scientific Committee Approval Date	01/06/2023		**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 Objectives أهداف المادة الدراسية	1. To develop problem solving skills and understanding of computer programs. 2. To understand functions of engineering programs. 3. This course deals with the basic concept of derivation of functions programs. 4. This is the basic subject for all method of integration methods.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize different types of functions and their behavior in science topics. 2. List the various lows associated with limits of computer. 3. Summarize what is meant by a basic computer. 4. Discuss the domain and range of many types of functions. 5. Describe computer components.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. None

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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
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	4
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% (10)	3,5,10 and 12	LO #1, #2 and #10, #11
	Assignments	4	20% (10)	5,7, 9and 13	LO #3, #4 and #6, #7
	Projects / Lab. Report	0	10% (10)	-----	----
		1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

الاسبوع	Week الموضوع
1-2	تعريف الحاسبات مكوناتها اجيالها
3	نظام تشغيل الMS-Doc
4-5	اوامر نظام التشغيل الداخلية
6	اوامر نظام التشغيل الخارجية
7	مفهوم نظام وندوز ومزاياه
8	الاستفادة من بعض المفاتيح للدخول الى البرامج واغلاقها
9	التعرف على مكونات سطح المكتب
10	الاستفادة من لوحة السيطرة
11	الاستفادة من البرامج الاضافية
12-13	التعامل مع Note pad ,WordPad
14-15	مفهوم فيروسات الحاسوب
16	امتحان

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	اساسيات الحاسوب وتطبيقاتها تاليف أ.م.د. زياد محمد عبود أ.د.غسان حميد عبد المجيد	Yes
Recommended Texts	None	No
Websites	None	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**English for Acadimic**			**Module Delivery**	
Module Type	**S**			☒ **Theory** ☐**Lecture** ☐ **lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ATU24011				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level		1	**Semester of Delivery**		1
Administering Department		PME	**College**	TCM	
Module Leader	Doaa Fadhil Kareem		**e-mail**	doaa.fadhil.tcm@atu.edu.iq	
Module Leader's Acad. Title		Assistant Lecher	**Module Leader's Qualification**		Msc
Module Tutor			**e-mail**		
Peer Reviewer Name		Name	**e-mail**		
Scientific Committee Approval Date		01/06/2023	**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 Objectives أهداف المادة الدراسية	1. Teaching the student, the basic principle of English Language. 2. Teaching students the exits of letters. 3. Teach the student the basic rules of the subject .
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Listening, Question, Cities and Countries, Numbers, Reading, Every Day English . 2. The Family, Possessives, Possessives Adjectives Vocabulary, Listening, Reading, Everyday English. 3. Sport, Food and Drinks, Present Simples, Number and Price, Listening. 4. Questions, Pronouns and Possessives. 5. Prepositions, Everyday English, Past Simple Irregular Verbs,. 6. Times Past, Reading, Past Simple- Regular, Everyday English, Vocabulary, Grammar,. 7. Present Continuous, Present Simple and Continuous, Reading, Opposite Verbs.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A -</u> Introduction , Listening, Question, Cities and Countries, Numbers, Reading, Every Day English, Jobs, Question and Negatives, Address, Phone Remember, Listening, Pronunciation, Listening, Everyday English, Sport, Food and Drinks, Present Simples, Number and Price, Listening, Object Pronouns, Questions Words, Why and Because, Vocabulary, Reading, Writing, Everyday English. <u>Part B -</u> , Prepositions, Everyday English, Past Simple Irregular Verbs, Times Past, Reading, Past Simple- Regular, Everyday English, Vocabulary, Grammar, Past Simple, Making Conversation, Time Expression, Reading, Everyday English, Present Continuous, Present Simple and Continuous, Reading, Opposite Verbs.

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	18	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	1
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	32	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	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**	2	20% (20)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	-	-	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction
Week 2	Basics of Present simple tense
Week 3	Spelling of –S and –ES and Exercises.
Week 4	**Present continuous tense** and Exercises.
Week 5	**Spelling of –ing and Spelling of –ed.**
Week 6	**Past simple tense and Exercises.**
Week 7	Mid-term Exam
Week 8	**Past continuous tense and Exercises.**

Week 9	EXPRESSIONS OF QUANTITY.
Week 10	Present perfect tense
Week 11	COMPARE THE PAST SIMPLE AND PRESENT PERFECT
Week 12	Verb Patterns
Week 13	The Second Conditional
Week 14	Past Perfect Tense
Week 15	Present Perfect Continuous
Week 16	**Preparatory week before the 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	**Headway**	Yes
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
	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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Engineering Drawing			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**ATU24016**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		1	**Semester of Delivery**		1
Administering Department		PEM	**College**	TCM	
Module Leader	Waleed Abdul Hamza Asker		**e-mail**	Waleedali824 @gmail.com	
Module Leader's Acad. Title		Aissit lec	**Module Leader's Qualification**		MSC
Module Tutor	Huda salih mkhailf		**e-mail**	Huda.salish.tcm@atu.edu.iq	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		10/06/2023	**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 Objectives أهداف المادة الدراسية	**1- Introducing students to the importance of engineering drawing and its relationship to other engineering subjects** **2- Developing the student's mental and motor abilities in drawing simple and complex shapes** **3- Expanding the student's horizons of engineering shapes and complexes to identify their components and parts** 4- **Organizing the student's thought to draw, assemble and disassemble engineering shapes and mechanical parts**
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.** **1. To familiarize the student with the importance of engineering drawingان** **2. The student learns how to imagine geometric shapes** **3. 3- The student should be able to draw geometric shapes, diagrams and isometrics through the skill he has acquired** **4. To distinguish the mechanical components and parts and the principle of their work** 5. Passing the curriculum of computer drawing AutoCAD 6. The student should be 100% proficient in the skill
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A - Engineering tools T-square ruler, compass, pens, triangles, drawing paper, drawing boards Geometric figures, identification boards, data show Part B- Computer hall A computer equipped with AutoCAD 2007, a data show data display device, the use of information and its practical applications

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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	87	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	63	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
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% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	15	30% (10)	1 -15	LO #3, #4 and #6, #7
	Projects / Lab.	0	0% (10)	Continuous	All
Summative assessment	Report	0	0% (10)		LO #5, #8 and #10
	Midterm Exam	3hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Define the Engineering Drawing
Week 2	The tools used in Engineering Drawing
Week 3	Typed of drawing sheets, types of lines
Week 4	English and Arabic Letters writing and sheet table
Week 5	Geometric construction, types of lines and arcs
Week 6	Geometric construction, types of regular polygons , Quadrilateral
Week 7	Geometric construction, types of circles and ellipse
Week 8	Isometric Views
Week 9	Dimensions

Week 10	Exercises , Center translation
Week 11	Theory of projection 1" angle
Week 12	Theory of projection 3" angle
Week 13	**Drawing the three projection views**
Week 14	**sections**
Week 15	**Draw sections**
Week 16	**Final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Engineering drawing book , Illustration aids, computer graphics book	Yes
Recommended Texts	Engineering drawing , Abdul Rasool Al-Khafaf	No
Websites	https://www.scribd.com/document/370481058/%D9%83%D8%AA%D8%A7%D8%A8-%D8%A7%D9%84%D8%B1%D8%B3%D9%85-	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Mathematics -I			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lecture** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATU24013**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	PME		**College**	TCM	
Module Leader	Fadhil Abid Elaiwi		**e-mail**	fadhil.alrubaiy@atu.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**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 Objectives أهداف المادة الدراسية	1. To develop problem solving skills and understanding of mathematics, engineering, and the natural sciences through the application of algebra and trigonometry concepts. 2. To understand functions, their plots and properties and plots. 3. This course deals with the basic concept of derivation of functions. 4. This is the basic subject for all method of integration methods. 5. To understand special types of trigonometry functions such as hyperbolic functions with their related Laws.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize different types of functions and their behavior in science topics. 2. List the various lows associated with limits of function. 3. Summarize what is meant by a basic electric circuit. 4. Discuss the domain and range of many types of functions. 5. Describe logarithmic, exponential, and trigonometric functions. 6. Identify the basic definition of derivatives and their applications. 7. Discuss the various methods of integration process to traditional and special types of functions.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – functions: **-Functions,** with their types, properties, graphing, and available application in different fields. - Revision problem for homework and assessment tests. Part B – Limits And Continuity Continuity clarifying the continuity and limits definitions by confining the term "endpoints" to intervals instead of more general domains, and we moved the subsection on continuous extension of a function to the end of the continuity section. - Revision problem for homework and assessment tests. Part C – Derivatives Derivatives clarified the meaning of differentiability for functions of several variables, and added a result on the Chain Rule for functions defined along a path. Brief geometric insight justifying l'Hôpital's Rule. Some examples for derivative applications. - Revision problem for homework and assessment tests. Part D – Integrals Integrals view basic integration formulas and the Substitution Rule, using them in combination with algebraic and trigonometric identities, before presenting other techniques of integration - Revision problem for homework and assessment tests.

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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

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	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**	4	20% (10)	3,5,10 and 12	LO #1, #2 and #10, #11
	Assignments	4	20% (10)	5,7, 9and 13	LO #3, #4 and #6, #7
	Projects / Lab.	0	0% (10)	-----	----
Summative assessment	**Report**	1	10% (10)	13	LO #5, #8 and #10
	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Determinants, properties
Week 2	Grammar's rule, application of determinant
Week 3	Trigonometric functions& relation
Week 4	Graphing of functions, Trigonometric equations
Week 5	Vectors, vectors in space, unit vector
Week 6	Scalar product, vector product
Week 7	Function of limits, Algebraic limit
Week 8	Trigonometric limit, Infinity as limit
Week 9	Derivative rule, Algebraic& Trigonometric derivative
Week 10	Chain rule, velocity& acceleration
Week 11	Inverse trigonometric functions& its derivative
Week 12	Logarithm& Exponential functions& its derivative
Week 13	Hyperbolic functions& its derivative
Week 14	Inverse hyperbolic functions& its derivative
Week 15	Integration, integrals of trigonometric& inverse functions
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Thomas' Calculus Thirteenth Edition, George B. Thomas, Jr. Cenveo® Publisher Services.2013	Yes
Recommended Texts	Higher Engineering Mathematics, Fifth Edition John Bird, BSc(Hons), by Published by Elsevier Ltd.2006	No
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
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	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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Work Shops**			**Module Delivery**	
Module Type	**Core**			☐**Theory** ☐**Lecture** ☐ **lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	ATU24014				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGI		**Semester of Delivery**	1	
Administering Department	PME		**College**	TCM	
Module Leader	Hussein Al-Gburi		**e-mail**	Hussein83@atu.edu.iq	
Module Leader's Acad. Title	Lecher		**Module Leader's Qualification**	Msc	
Module Tutor			**e-mail**		
Peer Reviewer Name	Name		**e-mail**		
Scientific Committee Approval Date	01/06/2023		**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 Objectives أهداف المادة الدراسية	Teaching and training the student to be able of, getting a skill in applying a machining and industrial operations with using different kinds of hand tools and measuring tools.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Teaching the student, the fundamentals of metals casting. 2. Recognize the steps of wilding 3. Describe the tools of filing. 4. Recognize the steps of cutting tools types, uses of measuring instruments. 5. Summarize Turning Processes: - Facing, simple steps, learning using measuring instruments.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A - Foundry work shop- Filing Work Shop Part B - Lath Work Shop- Welding work shop

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
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	0	0% (20)	5 and 10	
	Assignments	15	80% (10)	1-15	
	Projects / Lab.	-	-	Continuous	
	Report	4	20% (10)	13	
Summative assessment	Midterm Exam	2hr	0% (0)	7	
	Final Exam	3hr	0% (0)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Foundry work shop:** - Metal casting and its importance , purpose of using casts in industry, casting work shop equipments, industrial safety regulation in works shop, making sand mold for one piece pattern and cores types , resources of sand and mould properties, additives materials, mixing processes and percentage of quality , using sand mixing, sand treatment and sand handling equipments, making manual sand mold for one piece cast.
Week 2	Making sand mold for one-piece cast with runner and risers, cast cleaning make core and baking it in baking furnace, make sand mold for two pieces pattern with core.
Week 3	Making sand mold with core, melting the metal, pouring the metal. take out the cast from the mold, cleaning the cast, Melting furnaces of metals: types, specifications, its uses (rotary, crucible) heat treatment and cat inspection, visual surface defects and its causes. Measuring cast dimension and insure equal to original dimension.
Week 4	**Filing Work Shop:** - Vernier types, measuring methods, measuring height and depth, sketching process on sheet metal plate, tools used, scratching pointer, strip divider, bended edge divider, 90-degree square ruler, bended rulers.
Week 5	Files, files and filling process: filing types and its specifications, clamp vices types, processes of fixing work piece on it, the uses of different types of fillings, filing cleaning process, filling methods, exercises on scratching method and simple file,

Week 6	Saw cutting, hand saw, saw blade, fixing the saw blade, the saw blade condition available for sawing process, exercises for saw cutting process
Week 7	**Lath Work Shop: -**Lathe machine, specifications its uses, accessory lathe parts, lathe operation, lathe cutting tools types, uses of measuring instruments.
Week 8	Turning Processes: - Facing, simple steps, learning using measuring instruments
Week 9	Internal and external taper turning, making exercises for both methods.
Week 10	**Welding work shop:** - work shop safety, safety requirement, Gas welding: equipment, assembly and regulation, welding tools, gases used, specifications, fluxes, fillers, flame types and its uses, flame ignition, flam regulation.
Week 11	Corner and butt-welding training exercises
Week 12	Oxygen cutting: equipments, safety, requirement, cutting exercises
Week 13	Arc welding: welding machine and equipments, safety regulation, arc ignition
Week 14	Making exercises, making beaks on plates, using different kinds of electrodes
Week 15	Edge preparation, making exercises of T joints.
Week 16	

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		
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
	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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Fundamentals of Engineering Mechanics-Statics**			**Module Delivery**	
Module Type	**Core learning activity**			☒ **Theory** ☐**Lecture** ☐ **lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ATU24015				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	PME		**College**	TCM	
Module Leader	Doaa Fadhil Kareem		**e-mail**	doaa.fadhil.tcm@atu.edu.iq	
Module Leader's Acad. Title	Assistant Lecher		**Module Leader's Qualification**	Msc	
Module Tutor			**e-mail**		
Peer Reviewer Name	Name		**e-mail**		
Scientific Committee Approval Date	01/06/2023		**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 Objectives أهداف المادة الدراسية	1. Teaching the student, the fundamentals of engineering mechanics (Static's & Dynamics) in the engineering applications, the loads analysis, resultants. 2. Equilibrium in 2-D and 3-D, moments and couples. 3. First and second moment of inertia, motion of particles, and their theories.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Teaching the student, the fundamentals of engineering mechanics (Static's & 2. Dynamics) in the engineering applications, the loads analysis, resultants, 3. equilibrium in 2-D and 3-D, moments and couples. 4. first and second moment of inertia, motion of particles, and their theories. 5. Equipment and machinery design. 6. Inspection, installation, operation, maintenance and repair of all kinds of devices, turbocharged machines and equipment.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A -</u> Introduction , Fundamentals concepts, Load Analysis & Vectors, Moments, Couples, Resultant of Force Systems, Equivalent Systems of Forces. <u>Part B -</u> Equilibrium of Rigid Bodies , Centroids of Area, Friction, Center of Gravity, Work, Moment of Inertia.

