

# Middle Technical University الجامعة التقنية الوسطى



## *First Cycle – Bachelor's Degree (B.Sc.) – Air Conditioning and Refrigeration*

بكالوريوس – هندسة تقنيات التكييف والتبريد (الدورة الأولى)



# MODULE DESCRIPTION FORM

## نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Mathematics		Module Delivery
Module Type	C		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MPAC100		
ECTS Credits	8		
SWL (hr/sem)	240		
Module Level	1	Semester of Delivery	
Administering Department	Mechanical Power Eng. Dep.	College	TCB
Module Leader	Amani Altifat	e-mail	<a href="mailto:amani_al_kadhm@mtu.edu.iq">amani_al_kadhm@mtu.edu.iq</a>
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	MSc
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	Name	e-mail	E-mail
Scientific Committee Approval Date	20/06/2023	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

<b>Module Aims</b> أهداف المادة الدراسية	Teaching the student the basic and advanced principles of calculus and its applications to develop the students mental abilities to solve problems and make use of available information in the other scientific materials.
<b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية	To apply the knowledge of mathematics, science and engineering fundamentals.
<b>Indicative Contents</b> المحتويات الإرشادية	

## Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

<b>Strategies</b>	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.
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## Student Workload (SWL)

الحمل الدراسي للطالب

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	87	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	6
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	153	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	10
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	240		

## Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (15)	5, 10	LO #1, 2, 7 and 9
	Assignments	4	10% (15)	2, 8	LO # 3, 4, 5 and 6
	Projects / Lab.	0	0	0	
	Report	2	10% (10)	7,14	LO # 5, 6 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	8	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

## Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
<b>Week 1</b>	Determinants, properties, Grammar's rule, application of determinant
<b>Week 2</b>	Vectors, vectors in space, unit vector, Scalar product, vector product
<b>Week 3</b>	Trigonometric functions & relation, Graphing of functions, Trigonometric equations
<b>Week 4</b>	Function of limits, Algebraic limit, Trigonometric limit, Infinity as limit
<b>Week 5</b>	Derivative rule, Algebraic & Trigonometric derivative, Chain rule, velocity & acceleration
<b>Week 6</b>	Inverse trigonometric functions & its derivative, Logarithm & Exponential functions & its derivative
<b>Week 7</b>	Hyperbolic functions & its derivative, Inverse hyperbolic functions & its derivative
<b>Week 8</b>	Integration, integrals of trigonometric & inverse functions, Integrals of logarithm & Exponential functions
<b>Week 9</b>	Integrals of logarithm & Exponential functions, Integrals of hyperbolic functions & its derivative, L'Hopital's rules
<b>Week 10</b>	Integration methods; Integration by parts, Integration by partial fraction
<b>Week 11</b>	Integration by trigonometric substitution, Integration of $ax^2 + bx + c$
<b>Week 12</b>	Application of Integration, Area under the curve & between two curves
<b>Week 13</b>	Surface area generated, Length of the curve

<b>Week 14</b>	Volume generated by rotation of curve, Simple differential equations
<b>Week 15</b>	Simpson rule for area, Trapezoidal rule for area, applications
<b>Week 16</b>	<b>Preparatory week before the final Exam</b>

<b>Learning and Teaching Resources</b> مصادر التعلم والتدريس		
	Text	Available in the Library?
<b>Required Texts</b>	Advanced <i>Engineering Mathematics</i>	Yes
<b>Recommended Texts</b>	Calculus	Yes
<b>Websites</b>		

<b>Grading Scheme</b> مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
<b>Success Group (50 - 100)</b>	<b>A</b> - Excellent	امتياز	90 - 100	Outstanding Performance
	<b>B</b> - Very Good	جيد جدا	80 - 89	Above average with some errors
	<b>C</b> - Good	جيد	70 - 79	Sound work with notable errors
	<b>D</b> - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	<b>E</b> - Sufficient	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group (0 - 49)</b>	<b>FX</b> – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	<b>F</b> – Fail	راسب	(0-44)	Considerable amount of work required
<b>Note:</b> 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	C	<input type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	MPAC101		
ECTS Credits	6		
SWL (hr/sem)	180		
Module Level	1	Semester of Delivery	1
Administering Department	Mechanical Power Eng. Dep.	College	TCB
Module Leader	Maryam Firas Mohsen	e-mail	<a href="mailto:maryam.firas94@mtu.edu.iq">maryam.firas94@mtu.edu.iq</a>
Module Leader's Acad. Title	Assistant lecturer	Module Leader's Qualification	M.Sc.
Module Tutor	Maryam Firas Mohsen	e-mail	<a href="mailto:maryam.firas94@mtu.edu.iq">maryam.firas94@mtu.edu.iq</a>
Peer Reviewer Name	Younis Muhsin	e-mail	<a href="mailto:younis.muhsin@mtu.edu.iq">younis.muhsin@mtu.edu.iq</a>
Scientific Committee Approval Date	20/6/2023	Version Number	1

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

<p><b>Module Aims</b> أهداف المادة الدراسية</p>	<ol style="list-style-type: none"> <li>1. This module describes the skills, knowledge, and attitude required to apply technical drawing. At the end of this module, learners will be able to Introduce technical drawings, apply principles of drawing, and project views.</li> <li>2. to make the students know how to draw (Engineering Drawing) by using AUTOCAD program.</li> <li>3. This course deals with the basic concept of Engineering Drawing.</li> <li>4. Define the Engineering Drawing - The Tools used in Engineering Drawing - Types of drawing sheets, types of lines.</li> <li>5. Learning 2D interface in AutoCAD.</li> <li>6. Learning 3D interface in AutoCAD.</li> </ol>
<p><b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"> <li>1- Define the Engineering Drawing - The Tools used in Engineering Drawing - Types of drawing sheets, types of lines</li> <li>2-Introduction to AutoCAD and learning how to use the program interface</li> <li>3-Learning how to use Draw toolbar and its content</li> <li>4-Learning how to use modify toolbar and its content</li> <li>5-Learning how to use dimension toolbar and its content and draw 2D exercises</li> <li>6-Theory of projection, Theory of projection 1st angle</li> <li>7-Theory of projection 3rd angle</li> <li>7-Drawing the three projection views</li> <li>8-Theory of Section and Drawing the three Section views</li> <li>9-Learning 3D interface in AutoCAD and 3D tools, 3D exercises</li> </ol>
<p><b>Indicative Contents</b> المحتويات الإرشادية</p>	<p>indicative contents include the following:</p> <p><u>Part A: The Purpose of Engineering Drawings</u></p> <p>An engineering drawing is a subcategory of technical drawings. The purpose is to convey all the information necessary for manufacturing a product or a part. Engineering drawings use standardized language and symbols. This makes understanding the drawings simple with little to no personal interpretation possibilities.</p> <p><u>Part B: understanding AutoCAD</u></p>

	<p>AutoCAD interface and Its usage like centers around drawing with electronic equivalents of real-life drafting tools. The added support of digital precision helps with measurements and calculations, 3D components, and data sharing.</p> <p><u>Part C: 2D Drawings</u></p> <p>Using lines to make 2D drawings, apply dimensions rules, design 2d shapes and drawing projections and sectioning views.</p> <p><u>Part D: 3D drawings</u></p> <p>3D CAD, or three-dimensional computer-aided design, is technology for design and technical documentation, which replaces manual drafting with an automated process.</p>
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<b>Learning and Teaching Strategies</b> استراتيجيات التعلم والتعليم	
<b>Strategies</b>	<p>The main strategy that will be adopted in delivering this module is to courage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.</p> <p>YouTube channel for the teacher includes lessons to help the students in their studying <a href="https://www.youtube.com/channel/UCiUmlY4CLQn5ycY4von1P5g">https://www.youtube.com/channel/UCiUmlY4CLQn5ycY4von1P5g</a></p>

<b>Student Workload (SWL)</b> الحمل الدراسي للطالب			
<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	88	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	6
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	92	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	180		



### Module Evaluation

تقييم المادة الدراسية

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

### Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
<b>Week 1</b>	Define the Engineering Drawing, tools, types of drawing sheets, and types of lines
<b>Week 2</b>	Introduction to AutoCAD and learning how to use the program interface
<b>Week 3</b>	Learning how to use Draw toolbar and its content
<b>Week 4</b>	Learning how to use Draw toolbar and its content
<b>Week 5</b>	Learning how to use modify toolbar and its content
<b>Week 6</b>	Learning how to use dimension toolbar and its content and draw 2D exercises
<b>Week 7</b>	Theory of projection, Theory of projection 1st angle
<b>Week 8</b>	Find the 3rd project view from 2 views
<b>Week 9</b>	Theory of projection 3rd angle
<b>Week 10</b>	Drawing the three projection views
<b>Week 11</b>	Theory of Section
<b>Week 12</b>	Drawing the three Section views
<b>Week 13</b>	Learning 3D interface in AutoCAD
<b>Week 14</b>	3D tools, 3D exercises
<b>Week 15</b>	<b>Final Exam</b>

## Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Required Texts</b>	ملزمة الرسم الهندسي الخاصه بالكلية التقنية الهندسية بغداد/ قسم هندسة تقنيات المواد	Yes
<b>Recommended Texts</b>	K. Venkata Reddy “Textbook of Engineering Drawing second edition” 2008	No
<b>Websites</b>	<a href="https://www.autodesk.com/">https://www.autodesk.com/</a>	

## Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
<b>Success Group (50 - 100)</b>	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
<b>Fail Group (0 – 49)</b>	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	Workshops		Module Delivery
Module Type	C		<input type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MPAC102		
ECTS Credits	8		
SWL (hr/sem)	240		
Module Level	1	Semester of Delivery	
Administering Department	Mechanical Power Eng. Dep.	College	TCB
Module Leader	Mahmood H. Oudah	e-mail	<a href="mailto:mahmood@mtu.edu.iq">mahmood@mtu.edu.iq</a>
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		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 Aims أهداف المادة الدراسية	The main object of this unit is to identify the students on the gain of the manual skills by preceding the operations and manufacturing processes, and doing the maintenance by using different manual tools and measuring instruments

<p><b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية</p>	<p>By the end of the engineering mechanics module, students should be able to: preceding the operations and manufacturing processes, and doing the maintenance by using different manual tools and measuring instruments</p>
<p><b>Indicative Contents</b> المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <ol style="list-style-type: none"> <li>1. Foundry workshop:</li> <li>2. Casting of metals and their importance - Purpose of using castings in industry - Contents of the foundry unit - Industrial safety reserves in the foundry - Forming a sand mold for a one-piece model - Sands of molds and hearts: types, sources and properties - Additives, mixing processes and adjusting ingredients - Use of sand mixer - Handling of improvised sand - Sand handling devices - forming sand molds by manual method for a one-piece model - forming a sand mold.</li> <li>3. Sand mold for a one-piece model with defining the estuaries and elevators - Metal smelting and pouring into the mold - Extracting and cleaning the castings - Forming a mold using the pulp box and drying it in the drying oven - Forming a sand mold for a simple two-piece model with a dog.</li> <li>4. Forming a sandy mold like the previous one with melting the metal and pouring it into a mold and taking out the casting and cleaning it - Metal melting furnaces: types, qualities, uses (rotary kiln, stirrers and stationary) - Reviewing and examining the castings - Determining the apparent defects and their causes - Reviewing the dimensions of the castings and ensuring that they conform to the required dimensions.</li> <li>5. Furnaces: types, methods of measurement, how a Vernier works to read altimeters with depths - the process of marking (shenk) - base surfaces - the number used - backing materials - marking thorns - just vertebrae - mens of guilt and guilt notation - right angle - pointing flowers - scale heights and depths</li> <li>6. Files and the cold process: types and specifications of files - mechanized and their types - methods of attaching artifacts to them - uses of files - the method of cleaning the initiator - the cold process - an exercise on the process of marking and simple filings.</li> <li>7. Saw cutting: hand saw, saw weapon, saw weapon installation, conditions to be met in the sawing process - an exercise on the sawing process.</li> <li>8. Lathe: specifications, use, accessories and installation methods - forming the lathe - types of lathe pens and the use of measuring tools.</li> <li>9. Turning operations: flat turning, straightening, simple graded work with the use of measuring tools.</li> <li>10. Lathe the internal and external loot in different ways with an explanation of the laws of each method - doing an exercise for the external loot and another for the internal loot.</li> <li>11. Welding workshop:</li> <li>12. Occupational safety and security needs - gas welding - equipment used and how to install and control it - other auxiliary tools - used gases and their specifications - welding safety, types and measurements - other auxiliary materials - welding equipment - types of flames, method of ignition and control of the required flame - works - rinsing and cleaning the basins to be welded.</li> </ol>

	<p>13. Practical exercises for welding opposite surfaces, perpendicular surfaces, inclined surfaces and circuit welding, longitudinal and transverse cutting - cutting: circle, irregular shapes - electric arc welding - equipment used.</p> <p>14. Welding equipment - Practical training on the use of electric arc welding of different surfaces - Point and tape welding - Equipment used in each type - Types of electrodes and their installation method - Practical training on the use of each type.</p> <p>15. Welding using argon gas - doing welding exercises using argon gas.</p> <p>16. Gas cutting operations - equipment used - precautions to be provided.</p> <p>17. Assembly exercises using various different cutting and welding equipment.</p>
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### Learning and Teaching Strategies

#### استراتيجيات التعلم والتعليم

<b>Strategies</b>	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, and hand-in assignments while at the same time refining and expanding their critical thinking skills through the written exam, Case studies, Quizzes, seminars, Practical testing, and Online testing. and this will be achieved through classes and interactive tutorials.
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### Student Workload (SWL)

#### الحمل الدراسي للطلاب

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطلاب خلال الفصل	116	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطلاب أسبوعيا	8
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطلاب خلال الفصل	124	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطلاب أسبوعيا	8
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطلاب خلال الفصل	240		

### Module Evaluation

#### تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	6	40% (40)	3,6,9,12	LO #1,2,.....10
	<b>Report/Lab</b>	14	60% (60)	All	LO # 8
	<b>Seminar</b>				
<b>Summative assessment</b>	<b>Midterm Exam</b>				
	<b>Final Exam</b>				
<b>Total assessment</b>			100% (100 Marks)		

## Delivery Plan (Weekly Syllabus)

### المنهاج الاسبوعي العملي

	Material Covered
<b>Week 1</b>	Casting of metals and their importance - Purpose of using castings in industry - Contents of the foundry unit - Industrial safety reserves in the foundry - Forming a sand mold for a one-piece model - Sands of molds and hearts: types, sources and properties - Additives, mixing processes and adjusting ingredients - Use of sand mixer - Handling of improvised sand - Sand handling devices - forming sand molds by manual method for a one-piece model - forming a sand mold.
<b>Week 2</b>	Sand mold for a one-piece model with defining the estuaries and elevators - Metal smelting and pouring into the mold - Extracting and cleaning the castings - Forming a mold using the pulp box and drying it in the drying oven - Forming a sand mold for a simple two-piece model with a dog.
<b>Week 3</b>	Forming a sandy mold like the previous one with melting the metal and pouring it into a mold and taking out the casting and cleaning it - Metal melting furnaces: types, qualities, uses (rotary kiln, stirrers and stationary) - Reviewing and examining the castings - Determining the apparent defects and their causes - Reviewing the dimensions of the castings and ensuring that they conform to the required dimensions.
<b>Week 4</b>	Files and the cold process: types and specifications of files - mechanized and their types - methods of attaching artifacts to them - uses of files - the method of cleaning the initiator - the cold process - an exercise on the process of marking and simple filings.
<b>Week 5</b>	Saw cutting: hand saw, saw weapon, saw weapon installation, conditions to be met in the sawing process - an exercise on the sawing process.
<b>Week 6</b>	Lathe: specifications, use, accessories and installation methods - forming the lathe - types of lathe pens and the use of measuring tools.
<b>Week 7</b>	Turning operations: flat turning, straightening, simple graded work with the use of measuring tools.
<b>Week 8</b>	Lathe the internal and external loot in different ways with an explanation of the laws of each method - doing an exercise for the external loot and another for the internal loot.
<b>Week 9</b>	Occupational safety and security needs - gas welding - equipment used and how to install and control it - other auxiliary tools - used gases and their specifications - welding safety, types and measurements - other auxiliary materials - welding equipment - types of flames, method of ignition and control of the required flame - works - rinsing and cleaning the basins to be welded.
<b>Week 10</b>	Practical exercises for welding opposite surfaces, perpendicular surfaces, inclined surfaces and circuit welding, longitudinal and transverse cutting - cutting: circle, irregular shapes - electric arc welding - equipment used.
<b>Week 11</b>	Welding equipment - Practical training on the use of electric arc welding of different surfaces - Point and tape welding - Equipment used in each type - Types of electrodes and their installation method - Practical training on the use of each type.
<b>Week 12</b>	Welding using argon gas - doing welding exercises using argon gas.
<b>Week 13</b>	Gas cutting operations - equipment used - precautions to be provided.
<b>Week 14</b>	Assembly exercises using various different cutting and welding equipment.

## Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Required Texts</b>		
<b>Recommended Texts</b>		
<b>Websites</b>		

## Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
<b>Success Group (50 - 100)</b>	<b>A - Excellent</b>	امتياز	90 - 100	Outstanding Performance
	<b>B - Very Good</b>	جيد جدا	80 - 89	Above average with some errors
	<b>C - Good</b>	جيد	70 - 79	Sound work with notable errors
	<b>D - Satisfactory</b>	متوسط	60 - 69	Fair but with major shortcomings
	<b>E - Sufficient</b>	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group (0 – 49)</b>	<b>FX – Fail</b>	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	<b>F – Fail</b>	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	C	<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	MPAC103		
ECTS Credits	5		
SWL (hr/sem)	150		
Module Level	1	Semester of Delivery	1
Administering Department	Mechanical Power Eng. Dep.	College	TCB
Module Leader	Dr. Fawziea M.Hussien	e-mail	<a href="mailto:fawizea_material@mtu.edu.iq">fawizea_material@mtu.edu.iq</a>
Module Leader's Acad. Title	Assist. Professor	Module Leader's Qualification	Ph.D
Module Tutor		e-mail	
Peer Reviewer Name	Taha Hassan Abood	e-mail	<a href="mailto:dr.taha1967@mtu.edu.iq">dr.taha1967@mtu.edu.iq</a>
Scientific Committee Approval Date	20 / 6/2023	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

<p><b>Module Aims</b> أهداف المادة الدراسية</p>	<ol style="list-style-type: none"> <li>1. Explain the atomic structure and types of primary and secondary atomic and molecular bonding.</li> <li>2. Explain the crystal structures and geometry and classify different classes of space lattices in crystalline solids.</li> <li>3. Perform different types of mechanical testing for evaluation of mechanical properties of material.</li> <li>4. Extract information of materials behavior from phase diagram.</li> <li>5. Identify the structures, properties and applications of the main engineering materials (metals, alloys, polymers, ceramics and composites).</li> <li>6. Explain corrosion mechanisms and types of corrosions and methods of corrosion prevention.</li> <li>7. Explain the Nano materials.</li> </ol>
<p><b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية</p>	<p>The student able to:</p> <ol style="list-style-type: none"> <li>1. Mechanical Properties, stress-strain curve, elasticity, plasticity, ductility, young modulus, tensile stress, yield stress, bricking stress, true and engineering stress-strain diagram).</li> <li>2. Knowledge of Ionic bond, inter-atomic distance attraction forces between atoms, coordination number, covalent bond, and Metallic bond.</li> <li>3. Knowledge the Crystal structure, unit cell, types of unit cells simple cubic, Face centered cubic, body centered cubic, atomic packing factor, Previous lattice, Miller index, .</li> <li>4. To Understanding the Phase diagrams</li> <li>5. To know the types of Engineering Materials</li> <li>6. To know Corrosion, Definition, why it happens, Type of corrosion, Dry and wet corrosion. Eight Form of corrosion. Mechanism of crevice corrosion</li> <li>7. To know Methods of prevention and protection.</li> </ol>
<p><b>Indicative Contents</b> المحتويات الإرشادية</p>	<p>Indicative content includes the following:</p> <p>1-Crystalline and non Crystalline Materials, Metallic crystal structures crystallographic directions ,crystallographic planes-Types of crystal structure, Packing factor.Bonds ,metallic bond ,ionic bonds ,covalent bond ,vander waals bond , hydrogen bond (12 hr)</p> <p>- Defects ,point defects ,dislocations ,linear defects ,planar defects (3hr)</p> <p>-Mechanical properties ,Hardness (Brinell hardness ,Vickers hardness , Rockwell hardness ) Tensile test, Impact test, Creep test, Fatigue test. (15 hr)</p> <p>-Ferrous and nonferrous alloys in air conditioning and refrigeration equipment's Copper alloys , Aluminum alloys (3hr)</p> <p>-Solidi faction. Solid solution - Phase –diagrams for binary alloys, Complete solubility in both liquid and solid state, Complete solubility in liquid state and complete</p>

	insolubility in solid state, Complete solubility in liquid state and limited solubility in solid state, Iron –carbon systems , Types of iron- carbon systems (12 hr) - Corrosion and corrosion prevention(3hr) -Applications of Nano materials, types ,manufactures of Nano materials.(3hr)
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<b>Learning and Teaching Strategies</b> استراتيجيات التعلم والتعليم	
<b>Strategies</b>	Assessment is based on hand-in assignments, written exam, Quizzes, reports, seminars, Practical testing and Online testing.

<b>Student Workload (SWL)</b> الحمل الدراسي للطالب			
<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	60	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	4
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	150		

<b>Module Evaluation</b> تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	4	10% (10)	3,6, 9,12	
	<b>Assignments</b>	2	10% (10)	6, 12	
	<b>Projects / Lab.</b>	1	10% (10)	Continuous	
	<b>Report</b>	1	10% (10)	14	
<b>Summative assessment</b>	<b>Midterm Exam</b>	2 hr	10% (10)	7	
	<b>Final Exam</b>	2hr	50% (50)	15	
<b>Total assessment</b>			100% (100 Marks)		

## Delivery Plan (Weekly Syllabus)

### المنهاج الاسبوعي النظري

	Material Covered
<b>Week 1</b>	Introduction to engineering material science and needs of engineering materials study
<b>Week 2</b>	Classification of materials
<b>Week 3</b>	Ionic bond, inter-atomic distance attraction forces between atoms, coordination number, covalent bond, and Metallic bond.
<b>Week 4</b>	Crystal structure system ,examples and diagrams with definitions
<b>Week 5</b>	Previous lattice, packing factor
<b>Week 6</b>	Definition of alloys, binary alloys, phase diagrams (equilibrium thermal diagrams), eutectic; solid solution
<b>Week 7</b>	solid solution and combination type diagram, Iron-carbon face diagram
<b>Week 8</b>	Iron-carbon cooling curve, phases, reactions, and multi phases
<b>Week 9</b>	Types of thermal equilibrium diagrams
<b>Week 10</b>	Mechanical test and some types
<b>Week 11</b>	Corrosion and types of corrosion
<b>Week 12</b>	Composite material
<b>Week 13</b>	Powder methodology
<b>Week 14</b>	Nano materials
<b>Week 15</b>	Exam

## Learning and Teaching Resources

### مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Required Texts</b>	1- William D. Callister, Jr. and David G. Rethwisch, Materials Science and Engineering An Introduction, 2007 John Wiley & Sons, Inc. 2- Jones, D.A., "Principal and Protection of Corrosion", PrenticeHall	Yes

<b>Recommended Texts</b>	1-W. Bolton, R. A. Higgins. Materials for Engineers and Technicians, 2014. 2-Mechanical Properties of Materials, David Roylance 2008. 3-William Bolton, Engineering Materials,2014	no
<b>Websites</b>		

<b>Grading Scheme</b> مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
<b>Success Group (50 - 100)</b>	<b>A</b> - Excellent	امتياز	90 - 100	Outstanding Performance
	<b>B</b> - Very Good	جيد جدا	80 - 89	Above average with some errors
	<b>C</b> - Good	جيد	70 - 79	Sound work with notable errors
	<b>D</b> - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	<b>E</b> - Sufficient	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group (0 – 49)</b>	<b>FX</b> – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	<b>F</b> – Fail	راسب	(0-44)	Considerable amount of work required
<b>Note:</b> 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 1	Module Delivery	
Module Type	S	<input type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	MPAC104		
ECTS Credits	3		
SWL (hr/sem)	90		
Module Level	1	Semester of Delivery	1
Administering Department	Mechanical Power Eng. Dep.	College	TCB
Module Leader	Dr Sabiha A. Bedin	e-mail	<a href="mailto:Sabeeha.bedin2019@mtu.edu.iq">Sabeeha.bedin2019@mtu.edu.iq</a>
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	Ph.D.
Module Tutor	Mr. Labeled Kadhim	e-mail	<a href="mailto:Labeled1970@mtu.edu.iq">Labeled1970@mtu.edu.iq</a>
Peer Reviewer Name	no	e-mail	
Scientific Committee Approval Date	20/6/2023	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

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

## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

<b>Strategies</b>	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.
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## Student Workload (SWL)

### الحمل الدراسي للطالب

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	59	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	4
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	31	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	90		

## Module Evaluation

### تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	20% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

## Delivery Plan (Weekly Syllabus)

### المنهاج الاسبوعي النظري

	Material Covered
<b>Week 1</b>	Parts of speech, vocabulary and comprehension
<b>Week 2</b>	Verb to be, present simple, vocabulary and comprehension.
<b>Week 3</b>	Possessive adjective, possessives, verb to have, verb to do, vocabulary and comprehension.
<b>Week 4</b>	Definite Indefinite articles, pronouns, subject, object,
<b>Week 5</b>	This and that, expletive there, prepositions, vocabulary and comprehension
<b>Week 6</b>	Plurals, , expressions of quantity, , vocabulary and comprehension
<b>Week 7</b>	Simple past, modal verbs, auxiliary verbs,
<b>Week 8</b>	Question words, asking questions, vocabulary and comprehension.
<b>Week 9</b>	Negative and interrogative, I would like and I like, vocabulary and comprehension.
<b>Week 10</b>	Writing a composition, punctuation, vocabulary and comprehension.
<b>Week 11</b>	Present continues, vocabulary and comprehension
<b>Week 12</b>	Types of questions, (yes -no) questions and (wh) questions
<b>Week 13</b>	Simple past, vocabulary and comprehension
<b>Week 14</b>	Simple past, revision
<b>Week 15</b>	Final Exam

## Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Required Texts</b>	Headway plus for beginners	Yes
<b>Recommended Texts</b>	Any Grammar and comprehension for technical learning	No
<b>Websites</b>	1- <a href="https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering">https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering</a> 2- <a href="https://link.springer.com/book/10.1007/978-981-10-8624-3">https://link.springer.com/book/10.1007/978-981-10-8624-3</a> 3- <a href="https://progressivecollege.ie/courses/early-learning-and-care-qqi-level-5-major-award/?gad=1&amp;gclid=EAlaIQobChMI_Nqu2tqA_wIVZ4VoCR2O0woLEAAYASAAEgI9WvD_BwE">https://progressivecollege.ie/courses/early-learning-and-care-qqi-level-5-major-award/?gad=1&amp;gclid=EAlaIQobChMI_Nqu2tqA_wIVZ4VoCR2O0woLEAAYASAAEgI9WvD_BwE</a>	

## Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
<b>Success Group (50 - 100)</b>	<b>A</b> - Excellent	امتياز	90 - 100	Outstanding Performance
	<b>B</b> - Very Good	جيد جدا	80 - 89	Above average with some errors
	<b>C</b> - Good	جيد	70 - 79	Sound work with notable errors
	<b>D</b> - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	<b>E</b> - Sufficient	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group (0 – 49)</b>	<b>FX</b> – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	<b>F</b> – 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	Matlab		Module Delivery
Module Type	E		<input type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MPAC106		
ECTS Credits	4		
SWL (hr/sem)	120		
Module Level	1	Semester of Delivery	
Administering Department	Mechanical Power Eng. Dep.	College	TCB
Module Leader	Sura Ghanim Hussein	e-mail	<a href="mailto:sura@mtu.edu.iq">sura@mtu.edu.iq</a>
Module Leader's Acad. Title	Assistant Lecturer	Module Leader's Qualification	M.Sc.
Module Tutor	None	e-mail	None
Peer Reviewer Name	Name	e-mail	None
Scientific Committee Approval Date	20/06/2023	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