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
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	102	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7
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	20% (20)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	-	-	Continuous	All
Summative assessment	**Report**	1	10% (10)	13	LO #5, #8 and #10
	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction
Week 2	Fundamentals concepts
Week 3	Load Analysis & Vectors
Week 4	**Moments**
Week 5	**Couples**
Week 6	**Resultant of Force Systems**
Week 7	Resultant of Force Systems
Week 8	**Equivalent Systems of Forces**
Week 9	Equivalent Systems of Forces

Week 10	Equilibrium of Rigid Bodies
Week 11	Centroids of Area
Week 12	Centroids of Area
Week 13	Friction
Week 14	Center of Gravity
Week 15	Work
Week 16	**Moment of Inertia**

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	**J. L. Meriam** **L. G. Kraige**	Yes
Recommended Texts	John Wiley & Sons, Inc	yes
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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Engineering Drawing (CAD Draw)			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATU24025**				
ECTS Credits	**6**				
SWL (hr/sem)	150				
Module Level		UGI	**Semester of Delivery**		2
Administering Department		PME	**College**	TCM	
Module Leader	Waleed Abdul Hamza Asker		**e-mail**	Waleedali824 @gmail.com	
Module Leader's Acad. Title		Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Shaymaa abd alrasool		**e-mail**	Shayma.rasol1977@gmail.com	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		10/06/2023	**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ATU24016	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1- Enabling students to obtain knowledge and understanding in the subject of engineering drawing and using the computer through the AutoCAD program 2- Understanding and teaching students the basics of computer engineering drawing 3- Knowing the correct methods of engineering drawing using the computer and how to apply them in the AutoCAD 2007 program in engineering fields. 4- Increasing the student's experience in identifying drawing and designing engineering shapes and mechanical parts.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Cognitive goals 1 - Giving the student sufficient knowledge in the AutoCAD program to employ it in design by developing the students' practical, theoretical and creative abilities in computer design techniques of various types. 2 - Developing perception skills and knowing the technique of implementing design using the computer to enrich the students' experience through the use of the various techniques of the AutoCAD program to complete the required design plans. 3 - That the student be able to make any design scheme on the program through which he can fully clarify the idea. 4 - Providing the student with the skill of computer design easily and easily through the use of samples from the student's reality and applying them directly. 5- It is possible to use some exercises or projects to be completed in other subjects, such as designing mechanical parts. 6 - Developing the student's imagination skill to feel the difference between the AutoCAD program environment and the realistic building space and different spaces
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. A computer equipped with AutoCAD 2007, a data show data display device, the use of information and its practical applications

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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	87	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	63	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
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% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	4	20% (10)	Continuous	All
Summative assessment	Report	0	0% (10)	13	LO #5, #8 and #10
	Midterm Exam	3hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1-2	The use of CAD in engineering drawing description of menu Bar and toolbars
Week 3-6	drawing orders
Week 7-10	drawing Ellipse, Rectangle, line, Ray, Circle, point , Arc, Polygon , Rectangle , Donut ---------- etc.
Week 11	Editing commands: copy, cut, paste, erase, move,
Week 12	selecting objects
Week 13	Add texts
Week 14	Technical terms
Week 15	orthogonal projection, ISO drawing.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• AutoCAD Beginning and Intermediate	Yes
Recommended Texts	• AutoCAD from zero to hero	yes
Websites	• Any other materials available on the web	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electricity Fundamentals**			**Module Delivery**	
Module Type	**S**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATU24026**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGI	**Semester of Delivery**		2
Administering Department		PEM	**College**	TCM	
Module Leader	Ammer auid Abdullah		**e-mail**	Ammar.o.abdallh@atu.edu.iq	
Module Leader's Acad. Title		Asst.lecturer	**Module Leader's Qualification**		MSC
Module Tutor	Ammer auid Abdullah		**e-mail**	Ammar.o.abdallh@atu.edu.iq	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**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 Objectives أهداف المادة الدراسية	Teaching the student, 1. The principles of electrical technology 2. To develop problem solving skills and understanding of circuit theory through the application of techniques. 3. To understand Ohms law, series connection, parallel connections, compound connection 4. To understand voltage, current and power from a given circuit. 5. This is the basic subject for all electrical and electronic circuits. 6. To understand Kirchhoff's current and voltage Laws problems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 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> 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. -Thevenins theorem, maximum power, Norton theorem ,Nodal method ,Maxwells loop current method, superposition <u>Part B -</u> Fundamentals Parallel A.C circuit, R,L,C Parallel A.C circuit Addmittance, power factor, phasor diagram -phase circuit, star and delta connection , Active, reactive, apparent power in A.C circuit ,Transfarmer /1 ,Transfarmer/2, Voltage rectification, half wave rectifier

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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
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% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Resistance, conductance, effect of temp. on the resistance value
Week 2	Ohms law, series connection, parallel connections, compound connection
Week 3	Kirchhoffs current law, kirchhoffs voltage law-Star-delta conversion, voltage and current source conversion
Week 4	Thevenins theorem, maximum power
Week 5	Norton theorem - Nodal method
Week 6	Maxwells loop current method, superposition
Week 7	Electromagnetic-Alternating voltage and current
Week 8	Frequency, period, instantaneous value of voltage and current
Week 9	Series A.C circuit, R,L,C
Week 10	Impedance, phase angle, resonance, phasor diagram 22 Parallel A.C circuit, R,L,C
Week 11	Addmittance, power factor, phasor diagram
Week 12	3-phase circuit, star and delta connection
Week 13	Active, reactive, apparent power in A.C circuit
Week 14	Transfarmer/1 , Transfarmer/2
Week 15	Voltage rectification, half wave rectifier-Voltage rectification, full-wave rectifier
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Using measurement devices
Week 2	Lab 2: Ohms law
Week 3	Lab 3: Kirchhoffs current law- kirchhoffs voltage law
Week 4	Lab 4: Thevenins theorem
Week 5	Lab 5 Series A.C circuit
Week 6	Lab 6: Parallel A.C circuit
Week 7	Lab 7: half wave rectifier- full-wave rectifier

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education	Yes
Recommended Texts	DC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2020, dissidents.	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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Materials**			**Module Delivery**	
Module Type	**Suport**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATU24023**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	1		**Semester of Delivery**	2	
Administering Department	PME		**College**	TCM	
Module Leader	Awham Jumah Salman		**e-mail**	awhamj@aty.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**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 Objectives أهداف المادة الدراسية	1. This course deals with the basic concept of engineering materials. 2. To understand the type of material 3. To know the properties, advantage, disadvantage of each type of materials 4. To know the application of each type of materials.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Recognize the types and properties of engineering materials 2- Summarize what is meant crystalline structures and imperfections in crystals. 3- Discuss the types of thermal equilibrium diagrams 4- Describe thenano materials 5- Recognize the Non-destructive testing and Macro- and Micro-examination 6- Summarize what is meant materials selection
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – concept of engineering materials</u> Type, bond type on structure, crystalline structures, imperfections in crystals, dislocations and plasticity in metals slip, dislocations and plastic deformation, Defects. <u>Part B- Thermal equilibrium diagrams</u> Type of thermal diagrams, lever rule, Applications on binary phase diagrams, Phase Diagrams and Alloy Formation, Phase Transformations and Diffusion <u>Part C- detailed explanation of type of materials</u> Metals, ceramics, polymers , composite materials, nano materials <u>Part D- testing and selection materials</u> Non-destructive Testing, Macro- and Micro-examination, materials selection,

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 types of simple experiments involving some sampling activities that are interesting to the students.

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	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
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**	2	20% (20)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.				
Summative assessment	**Report**	1	10% (10)	13	LO #5, #8 and #10
	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	-Introduction; The range of materials; Properties of engineering materials; Cost and availability;Possibilities for the future -Atomic Structure and Bonding
Week 2	-Influence of Bond Type on Structure and Properties -Inter atomic Bonding, metallic, ionic, and covalent, van der Waals bonds
Week 3	-Crystalline Structures -Crystallographic Directions and Plans,

	-Coordination number and Atomic Packing Factor (APF)
Week 4	-Imperfections in crystals -Dislocations and Plasticity in Metals Slip, Dislocations and Plastic Deformation
Week 5	-Elastic Behaviour -Viscoelastic Behaviour
Week 6	-Thermal equilibrium diagrams -Lever rule
Week 7	-Applications on binary phase diagrams
Week 8	Metals
Week 9	Polymer -Thermoplastics -Thermosetting -Elastomers
Week 10	Ceramics and Glasses
Week 11	Composite materials
Week 12	-Electrical and Magnetic Properties -Optical, Thermal and Other Properties
Week 13	-Non-destructive Testing -Macro- and Micro-examination
Week 14	-Materials Selection
Week 15	-Nano materials
Week 16	**Preparatory week before the 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	Materials Science and Engineering An Introduction William D. Callister, Jr. David G. Rethwisch, eight edition , 2007	No
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
	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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Human Right & Democracy			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐**Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATU24021**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level		UGI	**Semester of Delivery**		2
Administering Department		PME	**College**	TCM	
Module Leader	Raida Hussein Hamid		**e-mail**	com.rad@atu.edu.iq	
Module Leader's Acad. Title		Assit.prof	**Module Leader's Qualification**		M.sc
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name		Name	**e-mail**	Nona	
Scientific Committee Approval Date		01/06/2023	**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 Objectives أهداف المادة الدراسية	1. **الدفاع عن كرامة الإنسان.** 2. **المساهمة في تغيير حياة الإنسان إلى الأفضل بشأن: التغيير في القيم والمشاعر – والتغيير في السلوك.** 3. **ترجمة المعارف والخبرات والقيم وأنماط السلوك إلى عمل دائم ونشاط مستمر من أجل الدفاع عنها في الواقع المعاش وتعزيز الجهود الكفيلة بمعالجة قضايا حقوق الإنسان.**
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. **تعزيز الربط بين الفرد والجماعة والدولة ومؤسساتها.** 2. **تعزيز مشاعر التضامن مع الآخرين.** 3. **تنمية مهارات رصد الانتهاكات والتعامل مع المنتهكين.** 4. **دعم مهارات فهم قضايا حقوق الإنسان.** 5. **تعزيز سبل التعليم التفاعلي.** 6. **تعزيز سبل المشاركة في الشأن العام – المواطنة.** 7. **تعرف المبادئ الرئيسة لأبرز حقوق الإنسان ومصادرها وأنواعها والآليات المستخدمة لحمايتها.** 8. **تعرف القيم والاتجاهات وأنماط السلوك التي تُعلي من شأن حقوق الإنسان وتعمل على التمسك بها**
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. None

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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	18	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	1
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	32	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	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% (10)	3,5,10 and 12	LO #1, #2 and #10, #11
	Assignments	0	0% (10)	5,7, 9and 13	LO #3, #4 and #6, #7
	Projects / Lab.	0	10% (10)	-----	----
	Report	2	20% (10)	4 and 13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week الموضوع	الاسبوع
التعرف على الحرية والديمقراطية في المجتمعات المتعددة وعلى مر العصور وأنواعها وكيف تحولت -لحرية والديمقراطية الحرية ليست فكرة مطلقة بل هي نسبية متغيرة من حيث الزمان والمكان -أنظمة بعض الدول من آخرنلنسبية في معنى الحرية	1

	والسلطة والمذهب السياسي
2	ضمانات الحريات العامة- للحرية ضمانات قانونية وسياسية تقسيم الحريات العامة- تتضمن الحريات الطبيعية والخاصة والحريات الفكرية والجماعية والحريات الاقتصادية
3	الحريات الفردية -تتضمن حرية الرأي والتعبير والصحافة والنشر والاجتماع والتظاهر السلمي وحرية الفكر والضمير والعقيدة والالتزام بالأحوال الشخصية والتنقل والسكن وحرية الاتصالات وسريتها
4	الديمقراطية والأنظمة السياسية - نبذة عن الديمقراطية وتاريخها- ا نواع الديمقراطية - الديمقراطية المباشرة والغير المباشرة
5	مفاهيم عن الديمقراطية -تشمل المعنى التقليدي (الواسع)والمعنى الحديث(المعاصر)
6	الديمقراطية في الحضارة الإغريقية ومقارنتها بالديمقراطية الحديثة - أزمة المعاصرة للديمقراطية -حيث واجهت الديمقراطية صعوبات اقتصادية واجتماعية وثقافية وسياسية
7	امتحان الفصلي
8	حقوق الإنسان في التاريخ والتراث الإنساني -يتناول حقوق الإنسان خلال فترة العصور القديمة كحضارة وادي الرافدين والنيل والحضارة اليونانية والرومانية
9	حقوق في الأديان السماوية -حقوق الإنسان في الديانة المسيحية وفي القران الكريم والسنة النبوية الشريفة
10	مفهوم حقوق الإنسان وخصائصها وفئاتها- الاعتراف الدولي بحقوق الانسان- الاعتراف الإقليمي بحقوق الانسان -المصادر القانونية الدولية لحقوق الإنسان من خلال المواثيق العالمية والإقليمية
11	المنظمات غير الحكومية ودورها في الدفاع عن الإنسان- حقوق المرآة - حقوق المرآة في العصر الإسلامي
12	حقوق الطفل- اهم حقو الأطفال لدى الحضارات القديمة والشرائع السماوية وكذلك حقوقهة في الاتفاقية الدولية لعام 1989
13	الانتخابات وحقوق الإنسان -سانحقوق مبدأ منالإن مبادئ الانتخابات الحرة النزيهة
14	مصادر حقوق الإنسان في العراق -القواعد التي تتضمن حقوق الإنسان في العراق من خلال دستور جمهورية العراق لعام 2005
15	الحقوق المدنية -تتضمن حق المساواة والحياة والحرية الشخصية وحرمة المساكن والخصوصية الشخصية والحق بجنسية- الحقوق السياسية والاقتصادية -تتضمن حق الانتخاب وحق انتقاد الحكومة وحق اللجوء السياسي أيضاوتتضمن حق العمل وحق الملكية وقانونية فرض الضرائب والرسوم. الحقوق الاجتماعية والثقافية
16	الامتحان النهائي

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	حقوق الانسان والديمقراطية تاليف الاستاذ المساعد الدكتور عبدالله لفتة البديري- كتاب حقوق الانسان في الاسلام النظرية العامة – تاليف جمال الدين عطية	Yes
Recommended Texts	كتاب حقوق الانسان والحريات العامة تاليف الدكتور رامز محمد عمار	No
Websites	None	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Mathematics -II			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lecture** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATU24022**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	1		**Semester of Delivery**	2	
Administering Department	PME		**College**	TCM	
Module Leader	Fadhil Abid Elaiwi		**e-mail**	fadhil.alrubaiy@atu.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ATU24O13	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To develop problem solving skills and understanding of mathematics, engineering, and the natural sciences through the application of algebra and trigonometry concepts. 2. To understand functions, their plots and properties and plots. 3. This course deals with the basic concept of derivation of functions. 4. This is the basic subject for all method of integration methods. 5. To understand special types of trigonometry functions such as hyperbolic functions with their related Laws.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize different types of functions and their behavior in science topics. 2. List the various lows associated with limits of function. 3. Summarize what is meant by a basic electric circuit. 4. Discuss the domain and range of many types of functions. 5. Describe logarithmic, exponential, and trigonometric functions. 6. Identify the basic definition of derivatives and their applications. 7. Discuss the various methods of integration process to traditional and special types of functions.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – functions: **-Functions,** with their types, properties, graphing, and available application in different fields. - Revision problem for homework and assessment tests. Part B – Limits And Continuity Continuity clarifying the continuity and limits definitions by confining the term "endpoints" to intervals instead of more general domains, and we moved the subsection on continuous extension of a function to the end of the continuity section. - Revision problem for homework and assessment tests. Part C – Derivatives Derivatives clarified the meaning of differentiability for functions of several variables, and added a result on the Chain Rule for functions defined along a path. Brief geometric insight justifying l'Hôpital's Rule. Some examples for derivative applications. - Revision problem for homework and assessment tests. Part D – Integrals Integrals view basic integration formulas and the Substitution Rule, using them in combination with algebraic and trigonometric identities, before presenting other techniques of integration - Revision problem for homework and assessment tests.

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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6.8
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% (10)	3,5,10 and 12	LO #1, #2 and #10, #11
	Assignments	4	20% (10)	5,7, 9and 13	LO #3, #4 and #6, #7
	Projects / Lab.	0	0% (10)	-----	----
Summative assessment	**Report**	1	10% (10)	13	LO #5, #8 and #10
	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Integrals of hyperbolic functions& its derivative
Week 2	L'Hopitals's rules
Week 3	Integration methods; Integration by parts
Week 4	Integration by partial fraction
Week 5	Integration by trigonometric substitution
Week 6	Integration of ax+ bx + c 2
Week 7	Application of Integration
Week 8	Area under the curve& between two curves
Week 9	Surface area generated
Week 10	Length of the curve
Week 11	Volume generated by rotation of curve
Week 12	Simple differential equations
Week 13	Simpson rule for area
Week 14	Trapezoidal rule for area
Week 15	Integrals of hyperbolic functions& its derivative
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Thomas' Calculus Thirteenth Edition, George B. Thomas, Jr. Cenveo® Publisher Services.2013	Yes
Recommended Texts	Higher Engineering Mathematics, Fifth Edition John Bird, BSc(Hons), by Published by Elsevier Ltd.2006	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
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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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Fundamentals of Engineering Mechanics-Dynamics**			**Module Delivery**	
Module Type	**Core learning activity**			☒ **Theory** ☐ **Lecture** ☐ **lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ATU24024				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	1		**Semester of Delivery**	2	
Administering Department	PME		**College**	TCM	
Module Leader	Doaa Fadhil Kareem		**e-mail**	doaa.fadhil.tcm@atu.edu.iq	
Module Leader's Acad. Title	Assistant Lecher		**Module Leader's Qualification**	Msc	
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ATU24015	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Teaching the student, the fundamentals of engineering mechanics (Static's & Dynamics) in the engineering applications, the loads analysis, resultants. 2. Equilibrium in 2-D and 3-D, moments and couples. 3. First and second moment of inertia, motion of particles, and their theories.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Teaching the student, the fundamentals of engineering mechanics (Static's & 2. Dynamics) in the engineering applications, the loads analysis, resultants, 3. equilibrium in 2-D and 3-D, moments and couples. 4. first and second moment of inertia, motion of particles, and their theories. 5. Equipment and machinery design. 6. Inspection, installation, operation, maintenance and repair of all kinds of devices, turbocharged machines and equipment.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A - Introduction , Particles Motion, Absolute Motion, Force, Mass and Acceleration. Part B - Relative Motion: Translating and Angular, Rigid Bodies Motion, Work and Energy, Impulse and Momentum, Plaines of Bodies Motion