<b>Module Aims</b>	To make the student able to process, program, and solve arithmetic and engineering problems using Matlab
<b>Module Learning Outcomes</b>	1. To apply the knowledge about Matlab. 2. To enable students solve scientific and mathematical problems, write codes, design projects and process images.
<b>Indicative Contents</b>	

## Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

<b>Strategies</b>	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.
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## Student Workload (SWL)

الحمل الدراسي للطالب

<b>Structured SWL (h/sem)</b>	88	<b>Structured SWL (h/w)</b>	6
<b>Unstructured SWL (h/sem)</b>	32	<b>Unstructured SWL (h/w)</b>	2
<b>Total SWL (h/sem)</b>	120		

## Module Evaluation

تقييم المادة الدراسية

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

### Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري محتوى كل اسبوع يجب ان يغطي الوقت المحدد

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

### Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

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

## Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Recommended Texts (Website)</b>	<a href="https://www.mathworks.com/products/matlab.html">https://www.mathworks.com/products/matlab.html</a>	

## Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
<b>Success Group (50 - 100)</b>	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
<b>Fail Group (0 - 49)</b>	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	Electrical Engineering		Module Delivery
Module Type	C		<input type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MPAC107		
ECTS Credits	7		
SWL (hr/sem)	210		
Module Level	1	Semester of Delivery	
Administering Department	Mechanical Power Eng. Dep.	College	TCB
Module Leader	Fatima Lateef Mohammed		e-mail <a href="mailto:fatima_lateef@mtu.edu.iq">fatima_lateef@mtu.edu.iq</a>
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	M.Sc.
Module Tutor	None		e-mail E-mail
Peer Reviewer Name	Oday Asam	e-mail	<a href="mailto:Oday-asam@mtu.edu.iq">Oday-asam@mtu.edu.iq</a>
Scientific Committee Approval Date	20/6/2023	Version Number	1

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	NA	Semester	
Co-requisites module	NA	Semester	

## Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Aims</b>	<ol style="list-style-type: none"> <li>1. This is the basic subject for all electrical and electronic circuits.</li> <li>2. This course deals with the basic concept of electrical circuits.</li> <li>3. To understand voltage, current and power from a given circuit.</li> <li>4. To develop problem solving skills and understanding of circuit theory through the application of techniques.</li> <li>5. To understand Kirchhoff's current and voltage Laws problems.</li> </ol>
<b>Module Learning Outcomes</b>	<p>Upon completion of the course, students should be able to:</p> <ol style="list-style-type: none"> <li>1. Define Ohm's law.</li> <li>2. List the various terms associated with electrical circuits.</li> <li>3. Recognize how electricity works in electrical circuits.</li> <li>4. Describe electrical power, charge, and current.</li> <li>5. Explain the two Kirchoff's laws used in circuit analysis.</li> <li>6. Discuss the various properties of resistors, capacitors, and inductors.</li> <li>7. Discuss the operations of sinusoid and phasors in an electric circuit.</li> <li>8. Identify the capacitor and inductor phasor relationship with respect to voltage and current.</li> </ol>
<b>Indicative Contents</b>	<p>Indicative content includes the following.</p> <p>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. [15 hrs]</p> <p>AC circuits I – Time dependent signals, average and RMS values. Capacitance and inductance, energy storage elements, simple AC steady-state sinusoidal analysis. [15 hrs]</p> <p>AC Circuits II - 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]</p> <p>Revision problem classes. [6 hrs]</p> <p>Resistive networks, voltage and current sources, Thevenin equivalent circuits, current and voltage division, input resistance, output resistance, maximum power transfer, RMS and power dissipation, current limiting and over voltage protection. [15 hrs]</p>

## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

<b>Strategies</b>	Assessment is based on hand-in assignments, participation in the exercises, classes interactive tutorials, Quizzes and Practical testing
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## Student Workload (SWL)

### الحمل الدراسي للطالب

<b>Structured SWL (h/sem)</b>	112	<b>Structured SWL (h/w)</b>	8
<b>Unstructured SWL (h/sem)</b>	94	<b>Unstructured SWL (h/w)</b>	6
<b>Total SWL (h/sem)</b>	210		

## Module Evaluation

### تقييم المادة الدراسية

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

## Delivery Plan (Weekly Syllabus)

### المنهاج الاسبوعي النظري

	Material Covered
<b>Week 1</b>	Resistance, conductance, effect of temp. on the resistance value
<b>Week 2</b>	Ohm's law, series connection, parallel connection, compound connection
<b>Week 3</b>	Voltage and current divider solved examples, kirchhoff's laws
<b>Week 4</b>	Star-delta conversion examples
<b>Week 5</b>	Thevenin's theorem, maximum power transfer
<b>Week 6</b>	Nodal method, superposition
<b>Week 7</b>	Alternating voltage and current

<b>Week 8</b>	Frequency, period, instantaneous value of voltage and current
<b>Week 9</b>	Component of A.C circuit, pure resistance, pure inductance, pure capacitance
<b>Week 10</b>	Series A.C circuit, R,L,C in series
<b>Week 11</b>	Impedance, phase angle, resonance, phase diagram
<b>Week 12</b>	Parallel A.C circuit, R,L,C, Admittance, power factor
<b>Week 13</b>	Active, reactive, apparent power in A.C circuit
<b>Week 14</b>	3-phase circuit
<b>Week 15</b>	<b>Preparatory week before the final Exam</b>

<b>Delivery Plan (Weekly Lab. Syllabus)</b> المنهاج الاسبوعي للمختبر	
	<b>Material Covered</b>
<b>Week 1</b>	Lab 1: Using Multimeter to measure Voltage, Current and Resistance
<b>Week 2</b>	Lab 2: Ohm's law.
<b>Week 3</b>	Lab 3: Voltage and current divider rules
<b>Week 4</b>	Lab 4: Kirchhoff's laws
<b>Week 5</b>	Lab 5: Thevenin's Theorem
<b>Week 6</b>	Lab 6: Series RLC circuit
<b>Week 7</b>	Lab 7: Parallel RLC circuit

<b>Learning and Teaching Resources</b> مصادر التعلم والتدريس		
	<b>Text</b>	<b>Available in the Library?</b>
<b>Recommended Texts</b>	DC Electrical Circuit Analysis: A Practical Approach, 2020.	No
<b>Websites</b>	<a href="https://docs.google.com/file/d/0B_O5jg0LZ_ZXY1g0WVU1bkhrlTg/edit">https://docs.google.com/file/d/0B_O5jg0LZ_ZXY1g0WVU1bkhrlTg/edit</a>	



## Grading Scheme

### مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
<b>Success Group (50 - 100)</b>	<b>A - Excellent</b>	امتياز	90 - 100	Outstanding Performance
	<b>B - Very Good</b>	جيد جدا	80 - 89	Above average with some errors
	<b>C - Good</b>	جيد	70 - 79	Sound work with notable errors
	<b>D - Satisfactory</b>	متوسط	60 - 69	Fair but with major shortcomings
	<b>E - Sufficient</b>	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group (0 - 49)</b>	<b>FX - Fail</b>	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	<b>F - Fail</b>	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 Mechanics		Module Delivery
Module Type	C		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MPAC108		
ECTS Credits	7		
SWL (hr/sem)	210		
Module Level	1	Semester of Delivery	2
Administering Department	Mechanical Power Eng. Dep.	College	TCB
Module Leader	Ahmed Jawad Khaleel	e-mail	<a href="mailto:ahmed1982_jk@mtu.edu.iq">ahmed1982_jk@mtu.edu.iq</a>
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	MSc
Module Tutor		e-mail	
Peer Reviewer Name	Younis Muhsin	e-mail	Younis.muhsin@mtu.edu.iq
Scientific Committee Approval Date	20 / 6/2023	Version Number	1

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

## Module Aims, Learning Outcomes and Indicative Contents

### أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Aims</b> أهداف المادة الدراسية	<ol style="list-style-type: none"> <li>1. The course aims to provide first-stage students with basic knowledge of engineering mechanics.</li> <li>2. Everything related to forces and motion and related concepts such as equilibrium and analysis of forces, centers of gravity, moments of inertia, friction and motion of bodies are studied.</li> <li>3. The course aims to enable students to gain access to the science of geometry by understanding how to perform correct engineering analysis</li> <li>4. Dealing with laws, equations, illustrations, and other data, and linking data together to reach outputs.</li> <li>5. Enabling the student to be able to analyze, devise and draw conclusions.</li> </ol>
<b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none"> <li>1. The student can understand the fundamentals and laws of engineering mechanics.</li> <li>2. The student is familiar with the types of forces and methods of analysis.</li> <li>3. The student can understand the basics of the Equilibrium of a Particle</li> <li>4. Understand the Moment of a Force around the point and axis.</li> <li>5. Learn the basics of Equilibrium of a Rigid Body and equations of equilibrium.</li> <li>6. The student can understand Structural Analysis.</li> <li>7. Enabling students to obtain knowledge, understanding, and analyze the motion of mechanical systems.</li> <li>8. Learn concepts of motion laws.</li> <li>9. Learn and analyze the motion of projectiles.</li> <li>10. Absolute Dependent Motion Analysis of Two Particles.</li> <li>11. The Students can understand the Kinetics of a Particle: Force and Acceleration.</li> <li>12. The Students can understand the Kinetics of a Particle: Work and Energy.</li> </ol>
<b>Indicative Contents</b> المحتويات الإرشادية	<p><b>Indicative content includes the following.</b></p> <ol style="list-style-type: none"> <li>1. The fundamentals and laws of engineering mechanics.</li> <li>2. Analyze forces.</li> <li>3. Equilibrium of a Particle</li> <li>4. Moment of a Force</li> <li>5. Structural Analysis</li> <li>6. Laws of Motion.</li> <li>7. Analyze the motion of mechanical systems.</li> </ol>

## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

<b>Strategies</b>	Assessment is based on hand-in assignments, written exams, Quizzes, reports, Practical testing ,and Online testing.
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## Student Workload (SWL)

### الحمل الدراسي للطالب

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	87	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	6
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	123	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	8
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	210		

## Module Evaluation

### تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	2	10% (10)	5, 10	
	<b>Assignments</b>	5	10% (10)	3,5,7,10,13	
	<b>Projects / Lab.</b>				
	<b>Report</b>	2	10% (10)	8 , 15	
<b>Summative assessment</b>	<b>Midterm Exam</b>	2 hr	20% (20)		
	<b>Final Exam</b>	2hr	50% (50)		
<b>Total assessment</b>			100% (100 Marks)		

## Delivery Plan (Weekly Syllabus)

### المنهاج الاسبوعي النظري

<b>Material Covered</b>	
<b>Week 1</b>	STATIC: Basic principles in mechanics, Vector Quantities and forces Analysis (2d ,3d)

<b>Week 2</b>	Equilibrium of a Particle (2d , 3d)
<b>Week 3</b>	Force System Resultants: Moment of a Force Scalar Formulation/Moment of a Force-Vector Formulation
<b>Week 4</b>	Force System Resultants: Moment of a Force about a Specified Axis/Moment of a Couple
<b>Week 5</b>	Equilibrium of a Rigid Body: Conditions for Rigid Body Equilibrium/ Free-Body Diagrams/ Equations of Equilibrium
<b>Week 6</b>	Equilibrium in three dimensions: Free-Body Diagrams/ Equations of Equilibrium
<b>Week 7</b>	Structural Analysis: Simple Trusses/ The Method of Joints/ Zero-Force Members
<b>Week 8</b>	Structural Analysis:The Method of Sections/ Space Trusses/ Frames and Machines
<b>Week 9</b>	DYNAMICS: Kinematics of a Particle/ Rectilinear Kinematics: Continuous Motion
<b>Week 10</b>	Motion of a Projectile
<b>Week 11</b>	Absolute Dependent Motion Analysis of Two Particles
<b>Week 12</b>	Kinetics of a Particle: Force and Acceleration
<b>Week 13</b>	Kinetics of a Particle: Work and Energy/ The Work of a Force
<b>Week 14</b>	Principle of Work and Energy
<b>Week 15</b>	Power and Efficiency

<b>Learning and Teaching Resources</b>		
مصادر التعلم والتدريس		
	<b>Text</b>	<b>Available in the Library?</b>
<b>Required Texts</b>	Engineering Mechanics, Twelfth Edition, R. C. Hibbeler	Yes
<b>Recommended Texts</b>		
<b>Websites</b>		

## Grading Scheme

### مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
<b>Success Group (50 - 100)</b>	<b>A - Excellent</b>	امتياز	90 - 100	Outstanding Performance
	<b>B - Very Good</b>	جيد جدا	80 - 89	Above average with some errors
	<b>C - Good</b>	جيد	70 - 79	Sound work with notable errors
	<b>D - Satisfactory</b>	متوسط	60 - 69	Fair but with major shortcomings
	<b>E - Sufficient</b>	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group (0 - 49)</b>	<b>FX – Fail</b>	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	<b>F – Fail</b>	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	Thermodynamics 2		Module Delivery
Module Type	C		<input type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MPAC109		
ECTS Credits	8		
SWL (hr/sem)	240		
Module Level	1	Semester of Delivery	
Administering Department	Mechanical Power Eng. Dep.	College	TCB
Module Leader	Hassan J. Fadhil	e-mail	<a href="mailto:hassan_jfsd@yahoo.com">hassan_jfsd@yahoo.com</a>
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	PhD
Module Tutor		e-mail	
Peer Reviewer Name	Dr.Ahmed Qasim Ahmed	e-mail	<a href="mailto:aqaal@mtu.edu.iq">aqaal@mtu.edu.iq</a>
Scientific Committee Approval Date	20 /6/2023	Version Number	1.0

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	NA	Semester	
Co-requisites module	NA	Semester	

## Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Aims</b> أهداف المادة الدراسية	Studying the principles of thermodynamics including, thermal systems according to energy interactions with their direct surroundings, the differences in the properties of both the system and the surrounding with their engineering applications
<b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none"> <li>1. To know the basic properties of material with units</li> <li>2. To know the laws of thermodynamics</li> <li>3. To know the phases of substance</li> <li>4. To know the basic thermodynamic cycles</li> <li>5. To know the entropy</li> <li>6. To know the basics on combustion</li> </ol>
<b>Indicative Contents</b> المحتويات الإرشادية	Indicative content includes the following.  <u>Part A – Laws of thermodynamics</u> First and second law of thermodynamics. [24 hrs.]  <u>Part B – P-V diagram</u> P-v diagram of water and different gases. Phases of the water and substances. [16 hrs.]  <u>Part C – Thermal cycle</u> Carnot cycle, vapor cycle, steam cycle, gas cycle, Otto cycle, Diesel cycle, duel cycle, and duel cycle. [58 hrs.]  <u>Part D – Combustion</u> Combustion, combustion and equilibrium equations [24 hrs.]

## Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

<b>Strategies</b>	Assessment is based on hand-in assignment, written exams, case study, quizzes, seminars and practical testing.
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### Student Workload (SWL)

الحمل الدراسي للطالب

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	144	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	10
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	96	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	10
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	240		

### Module Evaluation

تقييم المادة الدراسية

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

### Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
<b>Week 1</b>	Introductions, references, units, pressure, force, work, Temperature, unit of temperature and conversion, temperature measurements. Zeorith law of Thermodynamics. Energy, types of energy, positional, kinetic, internal and flow energy energies. Heat and work, power, enthalpy.
<b>Week 2</b>	First law of thermodynamics, Steady flow energy equation for open system, non-flow energy equation Transient state,
<b>Week 3</b>	Ideal gas, Boyle's law and Charles law and equation of state, Specific heat at constant pressure and constant volume, Closed system processes using ideal gas. Isometric and isobaric processes
<b>Week 4</b>	Isothermal and adiabatic processes, Polytropic processes, Control volume processes

<b>Week 5</b>	Vapour, phase of substance, Phase change curve on P-V diagram. Dryness fraction, liquid and vapour lines, wet vapour
<b>Week 6</b>	Steam tables and Examples on steam tables, Super-heated vapour, tables of super-heated tables
<b>Week 7</b>	Processes using two phase system, processes on P-V diagram, Irreversible processes Closed system, Second law of thermodynamics, heat engine, heat pump
<b>Week 8</b>	Carnot cycle and reversed Carnot cycle. Irreversible and reversible processes
<b>Week 9</b>	Clausius in equality for second law, Entropy on T-S and entropy calculations.
<b>Week 10</b>	Entropy for vapour, Entropy for system and surroundings, Isentropic efficiency
<b>Week 11</b>	Air standard cycle, Otto cycle. Diesel and Dual cycles
<b>Week 12</b>	Steam power plants- Rankin Cycle, Rankin Cycle with superheated. Modified Rankin Cycle
<b>Week 13</b>	Modification on Carnot to use as vapour compression cycle. Vapour compression cycle,
<b>Week 14</b>	Combustion, combustion equations, equilibrium of combustion equation. Volumetric analysis on combustion process
<b>Week 15</b>	Final exam

### Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	<b>Material Covered</b>
<b>Week 1</b>	Measurement and instruments
<b>Week 2</b>	Types of temperature measurements
<b>Week 3</b>	Measuring the velocity of air
<b>Week 4</b>	Calibration of thermocouple
<b>Week 5</b>	Joule experiment
<b>Week 6</b>	Boyle Experiment
<b>Week 7</b>	Measuring of C.V of fuel
<b>Week 8</b>	Measuring specific heats
<b>Week 9</b>	Finding the law of expansion
<b>Week 10</b>	Measuring the latent heat of evaporation
<b>Week 11</b>	Heat pump
<b>Week 12</b>	finding of the degree of superheating

<b>Week 13</b>	Performance of simple compression cycle
<b>Week 14</b>	Actual vapour compression cycle
<b>Week 15</b>	Final exam

<b>Learning and Teaching Resources</b> مصادر التعلم والتدريس		
	<b>Text</b>	<b>Available in the Library?</b>
<b>Required Texts</b>	Borgnakke, C. and Sonntag, R.E., 2022. <i>Fundamentals of thermodynamics</i> . John Wiley & Sons. Cengel, Y.A., Boles, M.A. and Kanoğlu, M., 2011. <i>Thermodynamics: an engineering approach</i> . New York: McGraw-hill. Rajput, R.K., 2005. <i>A textbook of engineering thermodynamics</i> . Laxmi Publications.	Yes

<b>Grading Scheme</b> مخطط الدرجات				
<b>Group</b>	<b>Grade</b>	<b>التقدير</b>	<b>Marks (%)</b>	<b>Definition</b>
<b>Success Group (50 - 100)</b>	<b>A - Excellent</b>	امتياز	90 - 100	Outstanding Performance
	<b>B - Very Good</b>	جيد جدا	80 - 89	Above average with some errors
	<b>C - Good</b>	جيد	70 - 79	Sound work with notable errors
	<b>D - Satisfactory</b>	متوسط	60 - 69	Fair but with major shortcomings
	<b>E - Sufficient</b>	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group (0 - 49)</b>	<b>FX – Fail</b>	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	<b>F – Fail</b>	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	Humans Rights and Democracy		Module Delivery
Module Type	B		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MPAC110		
ECTS Credits	2		
SWL (hr/sem)	60		
Module Level	1	Semester of Delivery	2
Administering Department	Mechanical Power Eng. Dep.	College	TCB
Module Leader	Dr. Hind Qasim Mohammed		e-mail: Hind.qasim90@gmail.com
Module Leader's Acad. Title	lecturer	Module Leader's Qualification	PhD
Module Tutor	NA		e-mail: E-mail
Peer Reviewer Name		e-mail	E-mail
Scientific Committee Approval Date	20/6/2023	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

<b>Module Aims</b> أهداف المادة الدراسية	تعريف الطلبة بالنظام الديمقراطي واساسياته . تعريف الطلبة بحقوقه وواجباته التي يتمتع بها في ظل النظام السياسي الديمقراطي . تعريف الطلبة بكافة حقوقهم الانسانية وكيفية الحفاظ عليها والدفاع عنها وحمايتها . تعريف الطلبة بالنظام السياسي الديمقراطي في العراق ودستور العراق الدائم لعام 2003 .
<b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية	المعرفة والفهم : أ- من خلال لقاء المحاضرات النظرية الصفية . ب- تكليف الطلبة بقراءة كتاب معين . ت- تكليف الطلبة بواجب بيئي باعداد تقرير عن موضوع معين . ث- الامتحانات الشفهية ج-
<b>Indicative Contents</b> المحتويات الإرشادية	يتكون المقرر من جزئين الأول يختص بالتعريف بحقوق الانسان واهم المواضيع التي يتعرف من خلالها الطلبة على حقوقهم . وتضمن الجزء الثاني التعريف بالديمقراطية وطبيعة النظم الديمقراطية وكيفية الحكم بالنظام الديمقراطي فضلا عن التعرف بالنظام الديمقراطي في العراق

## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

<b>Strategies</b>	محاضرات شرحية مكتوبة – اسئلة واجوبة – الاطلاع ع مصادر معينة
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## Student Workload (SWL)

### الحمل الدراسي للطلاب

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطلاب خلال الفصل	30	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطلاب أسبوعيا	2
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطلاب خلال الفصل	30	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطلاب أسبوعيا	2
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطلاب خلال الفصل	60		

## Module Evaluation

### تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	4	20% (10)	5, 10	LO #1, 2, 10 and 11
	<b>Assignments</b>	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	<b>Report</b>	1	10% (10)	13	LO # 5, 8 and 10
<b>Summative assessment</b>	<b>Midterm Exam</b>	2 hr	10% (10)	7	LO # 1-7
	<b>Final Exam</b>	2hr	50% (50)	16	All
<b>Total assessment</b>			100% (100 Marks)		

## Delivery Plan (Weekly Syllabus)

### المنهاج الاسبوعي العملي

weeks	Material Covered
1	حقوق الانسان . تعريفها . اهدافها حقوق الإنسان في الحضارات القديمة وفي الشرائع السماوية
2	حقوق الإنسان في التاريخ المعاصر والحديث: الاعتراف بحقوق الإنسان منذ الحرب العالمية الأولى وعصبة الأمم المتحدة الاعتراف الإقليمي بحقوق الإنسان اللاتفاقية الأوروبية لحقوق الإنسان 1950 الاتفاقية الأمريكية لحقوق الإنسان 1969 الميثاق الإفريقي لحقوق الإنسان 1981. الميثاق العربي لحقوق الإنسان 1994
3	المنظمات الغير حكومية وحقوق الانسان ( 1- اللجنة الدولية للصليب الاحمر، 2- منظمة العفو الدولية منظمة مراقبة حقوق الانسان ، المنظمات الوطنية لحقوق الانسان حقوق الانسان في الدستور العراقي (ا لحقوق والحريات في دستور جمهورية العراق لسنة 2005 )
4	العلاقة بين حقوق الانسان والحريات العامة في الاعلان العالمي لحقوق الانسان في الإعلان العالمي لحقوق الإنسان في المواثيق الاقليمية والدساتير الوطنية حقوق الانسان الاقتصادية والاجتماعية والبيئية والثقافية والتنمية وحقوق الانسان المدنية والسياسية.
5	حقوق الانسان الحديثة ( الحق في التنمية ، الحق في البيئة النظيفة ، الحق في التضامن ، الحق في الدين ) ضمانات احترام وحماية حقوق الانسان على الصعيد الوطني . الضمانات في الدستور والقوانين الضمانات في مبداء سيادة القانون الضمانات في الرقابة الدستورية الضمانات في حرية الصحافة والرأي العام دور المنظمات الغير حكومية في احترام وحماية حقوق الانسان
6	ضمانات احترام وحماية حقوق الانسان على الصعيد الدولي دور الامم المتحدة ووكالاتها المختصة في توفير الضمانات دور المنظمات الاقليمية ( الجامعة العربية ، الاتحاد الاوربي ، الاتحاد الافريقي ، منظمة الدول الامريكية ) دور المنظمات الدولية الاقليمية غير الحكومية والرأي العام في احترام وحماية حقوق الانسان النظرية العامة للحريات ، اصل الحقوق والحريات ، موقف الشرع من الحقوق والحريات المعلنة ، استخدام مصطلح الحريات العامة
7	دولة القانون وضمانات دولة القانون تنظيم الحريات العامة من قبل السلطات العامة

8	المساواة : التطور التاريخي لمفهوم المساواة التطور الحديث لمفهوم المساواة المساواة بين الجنسين المساواة بين الافراد حسب معتقداتهم وعنصرهم
9	الديمقراطية تعريفها وانواعها
10	مقومات ومعوقات الديمقراطية
11	النظام الديمقراطي في دستور العراق لسنة 2003 – الانتخابات – الاحزاب السياسية -
12	مفهوم الحريات وتصنيف الحريات العامة , الحريات الاساسية ، الحريات الفكرية ، الحريات الاقتصادية والاجتماعية
13	التقدم العلمي والتقني والحريات العامة مستقبل الحريات العامة
14	المفهوم العام للوعي ( تعريف الوعي البيئي والوعي المائي والحاجة لدراسته ) مفهوم الوعي البيئي وسائل تحقيق الوعي البيئي ابعاد الوعي المائي التحديات التي تواجه الامن المائي في العراق جراءات مقترحة لحل ازمة نقص المياه العذبة
15	تعريف الابادة الجماعية ، اتفاقية الامم المتحدة بشأن الابادة الجماعية عمليات الابادة الجماعية ، محاكم الابادة الجماعية ، جرائم الابادة الجماعية ، الجرائم ضد الانسانية جرائم حزب البعث الاشتراكي حقوق ذوي الاعاقة

## Learning and Teaching Resources

### مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	ملزمة حقوق الانسان والديمقراطية الجامعة التقنية الوسطى	no
Recommended Texts	د. فاروق السامرائي ، حقوق الانسان في القرآن الكريم ، مركز دراسات الوحدة العربية ، بيروت ، 2002	no



	رعد ناجي الجدة واخرون ، حقوق الانسان والطفل والديمقراطية ، 2009 .	
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
<p><b>Note:</b>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.</p>				

# MODULE DESCRIPTION FORM

## نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Arabic		Module Delivery
Module Type	B		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MPAC111		
ECTS Credits	2		
SWL (hr/sem)	60		
Module Level	1	Semester of Delivery	
Administering Department	Mechanical Power Eng. Dep.	College	TCB
Module Leader	Aseel Ghazi Ibrahim	e-mail	<a href="mailto:Asilaljanabi2020@gmail.com">Asilaljanabi2020@gmail.com</a>
Module Leader's Acad. Title	Assist Lecturer	Module Leader's Qualification	Msc
Module Tutor	NA	e-mail	
Peer Reviewer Name	Dr. Ali Khadum Jawad	e-mail	<a href="mailto:dr.ali.kadhim@mtu.edu.iq">dr.ali.kadhim@mtu.edu.iq</a>
Scientific Committee Approval Date	20 / 6/2023	Version Number	1.0

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	NA	Semester	
Co-requisites module	NA	Semester	

## Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Aims</b> أهداف المادة الدراسية</p>	<ul style="list-style-type: none"> <li>1- تعميق معرفة الطالب بقواعد اللغة والإملاء التي تعلمها سابقاً؛ ليتحاشى الوقوع في الأخطاء اللغوية والإملائية، وليسهل عليه كتابة التقارير وجميع الأعمال الكتابية بصورة صحيحة نحويًا ولغويًا.</li> <li>2- توسيع نطاق الوعي اللغوي والأدبي ليشمل جميع الطلبة والمجتمع المحلي من خلال المحاضرات والندوات والدورات التدريبية المختلفة، والأخذ بيد المبدعين من أصحاب المواهب.</li> </ul>
<p><b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية</p>	<p>المعرفة والفهم والتطبيق</p> <p>من خلال إلقاء المحاضرات النظرية الصفية وحث الطلبة على قراءة كتاب معين في المادة، إضافة إلى تكليف الطلبة بواجبات بحثية، أو تقارير مكتبية وذلك في مستوى السنة الأولى من الدراسة.</p>
<p><b>Indicative Contents</b> المحتويات الإرشادية</p>	<p>يتكون المقرر من جزء واحد يتناول تعليم الطلبة القواعد العامة للكتابة باللغة العربية بما يضمن عدم الإخلال بأساسيات هذه اللغة.</p>

## Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

<p><b>Strategies</b></p>	<p>استراتيجيات التعلم: التعلم الذاتي - التعلم النشط - التعلم التعاوني. استراتيجيات التعليم: عرض المادة - طرح الأسئلة - اختبارات صفيّة - واجب بيتي.</p>
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## Student Workload (SWL)

الحمل الدراسي للطلاب

<p><b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطلاب خلال الفصل</p>	<p>30</p>	<p><b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطلاب أسبوعياً</p>	<p>2</p>
<p><b>Unstructured SWL (h/sem)</b></p>	<p>30</p>	<p><b>Unstructured SWL (h/w)</b></p>	<p>2</p>

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعياً	
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	60		

Module Evaluation					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	20%	1 , 2 , 3 , 4	تطبيق ما تعلمه الطالب من قواعد في الأعمال الكتابية وتنمية المعرفة اللغوية لديه من خلال تمكين مهارات الإملاء، واستخدام الكلمة المناسبة في موضعها المناسب.
	Assignments	2	10%	5 , 11	
	Projects / Lab.				
	Report				
Summative assessment	Midterm Exam	2hr	20%	7	
	Final Exam	3hr	50%	15	
Total assessment			100%		

Delivery Plan (Weekly Syllabus)	
المنهاج الأسبوعي النظري	
	Material Covered
Week 1	- مفهوم الأخطاء اللغوية - قواعد كتابة التاء المربوطة والتاء المفتوحة
Week 2	- الألف الممدودة والمقصورة - الحروف الشمسية والقمرية
Week 3	الضاد والظاء
Week 4	كتابة الهمزة: - همزة الوصل والقطع - الهمزة المتوسطة - الهمزة المتطرفة
Week 5	علامات الترقيم

Week 6	الاسم والفعل والتفريق بينهما
Week 7	المفاعيل: - المفعول به - المفعول المطلق - المفعول لأجله - المفعول فيه - المفعول معه
Week 8	العدد
Week 9	تطبيقات الأخطاء اللغوية الشائعة
Week 10	تطبيقات الأخطاء اللغوية الشائعة
Week 11	- معاني حروف الجر - قاعدة الألف الفارقة - قاعدة النون والتنوين
Week 12	الجوانب الشكلية للخطاب الإداري
Week 13	لغة الخطاب الإداري
Week 14	لغة الخطاب الإداري
Week 15	امتحان

Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	<p>1. كتاب الاملاء الفريد: نعوم جرجيس زراير، نقحه: د. مصطفى جواد - مطابع النعمان النجف الاشرف - ط6- 1973م.</p> <p>2. كتاب الاملاء للمرحلة المتوسطة: عبد الجبار عبد الله الألوسي واخرون - وزارة التربية المديرية العامة للمناهج - ط18 - 2014م.</p> <p>3. دروس فب اللغة والنحو والاملاء لموظفي الدولة: إسماعيل حمود عطوان واخرون - مطبعة وزارة التربية (3) بغداد - ط2 - 1984م.</p> <p>4. اللغة العربية العامة لأقسام غير الاختصاص: عبد القادر حسن امين واخرون - وزارة التعليم العالي والبحث العلمي - ط2 - 2000م.</p>	نعم

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
<p><b>Note:</b> 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.</p>				

# MODULE DESCRIPTION FORM

## نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Computer principles	Module Delivery	
Module Type	E	<input type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	MPAC112		
ECTS Credits	4		
SWL (hr/sem)	120		
Module Level		Semester of Delivery	2
Administering Department	قسم هندسة المواد	College	TCB
Module Leader	1	1	<a href="mailto:alshekhrahman@gmail.com">alshekhrahman@gmail.com</a>
Module Leader's Acad. Title	Mechanical Power Eng. Dep.	Mechanical Power Eng. Dep.	MSc.
Module Tutor	Rahman A. Hussein	Rahman A. Hussein	E-mail
Peer Reviewer Name	Ass. Professor	Ass. Professor	E-mail
Scientific Committee Approval Date	Name (if available)	Name (if available)	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

<b>Module Aims</b> أهداف المادة الدراسية	الهدف العام : اكساب الطالب مهارات التعامل مع التطبيقات المكتبية الاساسية وانشاء الملفات والمستندات المكتبية واستخدام نظم التشغيل فضلا عن اساسيات العمل مع البيئة الرقمية.
<b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية	أ- المعرفة والفهم • 1- من خلال إلقاء المحاضرات النظرية الصفية وحث الطلبة على قراءة كتاب معين في المادة، إضافة إلى تكليف الطلبة بواجبات بحثية و/أو تقارير مكتوبة وذلك في مستوى السنة الأولى من الدراسة.
<b>Indicative Contents</b> المحتويات الإرشادية	

## Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

<b>Strategies</b>	محاضرات مكتوبة
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### Student Workload (SWL)

الحمل الدراسي للطالب

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	88	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	6
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	32	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	120		

### Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes				
	Assignments				
	Projects / Lab.				
	Report				
Summative assessment	Midterm Exam				
	Final Exam				
Total assessment					

### Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

weeks	Material Covered
1	اساسيات الحاسوب ومفهوم الحاسوب

	مجالات استخدام الحاسوب ومميزاته وتصنيفه من حيث الحجم والغرض من الاستخدام ونوع البيانات.
2	مكونات الحاسوب المادية والكيان البرمجي للحاسوب مكونات سط المكتب وقائمة ابدأ وشريط المهام المجلدات والملفات والايقونات اجراء العمليات على النوافذ وخلفيات سطح المكتب
3	الحاسوب الشخصي ومفهوم امن البرامج وتراخيص البرامج اخلاق العالم الالكتروني وامن الحاسوب وخصوصيته تراخض برامج الحاسوب وانواعها، الملئكة الفكرية، الاختراق الالكتروني، برمجيات خبيثة اهم الخطوات اللازمة للحماية من عمليات الاختراق، اضرار الحاسوب على الصحة
4	التحكم في نظام التشغيل ومكوناتها ومجموعاتها حذف البرامج وتنصيبها
5	بعض الحالات والاعدادات الشائعة في الحاسوب ,ادارة الطابعة وضبط الوقت والتاريخ , صيانة الاقراص الالوية.
6	مايكروسوفت 2010 تشغيل برنامج مايكروسوفت 2010 واجهه البرنامج التبويبات الرئيسية
7	تبويب home تبويب عرض تبويب تخطيط الصفحة
8	ادراج الكائنات والجدول مجموعة نص ورموز الكائنات الاضافية في وورد
9	برنامج بوربوينت 2010 فتح البرنامج بيئة البرنامج اضافة وتحرير الشرائح
10	الاضافات على الشرائح وحركاتها الاضافات والادراج والتعليق

11	برنامج اكسل 2010 بيئة البرنامج وفتحه واغلاقه التعرف على التبويبات
12	التعامل مع الجداول والدوال المعادلات ادخال المنحنيات والمضلعات و اضافتها
13	ملخص لبرنامج بينت paint كمثل على معالجة الصور لنسخ والاضافة والنقل بين البرامج المختلفة للحاسوب
14	مراجعة
15	امتحان نهاية الفصل للمادة النظرية

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي العملي	
weeks	Material Covered
1	تدريب الطالب على التعامل مع بيئة الحاسوب والديسك توب و تصفح وفتح واغلاق النوافذ ومربعات الحوار والطرق الصحيحة للتعامل مع لوحة المفاتيح والمؤشر والأجهزة الأخرى.

	-امثله عملة حول التخصيص والتعامل مع الايقونات وتغيير دقة الشاشة.
2	تدريب الطالب على قائمة ابدأ وتكوّن ملف وخرنه باسم الطالب على سطح المكتب .التعامل من النوافذ للبرنامج وشرطة التمرير. -انشاء مجلد باسم معين والتدريب حول تغيير الاسم والاختفاء والاسترجاع والحذف تدرّب الطالب على اجراء عملات على النوافذ خلفات سطح المكتب.
3	تدريب الطالب على التعامل مع تراخيص برامج الحاسوب وانواعها والتعامل مع المنشأ الأصلي للبرامج . تدرّب الطالب على التعامل مع امن الحاسوب والاختراق الالكتروني
4	التعرف على نظم التشغيل تهيئة القرص الصلب وتنصيب نظام التشغيل وندوز
5	تدرّب الطالب على استخدام لوحة التحكم و الاعدادات الشائعة في الحاسوب و تنصّب الطابعة وتهيئة التعامل معها , ضبط الوقت والتاريخ
6	التعرف على بيئة برنامج وورد وقوائمه وتنسيقاته كتابة نصوص كثيرة وتدريب الطالب عليها بأنواع التنسيقات وسحبها على الطابعة.
7	تدريب الطالب على تخطيط الصفحة وباقي التبويبات واطافة الرموز والمعادلات
8	التدريب على ادراج الكائنات عمل الجداول وامثلة متنوعة عليها عمل المستندات باحترافية اكثر
9	برنامج بور بوينت التدريب والتعرف على بيئة البرنامج والشرائح وتبويباته وتنسيقاته واطافتها وحذفها
10	عمل شرائح متعددة والتدريب على حركة الشرائح والاصوات و ادراج الكائنات
11	التعرف على بيئة برنامج اكسل وقوائمه وتنسيقاته تدريب الطالب على أنواع التنسيقات والتبويبات
12	التحكم بالجدول ورسم المنحنيات والمضلعات

13	برنامج مايكروسوفت بينت كمثل على برامج معالجة الصور التدريب على ربط البرامج ببعضها والتحكم بذلك
14	مراجعة
15	امتحان نهاية الفصل للمادة العملية

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	Advanced Mathematics		Module Delivery
Module Type	S		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MPAC200		
ECTS Credits	6		
SWL (hr/sem)	180		
Module Level	2	Semester of Delivery	
Administering Department	Mechanical Power Eng. Dep.	College	TCB
Module Leader	Esam Esmael Ibrahim	e-mail	<a href="mailto:Esam.esmael1994@mtu.edu.iq">Esam.esmael1994@mtu.edu.iq</a>
Module Leader's Acad. Title	Assistant lecture	Module Leader's Qualification	M.Sc
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	20 / 6/2023	Version Number	1

### Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	MPAC100	Semester	L1,S1
Co-requisites module		Semester	

### Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Aims</b> أهداف المادة الدراسية</p>	<p>The aim of this module are :</p> <ol style="list-style-type: none"> <li>1. To introduce students to the mathematical concepts and techniques that They will encounter in the various engineering.</li> <li>2. To develop an awareness of the role of mathematics in the solution of Engineering problems.</li> <li>3. Solve problems involving differentiation and integration.</li> <li>4. Solve system of linear equations using matrix method.</li> <li>5. Apply vector methods to the solution of geometric problems.</li> <li>6. Uses differential equations in problems of heat transfer and other Engineering systems.</li> </ol>
<p><b>Module Learning Outcomes</b></p>	<ol style="list-style-type: none"> <li>1. Apply basic operation in vector algebra(cartesian and geometric representation) to represent lines and planes, calculate the gradient of a scalar field using partial derivatives.</li> <li>2. Apply the basic rules and techniques of <b>**differential**</b> calculus and its application in engineering.</li> </ol>

مخرجات التعلم للمادة الدراسية	<p>3. Apply the basic rules and techniques of <b>integral</b> calculus and its application in engineering.</p> <p>4. Demonstrate the basics, rules and techniques for differential equation and partial differentiation.</p> <p>5. Demonstrate the basics, rules and techniques of complex number algebra and its application in engineering.</p> <p>6. Use basic operations of matrix algebra, determinants and their application in solving systems of linear equations.</p> <p>7. Use of software packages for matrix calculations.</p>
<b>Indicative Contents</b> المحتويات الإرشادية	<p>Indicative content includes the following.</p> <p>Differential and integral calculus of functions of two or more variables and Their applications. Vectors in 3D and their applications, line and surface Integrals, infinite and power series ,matrices , functions of complex variables.</p>

<b>Learning and Teaching Strategies</b> استراتيجيات التعلم والتعليم	
<b>Strategies</b>	Class activities , homework, quizzes, online testing , written exam .

<b>Student Workload (SWL)</b> الحمل الدراسي للطالب			
<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	102	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	7
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	78	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	180		



## Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	15%(15)	3,6,9,12	
	Assignments	3	15%(15)	4,8,12	
	Projects / Lab.				
	Report				
Summative assessment	Midterm Exam	2hr	20%(30)	7	
	Final Exam	3hr	50%(50)	16	
Total assessment					

## Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Overview of differentiation and integration.
Week 2	Vectors in 3D , triple product of vectors ( dot and cross), equations of line and plane in space.
Week 3	Complex numbers, De moiver's theory, power and roots of complex numbers, Euler formula, complex functions, Cauchy- Riemann equations.
Week 4	Functions of two or more variables, dependent and independent variables, limits, continuity, partial derivatives.
Week 5	Applications of partial derivatives, tangent plane to surface, normal line to surface, tangent line to curve, normal plane to curve, relative maximum and minimum points, directional derivative.
Week 6	Polar coordinate, polar functions, graph polar function, relations between polar and cartesian, cylindrical and spherical coordinate.
Week 7	Double integration ,change of double integration, polar coordinate in double integration.

<b>Week 8</b>	Applications of double integration.
<b>Week 9</b>	Triple integration, cylindrical and spherical coordinate in triple integration, applications.
<b>Week 10</b>	Line integrals, green theory.
<b>Week 11</b>	Sequences and series, finite and infinite series.
<b>Week 12</b>	Types of series, methods test diverge and converge of series.
<b>Week 13</b>	Power series, expansion of functions in power series (Taylor and Maclaurin).
<b>Week 14</b>	Ordinary differential equations, first and second O.D.E .
<b>Week 15</b>	<b>Solving of first and second O.D.E , applications of O.D.E .</b>
<b>Week 16</b>	<b>Exam</b>

### Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
<b>Week 1</b>	
<b>Week 2</b>	
<b>Week 3</b>	
<b>Week 4</b>	
<b>Week 5</b>	
<b>Week 6</b>	
<b>Week 7</b>	

### Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. Mu Murray R. Spiegel "Advanced calculus " schaum's outline series, McGraw-Hill company 1974. 2. G. Stephenson, " Mathematical methods for science students " Longman house, 1981 . 3. G. Thomas and R. Finney " calculus and analytical geometry " sixth edition, 2000. 4. J. Hass , C. Heil and M. D. Weir " Thomas calculus " fourteenth edition, 2018.	
Recommended Texts		
Websites		

Grading Scheme				
مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	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
<b>Note:</b> 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 Drawing		Module Delivery
Module Type	C		<input type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MPAC201		
ECTS Credits	6		
SWL (hr/sem)	180		
Module Level	2	Semester of Delivery	
Administering Department	Mechanical Power Eng. Dep.	College	TCB
Module Leader	Rahman A. Hussein	e-mail	<a href="mailto:alshekhrahman@gmail.com">alshekhrahman@gmail.com</a>
Module Leader's Acad. Title	Ass. Prof.	Module Leader's Qualification	M.Sc.
Module Tutor	None	e-mail	E-mail
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	20 / 6/2023	Version Number	1.0

### Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	MPAC101	<b>Semester</b>	L1,S1
<b>Co-requisites module</b>		<b>Semester</b>	

**Module Aims, Learning Outcomes and Indicative Contents**

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Aims</b>	<p>To teach the student,</p> <ol style="list-style-type: none"> <li>6. the basic skill of reading engineering drawing along with their simples and terms as well as the standards</li> <li>7. . joining, bolts and gears, knowledge of assembly drawings</li> <li>8. how to use ACD in mechanical drawing</li> <li>9. fits and tolerances</li> </ol>
<b>Module Learning Outcomes</b>	<p>Upon completion of the course, students should be able to:</p> <ol style="list-style-type: none"> <li>1- Focus on engineering drawing along with their simples and terms as well as the standards</li> <li>2- joining, bolts and gears, knowledge of assembly drawings.</li> <li>3- how to use ACD in mechanical drawing</li> <li>4- fits and tolerances.</li> </ol>
<b>Indicative Contents</b>	<p>Indicative content includes the following.</p> <p>Application on computer, basic of engineering drawing with their simples and terms as well as their standards.[12hrs]</p> <p>using AutoCAD to draw an example of joining by bolts. [10 hrs]</p> <p>Classification of keys, pins and rivets. [10hrs]</p> <p>Application on computer, using AutoCAD to draw an example of joining of keys or pins. [10 hrs]</p> <p>Tolerances, basic size, limits of size and deviation. [10 hrs]</p>

	<p>Fits , classes of fit/ clearance. Transition. Interference. Calculation of fits &amp; tolerance. [15 hrs]</p> <p>Assembly drawing using AutoCAD to draw general assembly. [10hrs]</p> <p>Application on computer, using AutoCAD to draw an example of spur gear. [10 hrs]</p>
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### Learning and Teaching Strategies

#### استراتيجيات التعلم والتعليم

<b>Strategies</b>	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.
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### Student Workload (SWL)

#### الحمل الدراسي للطالب

<b>Structured SWL (h/sem)</b>	116	<b>Structured SWL (h/w)</b>	8
<b>Unstructured SWL (h/sem)</b>	64	<b>Unstructured SWL (h/w)</b>	4
<b>Total SWL (h/sem)</b>	180		

### Module Evaluation

#### تقييم المادة الدراسية

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

## Delivery Plan (Weekly Syllabus) theoretical and practical

المنهاج الاسبوعي النظري والعملي محتوى كل اسبوع يجب ان يغطي الوقت المحدد

	Material Covered
Week 1	Symbols, expressions, general review
Week 2	Screws, bolts, studs and nuts, Keys.
Week 3	Screws, bolts, studs and nuts, Keys.
Week 4	pulleys
Week 5	Gears(bevel gear, worm gear, spur gear)
Week 6	Fit and tolerance
Week 7	Surface finishing and part tables
Week 8	Surface finishing and part tables
Week 9	Assembly drawing and working drawing for advanced mechanisms
Week 10	Assembly drawing and working drawing for advanced mechanisms
Week 11	Pipes and tubes
Week 12	Pipes and tubes
Week 13	Gears assembly
Week 14	Advanced machine assembly
Week 15	Advanced machine assembly

## Learning and Teaching Resources

مصادر التعلم والتدريس

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

## Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
<b>Success Group</b> (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
<b>Fail Group</b> (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

<b>Module Information</b> معلومات المادة الدراسية			
<b>Module Title</b>	<b>Fluid Mechanics</b>		<b>Module Delivery</b>
<b>Module Type</b>	<b>C</b>		<input type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
<b>Module Code</b>	<b>MPAC202</b>		
<b>ECTS Credits</b>	<b>8</b>		
<b>SWL (hr/sem)</b>	<b>240</b>		
<b>Module Level</b>	<b>2</b>	<b>Semester of Delivery</b>	<b>3</b>
<b>Administering Department</b>	<b>Mechanical Power Eng. Dep.</b>	<b>College</b>	<b>Technical Engineering College-Baghdad</b>
<b>Module Leader</b>	<b>Johain Jawdet Faraj</b>	<b>e-mail</b>	<b>johaintech@mtu.edu.iq</b>
<b>Module Leader's Acad. Title</b>	<b>Assistant Professor</b>	<b>Module Leader's Qualification</b>	<b>PhD</b>



<b>Module Tutor</b>		<b>e-mail</b>	E-mail
<b>Peer Reviewer Name</b>	<b>Ahmed Jasim Alhamad</b>	<b>e-mail</b>	E-mail: ahmed.elhamad99@gmail.com@mtu.edu.iq
<b>Scientific Committee Approval Date</b>	20 / 6/2023	<b>Version Number</b>	

### Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	MPAC108, MPAC109	<b>Semester</b>	2
<b>Co-requisites module</b>	MPAC100	<b>Semester</b>	1

### Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Aims</b> أهداف المادة الدراسية	<ol style="list-style-type: none"> <li>1. This module fluid mechanics is intended to develop a deeper understanding of the relationship between design and analysis processing as this module discusses various fluid systems..</li> <li>2. The student will be able to analyze simplified fluid problems with the aim of reduction of energy losses and manpower. The student will be able to identify/control the</li> </ol>
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	<p>appropriate process parameters, and possible defects of processes malfunctions so as to remove them.</p> <ol style="list-style-type: none"> <li>3. For each fluid process, the aspects covered include: aesthetics, principles, choices of materials, choice of processes, properties of materials, advantages and disadvantages, process economics. Examples are drawn from practical processes mainly used in aerospace, automotive and airconditioning industries.</li> <li>4. To introduce the theory and practice of fluid machines parts and assemblies using a wide range of technologies.</li> <li>5. To allow processes to be chosen appropriately for any given application with any given fluid material.</li> <li>6. To develop group working, research and writing skills.</li> <li>7. To provide knowledge on the influence of thermal and mechanical parameters on system structure.</li> </ol>
<p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"> <li>1. Examine fluid processes to describe the system properties of fluid devices.</li> <li>2. Calculate and measure the fluid behavior in thermal processes.</li> <li>3. Define the characteristics of various fluid operations.</li> <li>4. Choose appropriate processes for different parts.</li> <li>5. Design parts such that they are suitable for energy utilization using appropriate techniques.</li> <li>6. Graduates from this module will be skilled in the methods of scientific investigation.</li> <li>7. They will be able to think as a fluid engineer, critically evaluating scientific information and solving scientific problems.</li> <li>8. will be able to effectively communicate scientific information.</li> </ol>
<p><b>Indicative Contents</b></p> <p>المحتويات الإرشادية</p>	<ol style="list-style-type: none"> <li>1) Introduction to Fluid Mechanics. <ol style="list-style-type: none"> <li>1. Fluid Properties.</li> <li>2. density.</li> <li>3. viscosity.</li> <li>4. pressure.</li> <li>5. Shear stress.</li> </ol> </li> <li>2) Fluid Statics. <ol style="list-style-type: none"> <li>a) Pressure Distribution.</li> <li>b) Forces.</li> <li>c) Buoyancy.</li> <li>d) Manometers.</li> </ol> </li> <li>3) Fluid Dynamics <ol style="list-style-type: none"> <li>a) Momentum</li> <li>b) Control Volume</li> <li>c) Energy</li> <li>d) Continuity</li> </ol> </li> <li>4) Fluid machines and hydraulics</li> </ol>

## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

<b>Strategies</b>	<ol style="list-style-type: none"> <li>1. Quizzes and tests throughout the semester to check understanding and knowledge</li> <li>2. Examinations, both written and practical, that assess learners' understanding of concepts, principles, and theories related to Fluid Processes</li> <li>3. Observation of learners' practical skills in laboratory and workshop based or simulated settings.</li> <li>4. Peer evaluation and feedback tools used as part of group projects or reciprocal feedback assignments.</li> <li>5. Assignments and essays used to assess learners' comprehension of theoretical concepts.</li> <li>6. Presentation and demonstration of acquired knowledge in real-world scenarios.</li> </ol>
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## Student Workload (SWL)

### الحمل الدراسي للطالب

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	116	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعياً	8
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	96	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعياً	6
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	240		

## Module Evaluation

### تقييم المادة الدراسية

	Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Quizzes	2	10%	5, 10	

## Delivery Plan (Weekly Syllabus)

### المنهاج الاسبوعي النظري

Material Covered					
<b>Week 1</b>	Fluid Properties				
<b>Week 2</b>	Deriving Pressure equation in fluids				
<b>Week 3</b>	Manometry and pressure measurements.				
<b>Week 4</b>	fluid forces on vertical surfaces				
<b>Week 5</b>	Force on inclined surfaces and center of pressure				
<b>Week 6</b>	fluid forces on curved surfaces				
<b>Week 7</b>	Buoyancy and metastable center				
<b>Week 8</b>	Fluid dynamics applications				
<b>Week 9</b>	Control volume concept				
<b>Week 10</b>	Continuity				
<b>Week 11</b>	Momentum of fixed control volume				
<b>Week 12</b>	momentum of moving control volume and inertial systems				
<b>Week 13</b>	Energy equation as applied to fluid systems				
<b>Week 14</b>	Fluid machinery and hydraulics.				
<b>Week 15</b>	<b>Final exam</b>				
<b>Formative assessment</b>	<b>Assignments</b>	1	5%	9	
	<b>Projects / Lab.</b>	1	10%	continuous	
	<b>Report</b>	1	5%	12	
<b>Summative assessment</b>	<b>Midterm Exam</b>	2hr	10%	7	
	<b>Final Exam</b>	3hr	60%	15	All
<b>Total assessment</b>			100%		

## Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

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

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Required Texts</b>	<ol style="list-style-type: none"> <li>1. Streeter, Mikell P. Fluid Mechanics.</li> <li>2. Fox, Fluid Mechanics.</li> <li>3. F. White, Elementary Fluid Mechanics.</li> </ol>	yes

<b>Recommended Texts</b>	None	
<b>Websites</b>	None	

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

## MODULE DESCRIPTION FORM

### نموذج وصف المادة الدراسية

<b>Module Information</b> معلومات المادة الدراسية		
<b>Module Title</b>	Thermodynamics 2	<b>Module Delivery</b>
<b>Module Type</b>	C	<input type="checkbox"/> Theory

<b>Module Code</b>	MPAC203		<input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
<b>ECTS Credits</b>	10		
<b>SWL (hr/sem)</b>	300		
<b>Module Level</b>	2	<b>Semester of Delivery</b>	TCB
<b>Administering Department</b>	Mechanical Power Eng. Dep.	<b>College</b>	<a href="mailto:yasir_abulatif1@mtu.edu.iq">yasir_abulatif1@mtu.edu.iq</a>
<b>Module Leader</b>	Yasir Abdulateef Gheni	<b>e-mail</b>	TCB
<b>Module Leader's Acad. Title</b>	Lecturer	<b>Module Leader's Qualification</b>	MSc
<b>Module Tutor</b>		<b>e-mail</b>	
<b>Peer Reviewer Name</b>	Dr.Ahmed Qasim Ahmed	<b>e-mail</b>	<a href="mailto:aqaa1@mtu.edu.iq">aqaa1@mtu.edu.iq</a>
<b>Scientific Committee Approval Date</b>	20 / 6/2023	<b>Version Number</b>	1.0

### Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	MPAC109	<b>Semester</b>	L1,S1
<b>Co-requisites module</b>	None	<b>Semester</b>	

### Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Aims</b></p> <p>أهداف المادة الدراسية</p>	<p>To study the principles of applied thermodynamics, as the basis of refrigeration &amp; air conditioning engineering and power plant subjects</p>
<p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"> <li>7. To know the type of steam power plants</li> <li>8. To know the regenerative cycle – dual cycle, High speed gas flow</li> <li>9. To know the properties of isentropic flows, Shock waves</li> <li>10. To know the supersonic nozzles, single and multi-stage reciprocating compressors</li> <li>11. To know the multistage gas turbines and velocity triangles</li> <li>12. To know the steam turbines. Internal combustion engines, Thermodynamics relations</li> <li>13. To know the Maxwell relations, Clausius Clapyron relations</li> <li>14. To know the gas mixtures, Gibbs- equations</li> <li>15. To know the gravimetric analysis, Combustion, heat of reaction.</li> </ol>
<p><b>Indicative Contents</b></p> <p>المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <p><u>Part A – Steam Power Plans</u> Regenerative cycle – dual cycle, High speed gas flow. [24 hrs.]</p> <p><u>Part B – Gas Flow</u> Isentropic flows, shock waves, supersonic nozzles. [16 hrs.]</p> <p><u>Part C – Compressors and Turbines</u> Single and multi-stage reciprocating compressors, multistage gas turbines, velocity triangles, steam turbines, internal combustion engines. [32 hrs.]</p> <p><u>Part D – Thermodynamics Relations</u> Maxwell relations, Clausius Clapeyron relations, gas mixtures, Gibbs-equations. [48 hrs.]</p>



## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

<b>Strategies</b>	Assessment is based on hand-in assignment, written exams, case study, quizzes, seminars and practical testing.
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## Student Workload (SWL)

### الحمل الدراسي للطالب

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	158	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعياً	11
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	142	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعياً	10
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	300		