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
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	102	**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	20% (20)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	-	-	Continuous	All
Summative assessment	Report	1	10% (10)	13	LO #5, #8 and #10
	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction
Week 2	Particles Motion
Week 3	Absolute Motion
Week 4	**Absolute Motion**
Week 5	**Force, Mass and Acceleration**
Week 6	**Force, Mass and Acceleration**
Week 7	Relative Motion: Translating and Angular
Week 8	**Relative Motion: Translating and Angular**
Week 9	Rigid Bodies Motion

Week 10	Work and Energy
Week 11	Work and Energy
Week 12	Impulse and Momentum
Week 13	Impulse and Momentum
Week 14	Plaines of Bodies Motion
Week 15	Plaines of Bodies Motion
Week 16	

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	**J. L. Meriam** **L. G. Kraige**	Yes
Recommended Texts	John Wiley & Sons, Inc	yes
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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**English for Academic(Level 2)**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATU24035**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level		UGII	**Semester of Delivery**		3
Administering Department		PME	**College**		
Module Leader	Audai Hussein AL-Abbas		**e-mail**		
Module Leader's Acad. Title		Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Audai Hussein AL-Abbas		**e-mail**	aalabbas@atu.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**	5.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ATU24011	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To improve the level of students at this level in English using multiple means. 2. To understand the main rules of writing, especially for writing lab reports or graduation projects. 3. This course is concerned with presenting the main principles of the English language at this stage of study. 4. This course is concerned with introducing students to the main concepts of writing, reading, speaking and listening. 5. This course will raise the level of the student in the English language in all academic and general language modes, to be prepared for the next level.. 6. It will achieve the possibility for the student to write a short article as well as the ability to read for various scientific and general topics.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. know how *to use Present simple tense* and how to make questions and negative sentences . 2. know how *to use continuous Present tense* and how to make questions and negative sentences. 3. know how *to use past simple tense* and how to make questions and negative sentences. 4. Know how to use expressions of quantities for countable and uncountable nouns. 5. Know how to use verb patterns and forms for positive and negative sentences. 6. Know how to use comparative and superlative adjectives. 7. know how *to use present perfect tense* and how to make questions and negative sentences. 8. Know how to read academic and general articles and answer the questions. 9. Know how to use the strong and mild obligations. 10. Know how to use Active and Passive Voice for all tenses. 11. Know how to write essay for important topics. 12. Know how to speak about the general and academic topics.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Getting to know you**: Tenses - Questions Using a bilingual, dictionary, and Social expressions. [1 hr] **The way we live:** Present tenses, *have/have got* • Collocation- daily life • Making conversation. [1 hr] **It all went wrong:** Past tenses • Word formation • Time expressions. [1 hr] **Let's go shopping:** *much/many* • *some/any* • *a few, a little,a lot of* • Articles • Shopping • Prices. [1 hr] **What do you want to do?**: Verb patterns 1 • Future forms • Hot verbs • How do you feel? [1 hr] **Tell me! What's it like?**: *What…like?* • Comparatives and superlatives • Synonyms and antonyms • Directions . [1 hr] **Famous couples**: Present Perfect • *for,since* • Adverbs, word pairs • Short answers [1 hr] **Do's and Don'ts:** Have (got) to * should / must * words that go together * At the doctor [1 hr] **Going places:** Time if hot words in a hotel [1 hr] **Scared to death :** Verb patterns 2 - mange to, used to - -ed/-ing adjectives - exclamations [1 hr] **Things that changed the world:** Passives - verbs and nouns that go together - notices [1 hr] **Dreams and reality:** Second conditional - might – phrasal verbs - social expressions [1 hr] **Earning a living :** Present perfect continuous - word formation - adverbs - Telephoning [1 hr] **Love you and leave you:** Past perfect - reported statements - saying goodbye [1 hr] With all the topics above, the student is implicitly learnt the four different modules of the English language (speaking, listening, writing, and reading).

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in this lesson is to teach the student the main principles and rules used in constructing sentences that are used in different situations, and work to encourage students to write and speak in groups in order to raise language skills and improve listening skill as well. This will be achieved through interactive educational patterns and means, and by encouraging students to write about topics of interest to students.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	18	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	1
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	32	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	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**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	-	-	-	-
	Report	-	-	-	-
Summative assessment	**Midterm Exam**	2hr	30% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	*using Present simple tense* and how to make questions and negative sentences

Week 2	*using continuous Present tense* and how to make questions and negative sentences
Week 3	*using past simple tense* and how to make questions and negative sentences
Week 4	using expressions of quantities for countable and uncountable nouns
Week 5	using verb patterns and forms for positive and negative sentences
Week 6	using comparative and superlative adjectives
Week 7	Midterm exam
Week 8	reading academic and general articles and answer the questions
Week 9	using the strong and mild obligations
Week 10	using Active and Passive Voice for all tenses
Week 11	writing essay for important topics
Week 12	speaking about the general and academic topics
Week 13	*using present perfect tense* and how to make questions and negative sentences
Week 14	Talking in groups on different topics
Week 15	Listening to some video clips to improve knowledge of correct pronunciation
Week 16	**Preparatory week before the 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	New headway –English course by John and Liz Soars	Yes
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
	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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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electrical Engine**			**Module Delivery**	
Module Type	**S**			☒ **Theory** ☐ Lecture ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ATU24032				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	UGI		**Semester of Delivery**	3	
Administering Department	PEM		**College**	**TCM**	
Module Leader	**Reem Ibrahim Mohammed**		**e-mail**	**Reemdawai91@gmail.com**	
Module Leader's Acad. Title	**Assistant lecturer**		**Module Leader's Qualification**	**M.sc**	
Module Tutor	**N.A**		**e-mail**	**N.A**	
Peer Reviewer Name	**N.A**		**e-mail**	**N.A**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ATU24026	**Semester**	2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To develop problem solving skills and understanding of electrical motor theory through the application of techniques. 2. This course deals with the. Teaching the student, the principles of electrical machines and electronic devices that necessary for Power Mechanics engineer. 3. This course deals with the basic concept of electrical motors. 4. To understand Back e.m.f, speed equation, speed control 5. To understand the transistor as amplifier .
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	. 1. Recognize D.C motors, construction, commentator, types of D.C motors. 2. Starting of D.C motor, starter connection, torque of D.C motors. 3. Summarize to evaluate the starting current of D.C motor with and without starter, also for speed control. 4. Discuss the Speed characteristic for each type of induction motor. 5. Describe the Instruments and measurement, Sam meters, voltmeters, ohmmeters, kw-h meters 6. Define of Contactors, relays, timers. 7. Discuss. Transistor, construction, types, biasing, collector characteristic curves 8. describe Transistor as amplifier 9. Discuss Thermistor, construction, characteristic, silicon controlled rectifier. 10. Explain to SCR applications/1 in the area of power control input and output waveform 11. Explain to SCR applications/2 12. Explain to Diac, characteristics applications with SCR 13. Explain to Triac, characteristics applications with SCR. 14. Using thermistor as speed control – Amplifiers.
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. [15 hrs] AC circuits I – Time dependent signals, average and RMS values. Capacitance and inductance, energy storage elements, simple AC steady-state sinusoidal analysis. [15 hrs] AC Circuits II - Phasor diagrams, definition of complex impedance, AC circuit analysis with complex numbers. [10 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. [15 hrs] Revision problem classes [6 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. [15 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. [7 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 stabilization, voltage reference, power supplies. [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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
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)	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5

الحمل الدراسي غير المنتظم للطالب خلال الفصل			
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 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab. Report	1	10% (10)	Continuous	All
		1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	D.C motors, construction, commentator, types of D.C motors
Week 2	Back e.m.f, speed equation, speed control
Week 3	Starting of D.C motor, starter connection, torque of D.C motors
Week 4	Speed-torque characteristics of each type of D.C motor
Week 5	Examples to evaluate the starting current of D.C motor with and without starter, also for speed control.
Week 6	Single phase induction motor, split-phase, capacitor-start, shaded-pole type
Week 7	Speed characteristic for each type of induction motor
Week 8	3-phase induction motor, construction, synch. Speed
Week 9	Starting of 3-phase induction motor, star-delta method, step down transformer

Week 10	Torque characteristic, max torque
Week 11	3-phase system, star and delta connection, line current, line voltage, phase current and voltage
Week 12	Instruments and measurement, Sam meters, voltmeters, ohmmeters, kw-h meters
Week 13	Contactors, relays, timers
Week 14	Thermal overload, starter(contactor timer)
Week 15	Fuse, circuit breakers, types, choice
	Half-year Break
Week 16-17	Voltage drop in cables, calculation for choice the size of cable
Week 18	Diode, V-I characteristic, half –wave rectifier
Week 19	Full-wave rectifier, bridge and center-top transformer rectifier
Week 20	Transistor, construction, types, biasing, collector characteristic curves
Week 21	Saturation, active, break-down region. Cutoff region
Week 22	Transistor as amplifier
Week 23	Transistor as electronic switch
Week 24	Thermistor, construction, characteristic, silicon controlled rectifier
Week 25	SCR applications/1 in the area of power control input and output waveform
Week 26	SCR applications/2
Week 27	Diac, characteristics applications with SCR
Week 28	Triac, characteristics applications with SCR
Week 29	Triac as voltage regulator
Week 30	Using thermistor as speed control - Amplifiers

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered / Lab. Experiment Assignments
Week 6	Diode characteristic
Week 12	Zener diode
Week 18	Diode characteristic
Week 19	Half –wave rectifier
Week 20	Full-wave rectifier

Week 21	Transistor collector characteristic curves

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education	Yes
Recommended Texts	DC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2020, dissidents.	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

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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	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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Fluid Mechanics -static**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lab** ☐ **Tutorial**	
Module Code	**ATU24031**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGII		**Semester of Delivery**	3	
Administering Department	PME		**College**	MTC	
Module Leader	Akeel Abbas Mohammed		**e-mail**	Dr.akeelabbas@atu.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**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 Objectives أهداف المادة الدراسية	1. To cover the basic principles and equations of fluid mechanics 2. To present numerous and diverse real-world engineering examples to give students a feel for how fluid mechanics is applied in engineering practice. 3. To develop an intuitive understanding of fluid mechanics by emphasizing the physics, and by supplying attractive figures and visual aids to reinforce the physics .
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Introduce many of the quantities encountered in fluid mechanics including their dimensions and units. 2. Establish the variation of pressure in a fluid at rest. 3. Learn how to use manometers to measure pressure. 4. Calculate forces on plane and curved surfaces including buoyant forces. 5. Determine the stability of submerged and floating objects. 6. Calculate pressures and forces in accelerating and rotating containers. 7. Present numerous examples and problems that demonstrate how pressures and forces are calculated in fluids at rest. 8. Derive the Bernoulli equation and identify its restrictions.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part 1** **Introduction** The Concept of a Fluid **,** The Fluid as a Continuum, Dimensions and Units , Properties of the Velocity Field , Thermodynamic Properties of a Fluid , Viscosity and Other Secondary Properties . **Part 2** **Pressure Distribution in a Fluid** Pressure and Pressure Gradient , Equilibrium of a Fluid Element, Hydrostatic Pressure Distributions, Application to Manometry , Hydrostatic Forces on Plane Surfaces, Hydrostatic Forces on Curved Surfaces, Hydrostatic Forces in Layered Fluids, Buoyancy and Stability , Pressure Distribution in Rigid-Body Motion, Pressure Measurement. **Part 3** INTRODUCTION TO FLUIDS IN MOTION Description of Fluid Motion , Classification of Fluid Flows , The Bernoulli Equation, Applications of the Bernoulli Equation

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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction - The Concept of a Fluid **,** The Fluid as a Continuum, Dimensions and Units

Week 2	Properties of the Velocity Field , Thermodynamic Properties of a Fluid
Week 3	Viscosity and Other Secondary Properties .
Week 4	Pressure and Pressure Gradient , Equilibrium of a Fluid Element
Week 5	Hydrostatic Pressure Distributions, Application to Manometry
Week 6	Hydrostatic Forces on Plane Surfaces
Week 7	Mid-term Exam
Week 8	Hydrostatic Forces on Curved Surfaces
Week 9	Hydrostatic Forces in Layered Fluids
Week 10	Buoyancy and Stability
Week 11	Pressure Distribution in Rigid-Body Motion, Pressure Measurement.
Week 12	INTRODUCTION TO FLUIDS IN MOTION
Week 13	Classification of Fluid Flow
Week 14	The Bernoulli Equation,
Week 15	Applications of the Bernoulli Equation
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Pressure measurment
Week 2	Lab 2: Determine the Viscosity of different liquids
Week 3	Lab 3: Determine the Center of pressuer of Partial Immersion body
Week 4	Lab 4: Determine the Center of pressuer of Compelet Immersion body
Week 5	Lab 5: Verify the Bernoulli Equation.
Week 6	Lab 6: Impact of jet
Week 7	Lab 7: Reynold's Numbe for different flow

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Fluid Mechanics, Frank M. White, Seventh Edition	Yes
Recommended Texts	Mechanics of Fluids, Fourth Edition, Merle C. Potter	Yes
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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Mathematics -III			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lecture** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATU24036**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	UGI		**Semester of Delivery**	3	
Administering Department	PME		**College**	TCM	
Module Leader	Entsear Khlalel		**e-mail**	entsar_kl@atu.edu.iq	
Module Leader's Acad. Title	Asst.Lecturer		**Module Leader's Qualification**	M.sc	
Module Tutor	Name (if available)		**e-mail**	None	
Peer Reviewer Name	None		**e-mail**	None	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ATU24022	**Semester**	2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To develop problem solving skills and understanding of mathematics, engineering, and the natural sciences through the application of algebra and trigonometry concepts. 2. To understand vector and applications. 3. This course deals with the basic concept of derivation of functions. 4. This is the basic subject for all method of integration methods.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize different types of functions and their behavior in science topics. 2. List the various lows associated with limits of function. 3. Summarize what is meant by a basic electric circuit. 4. Discuss the domain and range of many types of functions. 5. Describe logarithmic, exponential, and trigonometric functions. 6. Identify the basic definition of derivatives and their applications. 7. Discuss the various methods of integration process to traditional and special types of functions.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. None

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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
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)	62	**Unstructured SWL (h/w)**	4

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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% (10)	3,5,10 and 12	LO #1, #2 and #10, #11
	Assignments	4	20% (10)	5,7, 9and 13	LO #3, #4 and #6, #7
	Projects / Lab.	0	10% (10)	-----	----
Summative assessment	**Report**	1	10% (10)	13	LO #5, #8 and #10
	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1-2	The chain rule for functions of two variables
Week 3	The directional derivative
Week 4-5	Multiple Integrals
Week 6	Application of double integrals
Week 7	Volume by double integrals
Week 8	Tripe integrals
Week 9	Differential equations
Week 10-11	First order differential equation

Week 12	Second order linear homogenous equation with constant coefficient
Week 13	Nonhomogeneous second order differential equation with constant coefficient
Week 14-15	Matrices and system of equation
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Thomas' Calculus Thirteenth Edition, George B. Thomas, Jr. Cenveo® Publisher Services.2013	Yes
Recommended Texts	Higher Engineering Mathematics, Fifth Edition John Bird, BSc(Hons), by Published by Elsevier Ltd.2006	No
Websites	None	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mechanical Engineering Drawing**			**Module Delivery**	
Module Type	**S**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATU24033**				
ECTS Credits	4				
SWL (hr/sem)	**150**				
Module Level		**UGII**	**Semester of Delivery**		3
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Hani Mizhir Majid		**e-mail**	hani_magid@yahoo.com	
Module Leader's Acad. Title		Assis. Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**ATU24025**	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1- To understand the basics of mechanical drawing and enhance the ability of students in problem-solving skills through some application of techniques. 2- To teach the student how to connect many parts to form one assembly, then estimate the cross-sectional view and others' views. 3- To study the tolerance and fit relation between the parts. 4- To teach the student the basic of Auto CAD in mechanical drawing.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Describe the criteria used for connecting many mechanical parts according to the dimensional fit. 2. Explain the importance of using symbols and machining signs to define mechanical operations. 3. Draw any engineering drawing using any Version of AutoCAD Program 4. Explain the connection methods in 3D form by using CATIA software. 5. Identify the dimensional relationship between the assembly parts by using fit and Tolerance tables.
Indicative Contents المحتويات الإرشادية	The content includes the following: **Part A – Connection methods, Welding symbols, and operation signs** Introduction to Mechanical Engineering drawing, Connection methods (bolts, studs and nuts, key, rivets, spring). Welding and weld symbols, Surface finishing, Gears (bevel gear, warm gear, spur gear), Fit, and tolerance. **Part B – Assembly drawing** Detail drawing, Assembly drawing and working drawing, Application in ACD.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The adopted strategy for this module is to enhance the student's ability, and increase their understanding, skills, and expand their critical thinking skills. Students will participate in the exercises, while at the same time will be able to achieve interactive tutorials by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	**87**	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	**4**
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	**63**	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	**2**

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	**Assignments**	25	25% (25)	Continuous	LO #1, #2 and #10, #11
	Evaluation	1	10% (10)	Continuous	LO #3, #4 and #6, #7
	Midterm Exam	2hr	15% (15)	7	All
					LO #5, #8 and #10
Summative assessment					LO #1 - #7
	Final Exam	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Mechanical Engineering Drawing, Connection methods bolts, studs and nuts, key, rivets, spring).
Week 2	Connection methods (bolts, studs and nuts, key, rivets, spring).
Week 3	Connection methods bolts, studs and nuts, key, rivets, spring).
Week 4	Welding and weld symbols
Week 5	Welding and weld symbols , Surface finishing
Week 6	Fit and tolerance
Week 7	Gears (bevel gear, warm gear, spur gear)
Week 8	Assembly drawing and working drawing
Week 9	Assembly drawing and working drawing
Week 10	Assembly drawing and working drawing
Week 11	Assembly drawing and working drawing
Week 12	Assembly drawing and working drawing
Week 13	Assembly drawing and working drawing
Week 14	Application in ACD

Week 15	Application in ACD

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Textbook 2: AutoCAD 2D Tutorials, AutoCAD 2013, By Kristen S. Kurland, 2012.	No
Recommended Texts	Manual of Engineering Drawing. The second edition By: Colin H Simmons and Dennis E Maguire	No
Websites	https:// www.mhhe.com	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Fundamental of thermodynamics			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ATU24034				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	UGII		**Semester of Delivery**	3	
Administering Department	PME		**College**	TCM	
Module Leader	Ali Aziz Abbas		**e-mail**	dr.ali.aljanabi@atu.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**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 Objectives أهداف المادة الدراسية	1. To understanding the basic principles and concept of thermodynamics. 2. To understand the kinds of energy, process , system, cycles, power, pure substance , ideal gas . 3. To teach the student how to use the steam table . 4. This course deals with the basic concept of heat and work. 5. To present a wealth of real-world engineering examples to give students a feel for how thermodynamics is applied in engineering practice 6. To develop an intuitive understanding of thermodynamics by emphasizing the physics and physical arguments. 7. This is the basic subject for gas and vapor power cycles.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. List the various terms in the thermodynamic science . 2. Summarize what is meant by a basic concept of thermodynamics 3. Summarize the first law of thermodynamics. 4. Draw the p-v diagram of constant pressure (phase change process of a pure substance at various pressure) 5. Explain the phase change process of pure substance. 6. List the kinds of work.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Basic concept for thermodynamics Introduction , unites, temperature, pressure, thermodynamics system, type so system, state , process, phase, forms of energy. Properties of pure substance , phase-change process for pure substance, using steam table, compressed liquid. Saturated liquid , mixture, saturate d vapor, superheated and ideal gas and solve problems. First law of thermodynamics (closed system), heat transfer , work, kind of work, processes , specific heat and solve problems. First law of thermodynamics (control volume), conservation of mass principle , conservation of energy principle, open system, steady state ,

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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
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	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**	2	10% (10)	5 and 10	LO #1, #3 and #6, #9
	Assignments	2	10% (10)	4 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introductions, references, units
Week 2	The basic concept of thermodynamics
Week 3	Properties of Pure Substances
Week 4	Properties of Pure Substances
Week 5	Use of steam table
Week 6	Examples on steam tables
Week 7	The ideal gas equation of state
Week 8	Forms of Energy
Week 9	The first law of thermodynamics in closed system
Week 10	Mechanical forms of work
Week 11	Energy analysis for closed system (Processes)
Week 12	First law of thermodynamics in closed system
Week 13	Specific heat (internal energy, enthalpy and specific hat of ideal gases)
Week 14	Mass and Energy Analysis of Control Volumes
Week 15	Some Steady-Flow Engineering Devices
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: : Types of temperature measurements
Week 2	
Week 3	Lab 2: Boyles Law
Week 4	
Week 5	Lab 3: Jarales's law
Week 6	
Week 7	Lab 7: The ratio between the two specific heats of a gas γ

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Thermodynamic an engineering approach , eight edition , Yunus A. Cengel and Michael A. Boles	NO
Recommended Texts	Applied thermodynamics for engineering technologists, A. Mc Conky and T.D. Eastop	No
Websites	https://www.amazon.com/Thermodynamics-Engineering-Approach-Textbook-Hardcover/dp/B0722G5SQC	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Fluid Mechanics –Daynamics**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lab** ☐ **Tutorial**	
Module Code	**ATU24041**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	2		**Semester of Delivery**	2	
Administering Department	PME		**College**	MTC	
Module Leader	Akeel Abbas Mohammed		**e-mail**	Dr.akeelabbas@atu.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Fluid Mechanics -statics	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To cover the basic principles and equations of fluid mechanics 2. To present numerous and diverse real-world engineering examples to give students a feel for how fluid mechanics is applied in engineering practice. 3. To develop an intuitive understanding of fluid mechanics by emphasizing the physics, and by supplying attractive figures and visual aids to reinforce the physics .
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Mathematically describe the motion of a fluid. 2. Express the acceleration and vorticity of a fluid particle given the velocity 3. components. 4. Describe the deformation of a fluid particle. 5. Classify various fluid flows. Is a flow viscous, is it turbulent, is it incompressible, is it a uniform flow? 6. Derive the Bernoulli equation and identify its restrictions. 7. Establish the parameters necessary to guide experimental studies. 8. Present the technique used to apply the results of model studies to prototypes for a variety of flow situations. 9. Extract the flow parameters from the differential equations and boundary conditions used to guide computational studies.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part 1** Description of Fluid Motion, Lagrangian and Eulerian Descriptions of Motion Angular Velocity and Vorticity, Classification of Fluid Flows, Viscous and Inviscid Flows, Laminar and Turbulent Flows, Incompressible and Compressible Flows, The Bernoulli Equation **Part 2** MOMENTUM ANALY S I S O F FLOW SYSTEMS NEWTON'S LAWS AND CONSERVATION OF MOMENTUM, THE LINEAR MOMENTUM EQUATION, Steady Flow, Flow with No External Forces, THE ANGULAR MOMENTUM EQUATION. **Part 3** Dimensional Analysis Review of Dimensions, Buckingham p-Theorem, Common Dimensionless Parameters, Similitude, Confined Flows , Free-Surface Flows, High-Reynolds-Number Flows, Compressible Flows, Periodic Flows, Normalized Differential Equations

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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Description of Fluid Motion, Lagrangian and Eulerian Descriptions of Motion

Week 2	Angular Velocity and Vorticity.
Week 3	Classification of Fluid Flows
Week 4	the Bernoulli EquationPart 2
Week 5	THE LINEAR MOMENTUM EQUATION, Steady Flow
Week 6	Flow with No External Forces
Week 7	Mid-term Exam
Week 8	THE ANGULAR MOMENTUM EQUATION.
Week 9	Dimensional Analysis, Review of Dimensions
Week 10	Buckingham p-Theorem
Week 11	Common Dimensionless Parameters
Week 12	Similitude
Week 13	Confined Flows , Free-Surface Flows, High-Reynolds-Number Flows,
Week 14	Compressible Flows, Periodic Flows
Week 15	Normalized Differential Equations
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: The type of flow
Week 2	Lab 2: surface tension
Week 3	Lab 3: Flow in open channel
Week 4	Lab 4: Friction factor
Week 5	Lab 5: The energy losses in pipe
Week 6	Lab 6: Fthe velocity of flow
Week 7	Lab 7: balance of bouncy body

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Fluid Mechanics, Frank M. White, Seventh Edition	Yes
Recommended Texts	Mechanics of Fluids, Fourth Edition, Merle C. Potter	Yes
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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Mathematics -IV			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lecture** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATU24043**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	UGII		**Semester of Delivery**	4	
Administering Department	PME		**College**	TCM	
Module Leader	Entsear Khlalel		**e-mail**	entsar_kl@atu.edu.iq	
Module Leader's Acad. Title	Asst.Lecturer		**Module Leader's Qualification**	M.sc	
Module Tutor	Name (if available)		**e-mail**	None	
Peer Reviewer Name	None		**e-mail**	None	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ATU24036	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To develop problem solving skills and understanding of mathematics, engineering, and the natural sciences through the application of algebra and trigonometry concepts. 2. To understand vector and applications. 3. This course deals with the basic concept of derivation of functions. 4. This is the basic subject for all method of integration methods.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize different types of functions and their behavior in science topics. 2. List the various lows associated with limits of function. 3. Summarize what is meant by a basic electric circuit. 4. Discuss the domain and range of many types of functions. 5. Describe logarithmic, exponential, and trigonometric functions. 6. Identify the basic definition of derivatives and their applications. 7. Discuss the various methods of integration process to traditional and special types of functions.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. None

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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
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)	62	**Unstructured SWL (h/w)**	4

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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% (10)	3,5,10 and 12	LO #1, #2 and #10, #11
	Assignments	4	20% (10)	5,7, 9and 13	LO #3, #4 and #6, #7
	Projects / Lab.	0	10% (10)	-----	----
Summative assessment	**Report**	1	10% (10)	13	LO #5, #8 and #10
	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1-2	The chain rule for functions of two variables
Week 3	The directional derivative
Week 4-5	Multiple Integrals
Week 6	Application of double integrals
Week 7	Volume by double integrals
Week 8	Tripe integrals
Week 9	Differential equations
Week 10-11	First order differential equation

Week 12	Second order linear homogenous equation with constant coefficient
Week 13	Nonhomogeneous second order differential equation with constant coefficient
Week 14-15	Matrices and system of equation
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Thomas' Calculus Thirteenth Edition, George B. Thomas, Jr. Cenveo® Publisher Services.2013	Yes
Recommended Texts	Higher Engineering Mathematics, Fifth Edition John Bird, BSc(Hons), by Published by Elsevier Ltd.2006	No
Websites	None	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Metallurgy			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATU24042**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	UGII		**Semester of Delivery**	4	
Administering Department	PME		**College**	TCM	
Module Leader	Awham Jumah Salman		**e-mail**	awhamj@atu.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Ammar Mishhad Jabbor		**e-mail**	Maralmmwry55@gmail.com	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**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 Objectives أهداف المادة الدراسية	1- To know the mechanical and physical properties of metals. 2- To study of the mechanism of mechanical examinations of metals. 3- To study of the mechanism of solidification in molten metals. 4- To study thermal equilibrium diagrams and focusing on the iron-carbon diagram. 5- To knowledge of types heat treatments of steel.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Recognize the mechanical and physical properties of metals. 2- Recognize the proceedings the mechanical examinations of metals. 3- Summarize what is meant solidification in molten metals. 4- Discuss the types of thermal equilibrium diagrams 5- Describe the iron-carbon phase diagram 6- Recognize the corrosion in metals
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – mechanical properties of metals</u> Specifications and standards, Normal stress and shear stress, Strain, Tensile Test, Elastic Deformation, stress –strain behavior, Hardness (Vickers, Brinell, Rockwell) tests, Impact Tests, <u>Part B - Phase Diagrams, Cooling Curves,Solidifications</u> Solid Solutions, The Rules of Hume- Rothery, Two Metals are soluble in each other in liquid state, but completely insoluble in the solid state, Completely Soluble in liquid state and partially Soluble in the solid state and Chemical Compound is Not Found, Solidification of metals, types of Cast Iron. <u>Part C- Heat Treatments of Carbon Steel</u> Annealing, Normalizing, Spheroidization, Hardening, T.T.T. Diagrams Tempering, Austempering, Martempering, Pearlitic process., Spheroidal graphite cast iron. Aging and precipitation hardening Al-Si, Al-Mg and Al-Cu alloys. <u>Part D- corrosion</u> Types of corrosion materials, Corrosion Prevention

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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Mechanical properties of metals - Specifications and standards - Normal stress and shear stress - Strain
Week 2	-Tensile Test -Hardness tests -Impact Tests
Week 3	-Creep Tests -Fatigue Tests

	-Modes of Failure Analysis
Week 4	-Phase Diagrams, Cooling Curves, Solidifications -Solid Solutions, The Rules of Hume- Rothery
Week 5	-Two Metals are soluble in each other in liquid state, but completely insoluble in the solid state
Week 6	Completely Soluble in liquid state and partially Soluble in the solid state and Chemical Compound is Not Found.
Week 7	Steel Making Effect of Carbon on Mechanical Properties of Carbon Steel.
Week 8	Heat Treatments of Carbon Steel. Annealing, Normalizing,
Week 9	Spheroidization, Hardening
Week 10	T.T.T. Diagrams Tempering
Week 11	Ferrous Alloys Alloy Steels Cast Iron
Week 12	-malleable cast iron, - Black-heart process, - White-heart process, - Pearlitic process. Spheroidal graphite cast iron.
Week 13	Non _ Ferrous Alloys Aluminum and Its Alloys Copper and Its Alloys
Week 14	- Aging and precipitation hardening Al-Si, Al-Mg and Al-Cu alloys.
Week 15	- Corrosion, Types of corrosion materials - Corrosion Prevention
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Tensile test
Week 2	Compression Test
Week 3	Hardness tests
Week 4	Impact Tests
Week 5	Preparation of Specimens for Microscopical Examination Microscopic Technique for Cast Iron
Week 6	Heat Treatments of Carbon Steel. - Annealing
Week 7	Heat Treatments of Carbon Steel. - Hardening

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Materials Science and Engineering An Introduction William D. Callister, Jr. David G. Rethwisch, eight edition , 2007	No
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
	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.

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	**ATU24044**				
ECTS Credits	6				
SWL (hr/sem)	**125**				
Module Level		**UGII**	**Semester of Delivery**		4
Administering Department		PEM	**College**		TCM
Module Leader	Hani Mizhir Majid		**e-mail**		hani_magid@yahoo.com
Module Leader's Acad. Title		Assis. Professor	**Module Leader's Qualification**		**Ph.D**
Module Tutor	Name (if available)		**e-mail**		E-mail
Peer Reviewer Name		Name	**e-mail**		E-mail
Scientific Committee Approval Date		12/06/2023	**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 Objectives أهداف المادة الدراسية	1. To understand the basic theories of the Strength of Materials theories and develop a method in problem-solving skills through some application of techniques. 2. To understand the important material properties and their effects on material strength. 3. To lay out a procedure that enables students to calculate and solve the exercises in this course.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Describe the criteria used in specifying the material's strength. 2. Explain the importance of calculating stress-strain effects on material failure. 3. Identify the effect of the stress concentration and its effects on the material's strength. 4. Discuss the principle of failure mode due to the effects of thermal stresses. 5. Explain the effects of stiffness, hooks law, strain, and strain ratio on the material behavior. 6. Identify the principle of the poison ratio.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A – Principals in the strength of material's** Introduction to Analysis of internal forces, Simple stress, Shearing, Bearing, Tearing stresses, Simple strain, Stress-strain diagram, Hook's law, axial deformation, Shearing force & bending moment, S.F. & B.M. diagrams. **Part B – Fundamentals Applications** Stresses in beams, Beam deflections, Deflection in simply supported beams, Deflection of cantilever beams, Columns, Critical load for columns, Buckling in columns, Combined stresses, Mohr's circle, and Application of Mohr's circle. **Part C – Experimental Test** Torsion test, Bending test, Hardness test.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The adopted strategy for this module is to enhance the student's ability and increase their understanding of calculations skills and expand their critical thinking skills. Students will participate in the exercises, while at the same time will be able to achieve interactive tutorials by considering types of simple experiments involving some sampling activities that are interesting to the students. Also, Students will join the lab to do some experiments and tests.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
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 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	Continuous	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to the Strength of Materials. Analysis of internal forces.
Week 2	Simple stress, Shearing, bending, Bearing stresses.
Week 3	Thermal stresses
Week 4	Simple strain, Stress-strain diagram, Hook's law, axial deformation.
Week 5	Poisons ratio
Week 6	Torsion of circular shift, Shearing force & bending moment
Week 7	Bending moment, S.F. & B.M. diagrams
Week 8	Shearing force & bending moment
Week 9	Bending with torsion

Week 10	Stresses in beams, and Beam deflections
Week 11	Deflection in simply supported beams
Week 12	Critical load for columns
Week 13	Buckling in columns, Combined stresses
Week 14	Mohr's circle, Application of Mohr's circle
Week 15	Mohr's circle, Application of Mohr's circle

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	**Mechanics of Materials. Eighth Edition** **By:** **R.C. HIBBELER**	No
Recommended Texts	**STRENGTH OF MATERIALS** **By:** **F.L.Singer , and A.Pytel**	No
Websites	https://www.academia.edu/9407986/_Strength_of_Materials_4th_Edition_by_Ferdinand_L_Singer_and_Andrew_Pytel_	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Thermodynamic - Applications			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ATU24046				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGII		**Semester of Delivery**	4	
Administering Department	PME		**College**	TCM	
Module Leader	Ali Aziz Abbas		**e-mail**	dr.ali.aljanabi@atu.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**PME214**	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To understanding the basic principles and concept of thermodynamics. 2. To understand the kinds of energy, process , system, cycles, power, pure substance , ideal gas . 3. This course deals with the basic concept of heat and work. 4. To present a wealth of real-world engineering examples to give students a feel for how thermodynamics is applied in engineering practice 5. To develop an intuitive understanding of thermodynamics by emphasizing the physics and physical arguments. 6. This is the basic subject for gas and vapor power cycles. 7. Teaching students how to work the heat engine in thermal power plants
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Draw the diagram for heat engine. 2. List the main components of heat engine. 3. list the main component of refrigerator . 4. write the law of unsteady state process. 5. Define the Clausius statement. 6. Discuss the Air standard Cycles. 7. Draw the T-s diagram for Rankine cycle. 8. Explain the phase change process of pure substance.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Energy Analysis of Unsteady-Flow Processes The second law of thermodynamics (heat engines, refrigerators , heat pump) and solve problems Entropy, the entropy change in pure substance , the entropy change in ideal gas, adiabatic(isentropic) process and solve problems Cycles, gas power cycle, vapor power cycle, otto cycle, diesel cycle, Rankine cycle, Brayton cycle and solve problems