## Module Evaluation

### تقييم المادة الدراسية

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

<b>Total assessment</b>	100% (100 Marks)		
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### Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	<b>Material Covered</b>
<b>Week 1</b>	An overview of steam, dryness fraction measurements
<b>Week 2</b>	Steam power plants, Rankine - reheat cycle
<b>Week 3</b>	Regenerative cycle – dual cycle, High speed gas flow
<b>Week 4</b>	Properties of isentropic flows, Shock waves
<b>Week 5</b>	Supersonic nozzles, Reciprocating compressors
<b>Week 6</b>	Dynamic analysis, Clearance volume
<b>Week 7</b>	Multistage compressors, Gas turbines
<b>Week 8</b>	Velocity triangles, frictional effects, Gas turbines comparison
<b>Week 9</b>	Steam turbines. Internal combustion engines, Thermodynamics relations
<b>Week 10</b>	Maxwell relations, Clausius Clapeyron relations
<b>Week 11</b>	Thermodynamic relations for $du$ , $dh$ , $ds$ , $C_p$ and $C_v$ , Real gases
<b>Week 12</b>	Compressibility factors, Real gas equations of states
<b>Week 13</b>	Gas mixtures, Gibbs- equations
<b>Week 14</b>	Dalton's law and molar ratio, Volumetric analysis
<b>Week 15</b>	Gravimetric analysis, Combustion, heat of reaction

### Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	<b>Material Covered</b>
<b>Week 1</b>	Measurement of specific heat ratio of air
<b>Week 2</b>	Operating parameters of VCR
<b>Week 3</b>	Saturated vapor pressure and temperature relation
<b>Week 4</b>	Steam boiler efficiency

<b>Week 5</b>	Determination the phase of the refrigerant for VCR system components
<b>Week 6</b>	Vapor dryness fraction measurement
<b>Week 7</b>	Determination the latent heat of evaporation
<b>Week 8</b>	Determination of thermal efficiency for VCR cycle
<b>Week 9</b>	EES software training

### Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Required Texts</b>	1. Borgnakke, C. and Sonntag, R.E., 2022. <i>Fundamentals of thermodynamics</i> . John Wiley & Sons. 2. Cengel, Y.A., Boles, M.A. and Kanoğlu, M., 2011. <i>Thermodynamics: an engineering approach</i> (Vol. 5, p. 445). New York: McGraw-hill. 3. Rajput, R.K., 2005. <i>A textbook of engineering thermodynamics</i> . Laxmi Publications.	No

### Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
<b>Success Group (50 - 100)</b>	<b>A</b> - Excellent	امتياز	90 - 100	Outstanding Performance
	<b>B</b> - Very Good	جيد جدا	80 - 89	Above average with some errors
	<b>C</b> - Good	جيد	70 - 79	Sound work with notable errors
	<b>D</b> - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	<b>E</b> - Sufficient	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group (0 - 49)</b>	<b>FX</b> – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	<b>F</b> – 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	<b>Fundamentals of Air Conditioning and Refrigeration</b>		Module Delivery
Module Type	C		<input type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	<b>MPAC205</b>		
ECTS Credits	10		
SWL (hr/sem)	300		
Module Level	2	Semester of Delivery	2
Administering Department	Mechanical Power Eng. Dep.	College	TCB
Module Leader	Dr. Hayder Mahdi Baqer	e-mail	<a href="mailto:dr.haydermahdi@mtu.edu.iq">dr.haydermahdi@mtu.edu.iq</a>
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	Ph.D.
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	Dr. Abdul Hadi N Khalifa	e-mail	<a href="mailto:ahaddi58@gmail.com">ahaddi58@gmail.com</a>
Scientific Committee Approval Date	20 / 6/2023	Version Number	1.0

### Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	MPAC109	<b>Semester</b>	L1, S2
<b>Co-requisites module</b>		<b>Semester</b>	

### Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Aims</b> أهداف المادة الدراسية	<ol style="list-style-type: none"> <li>1. Introduce the student to the basic processes of refrigeration and conditioning</li> <li>2. Identifying the properties of air and the processes that take place on the moisture content of air.</li> <li>3. Learn about the different cooling media and how to use their tables and curves.</li> <li>4. Learn about the refrigeration compression system and its accessories</li> </ol>
<b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية	<p>1- The student will be able to complete basic operations calculations on the content of moisture air content</p> <p>2- The student will be able to determine the internal and external conditions for the design of the air conditioning system according to the conditions of human comfort.</p> <p>3- The student will be able to complete all the operations of the compression refrigeration system, its components and accessories.</p>
<b>Indicative Contents</b> المحتويات الإرشادية	<p>Indicative content includes the following.</p> <p><u>Part A – Air Conditioning</u></p> <p>The basic properties of a mixture of air and water vapor: components of atmospheric air, general equation of gases, Dalton’s law of partial pressures, saturated vapor pressure, water vapor pressure in moist air, relative humidity, moisture content,</p>

humidification percentage, dew point, enthalpy, The psychrometric scheme and adaptation processes: a general explanation of the psychrometric chart and the basis for its construction. [15 hrs]

Sensible cooling, sensible heating, dehumidification, humidification by water injection, adiabatic humidification, humidification efficiency, humidification by constant wet bulb temperature, contact factor, and bypass factor. [15 hrs]

Humidification by steam injection, adiabatic air mixing, cooling, and dehumidification with reheating, preheating with humidification and reheat. [10 hrs]

Air mixing and adiabatic humidification with reheating, summer cycle and winter cycle, practical applications for the case of summer, and practical applications for the case of winter. [15 hrs]

Selection of supplied air conditions: removal of sensible heat, specific heat capacity of moisture air, removal of latent heat, inclination of the sensible heat ratio line, heat generated by fan motors, waste reheating, selection of appropriate air supply conditions [6 hrs]

#### Part B – Refrigeration cycle

##### Fundamentals

Refrigerants, types of old and modern refrigerants, side effects of refrigerants on the ozone layer and global warming, secondary refrigerants, concept of refrigeration: uses of refrigeration and refrigeration methods, second law of thermodynamics, heat pump, reverse Carnot cycle, simple vapor compression cycle, simple vapor compression cycle parts.. [15 hrs]

Mathematical analysis of the simple vapor compression cycle, the factors affecting the performance parameter of the vapor compression cycle (the impact of suction temperature, the impact of condensation temperature, the impact of sub-cooling, the impact of superheating, and the impact of pressure losses). Theoretical vapor compression cycle and its comparison with the real one, Improving the vapor compression cycle, Using flash tank, Supercooling of refrigerant.. [7 hrs]

	<p>Multistage compression: flash gas removal, intercooler, one evaporator and one compressor, two evaporators and one compressor, two compressors and one evaporator. multi-stage compression: two compressors and evaporators, multi-stage compression with several types of inter-cooling (water intercooler, liquid flash intercooler, flash gas intercooler) [15 hrs]</p> <p>Vapor Compression refrigeration cycle components: compressors type, positive displacement compressors, reciprocating compressors, volumetric efficiency, mechanical efficiency, rotary compressors, screw compressors, scroll compressors, centrifugal compressors. Condensers, evaporators, and cooling towers Expansion tools, accessories for vapor compressor cooling system. [15 hrs]</p>
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### Learning and Teaching Strategies

#### استراتيجيات التعلم والتعليم

<b>Strategies</b>	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.
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### Student Workload (SWL)

#### الحمل الدراسي للطالب

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	144	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعياً	10
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	156	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعياً	11
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	300		

### Module Evaluation

#### تقييم المادة الدراسية

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

### Delivery Plan (Weekly Syllabus)

#### المنهاج الاسبوعي النظري

	Material Covered
Week 1	The basic properties of a mixture of air and water vapor: components of atmospheric air, general equation of gases, Dalton's law of partial pressures, saturated vapor pressure, water vapor pressure in moist air, relative humidity, moisture content, humidification percentage, dew point, enthalpy, The psychrometric scheme and adaptation processes: a general explanation of the psychrometric chart and the basis for its construction
Week 2	Sensible cooling, sensible heating, dehumidification, humidification by water injection, adiabatic humidification, humidification efficiency, humidification by constant wet bulb temperature, contact factor, and bypass factor.
Week 3	Humidification by steam injection, adiabatic air mixing, cooling and dehumidification with reheating, preheating with humidification and reheat.
Week 4	Air mixing and adiabatic humidification with reheating, summer cycle and winter cycle, practical applications for the case of summer, and practical applications for the case of winter.
Week 5	Comfort and internal conditions: Metabolism and human comfort, body mechanics in heat transfer and thermoregulation, metabolic rate, clothing, the effect of the environment on human comfort, other factors affecting human comfort, and selection of internal conditions.
Week 6	Climate and external conditions: climate, wind, local winds, dew formation, seasonal temperature change, seasonal humidity change, meteorological measurements, seasonal change of the psychrometric condition of the external outdoor conditions, selection of external conditions (the three methods).



<b>Week 7</b>	Selection of supplied air conditions: removal of sensible heat, specific heat capacity of moisture air, removal of latent heat, inclination of the sensible heat ratio line, heat generated by fan motors, waste reheating, selection of appropriate air supply conditions
<b>Week 8</b>	Refrigerants, types of old and modern refrigerants, side effects of refrigerants on the ozone layer and global warming, secondary refrigerants, concept of refrigeration: uses of refrigeration and refrigeration methods, second law of thermodynamics, heat pump, reverse Carnot cycle, simple vapor compression cycle, simple vapor compression cycle parts.
<b>Week 9</b>	Mathematical analysis of the simple vapor compression cycle, the factors affecting the performance parameter of the vapor compression cycle (the impact of suction temperature, the impact of condensation temperature, the impact of sub-cooling, the impact of superheating, and the impact of pressure losses).
<b>Week 10</b>	Theoretical vapor compression cycle and its comparison with the real one, Improving the vapor compression cycle, Using flash tank, Supercooling of refrigerant.
<b>Week 11</b>	Multistage compression: flash gas removal, intercooler, one evaporator and one compressor, two evaporators and one compressor, two compressors and one evaporator.
<b>Week 12</b>	Multi-stage compression: two compressors and evaporators, multi-stage compression with several types of intercooling (water intercooler, liquid flash intercooler, flash gas intercooler)
<b>Week 13</b>	Vapor Compression refrigeration cycle components: compressors type, positive displacement compressors, reciprocating compressors, volumetric efficiency, mechanical efficiency, rotary compressors, screw compressors, scroll compressors, centrifugal compressors.
<b>Week 14</b>	Condensers, evaporators, and cooling towers
<b>Week 15</b>	Expansion tools, accessories for vapor compressor cooling system.
<b>Week 16</b>	<b>The preparatory week before the final Exam</b>

### Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	<b>Material Covered</b>
<b>Week 1</b>	Air velocity measuring devices - measuring air velocity using a Petot tube and a manometer.
<b>Week 2</b>	Applications to the air properties Psychometric Chart.
<b>Week 3</b>	Sensible cooling

<b>Week 4</b>	Sensible heating
<b>Week 5</b>	Dehumidification process
<b>Week 6</b>	Air Humidification by Direct Injection of Water Drops
<b>Week 7</b>	Humidify the air with a jet of steam
<b>Week 8</b>	Air mixing process
<b>Week 9</b>	Cooling and dehumidifying with reheating
<b>Week 10</b>	Preheating, cooling and dehumidifying with reheating
<b>Week 11</b>	Mixing and adiabatic saturation with reheating
<b>Week 12</b>	Theoretical calculations for compressor performance
<b>Week 13</b>	Condenser calculations for vapor compression cycle
<b>Week 14</b>	Calculations of capacity and performance factor for vapor compression cycle
<b>Week 15</b>	Calculations of the coefficient of performance for the real vapor compression cycle

### Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Required Texts</b>	<i>Jan F. Kreider, Peter S. Curtiss " Heating and cooling of Building" Mc Graw Hill, 2000 ASHRAE, Fundamental . 1997.</i>	Yes
<b>Recommended Texts</b>	<i>Sapali, S.N., 2009."Refrigeration and air conditioning". PHI Learning Pvt. Ltd.</i>	No
<b>Websites</b>		

### Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
<b>Success Group (50 - 100)</b>	<b>A - Excellent</b>	امتياز	90 - 100	Outstanding Performance
	<b>B - Very Good</b>	جيد جدا	80 - 89	Above average with some errors

	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work is required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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

## MODULE DESCRIPTION FORM

### نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Strength of Materials		Module Delivery
Module Type	C		<input type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MPAC206		
ECTS Credits	8		
SWL (hr/sem)	240		
Module Level	2	Semester of Delivery	2
Administering Department	Mechanical Power Eng. Dep.	College	TCB
Module Leader	HAITHAM T YAHYA	e-mail	<a href="mailto:Haithamyahya@mtu.edu.iq">Haithamyahya@mtu.edu.iq</a>
Module Leader's Acad. Title	Ass. Lecturer	Module Leader's Qualification	M.Sc.
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	Ammar Ali Hussain	e-mail	<a href="mailto:Drammar@mtu.edu.iq">Drammar@mtu.edu.iq</a>

<b>Scientific Committee Approval Date</b>	10/06/2023	<b>Version Number</b>	1.0
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<b>Relation with other Modules</b> العلاقة مع المواد الدراسية الأخرى			
<b>Prerequisite module</b>	MPAC108	<b>Semester</b>	L1- S2
<b>Co-requisites module</b>	None	<b>Semester</b>	

<b>Module Aims, Learning Outcomes and Indicative Contents</b> أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
<b>Module Aims</b> أهداف المادة الدراسية	<p>This course is the foundation to many advanced techniques that allow engineers to design machine components, mechanisms, predict failure and understand the physical properties of materials. Mechanics of Materials gives the student basic tools for stress, strain and deformation analysis. Methods for determining the stresses, strains and deformations produced by applied loads are presented. Engineering design concepts are integrated throughout the course.</p>
<b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none"> <li>1. To apply the formal theory of solid mechanics to calculate forces, deflections, moments, stresses, and strains in a wide variety of structural members subjected to tension, compression, torsion, bending, both individually and in combination, including : <ul style="list-style-type: none"> <li>• axially loaded bars</li> <li>• components in pure shear</li> <li>• circular shafts in torsion</li> <li>• beams in bending</li> <li>• thin-walled pressure vessels</li> </ul> </li> <li>2. Determine the stresses and strains in members subjected to combined loading and apply the theories of failure for static loading</li> <li>3. To determine principal stresses and angles, maximum shearing stresses and angles, and the stresses acting on any arbitrary plane within a structural element.</li> <li>4. Analyze slender, long columns subjected to axial loads</li> </ol>

	5. Determine the deflections and rotations produced by the flexural loading. 9.
<p><b>Indicative Contents</b> المحتويات الإرشادية</p>	<p><b><u>Indicative content includes the following.</u></b></p> <p>Give the students information about  stress and strain, [12 hrs]  Thermal stress, [12 hrs]  Thin Walled stress torsion, [12 hrs]  Thin Walled Torsion, [12 hrs]  Shear force and bending moment diagram, [12 hrs]  complex stress , [12 hrs]  Mohr's circle. [12 hrs]  Sum. <math>7 \times 12 = 84</math>  with lab. Part test for  tensile, [4 hrs]  impact, [4 hrs]  hardness , [4 hrs]  creep , [4 hrs]  compression, [4 hrs]  bending , [4 hrs]  buckling , [4 hrs]  torsion [4 hrs]  sum. <math>4 \times 8 = 32</math>  <b>TOTAL Structured SWL (h/sem)=<math>84+32=116</math></b></p>
<p><b>Learning and Teaching Strategies</b> استراتيجيات التعلم والتعليم</p>	
<p><b>Strategies</b></p>	<p>The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.</p>

### Student Workload (SWL)

الحمل الدراسي للطالب

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	116	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	8
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	124	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	9
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	240		

### Module Evaluation

تقييم المادة الدراسية

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

### Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Subject
1	Introduction to strength of materials
2	Simple stress and Strain
3	Compound Bars
4	Thermal stresses
5	Shearing force and bending moment diagrams
6	Bending of beam
7	Slope and deflection of beams
8	Shear stresses in beam
9	Torsion of shaft
10	Thin cylinders and shells
11	Complex stresses

12	Mohr's stress circle
13	Buckling of column
14	Strain Energy
15	Theories of Elastic failure
<b>Week 16</b>	<b>Preparatory week before the final Exam</b>

### Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

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

### Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Recommended Texts</b>	<ol style="list-style-type: none"> <li>1. Mechanics of materials By Hearn</li> <li>2. Mechanics of materials By Dean Updike</li> <li>3. Mechanics of materials By R.C. Hibbeler</li> <li>4. Mechanics of materials By F.P. Beer</li> <li>5. Mechanics of materials By Goodno and Gere</li> </ol>	no

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

## MODULE DESCRIPTION FORM

### نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Computer Applications 1		Module Delivery
Module Type	S		<input type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MPAC207		
ECTS Credits	6		
SWL (hr/sem)	180		
Module Level	2	Semester of Delivery	
Administering Department	Mechanical Power Eng. Dep.	College	TCB



<b>Module Leader</b>	Zahraa Ibrahim Saber	<b>e-mail</b>	<a href="mailto:alshmaryzahraa79@yahoo.com">alshmaryzahraa79@yahoo.com</a>
<b>Module Leader's Acad. Title</b>	Assistant Lecturer	<b>Module Leader's Qualification</b>	Ms. Tech.
<b>Module Tutor</b>	None	<b>e-mail</b>	None
<b>Peer Reviewer Name</b>	Name	<b>e-mail</b>	None
<b>Scientific Committee Approval Date</b>	20 / 6/2023	<b>Version Number</b>	1.0

### Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	None	<b>Semester</b>	
<b>Co-requisites module</b>	None	<b>Semester</b>	

### Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Aims</b>	To make the student able to process, program, and solve arithmetic and engineering problems using Matlab
<b>Module Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. To apply the knowledge about Matlab.</li> <li>2. To enable students solve scientific and mathematical problems, write codes, design projects and process images.</li> </ol>
<b>Indicative Contents</b>	

## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

<b>Strategies</b>	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.
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## Student Workload (SWL)

### الحمل الدراسي للطالب

<b>Structured SWL (h/sem)</b>	88	<b>Structured SWL (h/w)</b>	6
<b>Unstructured SWL (h/sem)</b>	92	<b>Unstructured SWL (h/w)</b>	6
<b>Total SWL (h/sem)</b>	180		

## Module Evaluation

### تقييم المادة الدراسية

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

## Delivery Plan (Weekly Syllabus)

### المنهاج الاسبوعي النظري محتوى كل اسبوع يجب ان يغطي الوقت المحدد

	Material Covered
<b>Week 1</b>	Introduction to Matlab
<b>Week 2</b>	Mathematical Functions
<b>Week 3</b>	Vectors & Matrices
<b>Week 4</b>	Vectors & Matrices
<b>Week 5</b>	Introduction to Programming in MATLAB
<b>Week 6</b>	Control flow
<b>Week 7</b>	Control flow

<b>Week 8</b>	Debugging
<b>Week 9</b>	Mathematical Equations
<b>Week 10</b>	Graph Plot
<b>Week 11</b>	GUI
<b>Week 12</b>	GUI
<b>Week 13</b>	Image Processing
<b>Week 14</b>	Simulink
<b>Week 15</b>	<b>Preparatory week before the final Exam</b>

### Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

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

### Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Recommended Texts (Website)</b>	<a href="https://www.mathworks.com/products/matlab.html">https://www.mathworks.com/products/matlab.html</a>	

## 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 2		Module Delivery
Module Type	S		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MPAC208		
ECTS Credits	6		
SWL (hr/sem)	180		
Module Level	2	Semester of Delivery	
Administering Department	Mechanical Power Eng. Dep.	College	TCB
Module Leader	Dr. Nabil Taih	e-mail	
Module Leader's Acad. Title	Lecturer. Assist	Module Leader's Qualification	MSc

<b>Module Tutor</b>	<b>Asst. Lecturer. Labeled Kadhim Jawad</b>	<b>e-mail</b>	<a href="mailto:labeled1970@mtu.edu.iq">labeled1970@mtu.edu.iq</a>
<b>Peer Reviewer Name</b>	Asst. Prof. Dr Ammar A. Hussain	<b>e-mail</b>	Drammar@mtu.edu.iq
<b>Scientific Committee Approval Date</b>	20 / 6/2023	<b>Version Number</b>	1.0

### Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	MPAC104	<b>Semester</b>	L1,S1
<b>Co-requisites module</b>	None	<b>Semester</b>	

### Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

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

## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

#### Strategies

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

## Student Workload (SWL)

### الحمل الدراسي للطالب

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	86	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	6
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	94	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	180		

## Module Evaluation

### تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	20% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

## Delivery Plan (Weekly Syllabus)

### المنهاج الأسبوعي النظري

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

<b>Learning and Teaching Resources</b>		
مصادر التعلم والتدريس		
	<b>Text</b>	<b>Available in the Library?</b>
<b>Required Texts</b>	Headway plus for pre intermediate	Yes
<b>Recommended Texts</b>	Any Grammar and comprehension for technical learning	No
<b>Websites</b>		

## 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	<b>Engineering and Numerical Analysis</b>		Module Delivery
Module Type	S		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MPAC300		
ECTS Credits	4		
SWL (hr/sem)	120		
Module Level	3	Semester of Delivery	
Administering Department	Mechanical Power Eng. Dep.	College	TCB



<b>Module Leader</b>	HAITHAM T YAHYA	<b>e-mail</b>	Haithamyahya@mtu.edu.iq
<b>Module Leader's Acad. Title</b>	Ass. Lecturer	<b>Module Leader's Qualification</b>	M.Sc.
<b>Module Tutor</b>	Name (if available)	<b>e-mail</b>	E-mail
<b>Peer Reviewer Name</b>	Ammar Ali Hussain	<b>e-mail</b>	Drammar@mtu.edu.iq
<b>Scientific Committee Approval Date</b>	20/06/2023	<b>Version Number</b>	1.0

### Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	MPAC200	<b>Semester</b>	L2- S1
<b>Co-requisites module</b>	None	<b>Semester</b>	

### Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Aims</b> أهداف المادة الدراسية	This course aims to provide a good knowledge to the students about the Engineering and numerical analysis with understand the basis of solutions and their application in different branches of engineering / mechanical, material, Civil and power.
<b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none"> <li>10. Understand the methods of solutions for first, second and high orders differential equations and their engineering applications.</li> <li>11. Understand the types and method of solution for Fourier Series and their engineering applications.</li> <li>12. Understand the methods of solution by Laplace transformation and their applications.</li> <li>13. Understand the methods of solution for partial differential equation and their engineering application.</li> </ol>

	<p>14. Understand the numerical methods for solving linear and non-linear equations and their engineering applications.</p> <p>15. Understand the numerical methods for solving the differential equations and their engineering applications.</p>
<p><b>Indicative Contents</b> المحتويات الإرشادية</p>	<p><b><i>Indicative content includes the following.</i></b></p> <p>Give the students information about :</p> <p>Differential Equations. First, 2nd and, Higher Linear Order Differential Equations, [12hrs]</p> <p>Fourier series, [10hrs]</p> <p>Laplace and Laplace Inverse transformation, [12hrs]</p> <p>Euler equation, [10hrs]</p> <p>Runge-Kutta method, [10hrs]</p> <p>interpolation, [10hrs]</p> <p>iteration, [10hrs]</p> <p>partial Differential Equations[13hrs]</p> <p><b>TOTAL Structured SWL (h/sem)=87</b></p>
<p><b>Learning and Teaching Strategies</b> استراتيجيات التعلم والتعليم</p>	
<p><b>Strategies</b></p>	<p>The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.</p>

<p><b>Student Workload (SWL)</b> الحمل الدراسي للطالب</p>			
<p><b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل</p>	87	<p><b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا</p>	6.0
<p><b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل</p>	33	<p><b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا</p>	2
<p><b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل</p>	120		

## Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	15% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	15% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	0	0% (10)	0	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

## Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Subject
1	First order differential equations, Special cases of first order D.E and their engineering applications.
2	Second order linear equation with constant coefficients and their engineering applications.
3	High order linear differential equations , Integral operators and their engineering applications.
4	Fourier series, even and odd functions and their engineering applications.
5	Gamma Function and integral solution.
6	Laplace transformation, Inverse Laplace transformation, Laplace transformation to solution for differential equations and their engineering applications.
7	Partial differential equations, solution by separation method and their engineering applications.
8	Nonlinear equations solution, Simple Iteration, Newton-Raphson, finite difference methods.
9	Solution of simultaneous linear equations, Direct and Indirect methods
10	Interpolation by Lagrangian and Newton methods.
11	Curves fitting analysis by Newton method.
12	Numerical integration, complex numerical integration and their applications.
13	Numerical method to solve partial differential equations by separation method.
14	Numerical method to solve differential equations by Rang-Kotta and Power series.
15	Numerical method to solve differential equations by exponential equations. method
<b>Week 16</b>	<b>Preparatory week before the final Exam</b>

## Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Recommended Texts	1- Advanced Engineering Mathematics, Erwin Kreyszig , John Wiley & Sons, Inc. 2- Advanced Engineering Mathematics, Peter V. O'Neil, Thomson Brooks/Cole 3- Advanced Engineering Mathematics, A.B. Mathur & V.P. Jaggi, Khanna Publishers 4- Advanced Engineering Mathematics, Wyle Barrett /fifth edition. 5- Numerical Methods for Scientists and Engineers, R.w. Hamming knowledge. 6- Numerical Analysis, Richard L. Burden & J. Douglas Faires. 7- Introduction to Numerical Analysis, F.B. Hildebrand.	no

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

<b>Module Information</b> معلومات المادة الدراسية			
<b>Module Title</b>	<b>Computer Applications 2</b>		<b>Module Delivery</b>
<b>Module Type</b>	<b>S</b>		<input type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
<b>Module Code</b>	<b>MPAC301</b>		
<b>ECTS Credits</b>	<b>4</b>		
<b>SWL (hr/sem)</b>	<b>120</b>		
<b>Module Level</b>		<b>Semester of Delivery</b>	
<b>Administering Department</b>	Mechanical Power Eng. Dep.	<b>College</b>	TCB
<b>Module Leader</b>	Wajdy Qassim Hussen	<b>e-mail</b>	<a href="mailto:waidiqasem@mtu.edu.iq">waidiqasem@mtu.edu.iq</a>
<b>Module Leader's Acad. Title</b>	Lecturer	<b>Module Leader's Qualification</b>	MSc
<b>Module Tutor</b>		<b>e-mail</b>	E-mail
<b>Peer Reviewer Name</b>		<b>e-mail</b>	E-mail
<b>Scientific Committee Approval Date</b>	20 / 6/2023	<b>Version Number</b>	1.0

<b>Relation with other Modules</b> العلاقة مع المواد الدراسية الأخرى			
<b>Prerequisite module</b>	MPAC207	<b>Semester</b>	L2,S2
<b>Co-requisites module</b>	None	<b>Semester</b>	

## Module Aims, Learning Outcomes and Indicative Contents

### أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Aims</b> أهداف المادة الدراسية	<p>1- أن يكون الطالب قادرا رسم وتصميم مختلف الأجزاء الميكانيكية الأكثر شيوعا في الصناعات الميكانيكية</p> <p>2- ان يكون الطالب قادرا استخدام البرمجيات لتوصيف الأجزاء الميكانيكية والانتقال من الحسابات الورقية المطولة الى العمليات الحاسوبية السريعة ومقارنة النتائج من حيث الدقة والسرعة واجراء حسابات عزم القصور الذاتي والانحناء لأجزاء ميكانيكية معينة</p> <p>3- ان يفهم الطالب ويطبق المحاكات لحساب وحل مختلف مسائل العتبات بانواعها البسيطة والمركبة وتحت مختلف الاحمال نقطي او منتشر او عزم التواء</p>
<b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية	<p>أ- المعرفة والفهم</p> <p>1- اعداد مهندسين تطبيقيين قادرين على التعرف على الفرق بين استخدام الحاسوب بالتصميم والعمل الورقي</p> <p>2- التعرف على الخطوات والطرق الصحيحة والأقصر للوصول الى نتائج مناسبة</p> <p>3- التعامل مع كتب المواصفات العالمية ولمختلف الدول</p> <p>4- تنفيذ الرسومات لاجزاء ميكانيكية وتحليل الاجهادات نظريا</p>
<b>Indicative Contents</b> المحتويات الإرشادية	<p>يتكون المقرر من جزئين, الأول يوضح التعرف على الطرائق التقليدية لتصميم ورسم الأجزاء الميكانيكية الرئيسية المختلفة, اما الجزء الثاني فيدرس حسابات عزم القصور الذاتي والانحناء والتشوه لمختلف مقاطع المعادن بالحاسبة وحل مسائل العتبات المختلفة ورسم مخططات الانحناء والتشوه لمختلف انواع المعادن</p>

## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

<b>Strategies</b>	
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مختبرات الحاسوب, فيديوهات تعليمية منشوره على القناة الخاصة في اليوتيوب  
 رابط القناة  
[https://youtu.be/F\\_zgHo-T8mg](https://youtu.be/F_zgHo-T8mg)

### Student Workload (SWL)

الحمل الدراسي للطالب

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	88	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	6
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	32	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	120		

### Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	2	10% (10)	4,10	LO# 1,2.10 and 11
	<b>Assignments</b>	2	10% (10)	2,13	LO# 3,4.6 and 7
	<b>Projects / Lab.</b>	1	10% (10)	Continuous	
	<b>Report</b>	1	10% (10)	14	LO# 5,8 and 10
<b>Summative assessment</b>	<b>Midterm Exam</b>	2 hr	10% (10)	7	LO# 1-7
	<b>Final Exam</b>	2 hr	50%(50)	16	ALL
<b>Total assessment</b>			100%(100 Marks)		

<b>Delivery Plan (Weekly Syllabus)</b> المنهاج الاسبوعي العملي	
weeks	Material Covered
1	Fasteners ( screw –washer –nut)
2	Shaft Generator(cylinder –gear –thread-wrench)
3	Spur Gear & Groove
4	Retaining Rings
5	Keys( 4 types of keys)
6	Roller Bearings( single & double)- Plain Bearings
7	Drill Bushings( headless & headed)
8	Seals
9	Springs( compression ,extension
10	,torsion Belleville )
11	Shaft Break
12	Moment of Inertia for steal shapes (nine types)
13	Shaft Calculations
14	Deflection Line
15	Bearing Calculation

<b>Learning and Teaching Resources</b> مصادر التعلم والتدريس		
	Text	Available in the Library?