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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
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	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**	2	10% (10)	5 and 10	LO #3, #5 and #9, #6
	Assignments	2	10% (10)	4 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Energy Analysis of Unsteady-Flow Processes
Week 2	Energy Analysis of Unsteady-Flow Processes
Week 3	The Second law of Thermodynamics, Heat engine
Week 4	Refrigerators
Week 5	Heat Pumps
Week 6	Carnot cycle
Week 7	Entropy, for ideal gas and for vapour
Week 8	Entropy, for ideal gas and for vapour
Week 9	Air standard Cycles,
Week 10	Otto cycle
Week 12	Diesel cycle
Week 13	Dual cycle
Week 14	Brayton's cycle
Week 15	Steam power plants- Rankin Cycle
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: The relationship between pressure and saturation temperature of water vapor
Week 2	
Week 3	Lab 2: **Saybolt viscometer**
Week 4	
Week 5	Lab 3: Sensible heat and latent heat
Week 6	Lab 4: specific heat
Week 7	Lab 5: Heat pump

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Thermodynamic an engineering approach , eight edition , Yunus A. Cengel and Michael A. Boles	NO
Recommended Texts	Applied thermodynamics for engineering technologists, A. Mc Conky and T.D. Eastop	No
Websites	https://www.amazon.com/Thermodynamics-Engineering-Approach-Textbook-Hardcover/dp/B0722G5SQC	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Analysis**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATU24053**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	UGIII		**Semester of Delivery**	5	
Administering Department	PME		**College**	TCM	
Module Leader	Fadhil Abid Elaiwi		**e-mail**	fadhil.alrubaiy@atu.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	ATU24043
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To develop differential equation solving skills and understanding their applications in mathematics, engineering, and the natural sciences. 2. To understand types of differential equations, their orders and degrees. 3. This course deals with the basic concept Laplace transforms. 4. To understand Fourier series and their applications in solving many types of differential equations.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Define a differential equation – first-order, second-order, general solution, particular solution, boundary conditions. 2. List the various methods associated with solving first and second order equations. 3. Recognize and solve a homogeneous differential equation 4. Recognize and solve a linear differential equation. 5. Understand the procedure to solve simultaneous differential equations using Laplace transforms. 6. Solve simultaneous differential equations using Laplace transforms
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – First order differential equations</u> - Separation of variables, homogeneous equations, Bernoulli equations and finally exact differential equations. Revision problem classes. <u>Part B – Second order differential equations</u> - Special types of second order, homogeneous equations, and non- homogeneous equations. Revision problem classes. <u>Part C – Laplace transforms</u> Laplace transforms for some functions and the inverse of Laplace technique in solving differential equations. - Revision problem for homework and assessment tests. <u>Part – Fourier series</u> Solve of ODES using series. - Revision problem for homework and assessment tests.

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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
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% (10)	3,5,9and 10	LO #1, #2 and #10, #11
	Assignments	4	20% (10)	4,8,11 and 14	LO #3, #4 and #6, #7
	Projects / Lab.				
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	First order differential equations
Week 2	Applications on first order D.E
Week 3	Special cases of first order D.E
Week 4	Second order linear equation with constant
Week 5	Applications on S.O.D.E
Week 6	High classes linear equation
Week 7	Applications on high classes equation
Week 8	Fourier series
Week 9	9 Double and single functions
Week 10	10 Applications
Week 11	11 Laplace transformation
Week 12	12 Laplace transformation
Week 13	Inverse Laplace transformation
Week 14	Inverse Laplace transformation
Week 15	Applications
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Higher Engineering Mathematics, 7th Edition John Bird, BSc(Hons), by Published by Elsevier Ltd.2010	No
Recommended Texts	Advanced Engineering Mathematics, ERWIN KREYSZIG John Wiley &Sons INC.2011	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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Gas Dynamics**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐**Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATU24054**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGIII	**Semester of Delivery**		5
Administering Department		PME	**College**	*TCM*	
Module Leader	Atheer Saleh Hassoon		**e-mail**	atheer.hassoon@atu.edu.iq	
Module Leader's Acad. Title		Assistant. Lecturer	**Module Leader's Qualification**		M.sc
Module Tutor	Nona		**e-mail**	Nona	
Peer Reviewer Name		Name	**e-mail**	Nona	
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Thermodynamics	**Semester**	PME226
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To learn about the basic concept and importance of Gas dynamics. 2. To understand the physical origin of the equations of compressible one-dimensional flows. 3. To understand the concept of Mach number, and how it relates to compressibility effects, typical flow properties, and wave propagation. 4. To understand the phenomena of shock, Fanno and Rayleigh flows. 5. To formulate and solve problems in one -dimensional steady compressible

	flow. 6. To teach students to analyze or compute one-dimensional and quasi-one-dimensional flows in typical applications such as supersonic wind tunnels, rocket nozzles, and shock tubes.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Upon completion of the course, students will be able to: 2. Formulate and solve problems in one -dimensional steady compressible flow including: isentropic nozzle flow, constant area flow with friction (Fanno flow) and constant area flow with heat transfer (Rayliegh flow). 3. Derive the conditions for the change in pressure, density and temperature for flow through a normal and oblique shocks. 4. Understand the relationship between inviscid and isentropic flows for typical compressible flows, the major limitations of isentropic and inviscid flows, and the effect of irreversibility and viscous effects on entropy. 5. Understand flow of adiabatic in wind tunnel. 6. Understand the concept of Mach number, and how it relates to compressibility effects, typical flow properties, and wave propagation. 7. Understand basic principles of jet and rocket propulsions.
Indicative Contents المحتويات الإرشادية	Nona

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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
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	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	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
Summative assessment	Report	1	10% (10)	13	LO #5, #8 and #10
	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Flow and Thermodynamic Properties
Week 2	Equations of flow and isentropic flow in variable and constant area ducts
Week 3	Equations of flow and isentropic flow in variable and constant area ducts
Week 4	Subsonic and supersonic flow into convergence and divergent nozzles
Week 5	Supersonic and subsonic diffusers, and Efficiencies analysis
Week 6	Thermodynamic and Flow analysis of normal shock waves
Week 7	First Exam
Week 8	Shock waves in convergent and convergent-divergent nozzles
Week 9	Oblique shock wave
Week 10	Flow with heat interaction: Analysis of Rayleigh Line Flows
Week 11	Supersonic and subsonic flows with heat interaction in constant area ducts
Week 12	Supersonic and subsonic flows with heat interaction in variable area ducts
Week 13	Adiabatic flow
Week 14	Jet propulsion- Rocket engine
Week 15	Second Exam
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered

Week 1	Lab 1: Introduction to compressible flow
Week 2	Lab 2: Mach number/ compressible flow Laws
Week 3	Lab 3: Compressible flow in convergent duct
Week 4	Lab 4: Compressible flow in divergent duct
Week 5	Lab 5: Convergent-divergent duct
Week 6	Lab 6: Fanno and Rayleigh flow

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Gas Dynamics, E. Rathakrishnan, PHI Learning Pvt. Ltd., Aug 1, 2004	Yes
Recommended Texts	1. Gas Dynamics, M.H.Aksel and O.C.Eralp, , Prentice-Hall, 1993. 2. – Fundamentals Of Compressible Fluid Dynamics, P. Balachandran	No
Websites	Nona	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Heat Transfer (conduction)**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATU24055**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGIII		**Semester of Delivery**	5	
Administering Department	**PME**		**College**	Type College Code	
Module Leader	Rana Ali Hussein		**e-mail**	ranaa.h.78@atu.edu.iq	
Module Leader's Acad. Title	Assistance Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**		

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 Objectives أهداف المادة الدراسية	1. Model basic heat transfer processes and identify modes 2. Calculate thermal resistances 3. Perform an energy balance to determine temperature and heat flux 4. Identify fins and calculate fin performance 5. Use shape factors for 2-D conduction 6. Solve lumped parameter transient heat transfer problems 7. Solve distributed parameter transient heat transfer problems
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1• Formulate basic equation for heat transfer problems. 2• Apply heat transfer principles to design and to evaluate performance of thermal systems. 3• Solve differential and algebraic equations associated with thermal systems using analytical and numerical approaches. 4• Calculate and evaluate the impacts of initial and boundary conditions on the solutions of a particular heat transfer problem. 5• Evaluate the relative contributions of different modes of heat transfer.
Indicative Contents المحتويات الإرشادية	**Introduction to heat transfer**, Modes of heat transfer (conduction, convection and radiation **One dim. steady state conduction**, Plane wall **One dim. steady state conduction,** Cylindrical system, Spherical system **One dim. steady state conduction**, Overall heat transfer coefficient, Insulations and composite walls, Critical thickness of insulation **One dim. steady state conduction**, Heat source systems **One dim. steady state conduction**, Extended surface **Steady state multi dim. conduction** , Analytical solution(separation of variable) **Steady state multi dim. conduction**, shape factor **Steady state multi dim. Conduction**, Numerical solution (finite difference) **Unsteady state conduction**, Biot's number, Lumped heat-Capacity system , Semi-infinite bodies **Unsteady state conduction**, Heisler charts , Numerical solution (finite difference)

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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction, Basics of Heat Transfer, Heat Transfer mechanisms.
Week 2	Steady State one dimensional Heat Conduction Equation in a Large Plane Wall
Week 3	Steady State one dimensional Heat Conduction Equation in a Cylinder and sphere.
Week 4	Conduction through Multilayer Plane Wall, Cylinder and Sphere.
Week 5	Conduction through Multilayer Plane Wall, Cylinder and Sphere.
Week 6	Over all Heat Transfer Coefficient.
Week 7	Critical Radius of Insulation
Week 8	Thermal Contact resistance.
Week 9	The Fins
Week 10	The Fins
Week 11	Fin Efficiency, Fin Effectiveness
Week 12	Transient Heat Conduction, (Lumped System Analysis)
Week 13	Two-Dimensional Steady Heat Conduction, Numerical analysis.
Week 14	Two-Dimensional Steady Heat Conduction, Numerical analysis.
Week 15	Two-Dimensional Transient Heat Conduction
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Temperature Measurement unit
Week 2	Lab 2: Thermal conductivity of metal
Week 3	Lab 3: Thermal Conductivity of Liquids and Gases
Week 4	Lab 4: Heat transfer through composite wall
Week 5	Lab 5: Heat transfer from a fin
Week 6	Lab 6: Heat transfer in two dimension
Week 7	Lab 7: Unsteady state heat transfer

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Heat transfer: A practical approach By Yunus A.Cengel	Yes
Recommended Texts	Heat Transfer by J. P. HOLMAN.	No
Websites	https://study.com/academy/lesson/mechanisms-of-heat-transfer-conduction-convection-radiation.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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Hydraulic**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ATU24051				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGIII		**Semester of Delivery**	5	
Administering Department	PME		**College**	TCM	
Module Leader	Malik N.Hawas		**e-mail**	Com.mlk@atu.edu.iq	
Module Leader's Acad. Title	Assist. Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**ATU24041**	**Semester**	FOUR
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Teaching the student, the basic principle of hydraulics. 2. To understand flow and types of flow. 3. This course deals with the basic concept of hydraulic. 4. To understand pipe network. 5. To understand the Boundary layer flow and flow in pipes 6. To perform the important applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how hydraulic plant work. 2. List the various types of flow. 3. Summarize what is flow in pipe and pipe network. 4. Discuss the influence of jet and nozzle on flow. 5. Describe Hydraulic gradient and total energy line. 6. Define Momentum equation. 7. Identify the Condition for maximum power transmitted through nozzle.. 8. Discuss the Water hammer in pipes.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' 1- participation in the exercises, 2- refining and expanding their critical thinking skills by discussion in class and lab. 3- Incorporating the students with interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
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	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	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Review of Flow in Pipes., Fully Developed Turbulent Flow.
Week 2	Dimensional Analysis of pipe Flow, Dimensional Analysis of pipe Flow
Week 3	Pipe network, Impact of jets and jet propulsion – force exerted by the jet on stationary vertical plate.
Week 4	Jet of water on an unsymmetrical moving curved plate jet of water on a series of vane, Deferent eq. of continually – rotational
Week 5	Boundary layer flow and flow in pipes and ducts external flows-flow over flats plate, Turbulent boundary layer – drag and lift – integral flow entrance flows – fully developed flows.
Week 6	Momentum equation for control volume, Force acting on contact surface.
Week 7	Adiabatic, one dimensional steady state, Velocity of sound in an ideal gas.
Week 8	Reversible adiabatic, One dimensional flow of an ideal gas through a nozzle.
Week 9	Normal shock in an ideal gas flowing through, Nozzle and diffuser coefficients.
Week 10	Nozzle and orifices as flow – measuring devices, Hydraulic gradient and total energy line and types of flow. Flow through branched pipes.
Week 11	Hydraulic gradient and total energy line, Types of fluid flow.
Week 12	Flow through syphon, Power transmission through pipes.
Week 13	Flow through nozzles, Power transmitted through nozzle.
Week 14	Condition for maximum power transmitted through nozzle.

Week 15	Water hammer in pipes, pipe network,
Week 16	Review of Flow in Pipes.

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	**قياس التصريف في الأنابيب بوسطة مقياس فنتشوري**
Week 2	**أيجاد الضياع في الطاقة بسبب التغير التدريجي في مساحة الأنابيب.**
Week 3	**توزيع السرعة في القنوات المفتوحة**
Week 4	**قوة ارتطام الماء (البثق) بلوح مستوي شاقولي**
Week 5	**قوة ارتطام الماء (البثق) على لوح المائل**
Week 6	**قوة ارتطام الماء (البثق) على لوح نصف كروي**
Week 7	**توزيع سرعة الجريان في ممر الهوائي :**
Week 8	**الجريان خلال فتحات (شقوق)**
Week 9	**(تاثير البثق على ريشة المضخات)**
Week 10	**اختبار اداء المضخة الطاردة المركزية**
Week 11	**حساب معامل التصريف عند خروج السائل من فوهة التصريف بطريقة الضغوط المختلفة (الأرتفاع).**
Week 12	**حساب خسائر الجريان في الأنابيب المستطيلة والدائرية**
Week 13	**أثبات نظرية برنولي.**
Week 14	**حساب الخسائر في الطاقة.**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	1 - Fluid mechanics and hydraulic machines Dr.R.K. Bansal.	Yes
Recommended Texts	2- Hydraulics and fluid mechanics including hydraulic machines, Dr. P.N MODI; Dr. S.M. SETH. 3- A Brief introduction to Fluid Mechanics by, Donad F. Young & etal., 2007, USA. 4- A Text Book of Fluid Mechanics and Hydraulics, by R.K.Raiput, 1998. 5- Engineering Fluid Mechanics, by prof. K.L.Kumar. 2012.	No
Websites	https://www.sciencedirect.com/science/article/pii/B978012800944400007X	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Internal combustion engine**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**ATU24052**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGIII		**Semester of Delivery**	5	
Administering Department	PME		**College**	TCM	
Module Leader	Hussein Al-Gburi		**e-mail**	hussein83@atu.edu.iq	
Module Leader's Acad. Title	Lecture		**Module Leader's Qualification**	Mss	
Module Tutor	Amer Mohan		**e-mail**	E-mail	
Peer Reviewer Name	------		**e-mail**	--------	
Scientific Committee Approval Date	01/06/2023		**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 Objectives أهداف المادة الدراسية	1. To understand types of internal combustion engines and their classification 2. This course deals with the basic concept of operating characteristics of engine. 3. To understand performance of internal combustion engine. 4. To understand environmental pollutants resulting from fuel combustion.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize the classification of internal combustion engine. 2. Recognize the main parts of internal combustion engine 3. Summarize what is meant pollutants resulting from fuel combustion inside the engine. 4. Discuss the performance engine (Brake power, indicated, Bsfc, torque, thermal efficiency) 5. Discuss the types of thermal efficiency diagrams (Otto, Deiseal and Dual cycle). 6. Describe the heat Transfer in Internal Combustion Engines
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Introduction</u> Introduction to internal combustion engine-Heat Engines Classification - Internal combustion engine classifications on bases of: Design, Valve location and Method of ignition, number stroke, location valve and arrangement of cylinder. Four and Two-Stroke Engines- Spark timing - Firing order-Valve timing, and comparison <u>Part B - Operating Characteristics</u> Engine parameters- Work- Mean effective pressure- Torque and power- Air-Fuel ratio and Fuel-Air ratio- Specific fuel consumption- Engine efficiency Engine cycle: Otto cycle- Diesel cycle, Dual cycle- Comparison of Otto, Diesel and Dual cycles <u>Part C - Combustion Reactions</u> Thermochemistry and fuels - Basic chemistry - Stoichiometry -Exhaust gas analysis Emissions & Air Pollution - Poisoning gases - Acidic gases - Particulate matters Measurements - Control - International regulates Combustion in gasoline engines - Octane number and engine knack- Combustion Diesel engines - Cetane number- Exhaust Dew point temperature Air and Fuel induction, intake and Exhaust manifold <u>Part D- Heat Transfer in Internal Combustion</u> Superchargers- Thermodynamic Cycle with Supercharging Turbochargers- Thermodynamic Cycle with Turbocharger-Methods of turbo charging

	Heat Transfer in Internal Combustion Engines- Energy distribution- Engine Temperatures- Engine Warmup- Heat transfer in intake system

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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
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	10% (10)	3,6,9 and 12	LO #1-#6, #7-#9and#9-#12
	Assignments	2	10% (10)	5 and 10	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	0	10% (10)	0	
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction - Introduction to internal combustion engine-Heat Engines Classification - Internal combustion engine classifications on bases of: Design, Valve location and Method of ignition, number stroke, location valve and arrangement of cylinder.
Week 2	I.C.E. Terminology - TDC & BDC - Stroke & swept volume - Compression ratio, bore, main body of I.C. engine, piston, connecting rod, crankcase
Week 3	Four and Two-Stroke Engines- Spark timing - Firing order-Valve timing, and comparison
Week 4	Operating Characteristics- Engine parameters- Work- Mean effective pressure- Torque and power
Week 5	Operating Characteristics : Air-Fuel ratio and Fuel-Air ratio- Specific fuel consumption- Engine efficiency-
Week 6	Engine cycle: Otto cycle- Diesel cycle
Week 7	Engine cycle: Dual cycle- Comparison of Otto, Diesel and Dual cycles:
Week 8	Thermochemistry and fuels -Combustion Reactions - Basic chemistry - Stoichiometry -Exhaust gas analysis
Week 9	Emissions & Air Pollution - Poisoning gases - Acidic gases - Particulate matters Measurements - Control - International regulates
Week 10	Combustion in gasoline engines - Octane number and engine knack- Combustion in Diesel engines - Cetane number- Exhaust Dew point temperature
Week 11	Air and Fuel induction, intake and Exhaust manifold
Week 12	Superchargers- Thermodynamic Cycle with Supercharging
Week 13	Turbochargers- Thermodynamic Cycle with Turbocharger-Methods of turbo charging
Week 14	Heat Transfer in Internal Combustion Engines- Energy distribution
Week 15	**Engine** Temperatures- Engine Warmup- Heat transfer in intake system
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Calculation of the control Balance of an internal combustion engine
Week 2	Lab 2: Calculation of Brake Power by the method of Morse test
Week 3	Lab 3: Calculation of the Performance of a gasoline engine (Four Stroke, Two stroke)

Week 4	Lab 4: Calculation of the Performance of a Diesel Engine (Four Stroke, Two stroke)
Week 5	Lab 5: Calculation of the indicate Power of a gasoline
Week 6	Lab 6: Calculation of the brake thermal efficiency of a gasoline and Diesel engine
Week 7	Lab 7: Comparison of types of method for measuring brake power

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Engineering Fundamentals of the Internal Combustion Engine- Willard W. Pulkrabek	Yes
Recommended Texts	Interdiction Internal Combustion engines- Richared Stone	No
Websites	https://link.springer.com/book/10.1007/978-1-349-14916-2	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Heat Transfer (Convection & Radiation)**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATU24063**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGIII		**Semester of Delivery**	6	
Administering Department	**PME**		**College**	Type College Code	
Module Leader	Rana Ali Hussein		**e-mail**	ranaa.h.78@atu.edu.iq	
Module Leader's Acad. Title	Assistance Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ATU24055	**Semester**	5
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Recognize basic convective heat transfer and apply appropriate methods for quantifying convection 2. Calculate convective heat transfer coefficients for internal flow 3. Calculate convective heat transfer coefficients for external flow 4. Design and size heat exchangers 5. Predict heat exchanger performance 6. Calculate radiation view factors 7. Determine radiation heat transfer
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Apply heat transfer principles to design and to evaluate performance of thermal convection systems. 2. Calculate the performance of heat exchangers 3. Calculate radiation heat transfer between objects with simple geometries
Indicative Contents المحتويات الإرشادية	**Principles of convection**, The relation between fluid friction and heat transfer **Principles of convection**, Laminar Tube flow, Turbulent flow in a tube **Empirical and practical relations for forced convection** , Introduction, Internal flow (entrance, fully developed region) (laminar and turbulent) **Empirical and practical relations for forced convection**, External flow across (cylinders and spheres) **Empirical and practical relations for forced convection**, Flow across Tube banks **Natural- convection system**, Introduction, Free convection heat transfer on a vertical plate **Natural- convection system**, Empirical Relations for free convection, planes and cylinder, horizontal plane **Natural- convection system**, horizontal cylinder, inclined surfaces, **Natural- convection system**, enclosed spaces **Natural- convection system**, Mixed (forced and natural) convection heat transfer **Radiation**, Introduction, physical mechanism **Radiation,** Radiation properties, The radiation shape factor , Relations between shape factors, **Heat exchanger** ,The log Mean Temperature difference, Effectiveness-NTU Method

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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Heat Transfer by Convection Review to the Fluid Flow
Week 2	Non-Dimensional Group Numbers Analysis
Week 3	Analytical Solution for Heat Convection, Heat Transfer for Laminar and Turbulent Flow
Week 4	One Dimensional Steady State Force Convection Heat Transfer on Flat Plate
Week 5	Empirical Equations for Forced Convection Heat Transfer (Laminar Flow)
Week 6	Empirical Equations for Forced Convection Heat Transfer (Turbulent Flow)
Week 7	Natural Convection Heat Transfer
Week 8	Empirical Equations for Natural Convection Heat Transfer
Week 9	Introduction to Heat Exchangers, Kinds of Heat Exchangers
Week 10	The Overall Heat Transfer Coefficient, Fouling Factor
Week 11	The Log Mean Temperature Difference Method
Week 12	The Effectiveness of the heat Exchangers
Week 13	The Performances for Difference Kinds of the Heat Exchangers
Week 14	Characteristics of Radiation, The View Factor
Week 15	Radiation Heat Transfer Between Two Black Surfaces and Two Gray Surfaces
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Forced convection heat transfer from a horizontal cylinder
Week 2	Lab 2: Heat Transfer in Forced Convection into tube
Week 3	Lab 3: Free (natural) convection heat transfer from a horizontal cylinder
Week 4	Lab 4: Free (natural) convection heat transfer from a vertical cylinder
Week 5	Lab 5: Effectiveness of centric heat exchanger (parallel flow)
Week 6	Lab 6: Effectiveness of centric heat exchanger (counter flow)
Week 7	Lab 7: Experimental study to measure the effect of fins shape on the rate of heat transfer by free and forced convection

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Heat transfer: A practical approach By Yunus A.Cengel	Yes
Recommended Texts	Heat Transfer by J. P. HOLMAN.	No
Websites	https://study.com/academy/lesson/mechanisms-of-heat-transfer-conduction-convection-radiation.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
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Maintenance**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	ATU24062				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGIII	**Semester of Delivery**		6
Administering Department		PME	**College**	TCM	
Module Leader	Waleed Adbulhamza		**e-mail**	Waleed.kathim.tcm@atu.edu.iq	
Module Leader's Acad. Title		Assistant Lecturer	**Module Leader's Qualification**		M.Sc.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**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 Objectives أهداف المادة الدراسية	1. To develop problem solving skills in maintenance for different machines. 2. To understand repairing, replacing of damaged parts. 3. This course deals with the basic concept of mechanical maintenance. 4. This is the basic subject for all types of preventive maintenance. 5. To understand how to estimate periodic time for maintenance for a machine. 6. To perform plan for future maintenance with the expected cost.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Recognize how maintenance is reducing damage in mechanical parts. 2. List the various terms associated with mechanical preventive maintenance. 3. Summarize what is meant by a check list? 4. Discuss the time duration for each maintenance process. 5. Describe the so called table of maintenance progress. 6. Define Gantt chart for conducting annual maintenance.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **<u>Part A – Primary Maintenance</u>** Defining tools for maintenance and all of the required fixtures and rigs as a first step in maintenance cycle. [15 hrs] Employing some modern techniques for primary checking for the assigned mechanical machines including all of its parts. [15 hrs] Planning a clear idea about the maintenance flow chart for both the specific parts and for the assembled machine as a whole. [10 hrs] Specifying the skilled labors for conducting such professional maintenance within a specific time duration. [15 hrs] Revision problem classes [6 hrs] **<u>Part B – Periodic Maintenance</u>** It is so important to specify a suitable time period for the coming maintenance session based on the recorded errors. [15 hrs] Estimation of the best way for conducting maintenance, i.e. part by part or the system as a whole body? [7 hrs] Presenting a check list and recommendation for future maintenance plan. [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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to maintenance
Week 2	Lab 2: Introduction to preventive maintenance
Week 3	Lab 3: time schedule for maintenance
Week 4	Lab 4: Gantt chart for maintenance
Week 5	Lab 5: types of maintenance
Week 6	Lab 6: Practical application for maintaining a machines – part by part. (I)
Week 7	Lab 7: Wear inspection
Week 8	Lab 8: lubrication process
Week 9	Lab 9: x-ray detection for pipelines maintenance
Week 10	Lab 10: Practical application for maintaining a machines – part by part. (II)
Week 11	Lab 11: Die penetration for vessels maintenance
Week 12	Lab 12: Water cycle as a coolant system maintenance
Week 13	Lab 13: nondestructive maintenance
Week 14	Lab 14: Practical application for maintaining a machines – part by part. (II)
Week 15	Lab 15: **Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Practical Maintenance for Machines by Shigly	Yes
Recommended Texts	Preventive Maintenance by S.S. Rao	Yes
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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Numerical Analysis**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATU24065**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	UGIII		**Semester of Delivery**	6	
Administering Department	PME		**College**	TCM	
Module Leader	Fadhil Abid Elaiwi		**e-mail**	fadhil.alrubaiy@atu.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ATU24053	**Semester**	5
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To develop numerical methods solving skills and understanding their applications in mathematics, engineering, and the natural sciences. 2. To understand rules of numerical differentiation and their characteristics. 3. This course deals with the basic method of numerical integration. 4. To understand interpolation and its applications in solving many types of equations.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Obtain a numerical solution to a first-order differential equation using Euler's method. 2. obtain a numerical solution to a first-order differential equation using the Runge–Kutta method 3. State the reason for solving differential equations using numerical methods. 4. Obtain a numerical solution to a first-order differential equation using the Euler–Cauchy method. 5. List the various methods associated with solving non-linear equations. 6. Apply numerical integration to practical situations.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A –numerical solution of first order differential equations</u> - Euler's method, Runge–Kutta method and Euler–Cauchy method. Revision problem classes. <u>Part B – numerical integration</u> - Trapezoidal rule, Simpson's rule and mid-ordinate rule. Revision problem classes. <u>Part C – Solving non-linear equations</u> Newton Raphson method, Iterative Methods Gauss Elimination (Gauss Reduction), Gauss-Jordan Elimination - Revision problem for homework and assessment tests.

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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

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	22	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.5
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% (10)	3,5,9and 10	LO #1, #2 and #10, #11
	Assignments	4	20% (10)	4,8,11 and 14	LO #3, #4 and #6, #7
	Projects / Lab.		0	---	
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Solving partial integral equations
Week 2	Geometrical and Mechanical Application
Week 3	Geometrical and Mechanical Application
Week 4	Application
Week 5	Solving non-linear equations
Week 6	application
Week 7	Simple Iteration method
Week 8	Application
Week 9	Newton Raphson method
Week 10	Finite difference method
Week 11	Linear equation
Week 12	Application
Week 13	Numerical Integral
Week 14	Interpolation
Week 15	Applications
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Higher Engineering Mathematics, 7th Edition John Bird, BSc(Hons), by Published by Elsevier Ltd.2010	No
Recommended Texts	Advanced Engineering Mathematics, ERWIN KREYSZIG John Wiley &Sons INC.2011	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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**pumps Technology**			**Module Delivery**	
Module Type	**Core learning activity**			☒ **Theory** ☐ **Lecture** ☒ **lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATU24061**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGIII		**Semester of Delivery**	6	
Administering Department	PME		**College**	TCM	
Module Leader	Doaa Fadhil Kareem		**e-mail**	doaa.fadhil.tcm@atu.edu.iq	
Module Leader's Acad. Title	Assistant Lecher		**Module Leader's Qualification**	Msc	
Module Tutor	Furat Hamid Obaid		**e-mail**	Yg77597@gmail.com	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	PME311	**Semester**	5
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Teaching the student, the basic principle of Pumps design, 2. selection types and 3. manufacturing.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Teaching the student, the basic principle of Pumps design, selection types and 2. manufacturing. 3. Equipment and machinery design. 4. Examination, installation, operation, maintenance and repair of all kinds of devices, turbocharged machines and equipment
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A - Classification of Pumps, Specific speed and modeling laws. Impeller Design ,Volute design, Hydraulics, Selection, and Curves, Pump Capacity ,Total Head ,Performance Curve Horsepower and Efficiency, NPSH and Cavitation , Specific Speed and Suction Specific Speed, Affinity Laws, System Head Curves , Pumps joins (series and parallel), Pump Speed Selection , Centrifugal Pump Design Types and Applications, Impellers, End Suction Pumps, Self-Priming Centrifugal Pumps, Split Case Double-Suction Pumps, Design of multi-stage casing, Submersible Pumps. Part B - Axial Flow Pumps, Pump Specifications and Standards, Couplings, Electric Motors, Sealing Systems and Sealless Pumps, O-Rings, Stuffing Box and Packing Assembly Sealless Pumps, Pumps selection, Corrosion, Materials Used for O-Rings in Pumps, High-Speed Pumps, Mechanical design, Shaft design and axial thrust, Bearings and Bearing Lubrication, Choosing the Most Efficient Pump, Variable-Speed Pumping Systems, Installation, Operation, and Maintenance

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

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Classification of Pumps
Week 2	Specific speed and modeling laws. Impeller design Volute design.

Week 3	Hydraulics, Selection, and Curves Pump Capacity Total Head
Week 4	**Performance Curve** **Horsepower and Efficiency**
Week 5	**NPSH and Cavitation**
Week 6	**Specific Speed and Suction Specific Speed** **Affinity Laws**
Week 7	System Head Curves
Week 8	**Pumps joins (series and parallel)**
Week 9	Oversizing Pumps Pump Speed Selection
Week 10	Special Hydraulic Considerations Viscosity Software to Size Pumps and Systems
Week 11	Piping Layout
Week 12	Sump Design
Week 13	Centrifugal Pump Design Types and Applications, Impellers, End Suction Pumps Self-Priming Centrifugal Pumps Split Case Double-Suction Pumps
Week 14	Design of multi-stage casing
Week 15	Vertical Column Pumps
Week 16	**Submersible Pumps**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Centrifugal pump
Week 2	Calculation of centrifugal pump efficiency
Week 3	Connect the pumps in series
Week 4	Connect the pumps in parallel
Week 5	Types of impellers in pumps
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	**J. L. Meriam** **L. G. Kraige**	Yes
Recommended Texts	John Wiley & Sons, Inc	yes
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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Theory of Machines**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATU24066**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level		UGIII	**Semester of Delivery**		6
Administering Department		PME	**College**	TCM	
Module Leader	**Prof. Dr. Emad Kamil Hussein**		**e-mail**	E-mail: emad_kamil72@atu.edu.iq	
Module Leader's Acad. Title		**Full Professor**	**Module Leader's Qualification**		**Ph.D.**
Module Tutor	Name (if available): **Raad Kareem**		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**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 Objectives أهداف المادة الدراسية	1. To develop problem solving skills and understanding of theory of machines through the application of techniques. 2. To understand interaction between displacement, velocity, and acceleration. 3. This course deals with the basic concept of theory of machines. 4. This is the basic subject for all mechanical machines. 5. To understand belts, brake, clutches, etc. as a mechanical machine. 6. To improve overall skills on mechanical engineering.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Recognize how mechanical parts are working within the whole system. 2. List the various terms associated with mechanical machines. 3. Summarize what is meant by a using different mechanical machines. 4. Discuss the reaction and involvement of some specific parts within the mechanical system as a compact unit. 5. Describe displacement, velocity and acceleration in a given mechanical system. 6. Define the induced output for a different mechanical equipment.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A – Dynamic Description** Each mechanical equipment is facing a mutual interaction of both displacement, velocity and acceleration as a part of them main tasks, followed by smooth working condition. [15 hrs] As a first step it is essential to find the linear parameters of a dynamic machine in terms of angular parameters via the so called velocity [15 hrs] Developing the assigned plan to draw the induced acceleration diagrams. [10 hrs] By employing engineering drawing techniques, it is required to draw both velocity and acceleration diagrams. [15 hrs] Revision problem classes [6 hrs] **Part B – Extended Applications** By extended view towards the mechanical machines including belt system, brake system, clutches, and others based on the standard curriculum. [15 hrs] Components and active devices – Components vs elements and mechanical modeling, real and ideal elements. Introduction to theory of machines, and practical application for the main systems. [7 hrs] Belts properties and types, brakes and clutches classifications, balancing procedure, governors and other machines. [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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
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
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 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction – displacement, velocity, and acceleration interaction.
Week 2	Velocity diagram.
Week 3	Acceleration diagram.
Week 4	Belt systems (I)
Week 5	Belt systems (II)
Week 6	Brake system (I)
Week 7	Brake system (II)
Week 8	Clutches systems (I)
Week 9	Clutches systems (II)
Week 10	Balancing for mass in one plane.
Week 11	Balancing for mass in multiple planes.
Week 12	Governors (I)
Week 13	Governors (II)
Week 14	Cam profiles (I)
Week 15	Cam profiles (II)
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to displacement, velocity, and acceleration interaction.
Week 2	Lab 2: Velocity diagram practical drawing.
Week 3	Lab 3: Acceleration diagram practical drawing.
Week 4	Lab 4: Belts systems practical applications.
Week 5	Lab 5: Brakes systems practical applications.
Week 6	Lab 6: Clutches systems practical application.
Week 7	Lab 7: Governors systems practical applications.