<b>Required Texts</b>	1-Engineering Design and Graphics with Mechanical Desktop 5.0 (book)	no
<b>Recommended Texts</b>	2-Learning Mechanical Desktop Release 4(book) 3- ASTM standardizes 4-Mechanical Desktop (book)	no
<b>Websites</b>	<a href="https://www.autodesk.com/">https://www.autodesk.com/</a>	

<b>Grading Scheme</b> مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
<b>Success Group (50 - 100)</b>	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
<b>Fail Group (0 – 49)</b>	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
<p><b>Note:</b>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.</p>				

## MODULE DESCRIPTION FORM

### نموذج وصف مادة نظرية المكينات والاهتزازات الميكانيكية

<b>Module Information</b> معلومات المادة الدراسية		
<b>Module Title</b>	<b>Theory of Machine and Vibrations</b>	<b>Module Delivery</b>
<b>Module Type</b>	<b>C</b>	<input type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture
<b>Module Code</b>	<b>MPAC302</b>	

<b>ECTS Credits</b>	4		<input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
<b>SWL (hr/sem)</b>	120			
<b>Module Level</b>	3	<b>Semester of Delivery</b>	1	
<b>Administering Department</b>	Mechanical Power Eng. Dep.		<b>College</b>	TCB
<b>Module Leader</b>	Wisam A. Ajlan		<b>e-mail</b>	<a href="mailto:waahwisam@gmail.com">waahwisam@gmail.com</a>
<b>Module Leader's Acad. Title</b>	Lecturer		<b>Module Leader's Qualification</b>	M.Sc.
<b>Module Tutor</b>	None		<b>e-mail</b>	E-mail
<b>Peer Reviewer Name</b>	Asst. Prof. Dr. Hassan Hamoodi Mahdi		<b>e-mail</b>	<a href="mailto:dr_hassan1961@mtu.edu.iq">dr_hassan1961@mtu.edu.iq</a>
<b>Scientific Committee Approval Date</b>	20/06/2023		<b>Version Number</b>	1.0

#### Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	MPAC108	<b>Semester</b>	L1,S2
	MPAC206		L2,S2
<b>Co-requisites module</b>	None	<b>Semester</b>	

#### Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Aims</b></p>	<ol style="list-style-type: none"> <li>10. To identify and enumerate different link based mechanisms with basic understanding of motion.</li> <li>11. To understand and illustrate various power transmission mechanisms using suitable method.</li> <li>12. The knowledge of this subject is very essential for an engineer in designing the various parts of a machine.</li> <li>13. Vibration analysis is a process of looking for anomalies and monitoring change from the established vibration signature of a system. The vibration of any object in motion is characterized by variations of amplitude, intensity, and frequency.</li> <li>14. Vibration is highly applicable for investigating the operational conditions and status of rotating machinery and structures. Vibrations can be represented in different forms, including displacement, velocity and acceleration.</li> </ol>
<p><b>Module Learning Outcomes</b></p>	<p>Upon completion of the course, students should be able to:</p> <ol style="list-style-type: none"> <li>1. Balance the rotating masses to reduce (or even eliminating) the unbalanced forces and couples in a mechanical system.</li> <li>2. Learn and understand how the motion can be transmitted by two or more toothed wheels.</li> <li>3. Learn that there are many types of governors and the main function of a governor is to regulate the mean speed of an engine within certain limits, when there are variations in the load.</li> <li>4. The student will learn how the belts or ropes are used to transmit power from one shaft to another by means of pulleys which rotate at the same speed or at different speeds.</li> <li>5. Learn to calculate the braking torque for different types of brake, and learn how to dealing with the braking of a vehicle.</li> <li>6. Learn general information about the cam, and also learn the type of motion of follower.</li> <li>7. Understand the engineering principles in mechanical system to identify.</li> <li>8. Formulate and solve the problem of mechanical engineering.</li> <li>9. Able to find the source of engineering problems in mechanical system through research that includes identification, formulation, analysis, data interpretation based on engineering principles.</li> <li>10. Able to formulate the solution of engineering problem in mechanical system by considering economy, safety, environment and energy conservation.</li> <li>11. Analyze mechanical vibration on 1 and 2 degree of freedom system.</li> <li>12. Explain basic concept of free body diagram and vibration mathematics model system.</li> <li>13. Formulate movement equation and analyze vibration respond from undamped and damped in free and forced excitation with various excitation.</li> </ol>
<p><b>Indicative Contents</b></p>	<p>Indicative content includes the following.  Balancing of a Single Rotating Mass by a Single Mass Rotating in the Same Plane, balancing of a Single Rotating Mass by Two Masses Rotating in Different Planes, Balancing of Several Masses Rotating in the Same Plane Using Analytical and Graphical Methods, Balancing of Several Masses Rotating in Different Planes. [4 hrs]</p>

	<p>Classification of Gears, Spur Gears, Velocity Ratio (Gear Ratio), Center to Center Distance, Gear Trains, Velocity Ratio of Simple Gear Trains, Velocity Ratio of Compound Gear Trains, Epicyclic Gear Trains, Simple Epicyclic Gear Trains, Compound Epicyclic Gear Trains. [4 hrs]</p> <p>Types of Governors, Watt Governor, Porter Governor, Proell Governor, Hartnell Governor. [4 hrs]</p> <p>Types of Belts, Types of Flat Belt Drive, Selection of Belt Drive, Velocity Ratio of Open Belt Drive, Effect of Belt Thickness on Velocity Ratio, Slip of the Belt, Velocity Ratio of a Compound Belt Drive, Length of Open and Cross Belt, Ratio of Driving Tension for Flat Belts, Determination of Angle of Contact for Open and Cross belt., Power Transmitted by a Belt, Centrifugal Tension, Maximum Tension in the Belts, Initial Tension in the Belt, V – Belt Drive and Rope Drive. [4 hrs]</p> <p>Types of Brakes, Simple Block or Shoe Brake (Single and Double Block), Band Brake (Simple and Differential Band Brake), Band and Block Brake, The Braking of a Vehicle. [4 hrs]</p> <p>Types of Followers, Nomenclatures for Cam Profile, Motions of the Follower, Uniform Motion or Uniform Velocity of a Follower, Simple Harmonic Motion of Follower, Uniform Acceleration and Uniform Retardation, Cam profile construction. [4 hrs]</p> <p>Basic concepts of vibration, Oscillatory motion, Second Order Differential Equations with Constant Coefficients. [4 hrs]</p> <p>Undamped Free Vibrations of Single degree of Freedom Systems, Torsional Oscillation of Elastic Shafting, Energy Methods. [4 hrs]</p> <p>Damped Free Vibrations of Single degree of Freedom Systems, Logarithmic Decrement, Forced Vibrations of Undamped Single Degree of Freedom Systems, Force Vibrations of Damped Single Degree of Freedom Systems, Forced Angular Oscillations of Rigid Bodies. [4 hrs]</p> <p>Influence of Frequency Ratio and Damping Factor on Steady State Response, Force Transmission and Vibration Isolation. [2 hrs]</p> <p>Natural Frequency of Transverse Vibrations of Shafts or Beams Under Different Types of Loads and End Conditions, Natural Frequency of Transverse Vibration of a System of Several Loads Attached to the Same Shaft (Energy and Dunkerley's Methods). [2 hrs]</p> <p>Whirling Speeds or Critical Speeds. [2 hrs]</p> <p>Free Vibrations of Undamped Systems with Two Degree of Freedom. [2 hrs]</p> <p>Free Vibrations of Damped Systems with Two Degree of Freedom. [2 hrs]</p> <p>Forced Vibrations for Systems with Two Degree of freedom. [2 hrs]</p>
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	Natural Frequency of Free Torsional Vibrations, Free Torsional Vibrations of a Single Rotor System, Free Torsional Vibrations of a Two Rotor System. [ 2 hrs]
	Free Torsional Vibrations of a Three Rotor System, Torsional Equivalent Shaft. [2 hrs]

### Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

<b>Strategies</b>	Assessment is based on hand-in assignments, written exam, Quizzes, Practical testing.
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### Student Workload (SWL)

الحمل الدراسي للطالب

<b>Structured SWL (h/sem)</b>	116	<b>Structured SWL (h/w)</b>	8
<b>Unstructured SWL (h/sem)</b>	4	<b>Unstructured SWL (h/w)</b>	1
<b>Total SWL (h/sem)</b>	120		

### Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	3	10% (10)	2, 5, 12	LO # 1-15
	<b>Assignments</b>				
	<b>Practical / Lab</b>	2	20% (20)	Continuous	
	<b>Report / Lab</b>	1	10% (10)	14	LO # 1-7
<b>Summative assessment</b>	<b>Midterm Exam</b>	2 hr	10% (10)		LO # 1-7
	<b>Final Exam</b>	3hr	50% (50)		All
<b>Total assessment</b>			100% (100 Marks)		

## Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري محتوى كل اسبوع يجب ان يغطي الوقت المحدد

	<b>Material Covered</b>
<b>Week 1</b>	Balancing of Rotating Masses Balancing of a Single Rotating Mass by a Single Mass Rotating in the Same Plane Balancing of a Single Rotating Mass by Two Masses Rotating in Different Planes Balancing of Several Masses Rotating in the Same Plane (a) Analytical Method (b) Graphical Method Basic concepts of vibration Oscillatory motion. (a) Harmonic motion. (b) Periodic motion. Vibration terminology.
<b>Week 2</b>	Balancing of Several Masses Rotating in Different Planes Solve Problems. Second Order Differential Equations with Constant Coefficients. Solve Problems. Undamped Free Vibrations of Single degree of Freedom Systems. (a) Simple Harmonic Oscillation (Equilibrium Method). (b) Angular Oscillations of Rigid Bodies. Torsional Oscillation of Elastic Shafting. Solve Problems.
<b>Week 3</b>	Classification of Gears Spur Gears Velocity Ratio (Gear Ratio) Center to Center Distance Gear Trains Velocity Ratio of Simple Gear Trains Velocity Ratio of Compound Gear Trains Solve Problems
<b>Week 4</b>	Epicyclic Gear Trains Simple Epicyclic Gear Trains Compound Epicyclic Gear Trains Energy Methods. Equivalent Spring Constants. Solve Problems.
<b>Week 5</b>	Solved Problems Damped Free Vibrations of Single degree of Freedom Systems. Logarithmic Decrement. Forced Vibrations of Undamped Single Degree of Freedom Systems. Solve Problems.
<b>Week 6</b>	Types of Governors Watt Governor

	Porter Governor (a) Equilibrium Method (b) Instantaneous Center Method Solve Problems tions of Damped Single Degree of Freedom Systems. Forced Angular Oscillations of Rigid Bodies. Solve Problems.
<b>Week 7</b>	Proell Governor Hartnell Governor Solve Problems Influence of Frequency Ratio and Damping Factor on Steady State Response. Force Transmission and Vibration Isolation. Base Excitation.
<b>Week 8</b>	Types of Belts Types of Flat Belt Drive Selection of Belt Drive Velocity Ratio of Open Belt Drive Effect of Belt Thickness on Velocity Ratio Slip of the Belt Velocity Ratio of a Compound Belt Drive Length of Belt (a) Open Belt (b) Cross Belt Ratio of Driving Tension for Flat Belts Natural Frequency of Transverse Vibrations of Shafts or Beams Under Different Types of Loads and End Conditions. (a) Natural Frequency of a Shaft Carrying a Single Concentrated Load. (b) Natural Frequency of a Shaft Carrying a Uniformly Distributed Load. Natural Frequency of Transverse Vibration of a System of Several Loads Attached to the Same Shaft. (a) Energy or (Rayleigh's) Method. (b) Dunkerley's Method. Solve Problems.
<b>Week 9</b>	Determination of Angle of Contact (a) Open Belt (b) Cross Belt Power Transmitted by a Belt Centrifugal Tension ( $T_c$ ) Maximum Tension in the Belts ( $T_{max}$ ) Condition for the Transmission of Maximum Power Initial Tension in the Belt ( $T_o$ ) V – Belt Drive and Rope Drive Whirling Speeds or Critical Speeds. Solve Problems.
<b>Week 10</b>	Solve Problems Free Vibrations of Undamped Systems with Two Degree of Freedom. Solve Problems.

<b>Week 11</b>	Types of Brakes Simple Block or Shoe Brake (a) Single Block or Shoe Brake (b) Double Block or Shoe Brake Band Brake (a) Simple Band Brake Differential Band Brake Free Vibrations of Damped Systems with Two Degree of Freedom. Solve Problems.
<b>Week 12</b>	Band and Block Brake Internal Expanding Shoe Brake The Braking of a Vehicle (a) Value of Retardation When the Brakes are Applied to Rear Wheels Only (b) Value of Retardation When the Brakes are Applied to Front Wheels Only (c) Value of Retardation When the Brakes are Applied to All the Wheels Solve Problems Forced Vibrations for Systems with Two Degree of freedom. Solve Problems.
<b>Week 13</b>	Types of Followers Nomenclatures for Cam Profile Motions of the Follower (a) Uniform Motion or Uniform Velocity of a Follower Free Torsional Vibrations of a Three Rotor System. Torsional Equivalent Shaft. Solve Problems.
<b>Week 14</b>	(b) Simple Harmonic Motion of Follower (c) Uniform Acceleration and Uniform Retardation Cam profile construction Free Torsional Vibrations of a Three Rotor System. Torsional Equivalent Shaft. Solve Problems.
<b>Week 15</b>	Solve Problems

### Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	<b>Material Covered</b>
<b>Week 1</b>	Lab 1: How to balance rotating masses. Mass – Spring system.
<b>Week 2</b>	Lab 2: How to get force equilibrium. Simple and Compound Pendulums.



<b>Week 3</b>	Lab 3: Explain the principle work of gear and gear train. Mass Moment of Inertia Estimation-Part one: Bifilar Suspension.
<b>Week 4</b>	Lab 4: Explain the principle work of governor. Mass Moment of Inertia Estimation-Part two: Auxiliary Mass Method.
<b>Week 5</b>	Lab 5: How plane surface friction calculated. Undamped Forced Vibration.
<b>Week 6</b>	Lab 6: Explain friction of flat belt. Transverse Vibration of a Beam.
<b>Week 7</b>	Lab 7: How frictional clutch operate. Undamped vibration absorber.

### Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Recommended Texts</b>	<ul style="list-style-type: none"> <li>➤ "Theory of Machines", Burasia Publishing House (PVT.) Ltd, 1988, by Khurmi R. S. and Gupta J. K.</li> <li>➤ "Theory of Machines", Laxmi Publications (P) Ltd, 2004, by Brar J. S. and Bansal R. K.</li> <li>➤ "Theory of Machines", S. Chand &amp; Company Ltd, 2005, Khurmi R. S. and Gupta J. K.</li> </ul>	Yes

### Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
<b>Success Group (50 - 100)</b>	<b>A</b> - Excellent	امتياز	90 - 100	Outstanding Performance
	<b>B</b> - Very Good	جيد جدا	80 - 89	Above average with some errors
	<b>C</b> - Good	جيد	70 - 79	Sound work with notable errors
	<b>D</b> - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	<b>E</b> - Sufficient	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group</b>	<b>FX</b> – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded

(0 – 49)	F – Fail	راسب	(0-44)	Considerable amount of work required
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**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		Module Delivery	
Module Type	C		<input type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	MPAC303			
ECTS Credits	8			
SWL (hr/sem)	240			
Module Level	3	Semester of Delivery		
Administering Department	Mechanical Power Eng. Dep.		College	TCB
Module Leader	Ahmed Jasim Hamad		e-mail	<a href="mailto:ahmed.elhamad@mtu.edu.iq">ahmed.elhamad@mtu.edu.iq</a>
Module Leader's Acad. Title	Lecturer		Module Leader's Qualification	Ph.D.
Module Tutor	None		e-mail	E-mail
Peer Reviewer Name	Johain Jawdat Faraj		e-mail	<a href="mailto:johaintech@mtu.edu.iq">johaintech@mtu.edu.iq</a>
Scientific Committee Approval Date	20/06/2023		Version Number	1

### Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	MPAC203, MPAC202	<b>Semester</b>	3
<b>Co-requisites module</b>	None	<b>Semester</b>	

### Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Aims</b>	<p>15. To develop students' fundamental knowledge into Heat transfer principles.</p> <p>16. To describe the physical principles and evolving technical capabilities of heat transfer</p> <p>17. To explain the heat transfer mechanisms, conduction, convection, and radiation.</p> <p>18. To describe the thermal resistance concept, conduction through multilayered plane wall, cylinders and spheres.</p> <p>19. To describe the Heat transfer from finned surfaces, fin equation, fin Efficiency, fin effectiveness.</p> <p>20. To explain the forced and natural convection heat transfer, boundary layer concepts.</p> <p>21. To describe the kinds of heat exchangers, heat exchangers design methods.</p> <p>22. To explain the heat transfer by radiation basic concepts.</p>
<b>Module Learning Outcomes</b>	<p>Upon completion of the course, students should be able to:</p> <p>16. Use the information of heat transfer principles.</p> <p>17. Identify the heat transfer mechanisms.</p> <p>18. Recognize the forced and natural convection heat transfer.</p> <p>19. Recognize the kinds of heat exchangers and design methods.</p> <p>20. Recognize the heat transfer by radiation basic concepts.</p> <p>21. Use the heat transfer principles in the practical applications.</p>
<b>Indicative Contents</b>	<p>Indicative content includes the following:</p> <p>Heat transfer principles [16hrs].</p> <p>Introduction to heat transfer mechanisms, conduction, convection, and radiation [16hrs].</p>

	<p>Thermal resistance concept, conduction through multilayered plane wall, cylinders and spheres [28hrs].</p> <p>Heat transfer from finned surfaces, fin equation, fin Efficiency, fin effectiveness [16hrs].</p> <p>Forced and natural convection heat transfer, boundary layer concepts [28hrs].</p> <p>Heat transfer by radiation basic concepts [24hrs].</p>
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### Learning and Teaching Strategies

#### استراتيجيات التعلم والتعليم

<b>Strategies</b>	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.
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### Student Workload (SWL)

#### الحمل الدراسي للطالب

<b>Structured SWL (h/sem)</b>	144	<b>Structured SWL (h/w)</b>	10
<b>Unstructured SWL (h/sem)</b>	96	<b>Unstructured SWL (h/w)</b>	6
<b>Total SWL (h/sem)</b>	240		

### Module Evaluation

#### تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	4	20% (20)	3,6,10,14	LO #1,2,3,4,5,6
	<b>Assignments</b>	2	10% (10)	5, 12	LO # 2.3.4.5
	<b>Seminar</b>	1	10% (10)	12	LO # 1,6
<b>Summative assessment</b>	<b>Midterm Exam</b>	2 hr	10% (10)	10	LO # 1,2,3
	<b>Final Exam</b>	3hr	50% (50)	16	All
<b>Total assessment</b>			100% (100 Marks)		

### Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري محتوى كل اسبوع يجب ان يغطي الوقت المحدد

	Material Covered
<b>Week 1</b>	Introduction, Heat Transfer Mechanisms, Steady State general Heat Conduction equation in Rectangular, Cylindrica and spherical Coordinates.
<b>Week 2</b>	Thermal Resistance Concept, Conduction through Multilayered Plane Wall, Cylinders and Spheres.
<b>Week 3</b>	Over all Heat Transfer Coefficient, Critical Radius of Insulation. Thermal Contact Resistance.
<b>Week 4</b>	Heat transfer from finned surfaces, fin equation, fin Efficiency, fin effectiveness
<b>Week 5</b>	Transient Heat Conduction, (Lumped System Analysis) Two-dimensional Steady Heat Conduction, numerical method.
<b>Week 6</b>	Introduction to Heat Transfer by Convection, Review to the Fluid Flow.
<b>Week 7</b>	Non-Dimensional Group Numbers Analysis, Laminar and Turbulent flow.
<b>Week 8</b>	External Forced Convection (on Flat Plate), Boundary layer concept, Empirical Equations
<b>Week 9</b>	Internal Forced Convection (Laminar and Turbulent Flow), Empirical Equations.
<b>Week 10</b>	Natural Convection Heat Transfer, Empirical Equations.
<b>Week 11</b>	Introduction to Heat Exchangers, Kinds of Heat Exchangers
<b>Week 12</b>	The Overall Heat Transfer Coefficient, Fouling Factor, The Log Mean Temperature Difference (LMTD) Method
<b>Week 13</b>	Effectiveness- NTU method, Performanc for Different Kinds of the Heat Exchangers.
<b>Week 14</b>	Heat Radiation, Introduction, Basic Concepts, Absorptivity, Reflectivity, and Transmissivity.
<b>Week 15</b>	Radiation Heat Transfer Between Two Black and Gray Surfaces.

### Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
<b>Week 1</b>	Lab 1: Calculation of thermal conductivity
<b>Week 2</b>	Lab 2: Calculation of heat transfer rate.
<b>Week 3</b>	Lab 3: Calculation of thermal contact resistance
<b>Week 4</b>	Lab 4: Heat transfer in long straight fins
<b>Week 5</b>	Lab 5: Estimating the convection heat transfer coefficient in fins
<b>Week 6</b>	Lab 6: Forced convection from a cylinder in a cross flow

<b>Week 7</b>	Lab 7: Free convection from a cylinder in free flow
<b>Week 8</b>	Lab 8: Parallel flow shell and tube heat exchanger performance
<b>Week 9</b>	Lab 9: Counter flow shell and tube heat exchanger performance
<b>Week 10</b>	Lab 10: Heat Transfer by Radiation

### Learning and Teaching Resources

#### مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Recommended Texts</b>	<ul style="list-style-type: none"> <li>➤ Yunus C. Cengel, "Heat and Mass Transfer", 6th Edition, Mc Graw-Hill Education, 2020.</li> <li>➤ J. P. Holman "Heat Transfer", 10th Edition, Mc Graw-Hill Education, 2010.</li> </ul>	Yes

### Grading Scheme

#### مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
<b>Success Group (50 - 100)</b>	<b>A</b> - Excellent	امتياز	90 - 100	Outstanding Performance
	<b>B</b> - Very Good	جيد جدا	80 - 89	Above average with some errors
	<b>C</b> - Good	جيد	70 - 79	Sound work with notable errors
	<b>D</b> - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	<b>E</b> - Sufficient	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group (0 - 49)</b>	<b>FX</b> - Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	<b>F</b> - 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

<b>Module Information</b> معلومات المادة الدراسية			
<b>Module Title</b>	<b>Air Conditioning and Refrigeration systems</b>	<b>Module Delivery</b>	
<b>Module Type</b>	<b>C</b>	<input type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
<b>Module Code</b>	<b>MPAC304</b>		
<b>ECTS Credits</b>	<b>10</b>		
<b>SWL (hr/sem)</b>	<b>300</b>		
<b>Module Level</b>		<b>Semester of Delivery</b>	
<b>Administering Department</b>		Mechanical Power Eng. Dep.	<b>College</b> TCB
<b>Module Leader</b>	Abdul Hadi N. Khalifa	<b>e-mail</b>	Ahaddi58@mtu.edu.iq
<b>Module Leader's Acad. Title</b>		Professor	<b>Module Leader's Qualification</b> Ph.D.
<b>Module Tutor</b>	Name (if available)	<b>e-mail</b>	E-mail
<b>Peer Reviewer Name</b>		Ahmed Jasim Hamad	<b>e-mail</b> <a href="mailto:ahmed.elhamad@mtu.edu.iq">ahmed.elhamad@mtu.edu.iq</a>
<b>Scientific Committee Approval Date</b>		20 / 6/2023	<b>Version Number</b> 1.0

<b>Relation with other Modules</b> العلاقة مع المواد الدراسية الأخرى			
<b>Prerequisite module</b>	MPAC205	<b>Semester</b>	4
<b>Co-requisites module</b>	MPAC 109	<b>Semester</b>	2

## Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Aims</b> أهداف المادة الدراسية</p>	<p>This topic aims to enable and qualify the student to know the heating, ventilation, and air conditioning systems, estimate the cooling and heating load, identify the pipe and duct design, select fans and pumps, etc., and estimate the refrigeration load of the food storage stores and diseases that affect food products during the storage period.</p>
<p><b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية</p>	<p><b>Course Outcomes:</b></p> <ol style="list-style-type: none"> <li>1. To apply the knowledge of mathematics, science, and engineering fundamentals</li> <li>2. To model refrigeration and air conditioning engineering.</li> <li>3. 2. To study the design procedures of cooling load, heating load, duct design, piping design, food preservation and food microbiology diseases.</li> <li>4. To study the design of cold store refrigeration load.</li> <li>5. To know the software that related to the subject.</li> </ol>
<p><b>Indicative Contents</b> المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <p style="text-align: center;"><b>Part A</b></p> <p style="text-align: center;"><b>Cooling and heating load estimation</b></p> <p>Site survey of air conditioned space, relation between heat gain and cooling load.</p> <p>Inside and outside design conditions, for winter &amp; summer, heating load calculation (heat loss from windows, doors, walls, roof, floor, base of building, ventilation (air change method, air required for each person, air volume per unit area,) infiltration (crack method) total heating load, Cooling load ( radiation glasses, conduction heat transfer through walls, roof, glasses,..etc using equivalent temperature deference,)</p> <p>Heat transfer through part ions, peoples heat generated, people metabolic rate, lighting heat, motors &amp; equipment, ventilation and infiltration load.</p> <p>Room total load, zone load, building load, bypass factor, cooling coil temperature.</p>



Heating load estimation, outdoor load, indoor load, ventilation and infiltration load. [30 hrs]

### **Part B**

#### **Duct design and fans selection**

Air ducting ( pressure loses in straight duct, duct fittings ( sudden enlargement & contraction, branches, bends, ....etc)

Duct design, methods of design, equal friction method, balancing of duct system.

Fans (type, selection, performance of centrifugal, laws) room air distribution, selection of supply & return air opening, diffusers, grilles, return grilles.) [18 hrs]

### **Part C**

#### **Piping and pumps selection**

Water piping design, pressure losses in straight, and other links, valves, and accessories, cooling water pipes, water pipe network design.

Pumps ( performance, types, pump selections, design of water distribution system , design of expansion tank) [12 hrs]

### **Part D**

#### **Food Preservation**

Food thermal properties, water contain, primary freezing point, ice fraction, density, specific heat.

Freezing and nonfreezing foods, thermal conductivity, parallel method, respiration heat, heat transfer coefficient of surface. Time of Food cooling and freezing. Estimation of Food cooling Time depending on dimensionless heat transfer coefficient, method of freezing estimation. Blank Equation for freezing time estimation. Refrigeration and the food deceases, biological deceases sources, microbes growth, critical growth requirement of microbes, control of microbes growth, HACCP method [18 hrs]

### **Part E**

#### **Refrigeration Load**

Thermal load of transportation, air filtration, equipment, safety factor, total ref. load, principle of freezing storage design, volume calculation, design of the

	storage construction, storage requirement. Methods of construction, space requirement, treatment of air and vapor infiltration from cracks, floor structure, preparing of the roof, water derange, Freezing systems, fan coil unit, valve selection, vale position, system design, Refrigerators [12 hrs]
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<b>Learning and Teaching Strategies</b> استراتيجيات التعلم والتعليم	
<b>Strategies</b>	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

<b>Student Workload (SWL)</b> الحمل الدراسي للطالب			
<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	144	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	10
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	156	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	11
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	300		

<b>Module Evaluation</b> تقييم المادة الدراسية	
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		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	10% (10)	3,7,10	LO #1, 2, 3,4,5
	Assignments	2	10% (10)	2, 8	LO # 3, 4
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	10	LO # 3,4,5
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 12,3,4
	Final Exam	2hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

<b>Delivery Plan (Weekly Syllabus)</b> المنهاج الاسبوعي النظري	
<b>Material Covered</b>	
<b>Cooling and heating load estimation</b>	
<b>Week 1</b>	Site survey of air conditioned space, relation between heat gain and cooling load. Inside and outside design conditions, for winter & summer, heating load calculation (heat loss from windows, doors, walls, roof, floor, base of building, ventilation (air change method, air required for each person, air volume per unit area,) infiltration (crack method) total heating load.
<b>Week 2</b>	Cooling load ( radiation glasses, conduction heat transfer through walls, roof, glasses,...etc using equivalent temperature deference.)
<b>Week 3</b>	Heat transfer through part ions, peoples heat generated, people metabolic rate, lighting heat, motors & equipment, ventilation and infiltration load.
<b>Week 4</b>	Room total load, zone load, building load, bypass factor, cooling coil temperature.
<b>Week 5</b>	Heating load estimation, outdoor load, indoor load, ventilation and infiltration load.
<b>Duct design and fans selection</b>	
<b>Week 6</b>	Air ducting ( pressure loses in straight duct, duct fittings ( sudden enlargement & contraction, branches, bends, ....etc)
<b>Week 7</b>	Duct design, methods of design, equal friction method, balancing of duct system.

<b>Week 8</b>	Fans (type, selection, performance of centrifugal, laws) room air distribution, selection of supply & return air opening, diffusers, grilles, return grilles.)
	<b>Piping and pumps selection</b>
<b>Week 9</b>	Water piping design, pressure losses in straight, and other links, valves, and accessories, cooling water pipes, water pipe network design.
<b>Week 10</b>	Pumps ( performance, types, pump selections, design of water distribution system , design of expansion tank)
	<b>Food Preservation</b>
<b>Week 11</b>	Food thermal properties, water contain, primary freezing point, ice fraction, density, specific heat. Freezing and nonfreezing foods, thermal conductivity, parallel method, respiration heat, heat transfer coefficient of surface.
<b>Week 12</b>	Time of Food cooling and freezing. Estimation of Food cooling Time depending on dimensionless heat transfer coefficient, method of freezing estimation.
<b>Week 13</b>	Blank Equation for freezing time estimation. Refrigeration and the food deceases, biological deceases sources, microbes growth, critical growth requirement of microbes, control of microbes growth, HACCP method.
	<b>Refrigeration Load</b>
<b>Week 14</b>	Thermal load of transportation, air filtration, equipment, safety factor, total ref. load, principle of freezing storage design, volume calculation, design of the storage construction, storage requirement,
<b>Week 15</b>	Methods of construction, space requirement, treatment of air and vapor infiltration from cracks, floor structure, preparing of the roof, water derange, Freezing systems, fan coil unit, valve selection, vale position, system design, Refrigerators.
<b>Week 16</b>	<b>Preparatory week before the final Exam</b>

### Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1-3	Case study for cooling load estimation, each student will select a house map and achieving the cooling load for the given house
Week 4-5	Case study for heating load estimation, each student will select a house map and achieving the cooling load for the given house
Week 6-7	Depending on the cooling and heating load, the student design the duct system to the house
Week 8	Design the duct system for the building and select the fan for the duct system. Finding the operating point, power consumption and pressure loss of the fan.
Week 9	Design the piping system for the heating load of the house
Week 10	Select the pumping system, system and finding the operating point, power consumption and pressure loss of the pumps.
Week 11	Perform a calculation for the freezing time of the food
Week 12-13	Perform the refrigeration load for a given cold store
Week 14-15	Estimation the freezing load of the cold store

Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	<ol style="list-style-type: none"> <li>Carrier Handbook</li> <li>ASHRAE – Fundamental</li> <li>Stanford III, Herbert W., and Adam F. Spach. Analysis and Design of Heating, Ventilating, and Air-Conditioning Systems. CRC Press, 2019.</li> <li>Wijeysundera, Nihal E. Principles of Heating, Ventilation and Air Conditioning with Worked Examples. World Scientific, 2015.</li> <li>Berk, Zeki. Food process engineering and technology. Academic press, 2018.</li> </ol>	Yes
Recommended Texts	<ol style="list-style-type: none"> <li>Stanford III, Herbert W., and Adam F. Spach. Analysis and Design of Heating, Ventilating, and Air-Conditioning Systems. CRC Press, 2019.</li> </ol>	No

	<p>2. Wijeyesundera, Nihal E. Principles of Heating, Ventilation and Air Conditioning with Worked Examples. World Scientific, 2015.</p> <p>3. Berk, Zeki. Food process engineering and technology. Academic press, 2018.</p>	
<b>Websites</b>		

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

## MODULE DESCRIPTION FORM

### نموذج وصف المادة الدراسية

<b>Module Information</b> معلومات المادة الدراسية		
<b>Module Title</b>	<b>Mechanical Design</b>	<b>Module Delivery</b>
<b>Module Type</b>	<b>C</b>	<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture
<b>Module Code</b>	<b>MPAC305</b>	

<b>ECTS Credits</b>	5		<input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input checked="" type="checkbox"/> Seminar	
<b>SWL (hr/sem)</b>	180			
<b>Module Level</b>	3	<b>Semester of Delivery</b>	1	
<b>Administering Department</b>	Mechanical Power Eng. Dep.	<b>College</b>	TCB	
<b>Module Leader</b>	Hamed A. Husein	<b>e-mail</b>	Mechanical10power@gmail.com	
<b>Module Leader's Acad. Title</b>	Prof.	<b>Module Leader's Qualification</b>	Ph.D.	
<b>Module Tutor</b>	None	<b>e-mail</b>	E-mail	
<b>Peer Reviewer Name</b>	Khudhayer J. Jadee	<b>e-mail</b>	<a href="mailto:khudhayer1970@mtu.edu.iq">khudhayer1970@mtu.edu.iq</a>	
<b>Scientific Committee Approval Date</b>	20 / 6/2023	<b>Version Number</b>	1.0	

### Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	MPAC206	<b>Semester</b>	4
<b>Co-requisites module</b>		<b>Semester</b>	

### Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Aims</b>	<p>22. Learning the design process of mechanical components, for different design considerations, such like strength, stiffness, and stability.</p> <p>23. Transfer real life mechanical systems to analytical models and analyze them and deal with design codes and standards.</p> <p>24. To be able to solve open-ended design problems, cope with decision making and satisfy competing objectives.</p> <p>25. Use and integrate the fundamentals studied previously towards the goal of analyzing and designing mechanical components to achieve satisfactory levels of safety and life.</p>
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	<p>26. To improve competence in multi-axis stress analysis.</p> <p>27. To obtain a knowledge in the use of the proper failure theories under steady and variable loadings.</p> <p>28. To develop the design skills of mechanical components under steady and variable loadings.</p>
<p><b>Module Learning Outcomes</b></p>	<p>Upon completion of the course, students should be able to:</p> <ol style="list-style-type: none"> <li>1. Apply basic design principles applicable to components as listed in the core content.</li> <li>2. Conceptualise, design and calculate simple stresses in mechanical components.</li> <li>3. Design and calculate working stress and factor of safety in mechanical components.</li> <li>4. Design and calculate stresses in composite bars and thermal stresses in mechanical components.</li> <li>5. Perform relevant and applicable calculations for torsional and bending stresses in mechanical components.</li> <li>6. Identify the principal stresses and principal planes in mechanical components.</li> <li>7. Apply theories of failure to achieve satisfactory levels of safety for mechanical components.</li> <li>8. Design and calculate variable stresses and stress concentration in mechanical components.</li> <li>9. Perform relevant and applicable calculations to design the shaft.</li> <li>10. Perform relevant and applicable calculations to design the keys, splines and couplings.</li> <li>11. Perform relevant and applicable calculations to design the riveted joints.</li> <li>12. Perform relevant and applicable calculations to design the welded joints.</li> <li>13. Perform relevant and applicable calculations to design the pressure vessels.</li> <li>14. Perform relevant and applicable calculations to design the power screws.</li> </ol>
<p><b>Indicative Contents</b></p>	<p>Indicative content includes the following:</p> <p>General Procedure in Machine Design, Classifications of Machine Design, Material Strength and Stiffness, Simple Stresses, Working Stress, Selection of Factor of Safety, Stresses in Composite Bars, Stresses due to Change in Temperature. [10 hrs]</p> <p>Torsional and Bending Stresses in Machine Parts, Shafts in Series and Parallel [3 hrs]</p> <p>Determination of Principal Stresses for a Member Subjected to Bi-axial Stress, Theories of Failure Under Static Load [5 hrs]</p> <p>Cyclic Stresses, Fatigue and Endurance Limit, Factor of Safety for Fatigue Loading, Theoretical Stress Concentration Factor, Fatigue Stress Concentration Factor, Combined Steady and Variable Stress [4 hrs]</p>



	<p>Material Used for Shafts, Design of Shafts, Shafts Subjected to Twisting Moment Only, Shafts Subjected to Bending Moment Only, Shafts Subjected to Combined Twisting Moment and Bending Moment, Shafts Subjected to Axial Load in addition to Combined Torsion and Bending Loads [4 hrs]</p> <p>Design of keys and Splines, Effect of Keyways, Types of Shafts Couplings [5 hrs]</p> <p>Riveted Joints, Failures of a Riveted Joint, Efficiency of a Riveted Joint, Design of Longitudinal Butt Joint for a Boiler, Design of Circumferential Lap Joint for a Boiler, Riveted Joint for Structural Use [5 hrs]</p> <p>Types of Welded Joints, Basic Weld Symbols, Strength of Transverse Fillet Welded Joints, Strength of Parallel Fillet Welded Joints [5 hrs]</p> <p>Classification of Pressure Vessels, Hoop and Longitudinal Stress, Spherical Shells, Compound Cylindrical Shells [4 hrs]</p> <p>Types of Screw Threads, Efficiency of Threaded Screws, Efficiency of Self-Locking Screws [3 hrs]</p>
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### Learning and Teaching Strategies

#### استراتيجيات التعلم والتعليم

<b>Strategies</b>	Assessment is based on hand-in assignments, Written exam, Quizzes, Tutorial, Seminars, Reports.
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### Student Workload (SWL)

#### الحمل الدراسي للطالب

<b>Structured SWL (h/sem)</b>	88	<b>Structured SWL (h/w)</b>	6
<b>Unstructured SWL (h/sem)</b>	62	<b>Unstructured SWL (h/w)</b>	4
<b>Total SWL (h/sem)</b>	150		

## Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	20% (20)	3,7,9,13	LO #1-13
	Assignments	1	10% (10)	7	LO # 5,12
	Seminar	2	10% (10)	4,11	LO # 10,12
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3hr	50% (50)	16	All
<b>Total assessment</b>			100% (100 Marks)		

## Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري محتوى كل اسبوع يجب ان يغطي الوقت المحدد

	Material Covered
<b>Week 1</b>	Design consideration, Design principle, Material Strength and Stiffness
<b>Week 2</b>	Simple Stresses in Machine Parts
<b>Week 3</b>	Working Stress and Factor of Safety
<b>Week 4</b>	Stresses in Composite Bars and Thermal Stresses
<b>Week 5</b>	Torsional and Bending Stresses in Machine Parts
<b>Week 6</b>	Principal Stresses and Principal Planes
<b>Week 7</b>	Theories of Failure
<b>Week 8</b>	Variable Stresses in Machine Parts and Stress Concentration
<b>Week 9</b>	Design of Shafts
<b>Week 10</b>	Design of keys, Splines and Couplings
<b>Week 11</b>	Riveted Joints
<b>Week 12</b>	Welded joints
<b>Week 13</b>	Pressure Vessels
<b>Week 14</b>	Power Screws
<b>Week 15</b>	<b>Preparatory week before the final Exam</b>

## Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

Material Covered	
Week 1	No Lab.
Week 2	

## Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	➤ A Textbook of Machine Design by R.S.KHURMI AND J.K.GUPTA	No
Recommended Texts	➤ Shigley's Mechanical Engineering Design (McGraw-Hill Series in Mechanical Engineering) 10th Edition	No
Websites	➤ <a href="https://www.coursera.org/learn/machine-design1">https://www.coursera.org/learn/machine-design1</a>	

## Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
<b>Success Group</b> (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
<b>Fail Group</b> (0 - 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
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## MODULE DESCRIPTION FORM

### نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Maintenance of Air Conditioning systems	Module Delivery	
Module Type	C	<input type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	MPAC307		
ECTS Credits	10		
SWL (hr/sem)	300		
Module Level	3		
Administering Department	Mechanical Power Eng. Dep.	College	TCB
Module Leader	Dr.Ahmed Qasim Ahmed	e-mail	<a href="mailto:aqaal@mtu.edu.iq">aqaal@mtu.edu.iq</a>
Module Leader's Acad. Title		Module Leader's Qualification	
Module Tutor		e-mail	
Peer Reviewer Name	Ahmed Jawad Khaleel	e-mail	<a href="mailto:ahmed1982_jk@mtu.edu.iq">ahmed1982_jk@mtu.edu.iq</a>
Scientific Committee Approval Date	20 / 6/2023	Version Number	1.0

### Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	MPAC205	<b>Semester</b>	
<b>Co-requisites module</b>		<b>Semester</b>	

### Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Aims</b> أهداف المادة الدراسية</p>	<ol style="list-style-type: none"> <li>1. study the maintenance of all types of refrigeration system.</li> <li>2. Introducing students to all the basic topics of this course, the theoretical side and the practical side.</li> <li>3. Introduces theories and operations of heating and air conditioning system. Includes service, testing and repair of air conditioning, ventilation, and heater and engine cooling systems</li> </ol>
<p><b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"> <li>1. Describe the Refrigeration and Air Conditioning system and the principle of work inside Refrigeration and Air Conditioning workshop</li> <li>2. The student can General Safety Practices and getting to know the Tools and equipment, Refrigeration and air conditioning systems strategies.</li> <li>3. Diagnose air conditioning and heating failures and make the required repairs.</li> <li>4. the student have ability to Refrigeration and air conditioning equipment installation, Inspection and welding of pipes , vacuum and charge, installation problems.</li> <li>5. The student able to troubleshoot for central air conditioning systems, Refrigeration and Oil Chemistry and Management—Recovery, Recycling, Reclaiming, and Retrofitting</li> <li>6. Study the Mechanical and Electrical troubleshooting of Refrigeration and air conditioning system and water chillers</li> <li>7. Study the Conventional air conditioning system (mechanical and electrical components, features, installation, connection, commissioning, maintenance, and control.</li> <li>8. Study the Compressors (types, applications, maintenance, assembly and dis assembly, test and commissioning).</li> <li>9. Study the Evaporators ,Condensers, Expansion devices and air washer (types, applications, maintenance, assembly and dis assembly, test and commissioning).</li> </ol>

	<p>10. Study Cooling tower (types, applications, maintenance, assembly and dis assembly, test and commissioning).</p> <p>11. Pumps (types, applications, maintenance, assembly and dis assembly, test and commissioning).</p> <p>12. Refrigeration and air conditioning components cleaning by using chemical materials.</p>
<p><b>Indicative Contents</b> المحتويات الإرشادية</p>	<p><b>Indicative content includes the following.</b></p> <ol style="list-style-type: none"> <li>1. General Safety Practices</li> <li>2. Tools and equipments</li> <li>3. Refrigeration and air conditioning equipment classification</li> <li>4. air conditioning and heating failures and make the required repairs.</li> <li>5. Refrigeration and air conditioning equipment installation</li> <li>6. Mechanical and Electrical troubleshooting</li> <li>7. Conventional air condition system(mechanical and electrical components)</li> </ol>

<p><b>Learning and Teaching Strategies</b> استراتيجيات التعلم والتعليم</p>	
<p><b>Strategies</b></p>	<p>Assessment is based on hand-in assignments, written exams, Quizzes, reports, Practical testing ,and Online testing.</p>

<p><b>Student Workload (SWL)</b> الحمل الدراسي للطالب</p>			
<p><b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل</p>	144	<p><b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا</p>	10
<p><b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل</p>	156	<p><b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا</p>	11
<p><b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل</p>	300		

## Module Evaluation

### تقييم المادة الدراسية

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

## Delivery Plan (Weekly Syllabus)

### المنهاج الاسبوعي النظري

	Material Covered
<b>Week 1</b>	General Safety Practices, Tools and equipment, Refrigeration and air conditioning systems strategies.Refrigeration and air conditioning equipment classification (types, applications, maintenance, control, mechanical and electrical parts).Test and commissioning Refrigeration and air conditioning equipment.
<b>Week 2</b>	Refrigeration and air conditioning equipment installation, tubing, welding, leak
<b>Week 3</b>	types of installation, mechanical and electrical connections, piping, Appropriate places selection, piping's and insulations assembly, air purge, vacuum and charge, installation problems
<b>Week 4</b>	Mollier's charts (drawing, point's determination, troubleshooting for central air conditioning systems, Refrigeration and Oil Chemistry and Management—Recovery, Recycling, Reclaiming, and Retrofitting
<b>Week 5</b>	Mechanical troubleshooting study of Refrigeration and air conditioning system and water chillers.
<b>Week 6</b>	Electrical troubleshooting study of Refrigeration and air conditioning system and water chillers.
<b>Week 7</b>	Conventional air condition system (mechanical and electrical components, features, installation, connection, commissioning, maintenance, and control.
<b>Week 8</b>	Compressors (types, applications, maintenance, assembly and dis assembly, test and commissioning).
<b>Week 9</b>	Evaporators and air washer (types, applications, maintenance, assembly and dis assembly, test and commissioning).
<b>Week 10</b>	Condensers (types, applications, maintenance, assembly and dis assembly, test and commissioning).
<b>Week 11</b>	Cooling tower (types, applications, maintenance, assembly and dis assembly, test and commissioning).
<b>Week 12</b>	Expansion devices (types, applications, maintenance, assembly and dis assembly, test and commissioning).
<b>Week 13</b>	Fans (types, applications, maintenance, assembly and dis assembly, test and commissioning).
<b>Week 14</b>	Pumps (types, applications, maintenance, assembly and dis assembly, test and commissioning).

<b>Week 15</b>	Refrigeration and air conditioning components cleaning by using chemical materials.
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<b>Delivery Plan (Weekly Lab. Syllabus)</b>	
المنهاج الاسبوعي للمختبر	
	<b>Material Covered</b>
<b>Week 1</b>	Dismantling the commercial system knew the basic parts and accessories and isolate each part of it for other parts.
<b>Week 2</b>	Repair compressor through the dismantling of reciprocating compressor semi –hermetic of commercial system
<b>Week 3</b>	identify the parts and functions and the method of examination and then gathered and examined parts of the compressor and take all measures in order to examine the operation and performance.
<b>Week 4</b>	Maintenance of air cooled condenser system for commercial and examination of the leak and treatment. Cleaning of the inside and outside and sweep the fins also work includes everything related to the fans for the condenser. Maintenance of water-cooled condenser system for commercial and examination of the leak and treatment. Cleaning of the interior and exterior work includes mechanical and chemical cleaning, as well as the pump and piping for the condenser
<b>Week 5</b>	Maintenance - evaporator system for commercial and leakage of examination and treatment. Cleaning of the inside and outside and sweep the fins also work includes everything related to the fans for the evaporator
<b>Week 6</b>	Dismantling expansion valve (used for different types of commercial systems) and checked and calibrated and cleaned.
<b>Week 7</b>	Maintenance of electrical accessories for commercial and test it (power and control circuit. Connect the electrical connections of the power and control circuits and test the connections.
<b>Week 8</b>	Conduct a process of checking the leak and add oil and make the process of charging and discharging of the gas by using modern equipment not impact on the environment.  Checking the final inspection of the system and the first to hold the operation of the system to ensure the safety of the electrical and mechanical connection.
<b>Week 9</b>	Maintenance of mechanical and electrical axial fans and Accessories.  Maintenance of mechanical and electrical centrifugal fans and Accessories.
<b>Week 10</b>	Maintenance of water pumps (the dismantling of the pump and the maintenance of internal parts and then assembled) adjust the straightness of the pump and the electric motor.
<b>Week 11</b>	Maintenance of all extensions of piping system (disassembly of the different types of valves to get to know their parts and re- assembled and tested) and examined and operated.
<b>Week 12</b>	Maintenance of air handling unit through the dismantling of parts and inspection and lubrication and then re- connect and straighter transmission belt and pulleys.
<b>Week 13</b>	Maintenance of cooling tower (fans –ball bearing- tank-nozzles-piping-pill and straighter transmission belt and pulleys).
<b>Week 14</b>	Maintenance of an air vehicle air conditioner and includes cleaning -Maintenance – components vacuum and churcing with modern equipment that do not adversely affect the environment.
<b>Week 15</b>	operating and inspection the vehicle air conditioner system.



## Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Required Texts</b>	Refrigeration and air conditioning Technology	yes
<b>Recommended Texts</b>	Modren refrigeration and airconditioning maintenance	Yes
<b>Websites</b>		

## Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
<b>Success Group (50 - 100)</b>	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
<b>Fail Group (0 - 49)</b>	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

<b>Module Information</b> معلومات المادة الدراسية			
<b>Module Title</b>	English 3		<b>Module Delivery</b>
<b>Module Type</b>	S		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
<b>Module Code</b>	MPAC308		
<b>ECTS Credits</b>	3		
<b>SWL (hr/sem)</b>	90		
<b>Module Level</b>	3	<b>Semester of Delivery</b>	
<b>Administering Department</b>	Mechanical Power Eng. Dep.	<b>College</b>	TCB
<b>Module Leader</b>	Aseel Jabbar	<b>e-mail</b>	
<b>Module Leader's Acad. Title</b>	Lecturer. Assist	<b>Module Leader's Qualification</b>	M.Sc
<b>Module Tutor</b>	Aseel Jabbar	<b>e-mail</b>	Aseel.jabbar@mtu.edu.iq
<b>Peer Reviewer Name</b>	Mr. Labeled Kadhim	<b>e-mail</b>	Labeled1970@mtu.edu.iq
<b>Scientific Committee Approval Date</b>	20 / 6/2023	<b>Version Number</b>	1.0

<b>Relation with other Modules</b> العلاقة مع المواد الدراسية الأخرى			
<b>Prerequisite module</b>	MPAC208	<b>Semester</b>	L2S1
<b>Co-requisites module</b>	None	<b>Semester</b>	

### Module Aims, Learning Outcomes and Indicative Contents

## أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Aims</b> أهداف المادة الدراسية	The goal is to study English language and gain knowledge of it as benefit engineers in general, and to develop speaking skills and understand its basic rules taking the way to the acquisition of the ability to use technical key words in their work and the capability of communicating with other engineers correctly
<b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية	Developing speaking skills and understanding its basic rules to take the way to the acquisition of the ability to use technical keywords in their work and the capability of communicating with other engineers correctly .
<b>Indicative Contents</b> المحتويات الإرشادية	

## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

<b>Strategies</b>	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.
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## Student Workload (SWL)

### الحمل الدراسي للطالب

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	44	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	3
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	90		

## Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	20% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

## Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Revision, vocabulary and comprehension
Week 2	Phrasal verbs, vocabulary and comprehension
Week 3	Academic writing (1), introduction
Week 4	English words with more than one meaning, vocabulary and comprehension
Week 5	Present tenses, vocabulary and comprehension
Week 6	Past tenses, vocabulary and comprehension
Week 7	Future tenses, vocabulary and comprehension
Week 8	Types of Essays, vocabulary and comprehension
Week 9	Punctuation, passive voice, vocabulary and comprehension
Week 10	Writing technical e-mails, vocabulary and comprehension
Week 11	Academic writing (1), writing a paragraph
Week 12	Technical English (2), keywords, vocabulary and comprehension
Week 13	Grammar revisions
Week 14	General Revision
Week 15	Final Exam

## Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Required Texts</b>	Headway plus for intermediate	Yes
<b>Recommended Texts</b>	Any Grammar and comprehension for technical learning and academic writing text.	No
<b>Websites</b>		

## Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
<b>Success Group (50 - 100)</b>	<b>A</b> - Excellent	امتياز	90 - 100	Outstanding Performance
	<b>B</b> - Very Good	جيد جدا	80 - 89	Above average with some errors
	<b>C</b> - Good	جيد	70 - 79	Sound work with notable errors
	<b>D</b> - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	<b>E</b> - Sufficient	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group (0 – 49)</b>	<b>FX</b> – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	<b>F</b> – 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.