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Theory of Machines, by R. S. Khurmi & J. K. Gupta	Yes
Recommended Texts	Theory of Machines and Mechanics, by J. E. Shigly & J. J. Uicker	Yes
Websites	Not Available.	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Steam Power Plants**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATU24071**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGIV		**Semester of Delivery**	7	
Administering Department	PME		**College**		
Module Leader	Audai Hussein AL-Abbas		**e-mail**		
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Ali Hamza Allawi		**e-mail**	tcm.aliham@atu.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ATU24046	**Semester**	4
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	Upon successful completion of the course, the student will demonstrate competency by being able to: 1. Describe sources of energy and types of power plants. 2. Analyze different types of steam cycles and estimate efficiencies in a steam power plant. 3. Describe basic working principles of gas turbine and diesel engine power plants Define the performance characteristics and components of such power plants. 4. Evaluate cycle efficiency and performance of a gas cooled reactor power plant. 5. Classify different types of coupled vapor cycles and list the advantages of combined cycles power plant. 6. List different types of fuels used in power plants and estimate their heating values. 7. List types, principles of operations, components and applications of steam turbines, steam generators, condensers, feed water and circulating water systems. Estimate different efficiencies associated with such systems. 8. Define terms and factors associated with power plant economics. 9.Calculate present worth depreciation and cost of different types of power plants.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of the course, the student will be able to: **1.00 Introduction** 1.01 List and explain different sources of energy 1.02 Identify different types of power plants and recognize their components 1.03 Define basic terms and properties used in thermodynamics and state first and law of thermodynamics and apply it to different thermodynamics systems 1.04 Solve problems on first and second law of thermodynamics **2.00 Analysis of Steam Cycles** 2.01 Represent different types of steam cycles on pressure-volume and temperature diagrams 2.02 List the methods and advantages of reheating of steam 2.03 Explain the advantages of regeneration 2.04 Discuss different types of Feed water heaters and their applications 2.05 Calculate different type of efficiencies in a steam power plant 2.06 Solve problems on a simple Rankine and reheating cycles **3.00 Fuels and Combustion** 3.01 Describe various types of fuels, properties and application 3.02 Calculate stoichiometric and actual fuel-air ratio 3.03 Apply the first law of thermodynamics for calculation of heat of combustion in open and closed systems 3.04 Estimate the higher and lower heating values of different types of fuels **4.00 Steam Generators** 4.01 List types, applications and describe working principles of most commonly boilers 4.02 Describe types, advantages and operating principles of auxiliary systems use steam generators 4.03 Differentiate between natural and forced circulation in boilers 4.04 Calculate boiler efficiency 4.05 Evaluate the operation performance of a steam boiler 4.06 Solve problems on steam generators **5.00 Steam Turbines** 5.01 List types, application and working principles of nozzles 5.02 Describe the construction and working principles of impulse and reaction turbine: 5.03 Construct velocity diagram in impulse and reaction bleeding 5.04 List the function, construction and working principles of different turbine governors and control equipment 5.05 Analyze the performance of a steam turbine unit and calculate the efficiency power produced. **6.00 Combined Cycle Power Plants** 6.01 Describe the working principle of a binary vapor cycle 6.02 Describe the working principle of different types coupled cycles 6.03 Describe construction, working principles and advantages of a combined gas turbine - steam turbine power plant 6.04 List the advantages of combined cycles co-generation plant 6.05 Solve problems on combined cycle power plants **7.00 Condensers, Feed Water and Circulating Water System** 7.01 List types, construction and working principles of the direct contact type and surface condensers 7.02 Draw schematic flow diagrams and their corresponding T-S diagrams of direct contact type and surface condensers 7.03 List the functions and types of feed water heaters 7.04 List the functions and types of circulating water system used in power plant 7.05 List the functions, types and working principles of cooling towers 7.06 Calculate make-up water in cooling towers 7.07 Solve problems on cooling towers

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **I Introduction** 1. Energy sources 2. Types of power plants 3. Thermodynamics review **II Analysis of Steam Cycles** 1. Carnot and Rankine cycles 2. Reheating of steam 3. Regenerative feedwater heaters 4. Efficiencies in a steam power plant **III Fuels and Combustion** 1. Types of fuels 2. Air-fuel ratio 3. Heat of combustion 4. Heating values **IV Steam Generators** 1. Basic types of steam generators 2. The economizers, superheaters and reheaters 3. Boiler circulation 4. Boiler efficiency **V Steam Turbines** 1. Flow through nozzles 2. Types of steam turbines 3. Velocity diagrams 4. Turbine governing and control 5. Power and efficiency in steam turbines **VI Diesel Engine and Gas Turbine Power Plants** 1. Types of diesel plant 2. Advantages and disadvantages of diesel engine power plant 3. Performance characteristic of diesel engine power plant 4. Gas turbine power plant 5. Components of gas turbine power plants 6. Gas turbine fuels and materials **VII Combined Cycle power plant** 1. Binary vapor cycles 2. Coupled cycles 3. Combined gas turbine - steam turbine power plants 4. Combined cycle plants for co-generation **VIII Condensers, Feedwater and Circulating Water Systems** 1. Direct contact condensers 2. Surface condensers 3. Feed water heaters 4. Circulating water systems used in steam power plant 5. Cooling towers 6. Cooling towers calculations

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in this course is to provide the students with application of thermal engineering and mechanics to different thermo-fluid systems. types, construction, working principles performance of; boilers, heat exchangers, turbines, power plants and internal combustion engines are covered. Overall plant performance, load curves and economics of power plants is introduced. This course is supported by tutorials, laboratory experiments and field visits.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
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**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Energy sources , types of power plants, Thermodynamics review

Week 2	Carnot and Rankine cycles, Reheating of steam,Regenerative feedwater heaters Efficiencies in a steam power plant
Week 3	Carnot and Rankine cycles, Reheating of steam,Regenerative feedwater heaters Efficiencies in a steam power plant
Week 4	Types of fuels, Air-fuel ratio, Heat of combustion, Heating values
Week 5	Basic types of steam generators, The economizers, superheaters and reheaters Boiler circulation, Boiler efficiency
Week 6	Flow through nozzles, Types of steam turbines, Velocity diagrams, Turbine governing and control Power and efficiency in steam turbines
Week 7	Midterm exam
Week 8	Types of diesel plant , Advantages and disadvantages of diesel engine power plant Performance characteristic of diesel engine power plant, Gas turbine power plant Components of gas turbine power plants, Gas turbine fuels and materials
Week 9	Types of diesel plant , Advantages and disadvantages of diesel engine power plant Performance characteristic of diesel engine power plant, Gas turbine power plant Components of gas turbine power plants, Gas turbine fuels and materials
Week 10	Binary vapor cycles, Coupled cycles, Combined gas turbine - steam turbine power plants Combined cycle plants for co-generation
Week 11	Direct contact condensers, Surface condensers, Feed water heaters, Circulating water systems used in steam power plant, Cooling towers, Cooling towers calculations
Week 12	Direct contact condensers, Surface condensers, Feed water heaters, Circulating water systems used in steam power plant, Cooling towers, Cooling towers calculations
Week 13	Direct contact condensers, Surface condensers, Feed water heaters, Circulating water systems used in steam power plant, Cooling towers, Cooling towers calculations
Week 14	Terms and factors, Load duration curves, Power plant economics (present worth, depreciation and cost)
Week 15	Terms and factors, Load duration curves, Power plant economics (present worth, depreciation and cost)
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Tutorial 1-First and Second Law of Thermodynamics Calculations
Week 2	Operating and Testing the Performance of Gas Turbine Power Plants
Week 3	Field Visit to a Diesel Engine and Gas Turbine Power Plants
Week 4	Tutorial 2 - Calculations of Simple Rankine and Reheating Cycles
Week 5	Field Visit to a Diesel Engine and Gas Turbine Power Plants
Week 6	Tutorial 3 - Boiler Efficiency Calculations, Tutorial 4 - Diesel Engine and a Gas Turbine Power Plants Cycle's Calculations, Tutorial 5 - Combined Cycle Power Plant Calculations
Week 7	Final Exam.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Power Plant Engineering. by *Nag, P.K.*, Tata-McGraw Hill. Higher Education, 3nd edition, 2008.	Yes
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
	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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Air Conditioning and Refrigeration**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ATU24073				
ECTS Credits	6				
SWL (hr/sem)	**150**				
Module Level	4		**Semester of Delivery**	7	
Administering Department	PEM		**College**	TCM	
Module Leader	Akeel Abbas Mohammed		**e-mail**	Dr.akeelabbas@atu.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**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 Objectives أهداف المادة الدراسية	Study the basic concepts of refrigeration and air conditioning technology and their importance in engineering applications
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Define refrigeration and air conditioning 2. Study of the vapor compression refrigeration system and its basic components 3. Study the basic operations of air conditioning/ 4. Study the internal and external design conditions according to human comfort standards 5. Calculation of thermal loads for cooling and heating 6. Study the types of compressors used in refrigeration systems 7. Study of evaporators, condensers, and fans used in refrigeration and air conditioning systems
Indicative Contents المحتويات الإرشادية	Indicative content includes the following.

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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
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% (10)	5 and 10	LO #1, #2 and #8, #9
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Review of basic principle** - To review all thermodynamic and fluid flow relations corresponding to the air conditioning subject. **Properties of air and water vapor mixture** - To outline the mixing processes of gases especially dry air and water vapor to obtain the moist air required in air conditioning practice
Week 2	**Psychometric Processes** - To learn the construction of the Psychometric chart and the related psychometric processes of moist air **Cooling Heating , humidification & dehumidification, processes** - To perform the processes of cooling , heating , humidification and dehumidification on the psychometric chart and calculating the related heat and mass transfer quantities
Week 3	**Practical air conditioning process / summer** - Studying the practical summer psychrometric applications such as mixing , cooling , dehumidifying using all outside air ,all return air or any other combination practice **Practical air conditioning process /winter** - Similar practice for winter season as in summer practice

Week 4	**Thermal comfort &design conditions** - To specify the related comfort design conditions based on ASHRAE standard with the effective temperature for air conditioned spaces **Cooling load calculation /wall &roofs** - To carry out the calculation required for load estimation starting with wall and roof resistances and the related CLTD and CLTD corrections
Week 5	**Cooling load calculation /windows** - Similar calculation as for walls and roof with the addition of solar heat gain and shading and cooling factors **Cooling load calculation /occupants,lighting and ventilation** - Estimate the cooling loads for occupants according to their activities and the light and ventilation loads
Week 6	Heating load calculation - Carry out the heat load calculation as in summer for the related thermal resistances and ventilation air requirement for winter. **Condensation on internal surfaces** - As a winter problem the condensation is required to be checked and eliminated
Week 7	**Mid-term Exam** + **Application on cooling & heating load** - Solving several practical exercises for cooling and heating loads estimation **Air-conditioning systems/ all air &all water systems** - Discuss the common types of air conditioning systems such all air and all water systems and the practical convenience of each type
Week 8	**Air-conditioning systems/air – water systems** - Similarly for the combined systems and its applications **Ducting Design : procedure & methods** - Explain the design methods of ductingsystems especially the equal pressure drop method for its simplicity **Equal pressure drop method** - Solving several practical exercises to learn the use of equal pressure drop method in designing ducting systems
Week 9	**Pressure distribution diagram &the use of ductulater** - Carry out pressure calculation to plot the pressure distribution along the ducting system and learning the use of ductulater for site applications **Fan ; types & laws**

	- To study fans , its types and laws for air conditioning applications
Week 10	**Piping Design application** - Explain the importance of piping design and solve related example to lear such design as found in air conditioning practice as in central A/C stations **Pumps ; Types & Selection** - Highlight the types for centrifugal pumps and their selections according to head and capacities required
Week 11	**Refrigerant properties** - Properties of refrigerants such boiling point, saturated temperature, ,latent heat ,critical point, specific volume, and their effects on selecting the required refrigerant **Refrigeration machine & Carnot cycle** - Highlight the differences between the heat engine and the refrigeration machine according to the first and second laws of thermodynamics in relation to the Carnot cycle
Week 12	**Refrigeration systems** - Study the type of refrigeration systems such as VCRS , ARS and air cycle refrigeration system and the application and limitations of each one **Saturated vapor compression cycle** - Define the VCRC and its P-H Moeller Chart and diagram and how to find the related enthalpies from the given temperatures and pressures Actual vapor compression cycle - Specify the differences between the
Week 13	Absorption refrigeration cycle
Week 14	Air – refrigeration cycle Air – refrigeration cycle / application
Week 15	Air – refrigeration cycle / application
Week 16	**final Exam**

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

Week 6	Lab 6:
Week 7	Lab 7:

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts		Yes
Recommended Texts		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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Manufacturing Processes**			**Module Delivery**	
Module Type	**Supportive**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ATU24074				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		UGIV	**Semester of Delivery**		7
Administering Department		PME	**College**	TCM	
Module Leader	**Emad Jebur Yousif**		**e-mail**	E-mail: emad.abed@atu.edu.iq	
Module Leader's Acad. Title		Assistant Lecturer	**Module Leader's Qualification**		M.Sc.
Module Tutor	Zaid M. Fareed		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**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 Objectives أهداف المادة الدراسية	1. To develop problem solving skills and understanding of circuit theory through the application of techniques. 2. To understand 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. 5. To understand Kirchhoff's current and voltage Laws problems. 6. To perform mesh and Nodal analysis.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 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. [15 hrs] AC circuits I – Time dependent signals, average and RMS values. Capacitance and inductance, energy storage elements, simple AC steady-state sinusoidal analysis. [15 hrs] AC Circuits II - Phasor diagrams, definition of complex impedance, AC circuit analysis with complex numbers. [10 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. [15 hrs] Revision problem classes [6 hrs]

	Part B - Analogue Electronics 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. [15 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. [7 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 stabilization, voltage reference, power supplies. [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 types of simple experiments involving some sampling activities that are interesting to the students.

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction – Manufacturing Processes
Week 2	Basics of Manufacturing Processes
Week 3	Drilling Process
Week 4	Casting Process
Week 5	Turning Process
Week 6	Evaluation parameters for the produced product.
Week 7	Tolerances and allowances
Week 8	Technological path (I)
Week 9	Technological path (II)
Week 10	Welding process as a manufacturing process
Week 11	Riveted joints as a part of manufacturing process
Week 12	Gantt chart
Week 13	Alternative manufacturing processes
Week 14	Practical application for some specific manufacturing processes
Week 15	Estimation of the performance of a produced parts.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Drilling Process
Week 2	Lab 2: Casting Process
Week 3	Lab 3: Turning Process
Week 4	Lab 4: Practical application for some specific manufacturing processes
Week 5	Lab 5: Welding process as a manufacturing process
Week 6	Lab 6: Alternative manufacturing processes
Week 7	Lab 7: Practical application for some specific manufacturing processes

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Manufacturing Processes by Khurmi	Yes
Recommended Texts	Manufacturing Processes by Shigly	Yes
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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Project-1			**Module Delivery**	
Module Type	**Core**			☐ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**ATU24076**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	4		**Semester of Delivery**	7	
Administering Department	PME		**College**	TCM	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**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 Objectives أهداف المادة الدراسية	1- To assure that the students have acquired the skills, knowledge and concepts necessary to perform well when they leave the university. 2- Each student will use educational tools to broaden his/her knowledge about a particular, self-selected topic. 3- To apply literature survey, data collection finding a research question, and establishing the first prototype of their research project.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Understand and apply the fundamentals of engineering-design practices and procedures. 2- Participate in team work activities 3- Implement the techniques of oral and written presentations 4- Identify an engineering problem and assess alternative solutions 5- Apply project management fundamentals 6- Understand the ethics of engineering profession and environmental issues
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A Apply knowledge of mathematics, natural science with relevant to life science and multidisciplinary context of engineering science. Part B Analyze, design and conduct experiments, as well as to analyze and interpret data. Part C Design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability .

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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem)	48	**Structured SWL (h/w)**	3

الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	102	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7
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		% (0)		
	Assignments	1	10% (10)	5	
	Projects / Lab.		0% (0)		
	Report	1	20% (20)	13	
Summative assessment	Midterm Exam		0% (0)		
	Final Exam	3hr	70% (70)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	
Week 8	
Week 9	
Week 10	
Week 11	
Week 12	

Week 13	
Week 14	
Week 15	
Week 16	**Preparatory week before the 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		
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
	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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Theory of Vibrations**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATU24072**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level		UGIV	**Semester of Delivery**		7
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	**Prof. Dr. Emad Kamil Hussein**		**e-mail**	E-mail: emad_kamil72@atu.edu.iq	
Module Leader's Acad. Title		**Full Professor**	**Module Leader's Qualification**		**Ph.D.**
Module Tutor	Name (if available): **Raad Kareem**		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ATU24066	**Semester**	6
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To develop problem solving skills and understanding of theory of vibrations through the application of techniques. 2. To understand interaction between mass, spring, and damper system. 3. This course deals with the basic concept of theory of vibrations. 4. This is the basic subject for all mechanical vibrating system (linear and Angular). 5. To understand single, and multiple degrees of freedom for a given system. 6. To improve overall skills on mechanical vibration engineering.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Recognize how vibrating mechanical parts are affecting within the whole system. 2. List the various terms associated with mechanical vibrations. 3. Summarize what is meant by a using different mechanical machines. 4. Discuss the expected effect of vibration on a mechanical system and the induced damage. 5. Describe equation of motion, natural frequency, and the induced response in a given mechanical system. 6. Define the prompted output natural frequency and its effect on the system.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **<u>Part A – Vibration Description</u>** Each mechanical vibrating system is facing a mutual interaction of both of its mass, spring, and the associated dashpot as a part of them main tasks, followed by smooth working condition. [15 hrs] As a first step it is essential to find the exact value of the required mass, spring stiffness, and coefficient of damping for the proposed system. [15 hrs] Developing the assigned plan to find the descriptive equation of motion. [10 hrs] By employing engineering mathematics, it is required to find the equation of motion the related natural frequency. [15 hrs] Revision problem classes [6 hrs] **<u>Part B – Vibration Applications</u>** By extended view towards the mechanical vibrating system linear, angular, torsional and other types of vibration methods. [15 hrs] Comparing different types of mass, springs, dashpots for reaching the optimum vibrated system with reaching the natural frequency at all. [7 hrs] By using matrix notation for multiple degrees of freedom to analyze such complex systems. [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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
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
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 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction – vibration of mechanical system.
Week 2	Single degree of freedom analysis. Free vibration without damping.
Week 3	Equation of motion and the associated natural frequency. Free vibration with damping
Week 4	Newton's second law of motion (I) free and forced vibration
Week 5	Newton's second law of motion (II) free and forced vibration
Week 6	Energy approach (I)
Week 7	Energy approach (II)
Week 8	Lagrange Equation in vibrations.
Week 9	Two degrees of freedom analysis. (I)
Week 10	Two degrees of freedom analysis. (II)
Week 11	Equation of motion and the associated natural frequency.
Week 12	Matrix notation.
Week 13	Multiple Degrees of freedom (I)
Week 14	Multiple Degrees of freedom (II)
Week 15	Mechanical vibration applications.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to mechanical vibrations.
Week 2	Lab 2: simple mass spring system.
Week 3	Lab 3: mass-spring-damper system.
Week 4	Lab 4: free vibration without damping.
Week 5	Lab 5: forced vibration with damping.
Week 6	Lab 6: multiple degrees of freedom vibrations applications.
Week 7	Lab 7: Mechanical vibrated systems practical applications.

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Theory of Vibrations, by Thomson	Yes
Recommended Texts	Theory of Vibrations, by S. S. Rao	Yes
Websites	Not Available.	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Hydraulic Power Plants**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATU24083**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGIV		**Semester of Delivery**	8	
Administering Department	PME		**College**		
Module Leader	Audai Hussein AL-Abbas		**e-mail**		
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Ali Hamza Allwi		**e-mail**	tcm.aliham@atu.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ATU24071	**Semester**	7
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	Upon successful completion of the course, the student will demonstrate competency by being able to introduce the following: 1- Different types of Hydraulic Turbines 2- Operation of Hydraulic turbines 3- Draft tubes 4- Design concepts related to hydraulic turbines 5-Calcualte the efficiency of hydraulic turbine 6- evaluate the performance of different types of hydraulic turbine
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of the course, the student will be able to: 1. Introduction The main components of a hydroelectric system may be classified into two groups: – the hydraulic system components that include the turbine, the associated conduits-like penstocks, tunnel and surge tank-and its control system, and – the electric system components formed by the synchronous generator and its control system. 2- Layout of a Hydro-Electric Power Plant 3-Necessity of Surge Tank 4-Classification of Hydraulic Turbines 5-Impulse and Reaction Turbines 6-Pelton Turbine 7-Francis Turbine 8-Propeller Turbine 9-Kaplan Turbine 10-Hydraulic Turbine Selection 11-Impulse Turbine – Head 12-Reaction Turbine- Head 13-Specific Energy of Hydraulic Turbine 14-Velocity Triangle for Pelton Turbine 15-Draft Tube 16-Energy Equation Applied to Draft Tube 17-Cavitation in Turbines 18-Efficiencies of Hydraulic Turbines 19-Specific Speed
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: 1-Working principle of hydraulic turbines 2-Classification and types 3- Operation of hydro turbines 4- Materials and construction 5- Importance and types of draft tubes 6-The main turbine equation and various efficiencies 7- Cavitations phenomenon in hydraulic turbines 8- Performance and velocity diagrams of different hydraulic turbines

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in this course is to provide the students with application of fluid engineering and mechanics to different hydraulic systems. Types, construction, working principles performance of; hydraulic turbine, draft tube, and cavitations are covered. The most recent types of hydraulic turbines: Francis, Kaplan, and Pelton are discussed. Efficiency and performance of the aforementioned types are studied in details. Overall hydroelectric power plant, performance curves and selection of hydraulic turbines are introduced. This course is supported by tutorials, laboratory experiments and field visits.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered

Week 1	The main components of a hydroelectric system
Week 2	Classification of Hydraulic Turbines
Week 3	Impulse and Reaction Turbines
Week 4	Pelton Turbine
Week 5	Francis Turbine
Week 6	Kaplan Turbine and Propeller Turbine
Week 7	Midterm exam
Week 8	Hydraulic Turbine Selection
Week 9	Specific Energy of Hydraulic Turbine
Week 10	Draft Tube
Week 11	Energy Equation Applied to Draft Tube
Week 12	Efficiencies of Hydraulic Turbines
Week 13	Specific Speed
Week 14	Performance curves of different hydraulic turbines
Week 15	Specific Energy of Hydraulic Turbine
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Tutorial 1-energy equation Calculations
Week 2	Operating and Testing the Performance of Francis Turbine Power Plants
Week 3	Field Visit to a hydro-electric Power Plants
Week 4	Tutorial 2 - Calculations of velocity diagrams by Drawing scale
Week 5	Operating and Testing the Performance of Pelton Turbine Power Plants
Week 6	Tutorial 3 – Draft tube Efficiency Calculations, Tutorial 4 – Performance curves discussion
Week 7	Final Exam.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Logan, E Jr, (1993) "Turbomachinery – Basic Theory and Application" Marcel Dekker Inc, ISBN: 082479138X	Yes
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
	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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Machine Design**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATU24081**				
ECTS Credits	5				
SWL (hr/sem)	**125**				
Module Level		UGIV	**Semester of Delivery**		8
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Hani Mizhir Majid		**e-mail**	hani_magid@yahoo.com	
Module Leader's Acad. Title		Assis. Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**ATU24044**	**Semester**	4
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To understand the basic of machine design theories and develop a method in problem-solving skills through some application of techniques. 2. To understand stress-strain calculations, and their impact, which leads to material failure. 3. To understand the procedure of vessel design, gear design, welding design, shaft and coupling design, and other up to date applications such as finite element analysis.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Describe the criteria used in selecting engineering material for design purposes. 2. Explain the importance of calculating stress-strain effects on material failure. 3. Identify the effect of the stress concentration factor in variable sections. 4. Discuss the principle of welding joints design. 5. Summarize the main stresses that may generated in pressure vessels and what are the design criteria to avoid these stresses. 6. Identify the various formals and calculation used in shaft and coupling design.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Principals in machine design</u> Introduction to Mechanical Engineering Design, Materials Selection for Design Purposes, Load and Stress Analysis, Deflection and Stiffness, Failures Resulting from Static Loading, Failures Resulting from Static Loading, Fatigue Failure Resulting from Variable Loading. . Shafts and Shaft Components Screws, Fasteners, and the Design of Nonpermanent Joints, Welding, Bonding, and the Design of Permanent Joints, Rolling-Contact Bearings, Gears – General, Spur and Helical Gears, Bevel and Worm Gears. <u>Part B – Fundamentals Applications</u> Lubrication and Journal Bearings, Flexible Mechanical Elements, Power Transmission Case Study, Pipes and Pipe Joints, Pressure Vessels Design, Internal Combustion Engine Parts, Levers , belts, Flywheel and Clutches, Finite-Element Analysis.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The adopted strategy for this module is to enhance the student's ability, and increase their understanding of parameter calculations skills, mechanical design applications,

	and expand their critical thinking skills. Students will participate in the exercises, while at the same time will be able to achieve and interactive tutorials by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Mechanical Engineering Design, Materials Selection for Design Purposes
Week 2	Load and Stress Analysis, Fatigue Failure Resulting from Variable Loading
Week 3	Load and Stress Analysis, Fatigue Failure Resulting from Variable Loading

Week 4	Welding, Bonding, and the Design of Permanent Joints
Week 5	Pressure Vessels Design.
Week 6	Pressure Vessels Design.
Week 7	Shafts Design, coupling design, key design, Screws, Fasteners, and the Design of Nonpermanent Joints
Week 8	Shafts Design, coupling design, key design, Screws, Fasteners, and the Design of Nonpermanent Joints.
Week 9	Shafts Design, coupling design, key design, Screws, Fasteners, and the Design of Nonpermanent Joints.
Week 10	Gears - General, Spur, and Helical Gears Finite-Element Analysis Bevel and Worm Gears
Week 11	Clutches Design
Week 12	Brakes Design
Week 13	Rolling-Contact Bearings
Week 14	Finite Element Method
Week 15	Finite Element Method

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Textbook in Machine Design by R.S. Khurmi	No
Recommended Texts	"Mechanical Design of Machine Components" Second Edition	No
Websites	https:// www.mhhe.com	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Measuring and Control Devices**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATU24082**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	4		**Semester of Delivery**	8	
Administering Department	PME		**College**	TCM	
Module Leader	Abbas Abdulkadhim Klaif		**e-mail**		
Module Leader's Acad. Title	Asst. Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Abbas Abdulkadhim Klaif		**e-mail**	dr.abbas.rikabi@atu.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**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 Objectives أهداف المادة الدراسية	Upon successful completion of the course, the student will demonstrate competency by being able to introduce the following: 1- Types of control systems 2- Types of Controllers 3- The Student being Able to select the suitable controller for any operation 4- Assessment Performance of control systems
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of the course, the student will be able to know : 1. The main components of control system may be classified into the Following. - Process - Measuring element - Controller - Final Control Device 2. The main types of continuous controllers may classified into the following. - Proportional Controllers - Integral Controllers - Derivative Controllers - Proportional Integral Controllers - Proportional Derivative Controllers - Proportional Integral Derivative Controllers 3. The Performance of Control Systems - Speed of Response - Accuracy - Stability - Others 4- Design of Control systems 5- Derive the Transfer Function of process and instruments
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: 1-Working principle of Control Systems 2- Classification and types 3- Materials and construction 4- The main transfer function of first order and second order systems 5- The main transfer function of controllers

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in this course is to provide the students with application of Proportional Controllers, Integral Controllers, Derivative Controllers, Proportional Integral Controllers, Proportional Derivative Controllers, Proportional Derivative Controllers, Proportional Integral Derivative Controllers, open systems and Closed systems, first order systems and Second order systems.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
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
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 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	The main components control systems
Week 2	Open loop systems second loop systems
Week 3	Laplace Transform
Week 4	Inverse Laplace transform
Week 5	Block diagram
Week 6	Transfer Functions
Week 7	Mathematical Modeling of Mechanical Systems
Week 8	Mathematical Modeling of Electrical Systems
Week 9	Block diagram reduction
Week 10	Routh's Method for stability
Week 11	Root locus method
Week 12	Transient response
Week 13	State analysis
Week 14	Accuracy
Week 15	Types of Controllers
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Open Loop and Second loop system
Week 2	Components of Controllers
Week 3	Laplace solution by MATHLAP
Week 4	Inverse Laplace solution by MATHLAP
Week 5	Effect the Control action coefficients on the stability of controllers
Week 6	Effect the Control action coefficients on the accuracy of controllers
Week 6	Effect the Control action coefficients on the speed of response
Week 7	Final Exam.

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Modern Control Engineering ,Ogata	Yes
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
	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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Project-2			**Module Delivery**	
Module Type	**Core**			☐ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**ATU24086**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	4		**Semester of Delivery**	8	
Administering Department	PME		**College**	TCM	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**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 Objectives أهداف المادة الدراسية	1- To assure that the students have acquired the skills, knowledge and concepts necessary to perform well when they leave the university. 2- Each student will use educational tools to broaden his/her knowledge about a particular, self-selected topic. 3- To apply literature survey, data collection finding a research question, and establishing the first prototype of their research project.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Understand and apply the fundamentals of engineering-design practices and procedures. 2- Participate in team work activities 3- Implement the techniques of oral and written presentations 4- Identify an engineering problem and assess alternative solutions 5- Apply project management fundamentals 6- Understand the ethics of engineering profession and environmental issues
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A Apply knowledge of mathematics, natural science with relevant to life science and multidisciplinary context of engineering science. Part B Analyze, design and conduct experiments, as well as to analyze and interpret data. Part C Design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability .

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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem)	48	**Structured SWL (h/w)**	3

الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	102	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7
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		% (0)		
	Assignments	1	10% (10)	5	
	Projects / Lab.		0% (0)		
	Report	1	20% (20)	13	
Summative assessment	Midterm Exam		0% (0)		
	Final Exam	3hr	70% (70)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	
Week 8	
Week 9	
Week 10	
Week 11	
Week 12	

Week 13	
Week 14	
Week 15	
Week 16	**Preparatory week before the 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		
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
	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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**The industrial engineering**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATU24084**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	UGIV		**Semester of Delivery**	8	
Administering Department	**PME**		**College**	Type College Code	
Module Leader	Rana Ali Hussein		**e-mail**	ranaa.h.78@atu.edu.iq	
Module Leader's Acad. Title	Assistance Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**		

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 Objectives أهداف المادة الدراسية	• Study the techniques for improvement in productivity of the people and equipment. • Plan the production schedule accordingly organize material supply for the manufacturing activities. • Minimize the direct and indirect cost by optimizing the use of resources available. • Learn accounting process, inventory control and process planning. • Employ Modern techniques in manufacturing system.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	(1) to increase productivity, (2) to eliminate waste and non-value-added activities, and (3) to come up with the optimum use of scarce resources that would bring out the best results.
Indicative Contents المحتويات الإرشادية	Industrial Engineering Production control production Lines Equilibrium Analysis of variance (ANOVA)

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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
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	4
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 ,9and 12	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 10	LO #3, #4 and #6, #7
	Projects / Lab.	-	-	Continuous	All
Summative assessment	**Report**	1	10% (10)	13	LO #5, #8 and #10
	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to engineering management and occupational safety
Week 2	management as a process
Week 3	Management skills, Production management, cost accounting, Production control
Week 4	technological organization, production cycle, Plant Layout Design, Products Layout
Week 5	production Lines Equilibrium
Week 6	Plant Location

Week 7	Methods used in choosing the location of the industrial unit
Week 8	Production planning, Demand Forecasting
Week 9	Aggregate planning
Week 10	Linear programming
Week 11	Production planning and control, Planning the production capacity of industrial enterprises
Week 12	Project evaluation
Week 13	Analysis of variance (ANOVA), One- way analysis of variance with different sample sizes
Week 14	Two- way analysis of variance
Week 15	Inventory models - General inventory model - Static economic order quality (EOQ) models ; EOQ with price break ; and multi - item EOQ with storage limitation
Week 16	Preparatory week before the final Exam

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Evans, James R. (1997). *Production/Operations Management: Quality, Performance & Value* (5th ed.). West Publishing, USA.	No
Recommended Texts	33-Feigenbaum, A.V.(1961). *Total Quality Control: Engineering & Management*. McGraw-Hill, USA.	No
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
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