# Air Conditioning Systems Drawing

## Module Information

معلومات المادة الدراسية

<b>Module Title</b>	Air Conditioning Systems Drawing		<b>Module Delivery</b>	
<b>Module Type</b>	C		<input type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
<b>Module Code</b>	MPAC309			
<b>ECTS Credits</b>	7			
<b>SWL (hr/sem)</b>	210			
<b>Module Level</b>	3	<b>Semester of Delivery</b>		
<b>Administering Department</b>	Mechanical Power Eng. Dep.	<b>College</b>	TCB	
<b>Module Leader</b>	Yasir Abdulateef Ghani		<b>e-mail</b>	<a href="mailto:yasir_abulatif1@mtu.edu.iq">yasir_abulatif1@mtu.edu.iq</a>
<b>Module Leader's Acad. Title</b>	Lecturer	<b>Module Leader's Qualification</b>	M. Tech.	
<b>Module Tutor</b>		<b>e-mail</b>		
<b>Peer Reviewer Name</b>	Dr.Ahmed Qasim Ahmed	<b>e-mail</b>	<a href="mailto:aqaal@mtu.edu.iq">aqaal@mtu.edu.iq</a>	
<b>Scientific Committee Approval Date</b>	20 / 6/2023	<b>Version Number</b>	1.0	

### Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	MPAC 201 MPAC 205	<b>Semester</b>	3, 4
<b>Co-requisites module</b>	None	<b>Semester</b>	

## Module Aims, Learning Outcomes and Indicative Contents

### أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Aims</b> أهداف المادة الدراسية</p>	<ol style="list-style-type: none"><li>1. To enable and qualify the student to understand the architectural plans and their sections.</li><li>2. To draw and understand the mechanical layouts of the ducting network for ventilation.</li><li>3. To provide the ability to draw the piping network of the central air conditioning systems with all the necessary accessories of valves, fittings and sensors.</li><li>4. To draw the detail drawings of the air conditioning devices of fan coil units, chillers, boilers, air handling units, and cooling towers.</li><li>5. To design VRF systems for selective AC companies.</li><li>6. To understand the electrical and control diagrams of the air conditioning systems.</li></ol>
<p><b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"><li>29. Making site survey and drawing the architectural plans.</li><li>30. Estimate the cooling load of buildings by Rule of Thumb method.</li><li>31. Estimate the required ventilation of buildings by Rule of Thumb method.</li><li>32. Using the Duct Sizer software to design the ducting network.</li><li>33. Drawing the ducting network by AutoCAD MEP or Revit software.</li><li>34. Selection of chillers, boilers, AHU's, package units, fan coils and cooling towers of deferent brand.</li><li>35. Using the Pipe Sizer software to design the piping network of the air conditioning system.</li><li>36. Drawing the piping network by AutoCAD MEP or Revit software.</li><li>37. Designing the VRV/VRF system by the selection software of some manufacturer brands.</li></ol>
<p><b>Indicative Contents</b> المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <p><u>Part A – Drawing Plans</u> Walls, columns, doors, windows, stairs, shafts, elevation. [9 hrs]</p>

	<p><u>Part B – Ducting Drawing</u> Load estimation, specify ventilation, units' selection, duct design and drawing. [30 hrs]</p> <p><u>Part C – Piping Drawing</u> Chillers, boilers, pumps selection, piping design and drawing, VRF system drawing. [30 hrs]</p> <p><u>Part D – Electrical Drawing</u> Chillers, boilers, pumps, VRF system electrical drawing. [21 hrs]</p>
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<b>Learning and Teaching Strategies</b> استراتيجيات التعلم والتعليم	
<b>Strategies</b>	<p>The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises. This will be achieved through classes, interactive tutorials and by considering some simple real projects as well as site visiting for finished and ongoing projects.</p>

<b>Student Workload (SWL)</b> الحمل الدراسي للطالب			
<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	116	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعياً	8
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	94	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعياً	6
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	210		



### Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	5% (8)	3,8,12,13	LO # 1, 5, 8, 9
	Assignments	8	15 % (12)	2,4,5,8,12,13,14,15	LO # 1-9
Summative assessment	Midterm Exam	3 hr.	30% (30)	9	LO # 1-9
	Final Exam	3 hr.	50% (50)	15	All
<b>Total assessment</b>			100% (100 Marks)		

### Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
<b>Week 1</b>	Making site survey
<b>Week 2</b>	Draw architectural plans
<b>Week 3</b>	Draw elevation plans
<b>Week 4</b>	Cooling load estimation
<b>Week 5</b>	Specify the required ventilation
<b>Week 6</b>	Package units, fan coil units and AHUs selection
<b>Week 7</b>	Design ducting network by Duct Sizer
<b>Week 8</b>	Drawing ducting network
<b>Week 9</b>	Midterm Exam
<b>Week 10</b>	Chillers, boilers, cooling towers and pumps selection

<b>Week 11</b>	Design piping system by Pipe Sizer
<b>Week 12</b>	Drawing the piping system
<b>Week 13</b>	VRV/VRF system design and drawing
<b>Week 14</b>	Drawing the electrical and control diagram of central air conditioning system
<b>Week 15</b>	Drawing the electrical and control diagram of VRV/VRF systems

<b>Learning and Teaching Resources</b> مصادر التعلم والتدريس		
	<b>Text</b>	<b>Available in the Library?</b>
<b>Required Texts</b>	1. <a href="#">2021 ASHRAE handbook. Fundamentals</a> 2. <a href="#">Principles of heating, ventilating, and air conditioning: a textbook with design data based on the 2021 ASHRAE handbook--Fundamentals</a> 3. Design manual for heating, ventilation and air conditioning with coordinated standard details: Lee Kendrick, Julian C. Gonzalez, 1986	No

<b>Grading Scheme</b> مخطط الدرجات				
<b>Group</b>	<b>Grade</b>	<b>التقدير</b>	<b>Marks (%)</b>	<b>Definition</b>
<b>Success Group (50 - 100)</b>	<b>A - Excellent</b>	امتياز	90 - 100	Outstanding Performance
	<b>B - Very Good</b>	جيد جدا	80 - 89	Above average with some errors
	<b>C - Good</b>	جيد	70 - 79	Sound work with notable errors
	<b>D - Satisfactory</b>	متوسط	60 - 69	Fair but with major shortcomings
	<b>E - Sufficient</b>	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group (0 - 49)</b>	<b>FX - Fail</b>	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	<b>Electrical and Electronic Engineering</b>		Module Delivery
Module Type	C		<input type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MPAC311		
ECTS Credits	5		
SWL (hr/sem)	150		
Module Level	3	Semester of Delivery	
Administering Department	Mechanical Power Eng. Dep.	College	TCB
Module Leader	Odai isam wadea	e-mail	<a href="mailto:Odai-asam@mtu.edu.iq">Odai-asam@mtu.edu.iq</a>
Module Leader's Acad. Title	Asst. lecturer.	Module Leader's Qualification	MSc
Module Tutor	None	e-mail	E-mail
Peer Reviewer Name	Sali dakheel	e-mail	<a href="mailto:Sali-dakeel@mtu.edu.iq">Sali-dakeel@mtu.edu.iq</a>
Scientific Committee Approval Date	20/06/2023	Version Number	1.0

### Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	MPAC107	<b>Semester</b>	L1,S2
<b>Co-requisites module</b>	None	<b>Semester</b>	

### Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Aims</b>	To study the principles of electrical machines and electronic devices that are necessary for refrigeration and air conditioning engineer.
<b>Module Learning Outcomes</b>	Upon completion of the course, students should be able to: 38. Be able to analyze DC motor 39. Calculate the current and voltage of Motor then calculate the Torque 40. Compare between single phase and three phase motor
<b>Indicative Contents</b>	

### Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

<b>Strategies</b>	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.
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### Student Workload (SWL)

الحمل الدراسي للطالب

<b>Structured SWL (h/sem)</b>	88	<b>Structured SWL (h/w)</b>	6
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Unstructured SWL (h/sem)	62	Unstructured SWL (h/w)	4
Total SWL (h/sem)	150		

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

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري محتوى كل اسبوع يجب ان يغطي الوقت المحدد	
	Material Covered
Week 1	D.C motors, construction, commutator, types of D.C motors
Week 2	Starting of D.C motor, starter connection, torque of D.C motors
Week 3	Single phase induction motor, split-phase, capacitor-start, shaded-pole type
Week 4	3-phase induction motor , construction , synch. Speed, slip .
Week 5	Starting of 3-phase induction motor, star-delta method, step down transformer
Week 6	Instruments and measurements, ammeters, voltmeter, ohmmeter, kw - h meters .
Week 7	Contactors, relays, timers .. Thermal overload, starter (contactor +timer)
Week 8	Fuse, circuit breakers, types, choice
Week 9	Diode, V-I characteristic, half –wave rectifier
Week 10	Full-wave rectifier, bridge and center-top transformer rectifier

<b>Week 11</b>	Transistor, construction, types
<b>Week 12</b>	Saturation, active, break-down region and cutoff regions
<b>Week 13</b>	Transistor as amplifier and Transistor as electronic switch.
<b>Week 14</b>	Diac – Traic , characteristics applications with SCR .
<b>Week 15</b>	Operational amplifier 741.

### Delivery Plan (Weekly Lab. Syllabus)

#### المنهاج الاسبوعي للمختبر

	<b>Material Covered</b>
<b>Week 1</b>	Basic wiring diagram for electrical measurements
<b>Week 2</b>	Test of current, voltage and solid state relay
<b>Week 3</b>	Start-up compressor with solid state relay
<b>Week 4</b>	Start-up compressor with current relay
<b>Week 5</b>	Star delta starter
<b>Week 6</b>	Simulation of block for refrigerant , notice the effects
<b>Week 7</b>	Simulation of valve damage, notice the effects
<b>Week 8</b>	Dismantling of induction motor
<b>Week 9</b>	Diode characteristics
<b>Week 10</b>	Diode characteristics
<b>Week 11</b>	Half wave rectifier
<b>Week 12</b>	Full wave rectifier
<b>Week 13</b>	Full wave rectifier with filter
<b>Week 14</b>	Diode limiters
<b>Week 15</b>	Zener diode

## Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Recommended Texts</b>	➤ Principle of Dc Motor and types	No

## Grading Scheme

مخطط الدرجات

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

<b>Module Title</b>	Air Conditioning System Design	<b>Module Delivery</b>
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<b>Module Type</b>	C		<input type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
<b>Module Code</b>	MPAC401			
<b>ECTS Credits</b>	10			
<b>SWL (hr/sem)</b>	300			
<b>Module Level</b>	4	<b>Semester of Delivery</b>	1	
<b>Administering Department</b>	Mechanical Power Eng. Dep.	<b>College</b>	TCB	
<b>Module Leader</b>	Dr. Ahmed Qasim Ahmed		<b>e-mail</b>	<a href="mailto:aqaa1@mtu.edu.iq">aqaa1@mtu.edu.iq</a>
<b>Module Leader's Acad. Title</b>	Assist. Professor	<b>Module Leader's Qualification</b>	PhD	
<b>Module Tutor</b>		<b>e-mail</b>		
<b>Peer Reviewer Name</b>	Ahmed Jawad Khaleel	<b>e-mail</b>	<a href="mailto:ahmed1982_jk@mtu.edu.iq">ahmed1982_jk@mtu.edu.iq</a>	
<b>Scientific Committee Approval Date</b>	20/6/2023	<b>Version Number</b>	1.0	

### Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	MPAC304	<b>Semester</b>	L3,S1
<b>Co-requisites module</b>		<b>Semester</b>	

### Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية



<p><b>Module Aims</b> أهداف المادة الدراسية</p>	<p>4. Study the type of all types of refrigeration system. 5. This course provides information on air conditioning system design and gives a good understanding of the techniques, concepts, and methods of the HVAC system design. 6. Introduces theories and operations of heating and air conditioning system. Includes design of HVAC system</p>
<p><b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية</p>	<p>1- Learn how to select the suitable air terminal device and the indoor air distribution behavior 2-Study and learn some important concepts of air distribution such as duct layout, Fan, AHU, etc. 3-Work on the advanced process in the HVAC system 4-Learn about the different types of air conditioning system 5-Learn some rules of piping systems and accessories</p>
<p><b>Indicative Contents</b> المحتويات الإرشادية</p>	<p><b>Indicative content includes the following.</b></p> <p>8. Air distribution systems 9. Room air distribution, conditioned room air distribution 10. Refrigeration and air conditioning equipment classification 11. Piping's systems and accessories. 12. Advanced applications on psychometric charts. 13. Conventional air condition system(mechanical and electrical components)</p>

### Learning and Teaching Strategies

#### استراتيجيات التعلم والتعليم

<p><b>Strategies</b></p>	<p>Assessment is based on hand-in assignments, written exams, Quizzes, reports, Practical testing, and Online testing.</p>
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### Student Workload (SWL)

#### الحمل الدراسي للطالب

<p><b>Structured SWL (h/sem)</b></p>	<p>144</p>	<p><b>Structured SWL (h/w)</b></p>	<p>10</p>
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الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	156	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	11
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	300		

<b>Module Evaluation</b> تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	2	10% (10)	5, 11	
	<b>Assignments</b>	5	10% (10)	3,5,7,10,13	
	<b>Projects / Lab.</b>				
	<b>Report</b>	2	10% (10)	8, 13	
<b>Summative assessment</b>	<b>Midterm Exam</b>	2 hr	20% (20)	7	
	<b>Final Exam</b>	3hr	50% (50)	15	
<b>Total assessment</b>			100% (100 Marks)		

<b>Delivery Plan (Weekly Syllabus)</b> المنهاج الاسبوعي النظري	
	<b>Material Covered</b>
<b>Week 1</b>	Air distribution systems, zoning, Air –conditioning layout systems.
<b>Week 2</b>	Room air distribution, conditioned room air distribution systems, room air distribution requirements, air outlets (types) and selection. Air –handling units, fan-coil units (components and selection), system resistance in series and parallel.
<b>Week 3</b>	Fans ( types ,designs ,selection ,calculation and connection)
<b>Week 4</b>	Air filtration (types, application, selection and its relations with conditioned room function. The noise in air conditioning systems. (Sources and treatments by using ducts silencers and plenum), air outlet selection with recommended noise.
<b>Week 5</b>	Advanced applications on psychometric charts.
<b>Week 6</b>	Advanced applications on psychometric charts.

<b>Week 7</b>	Piping's systems and accessories (open and closed system), (two, three, four pipe system) comparative study and design and applications.
<b>Week 8</b>	Evaporative cooling systems, application and design of (air cooler, cooling tower, and air washers), psychometric chart. Air conditioning systems (types and selection) and its relation with occupant's activities..
<b>Week 9</b>	All air systems, features, advantages, disadvantages, comparative study with other systems, and psychometric chart.
<b>Week 10</b>	Single zone system (variable volume constant temperature and variable temperature constant volume), comparative study (cost and performance), psychometric chart.
<b>Week 11</b>	Dual conduit system, multi zone system comparative study, psychometric chart. Air –water systems (types, features, advantages, disadvantages, comparative study with other systems, psychometric chart.
<b>Week 12</b>	Induction unit systems (features, types, advantages and disadvantages). All –water systems, advantages, disadvantages, performance and applications.
<b>Week 13</b>	Fan –coil unit systems ,and primary air and fan –coil system (comparative study) Dx – systems, package system, and applications.
<b>Week 14</b>	Energy conservation in air conditioning systems. Heat pump system for air conditioning system.
<b>Week 15</b>	Evaluations and commercial analysis for air conditioning systems.

### Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
<b>Week 1</b>	Project
<b>Week 2</b>	
<b>Week 3</b>	
<b>Week 4</b>	
<b>Week 5</b>	
<b>Week 6</b>	
<b>Week 7</b>	
<b>Week 8</b>	
<b>Week 9</b>	
<b>Week 10</b>	

Week 11	
Week 12	
Week 13	
Week 14	
Week 15	

Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1- "REFRIGERATION AND AIR CONDITIONING " By RAMESH CHANDRA ARORA 2-"Heating, Ventilating, and Air Conditioning" Analysis and Design By Faye C. McQuiston, Jerald D. Parker, and Jeffrey D. Spitzer. Sixth Edition	yes
Recommended Texts	"REFRIGERATION AND AIR CON.DITIONING" By W. F. Stoecker, and J. W. Jones	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	Power Plants		Module Delivery
Module Type	C		<input type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MPAC402		
ECTS Credits	6		
SWL (hr/sem)	180		
Module Level	4	Semester of Delivery	
Administering Department	Mechanical Power Eng. Dep.	College	ETC
Module Leader	Dr. Asiem S, Allawi	e-mail	<a href="mailto:Dr.asimalobidy@mtu.edu.iq">Dr.asimalobidy@mtu.edu.iq</a>
Module Leader's Acad. Title	Assist. Professor	Module Leader's Qualification	PhD.
Module Tutor	None	e-mail	E-mail
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	20/06/2023	Version Number	1

### Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	MPAC203	<b>Semester</b>	L2
<b>Co-requisites module</b>	MPAC303	<b>Semester</b>	L3

**Module Aims, Learning Outcomes and Indicative Contents**

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Aims</b>	<p>1- Introduce the student to the basic processes of power cycles.</p> <p>2- Identifying the properties of steam from tables and the processes that take place on the steam power plants cycle.</p> <p>3- Learn about the different parts of the steam power plants and how it working.</p> <p>4- Learn about the calculation the performance of each part of the steam power plants and the accessories.</p>
<b>Module Learning Outcomes</b>	<p>Upon completion of the course, students should be able to:</p> <p>1- The student will be able to complete basic operations calculations on the steams cycles.</p> <p>2- The student will be able to understand the thermal processes.</p> <p>3- The student will be able to understand all types of boilers and fuels.</p> <p>4- The student will be able to understand and calculate all performance which used in power plants.</p>
<b>Indicative Contents</b>	<p>Indicative content includes the following.</p> <p>*In the fourth week, outside the students' commitments, a scientific trip to a steam station (1) to see the parts of the system and how it works in reality, and to make a report</p>

	<p>[8 hrs].</p> <p>*In the eighth week, outside the students' commitments, a scientific trip to a gas power station (1) to see the parts of the system and how it works in reality, and to make a report .[8 hrs]</p> <p>*In the Twelfth week, outside the students' commitments, a scientific trip to a steam station (2) to see the parts of the system and how it works in reality, and to make a report .[8 hrs]</p> <p>*In the Fifteenth week, outside the students' commitments, a scientific trip to a thermal machinery repair plant to see the parts of the system and how it works in reality, Or showing scientific films about repairing thermal machines and steam turbines and to make a report .[8hrs]</p>
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<b>Learning and Teaching Strategies</b> استراتيجيات التعلم والتعليم	
<b>Strategies</b>	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.

<b>Student Workload (SWL)</b> الحمل الدراسي للطالب			
<b>Structured SWL (h/sem)</b>	144	<b>Structured SWL (h/w)</b>	10
<b>Unstructured SWL (h/sem)</b>	36	<b>Unstructured SWL (h/w)</b>	2

<b>Total SWL (h/sem)</b>	180
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<b>Module Evaluation</b> تقييم المادة الدراسية					
		<b>Time/Number</b>	<b>Weight (Marks)</b>	<b>Week Due</b>	<b>Relevant Learning Outcome</b>
<b>Formative assessment</b>	<b>Quizzes</b>	4	20% (20)	3,5,6,10	LO #1,2,.....10
	<b>Assignments</b>	2	10% (10)	7, 8	LO # 8
	<b>Seminar</b>	1	10% (10)	11	LO # 11
<b>Summative assessment</b>	<b>Midterm Exam</b>	2 hr	10% (10)	12	LO # 1-12
	<b>Final Exam</b>	3hr	50% (50)	16	All
<b>Total assessment</b>			100% (100 Marks)		

<b>Delivery Plan (Weekly Syllabus)</b> المنهاج الاسبوعي النظري محتوى كل اسبوع يجب ان يغطي الوقت المحدد	
<b>Week</b>	<b>Subject</b>
1	Introduction to power cycles and main equations in thermodynamics..
2	Power Plant Steam Cycles, Main Cycles.
3	Carnot cycle and its efficiency and all performance.
4	Steam table and its calculations.
5	Ideal Rankine cycle and colocations its performance.
6	Reheat cycle.
7	Regenerative cycle with open feed water heater.
8	Regenerative cycle with closed feed water heater.
9	Introduction to Heat Exchangers, Theoretical Principles, Parallel Flow H.E., Counter Flow H.E, Cross Flow H.E, The Log Mean Temperature Difference Method, The NTU Method, Shell and Tubes H.E., Condensing, Evaporation. .
10	Combustion and Fuels, Complete and Incomplete Combustion, Correct Air/Fuel Ratio, Access Air Supplied, Heat Generation, Boiler Efficiency, pinch principle.
11	Steam Boilers, Kinds, Burners, Air Preheated, Preheated and Superheated, Combustion and Fuels, Complete and Incomplete Combustion, Correct Air/Fuel Ratio, Access Air Supplied, Heat Generation, Boiler Efficiency, pinch principle.



12	Steam Nozzles, Applications, Steam Expansion, Discharge, Velocity of Steam Through Nozzles, Values of Critical Pressure, Diameters of Throat and Exit for Maximum.
13	Steam Condensers, Kinds, Direct Contact Condensers, Surface Condenser, Design and Manufacturing.
14	Steam Turbines, The Kinds, Impulse Turbine, Blades Efficiency, Reaction Turbine, Reaction Ratio, Installation, Multi Stage Blades,
15	The Pumps, Kinds of Pumps, System Characteristics, Pumps Characteristics, Matching Pumps to System Characteristics, Operation of Pumps in series and Parallel, Performance of the Condensers. Applications

### Delivery Plan (Weekly Lab. Syllabus)

#### المنهاج الاسبوعي للمختبر

	Material Covered
<b>Week 1</b>	Feed water treatments .
<b>Week 2</b>	Fuel .
<b>Week 3</b>	The burner.
<b>Week 4</b>	The boiler.
<b>Week 5</b>	The quality calculation.
<b>Week 6</b>	The condense system part 1.
<b>Week 7</b>	The condense system part 2.
<b>Week 8</b>	The efficiency calculation for cycle.
<b>Week 9</b>	The turbine .
<b>Week 10</b>	The efficiency of the turbine .
<b>Week 11</b>	Bryton cycle .
<b>Week 12</b>	Efficiency of the Bryton cycle.
<b>Week 13</b>	Centrifugal pump.
<b>Week 14</b>	Axial pump.
<b>Week 15</b>	The effectiveness of the heat exchanger.

## Learning and Teaching Resources

### مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Recommended Texts</b>	<ul style="list-style-type: none"> <li>➤ 1-Dr. Rahim K. Jassim "POWER PLANT ENGINEERING and ECONOMY"2010</li> <li>➤ 2-Nag, P. K., "Power Plant Engineering", (2002) Tata-McGraw Hill. Higher Education, 2nd edition.</li> <li>➤ 3-Kotas, T. J. (1995) "The Exergy Method of Thermal Plant Analysis", reprinted, Malabar, Florida, USA: Krieger.</li> </ul>	yes

## Grading Scheme

### مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
<b>Success Group (50 - 100)</b>	<b>A</b> - Excellent	امتياز	90 - 100	Outstanding Performance
	<b>B</b> - Very Good	جيد جدا	80 - 89	Above average with some errors
	<b>C</b> - Good	جيد	70 - 79	Sound work with notable errors
	<b>D</b> - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	<b>E</b> - Sufficient	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group (0 - 49)</b>	<b>FX</b> – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	<b>F</b> – 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			
<b>Module Title</b>	Computer Applications 3		<b>Module Delivery</b>
<b>Module Type</b>	S		<input type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
<b>Module Code</b>	MPAC404		
<b>ECTS Credits</b>	5		
<b>SWL (hr/sem)</b>	150		
<b>Module Level</b>	4	<b>Semester of Delivery</b>	2
<b>Administering Department</b>	Mechanical Power Eng. Dep.	<b>College</b>	TCB
<b>Module Leader</b>	Ahmed Mohammed	<b>e-mail</b>	<a href="mailto:ahmed_mohammed19@mtu.edu.iq">ahmed_mohammed19@mtu.edu.iq</a>
<b>Module Leader's Acad. Title</b>	Ass. Lecturer	<b>Module Leader's Qualification</b>	MS.c
<b>Module Tutor</b>	Name (if available)	<b>e-mail</b>	E-mail
<b>Peer Reviewer Name</b>	Dr. Ahmed Qasem	<b>e-mail</b>	<a href="mailto:aqaa1@mtu.edu.iq">aqaa1@mtu.edu.iq</a>
<b>Scientific Committee Approval Date</b>		<b>Version Number</b>	

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
<b>Prerequisite module</b>	MPAC101	<b>Semester</b>	1
	MPAC201		3

Co-requisites module		Semester	
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## Module Aims, Learning Outcomes and Indicative Contents

### أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Aims</b> أهداف المادة الدراسية	AutoCAD 3d course teaches students to create basic 2D and 3D drawings using drawing and editing tools, organizes drawing objects on solids, basic dimensions, and prepares to plot. This course is designed for Mechanical Engineers.
<b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية	AutoCAD 3D certificate goal is to educate individuals on extra-advanced functions, the strategy, how to design and model items in the 3D design software program, enveloping surface areas, and solids in visualizing engineering designs.
<b>Indicative Contents</b> المحتويات الإرشادية	Indicative content includes the following. <u>Part 1 – 3d solids</u> Drawing the basic components of 3d solids in space. <u>Part 2 – 3d operations</u> Enable to make operations on the 3d solids. <u>Part 3 – Solid editing</u> Enable to editing on 3d solids, faces and edges. <u>Part 4- User coordinate system UCS</u> Types of UCS and their applications on 3d solids. <u>Part 5- Advanced 3d commands</u> (Extrude, revolve, sweep and loft), 2d drawings and UCS . <u>Part 6 – Surface</u> Drawing different types of surfaces in space.

## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

<b>Strategies</b>	The main strategy that will be adopted in this module is to encourage students participation in the exercises, in the same time refining and expanding their critical thinking skills. This will be achieved through classes and interactive tutorials.
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<b>Student Workload (SWL)</b> الحمل الدراسي للطالب			
<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	88	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل		<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل			

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

<b>Delivery Plan (Weekly Syllabus)</b> المنهاج الاسبوعي النظري	
	Material Covered
<b>Week 1</b>	Introduction to AutoCAD -3D, workspace, visual style, 3d views, view ports, right hand rule, world coordinate and user coordinate systems and types of coordinate systems.

	3D solids (box, wedge and cylinder).
<b>Week 2</b>	3D solids (cone and tours). 3D solids (sphere and pyramid).
<b>Week 3</b>	Examples to 3D solids. Basic solid editing (union, subtract and intersect) with examples.
<b>Week 4</b>	Fillet and chamfer with applied examples. 3D operations (3d move and 3d rotate) with examples.
<b>Week 5</b>	3D operations (3d align and 3d mirror) with examples. 3D operations (3d array and slice) with examples.
<b>Week 6</b>	More applied examples. User coordinate system ( origion, face and objects) with examples.
<b>Week 7</b>	User coordinate system (view, world ,x-y-z) with examples. User coordinate system ( z-axis and 3 points) with examples.
<b>Week 8</b>	Advanced 3d commands (extrude and loft) with examples.
<b>Week 9</b>	Advanced 3d commands (revolve, sweep) with examples. Advanced 3d commands (presspull and section plane) with examples.
<b>Week 10</b>	Advanced solid editing/face (extrude, move,rotate and offest).
<b>Week 11</b>	Advanced solid editing/face (taper, delete, copy, color, material, undo and exit).
<b>Week 12</b>	Applied examples. Advanced solid editing/edge (copy and color).
<b>Week 13</b>	Advanced solid editing/body (imprint, separate, shell, clean and check).
<b>Week 14</b>	Surface (box, cone, dome and mesh). surface (pyramid and sphere)
<b>Week 15</b>	surface (torus and wedge) with examples.
<b>Week 16</b>	<b>The preparatory week before the final Exam</b>

### Delivery Plan (Weekly Lab. Syllabus)

## المناهج الاسبوعي للمختبر

	Material Covered
<b>Week 1</b>	examples on coordinate systems
<b>Week 2</b>	examples on box, wedge and cylinder
<b>Week 3</b>	examples on cone and tours examples on sphere and pyramid
<b>Week 4</b>	applied examples examples on asic solid editing
<b>Week 5</b>	examples on fillet and chamfer examples on 3d move and 3d rotate
<b>Week 6</b>	examples on 3d align and 3d mirror examples on 3d array and slice
<b>Week 7</b>	applied examples on ucs
<b>Week 8</b>	applied examples on ucs
<b>Week 9</b>	examples on extrude and loft
<b>Week 10</b>	examples on revolve and sweep presspull and section plane
<b>Week 11</b>	examples on advanced solid editing/face (extrude, move,rotate and offest
<b>Week 12</b>	Advanced solid editing/face (taper, delete, copy, color, ).material, undo and exit
<b>Week 13</b>	Applied examples.
<b>Week 14</b>	examples
<b>Week 15</b>	examples on 3d surface Surface (box, cone, dome and mesh)

## Learning and Teaching Resources

### مصادر التعلم والتدريس

	Text	Available in the Library?

<b>Required Texts</b>	Autocad user manual	Yes
<b>Recommended Texts</b>	Introduction to AutoCAD 2009	Yes
<b>Websites</b>		

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



# MODULE DESCRIPTION FORM

## نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Industrial Engineering Management		Module Delivery
Module Type	B		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MPAC405		
ECTS Credits	3		
SWL (hr/sem)	90		
Module Level	4	Semester of Delivery	1
Administering Department	Mechanical Power Eng. Dep.	College	TCB
Module Leader	Sohaib Khalil Ibrahim	e-mail	<a href="mailto:sohaib-khlil@mtu.edu.iq">sohaib-khlil@mtu.edu.iq</a>
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	M.Sc
Module Tutor	Suzan abbas	e-mail	<a href="mailto:suzan.abbas@mtu.edu.iq">suzan.abbas@mtu.edu.iq</a>
Peer Reviewer Name		e-mail	<a href="mailto:Suzanabbas977@gmail.com">Suzanabbas977@gmail.com</a>
Scientific Committee Approval Date	20 / 6/2023	Version Number	1.0

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	NA	Semester	
Co-requisites module	NA	Semester	

## Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Aims</b> أهداف المادة الدراسية	Providing the engineer with information related to the management of the industrial unit (productivity) and its structural composition and finding the optimal solution using known methods in operations research and other engineering mathematical methods.
<b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية	Achieving the objectives of the industrial unit with the highest possible efficiency and maximum profitability and at the lowest cost, through the optimal use of production resources (workers, machines, and raw materials), maintenance and warehousing operations, then introducing the student to the system and economics of quality control and its functions and the principles of statistics and probability distributions.
<b>Indicative Contents</b> المحتويات الإرشادية	

## Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

<b>Strategies</b>	<ol style="list-style-type: none"> <li>1. Quizzes and tests throughout the semester to check understanding and knowledge</li> <li>2. Examinations, written, that assess learners' understanding of concepts, principles, and theories related to Industrial Engineering</li> <li>3. Peer evaluation and feedback tools used as part of group projects or reciprocal feedback assignments.</li> <li>4. Assignments and essays used to assess learners' comprehension of theoretical concepts.</li> <li>5. Presentation and demonstration of acquired knowledge in real-world scenarios.</li> </ol>
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## Student Workload (SWL)

الحمل الدراسي للطالب

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	45	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعياً	2
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<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطلاب خلال الفصل	45	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطلاب أسبوعيا	2
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطلاب خلال الفصل	90		

<b>Module Evaluation</b> تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	2	10%	5, 10	
	<b>Assignments</b>	1	5%	9	
	<b>Projects / Lab.</b>				
	<b>Report</b>	1	5%	12	
<b>Summative assessment</b>	<b>Midterm Exam</b>	2hr	10%	7	
	<b>Final Exam</b>	3hr	60%	15	All
<b>Total assessment</b>			100%		

<b>Delivery Plan (Weekly Syllabus)</b> المنهاج الاسبوعي النظري	
	Material Covered
<b>Week 1</b>	Introduction of management and industrial engineering
<b>Week 2</b>	Factors affecting the selection of the project place
<b>Week 3</b>	Methods of calculating transportation costs as an applied case
<b>Week 4</b>	Network diagrams and their applications in engineering projects
<b>Week 5</b>	Production lines and their types
<b>Week 6</b>	Planning and balancing production lines in the industrial unit
<b>Week 7</b>	Linear programming and its applications in industrial engineering
<b>Week 8</b>	Work study and time study
<b>Week 9</b>	Production process capability
<b>Week 10</b>	Inventory and its levels
<b>Week 11</b>	Maintenance and replacement and its applications Mathematics
<b>Week 12</b>	Economic feasibility
<b>Week 13</b>	The methods used to calculate the economic feasibility
<b>Week 14</b>	Normal Distribution and Area Calculation of the Standard Normal Curve
<b>Week 15</b>	Final exam

## Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Required Texts</b>	1.	yes
<b>Recommended Texts</b>	None	
<b>Websites</b>	None	

## Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
<b>Success Group (50 - 100)</b>	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
<b>Fail Group (0 - 49)</b>	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

<b>Module Information</b> معلومات المادة الدراسية			
<b>Module Title</b>	<b>Refrigeration Systems</b>		<b>Module Delivery</b>
<b>Module Type</b>	<b>C</b>		<input type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
<b>Module Code</b>	<b>MPAC406</b>		
<b>ECTS Credits</b>	<b>10</b>		
<b>SWL (hr/sem)</b>	<b>300</b>		
<b>Module Level</b>	4	<b>Semester of Delivery</b>	
<b>Administering Department</b>	Mechanical Power Eng. Dep.	<b>College</b>	TCB
<b>Module Leader</b>	Fadhil Abdulrazzaq Kareem	<b>e-mail</b>	<a href="mailto:Fadhiljua91@yahoo.com">Fadhiljua91@yahoo.com</a>
<b>Module Leader's Acad. Title</b>	Leacture	<b>Module Leader's Qualification</b>	M.sc.
<b>Module Tutor</b>	None	<b>e-mail</b>	E-mail
<b>Peer Reviewer Name</b>	Prof. Dr. Saad Mohsen Al Mashat	<b>e-mail</b>	<a href="mailto:almashatsaad@yahoo.com">almashatsaad@yahoo.com</a>
<b>Scientific Committee Approval Date</b>	13 / 6/2023	<b>Version Number</b>	1.0

<b>Relation with other Modules</b> العلاقة مع المواد الدراسية الأخرى			
<b>Prerequisite module</b>	MPAC205	<b>Semester</b>	L2,S1
<b>Co-requisites module</b>		<b>Semester</b>	

## Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Aims</b>	<p>41. Enhance the students' knowledge of the principles of vapor compression refrigeration systems and its analysis.</p> <p>42. Provide the students the basic design of all components for vapor refrigeration system</p> <p>43. Studying types of refrigeration units and cryogenic refrigeration.</p>
<b>Module Learning Outcomes</b>	<p>Upon completion of the course, students should be able to:</p> <p>15. To understand the principles of work of refrigeration systems, and main advantages, disadvantages and application of each them.</p> <p>16. To investigate the general design of condenser, evaporator, expansion device and cooling tower</p> <p>17. To understand the basic calculations of the all type of refrigeration systems.</p>
<b>Indicative Contents</b>	<p>Indicative content includes the following:</p> <p>Condensers and Evaporators: Condensers and evaporators as heat exchangers, overall heat transfer coefficients, heat transfer and pressure drop for the fluid flow in heat exchanger tubes and shell. Extended surfaces, Heat transfer and pressure drop for air side. Required condensing capacity, condensing coefficient, fouling factor, de-super heating, condenser design, Wilson plots, air and non-condensable gases. Evaporators, Boiling in the shell, boiling inside tube, evaporators performance, pressure drop in tubes, frost. [10 hrs]</p> <p>Expansion devices: Purpose and types of expansion devices, capillary tube, selection of capillary tube ,analytical computation of pressure drop in capillary tube, increment length, choked flow graphical method of capillary tube selection ,Constant pressure expansion valve, controlling of super-heating in thermostatic expansion valve [3 hrs]</p> <p>Vapor compression refrigeration system Analysis: balance point and system simulation, reciprocating compressors, condenser performance, condensing unit system mathematical and graphical analysis, evaporator performance, performance of complete system graphical and mathematical analysis, some performance trends, the expansion devices, sensitivity analysis. [5 hrs]</p> <p>Cooling towers and evaporative condensers: Heat rejected to atmosphere, cooling towers, analysis of counter flow cooling tower, stepwise integration, acceptance test, predicting outlet conditions from tower, air conditions through tower, evaporative condensers, when using a cooling tower and evaporative condensers. [4 hrs]</p>

	<p>Absorption refrigeration system: relation between vapour compression and absorption refrigeration units, the absorption refrigeration system, temperature and concentration properties of LiBr-water solution, calculations of mass flow rates in the absorption cycle, enthalpy of LiBr-water solutions, thermal analysis of simple cycle, absorption cycle with heat exchanger, crystallization, capacity control, aqua-ammonia system . [4 hrs]</p> <p>Adsorption system : the relation between adsorption and absorption, absorption and vapour compression cycle, the analysis of adsorption system, mathematical analysis of the adsorption system . Steam jet refrigeration: system components, analysis of steam jet refrigeration system, approximation analysis, equilibrium concentration. [5 hrs]</p> <p>Air refrigeration system : the working principle of the cycle, design considerations, atmosphere temperature, humidity and pressure, load calculation, refrigeration, heating, temperature control, ventilation, pressure control of zone, types of air system. [5 hrs]</p> <p>Thermoelectric refrigeration: working principle, types of thermoelectric refrigeration systems, electro-acoustic refrigeration, working principle, types. [5 hrs]</p> <p>Cryogenic and liquefaction of gases: Cryogenic, Joule-Thomson effect, air liquefaction by Hopson system ( Joule-Thomson expansion ). Temperature entropy diagram for air, calculation of work required for gas compression , Claude system, cascade system, general consideration for gas liquefaction, Hydrogen , Pre-Cooling system for air liquefaction, Helium [4 hrs]</p> <p>Vortex tube: Types and working principle. Heat Pipe: Types and working principle. [3 hrs]</p>
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### Learning and Teaching Strategies

#### استراتيجيات التعلم والتعليم

<b>Strategies</b>	Assessment is based on hand-in assignments, Written exam, Quizzes, Tutorial, Seminars, Reports.
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### Student Workload (SWL)

#### الحمل الدراسي للطالب

<b>Structured SWL (h/sem)</b>	158	<b>Structured SWL (h/w)</b>	11
<b>Unstructured SWL (h/sem)</b>	142	<b>Unstructured SWL (h/w)</b>	10
<b>Total SWL (h/sem)</b>	300		

## Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	4	20% (20)	3,7,9,13	LO #1-13
	<b>Assignments</b>	1	10% (10)	7	LO # 5,12
	<b>Seminar</b>	2	10% (10)	4,11	LO # 10,12
<b>Summative assessment</b>	<b>Midterm Exam</b>	2 hr	10% (10)	7	LO # 1-7
	<b>Final Exam</b>	3hr	50% (50)	16	All
<b>Total assessment</b>			100% (100 Marks)		

## Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري محتوى كل اسبوع يجب ان يغطي الوقت المحدد

<b>Material Covered</b>	
<b>Week 1</b>	Condensers and Evaporators: Condensers and evaporators as heat exchangers, overall heat transfer coefficients, heat transfer and pressure drop for the fluid flow in heat exchanger tubes and shell.
<b>Week 2</b>	Extended surfaces, Heat transfer and pressure drop for air side. Required condensing capacity, condensing coefficient, fouling factor, de-super heating, condenser design, Wilson plots, air and non-condensable gases



<b>Week 3</b>	Evaporators, Boiling in the shell, boiling inside tube, evaporators performance, pressure drop in tubes, frost.
<b>Week 4</b>	Expansion devices: Purpose and types of expansion devices, capillary tube, selection of capillary tube ,analytical computation of pressure drop in capillary tube, increment length, choked flow graphical method of capillary tube selection ,Constant pressure expansion valve, controlling of super-heating in thermostatic expansion valve
<b>Week 5</b>	Vapor compression refrigeration system Analysis: balance point and system simulation, reciprocating compressors, condenser performance, condensing unit system mathematical and graphical analysis, evaporator performance, performance of complete system graphical and mathematical analysis, some performance trends, the expansion devices, sensitivity analysis.
<b>Week 6</b>	Cooling towers and evaporative condensers: Heat rejected to atmosphere, cooling towers, analysis of counter flow cooling tower, stepwise integration, acceptance test, predicting outlet conditions from tower, air conditions through tower, evaporative condensers, when using a cooling tower and evaporative condensers.
<b>Week 7</b>	Absorption refrigeration system: relation between vapour compression and absorption refrigeration units, the absorption refrigeration system, temperature and concentration properties of LiBr-water solution, calculations of mass flow rates in the absorption cycle, enthalpy of LiBr-water solutions, thermal analysis of simple cycle, absorption cycle with heat exchanger, crystallization, capacity control, aqua-ammonia system .
<b>Week 8</b>	Adsorption system : the relation between adsorption and absorption, absorption and vapour compression cycle, the analysis of adsorption system, mathematical analysis of the adsorption system .
<b>Week 9</b>	Steam jet refrigeration: system components, analysis of steam jet refrigeration system, approximation analysis, equilibrium concentration.
<b>Week 10</b>	Air refrigeration system : the working principle of the cycle, design considerations, atmosphere temperature, humidity and pressure, load calculation, refrigeration, heating, temperature control, ventilation, pressure control of zone, types of air system.

<b>Week 11</b>	Thermoelectric refrigeration: working principle, types of thermoelectric refrigeration systems, electro-acoustic refrigeration, working principle, types.
<b>Week 12</b>	Cryogenic and liquefaction of gases: Cryogenic, Joule-Thomson effect, air liquefaction by Hopson system ( Joule-Thomson expansion )
<b>Week 13</b>	Temperature entropy diagram for air, calculation of work required for gas compression , Claude system, cascade system, general consideration for gas liquefaction, Hydrogen , Pre-Cooling system for air liquefaction, Helium
<b>Week 14</b>	Vortex tube: Types and working principle.
<b>Week 15</b>	Heat Pipe: Types and working principle.

### Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
<b>Week 1-15</b>	<b>Project</b>

### Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Required Texts</b>	<ul style="list-style-type: none"> <li>➤ Refrigeration and air condition, second edition , W. F. Stocker and J. W. Jones</li> <li>➤ REFRIGERATION AND AIR CONDITIONING --- Ramesh Chandra Arora</li> <li>➤ A textbook of refrigeration and air condition, R. S. Khurmi and J. K. Gupta</li> </ul>	yes

## Grading Scheme

### مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
<b>Success Group</b> (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
<b>Fail Group</b> (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	<b>Renewable Energy</b>		Module Delivery
Module Type	<b>C</b>		<input type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	<b>MPAC407</b>		
ECTS Credits	<b>10</b>		
SWL (hr/sem)	<b>300</b>		
Module Level	4	Semester of Delivery	2

<b>Administering Department</b>	Mechanical Power Eng. Dep.	<b>College</b>	TCB
<b>Module Leader</b>	Dr. Wisam Abd Mohammed Mahmood	<b>e-mail</b>	<a href="mailto:wam@mtu.edu.iq">wam@mtu.edu.iq</a>
<b>Module Leader's Acad. Title</b>	Assistant Professor	<b>Module Leader's Qualification</b>	Ph.D.
<b>Module Tutor</b>	Name (if available)	<b>e-mail</b>	E-mail
<b>Peer Reviewer Name</b>	Dr. Ahmed Qasim Ahmed	<b>e-mail</b>	<a href="mailto:aqaa1@mtu.edu.iq">aqaa1@mtu.edu.iq</a>
<b>Scientific Committee Approval Date</b>	20 / 6/2023	<b>Version Number</b>	1.0

### Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	MPAC203	<b>Semester</b>	2
<b>Co-requisites module</b>		<b>Semester</b>	

### Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Aims</b> أهداف المادة الدراسية	<ol style="list-style-type: none"> <li>1. Provide the students the basic knowledge of all sources of renewable energies.</li> <li>2. Provide the students with the fundamentals of the different power generation systems working based on renewable energies.</li> <li>3. Provide the students the experimental training about the different renewable energy systems.</li> </ol>
<b>Module Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. To understand the sources of renewable energies and the main advantages and disadvantages of each of them.</li> <li>2. To understand the effects of renewable energy on the environment.</li> </ol>

مخرجات التعلم للمادة الدراسية	<p>3. To understand the principles of work of renewable energy systems.</p> <p>4. To investigate the general design of renewable energy systems.</p> <p>5. To understand the basic calculations of renewable energy sources and systems.</p>
<p><b>Indicative Contents</b> المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <p><u>Part 1 – Solar energy</u></p> <p>The principles of solar energy with the solar systems of solar water heating, solar air heating, solar thermal power plants, solar water desalination, and solar dryer. [30 hrs]</p> <p><u>Part 2 - Photovoltaic</u></p> <p>Principles of solar cells and photovoltaic modules. Effects of solar radiation and ambient temperature on the photovoltaic systems. Types of photovoltaic systems with different applications. Power outputs of the photovoltaic systems. [30 hrs]</p> <p><u>Part 3 – Wind energy</u></p> <p>Wind energy and wind turbines. Classifications and types of wind turbines. Components of wind turbines. Types of wind farms and performance of the wind turbines. [10 hrs]</p> <p><u>Part 4- Water energy</u></p> <p>Hydro energy with hydro turbines. Types of hydro power plant. Ocean energy with different power plants. Tidal energy and tidal power plants. [10 hrs]</p> <p><u>Part 5- Geothermal energy</u></p> <p>Types and applications of geothermal energy, geothermal heating systems, and geothermal power plants. [10 hrs]</p> <p><u>Part 6 – Bioenergy</u></p> <p>Types and applications of bioenergy, biomass biogas and biofuel. [10 hrs]</p>

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

## Student Workload (SWL)

### الحمل الدراسي للطالب

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	<b>158</b>	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعياً	<b>11</b>
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	<b>142</b>	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعياً	<b>10</b>
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	<b>300</b>		

## Module Evaluation

### تقييم المادة الدراسية

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

## Delivery Plan (Weekly Syllabus)

### المنهاج الأسبوعي النظري

	<b>Material Covered</b>
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<b>Week 1</b>	General introduction to Energy. Introduction to renewable energy. Renewable energy resources and application. Renewable energy and environmental problems (Acid rain, Ozone layer depletion, Global climate change, Nuclear hazards).
<b>Week 2</b>	The sun. Reckoning of time (the equation of time and longitude correction). Solar angles (declination, hour angle, solar altitude angle, solar azimuth angle, sunrise and sunset times and day length, incidence angle). Calculations of solar radiation (Extraterrestrial solar radiation, Atmospheric attenuation. Terrestrial irradiation. Total radiation on the surface).
<b>Week 3</b>	Solar energy collectors. Stationary collectors (Flat plate collectors, Compound parabolic collectors, Evacuated tube collectors). Sun-tracking concentrating collectors (Parabolic trough collectors, Fresnel collectors, Parabolic dish reflectors, Heliostat field collectors).
<b>Week 4</b>	Solar water heating systems. Passive systems (Thermo siphon systems, Integrated collector storage). Active systems (Direct circulation systems, Indirect water heating systems, Pool heating systems).
<b>Week 5</b>	Heat storage systems (Air system thermal storage, Liquid system thermal storage, and thermal analysis of storage systems). Module and array design. Differential temperature controller, Placement of sensors.
<b>Week 6</b>	Heat storage systems (Air system thermal storage, Liquid system thermal storage, and thermal analysis of storage systems). Module and array design. Differential temperature controller, Placement of sensors.
<b>Week 7</b>	Industrial process heat (Solar industrial air and water systems, Solar steam generation systems). Chemistry applications (Reforming of fuels, Fuel cells, Materials processing, Solar detoxification). Solar dryers (Active solar energy dryers, Passive solar energy dryers. Greenhouses and greenhouse materials).
<b>Week 8</b>	Solar desalination systems. Desalination processes. Direct collection systems. Classification of solar water desalination systems. Performance of solar stills. Solar cells, Structure of photovoltaic System, Design of photovoltaic system. Hybrid photovoltaic /thermal systems and applications.
<b>Week 9</b>	Solar Thermal Power Systems (Parabolic trough collector systems, Power tower systems, Dish systems, Solar ponds).
<b>Week 10</b>	Introduction to wind energy. Power available in the energy. Wind turbine power and torque. Classification of Wind turbine (Horizontal axis Wind turbine, Vertical axis Wind turbine). Aerodynamics of Wind turbine (Airfoil, Aerodynamic theories). Characteristics of wind rotors (Rotor design, Rotor performance). Analysis of wind data
<b>Week 11</b>	Wind energy conversion systems. Wind electric generators (Tower, Rotor, Gearbox, Power regulation, Safety brakes, Generator). Wind farms, Offshore wind farms. Wind pumps. Wind water heater. Performance of wind energy conversion system. Power curve of wind turbine. Capacity factor.
<b>Week 12</b>	Introduction to water cycle. Water turbines. Hydropower plants (Run - of - River power plants, Storage power plants, Pumped - storage power plants).

<b>Week 13</b>	Introduction to bioenergy (biomass, biogas, biofuel). Biomass heating (Wood as a fuel, Fireplaces and closed wood burning stoves, Wood pellet heating). Biomass heat and power plants.
<b>Week 14</b>	Introduction to geothermal energy. Geothermal plants (Geothermal heat plants, Geothermal power plants), Geothermal heat pumps.
<b>Week 15</b>	Tidal energy. Tidal power plants. Wave energy. Wave power plants.
<b>Week 16</b>	<b>The preparatory week before the final Exam</b>

<b>Delivery Plan (Weekly Lab. Syllabus)</b>	
المنهاج الاسبوعي للمختبر	
	<b>Material Covered</b>
<b>Week 1</b>	Measurement devices and safety tools
<b>Week 2</b>	Solar angles
<b>Week 3</b>	Sun path and shading
<b>Week 4</b>	Solar simulators
<b>Week 5</b>	solar water heating systems
<b>Week 6</b>	solar air heating system
<b>Week 7</b>	Solar dryer
<b>Week 8</b>	Solar water desalination
<b>Week 9</b>	Solar concentrators
<b>Week 10</b>	Performance of photovoltaic modules
<b>Week 11</b>	Performance of photovoltaic systems
<b>Week 12</b>	Performance of photovoltaic thermal system
<b>Week 13</b>	Wind turbines
<b>Week 14</b>	Hydro energy
<b>Week 15</b>	Geothermal systems



## Learning and Teaching Resources

### مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Required Texts</b>	<p>Solar energy engineering processes and systems, Second edition. Soteris A. Kalogirou.</p> <p>Wind energy: fundamentals, resource analysis and economics. Sathyajith Mathew.</p> <p>Introduction to geothermal power. Val Pierce.</p> <p>Introduction to renewable energy. Vaughn Nelson.</p>	Yes
<b>Recommended Texts</b>	Solar Energy Thermal Processes, fourth edition. Duffie, John A	Yes
<b>Websites</b>		

## Grading Scheme

### مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
<b>Success Group (50 - 100)</b>	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
<b>Fail Group (0 - 49)</b>	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work is required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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

## MODULE DESCRIPTION FORM

### نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Professional Ethics		Module Delivery
Module Type	B		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MPAC408		
ECTS Credits	2		
SWL (hr/sem)	60		
Module Level	4	Semester of Delivery	
Administering Department	App. Mech.	College	TCB
Module Leader	Rahman Ali Hussein	e-mail	<a href="mailto:alshekhrahman@gmail.com">alshekhrahman@gmail.com</a>
Module Leader's Acad. Title	Ass. Prof.	Module Leader's Qualification	M.Sc.
Module Tutor	None	e-mail	E-mail
Peer Reviewer Name	Prof. Dr. Hamed A. Husein	e-mail	<a href="mailto:Mechanical10power@gmail.com">Mechanical10power@gmail.com</a>
Scientific Committee Approval Date	20 / 6/2023	Version Number	1.0

## Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	None	<b>Semester</b>	
<b>Co-requisites module</b>	None	<b>Semester</b>	

## Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Aims</b>	<ol style="list-style-type: none"> <li>1. وصف للاخلاق</li> <li>2. وصف للعمل والمهنة</li> <li>3. وصف لاخلاقيات المهنة .</li> <li>4. وصف لقيم و اخلاقيات المهنة</li> <li>5. وصف لانماط السلوك الغير اخلاقي في المهنة</li> <li>6. وصف لوسائل واساليب ترسيخ قيم اخلاقيات المهنة</li> <li>7. وصف لاخلاقيات ممارسة المهن الهندسية</li> </ol>
<b>Module Learning Outcomes</b>	<p>بعد اكمنا هذا الفصل سيكون الطالب قادرا على:</p> <ol style="list-style-type: none"> <li>1. فهم صفة الاخلاق .</li> <li>2. التفريق بين العمل والمهنة .</li> <li>3. فهم اخلاقيات المهنة</li> <li>4. التعرف على انماط السلوك الغير اخلاقي في المهنة .</li> <li>5. التعرف على وسائل واساليب ترسيخ قيم اخلاقيات المهنة .</li> <li>6. ممارسة اخلاقيات المهن الهندسية</li> </ol>
<b>Indicative Contents</b>	<p>:.المحتوى الارشادي يتضمن مايلي</p> <p>مفهوم الاخلاق ومنشأها ، القواعد العامة للاخلاقيات، مصادر الاخلاق، القيم الاخلاقية، اهمية الاخلاق للفرد والمجتمع [6 hrs]</p>

	<p>العمل والمهنة: العمل واهميته، سلوكيات العمل، مفهوم المهنة، تعريف المهنة، الفرق بين مفهوم العمل والمهنة [6 hrs] والحرفة، المعايير التي يجب ان تقوم عليها المهنة</p> <p>اخلاقيات المهنة: ماهي اخلاقيات المهنة ، المردودات الايجابية للالتزام باخلاقيات المهنة، خصائص اخلاقيات (العمل، صفات اخلاقيات المهنة، خطوات المستوى المقبول من اخلاقيات المهنة [6 hrs]</p> <p>[6 hrs] القيم واخلاقيات المهنة: الامانة الصدق التصح العدل حسن التعامل، اتقان العمل</p> <p>انماط السلوك الغير اخلاقي في المهنة: الفساد الاداري تعريفه وانواعه، الرشوة تعريقتها وانواعها واسبابها، الغش [10 hrs] .مفهومه وطبيعته ومظاهره في اداء الوظيفة</p> <p>[5 hrs] وسائل واساليب ترسيخ قيم اخلاقيات المهنة</p> <p>[5 hrs] اخلاقيات ممارسة المهن الهندسية</p>
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### Learning and Teaching Strategies

#### استراتيجيات التعلم والتعليم

<b>Strategies</b>	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.
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### Student Workload (SWL)

#### الحمل الدراسي للطالب

Structured SWL (h/sem)	30	Structured SWL (h/w)	2
Unstructured SWL (h/sem)	30	Unstructured SWL (h/w)	2
<b>Total SWL (h/sem)</b>	60		

<b>Module Evaluation</b>					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	3,5,6,10	LO #1,2,.....10
	Assignments	2	10% (10)	7, 8	LO # 8
	Seminar	1	10% (10)	11	LO # 11
Summative assessment	Midterm Exam	2 hr	10% (10)	12	LO # 1-12
	Final Exam	3hr	60% (60)	15	All
<b>Total assessment</b>			100% (100 Marks)		

<b>Delivery Plan (Weekly Syllabus)</b>	
المنهاج الاسبوعي النظري محتوى كل اسبوع يجب ان يغطي الوقت المحدد	
	Material Covered
<b>Week 1</b>	الاخلاق: مفهوم الاخلاق ومنشأها، القواعد العامة للاخلاقيات
<b>Week 2</b>	الاخلاق: مصادر الاخلاقيات، القيم الاخلاقية، اهمية الاخلاق للفرد والمجتمع
<b>Week 3</b>	العمل والمهنة: العمل واهميته، سلوكيات العمل ، مفهوم وتعريف المهنة، المعايير التي تقوم عليها المهنة، الفرق بينها وبين العمل والحرفة

<b>Week 4</b>	اخلاقيات المهنة: تعريفها ومردوداتها الايجابية للالتزام بها، خصائص اخلاقيات العمل والمهنة، خطوات المستوى المقبول منها.
<b>Week 5</b>	القيم وإخلاقيات المهنة: الامانة ، الصدق، النصح، العدل، حسن التعامل و اتقان العمل.
<b>Week 6</b>	القيم وإخلاقيات المهنة: الامانة ، الصدق، النصح، العدل، حسن التعامل و اتقان العمل.
<b>Week 7</b>	انماط السلوك الغير اخلاقي في المهنة: الفساد الاداري تعريفه وانواعه
<b>Week 8</b>	انماط السلوك الغير اخلاقي في المهنة: الرشوة تعريفها وانواعها واسبابها والدوافع، والغش مفهومه وطبيعته ومظاهره في اداء الوظيفة
<b>Week 9</b>	وسائل واساليب ترسيخ قيم اخلاقيات المهنة:مستويات بناء ووسائل ترسيخ اخلاقيات المهنة
<b>Week 10</b>	. الامور التي يجب مراعاتها في صياغة الميثاق الاخلاقي للمهنة، كيفية تعزيز السلوك الاخلاقي في العمل
<b>Week 11</b>	اخلاقيات ممارسة المهن الهندسية: اهمية التقني الفني في المجتمع
<b>Week 12</b>	الاخلاق الفنية والتكنولوجية
<b>Week 13</b>	شروط التقني المحترفوسماته
<b>Week 14</b>	بنود لائحة مزاولة المهنة لنقابة العمال
<b>Week 15</b>	النظرة الاسلامية لاخلاقيات المهنة مقارنة بالنظرة الغربية والامريكية

## Learning and Teaching Resources

### مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Recommended Texts</b>	➤ كتاب اخلاقيات المهنة : مقرر منهجي الناشر الجامعة التقنية الوسطى	نعم

## Grading Scheme

## مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
<b>Success Group</b> (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
<b>Fail Group</b> (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 4		Module Delivery
Module Type	S		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MPAC409		
ECTS Credits	2		
SWL (hr/sem)	60		
Module Level	4	Semester of Delivery	

<b>Administering Department</b>		Mechanical Power Eng. Dep.	<b>College</b>	TCB
<b>Module Leader</b>	Dr. Nabil Taih		<b>e-mail</b>	
<b>Module Leader's Acad. Title</b>		Lecturer. Assist	<b>Module Leader's Qualification</b>	MSc
<b>Module Tutor</b>	Asst. Lecturer. Labed Kadhim Jawad		<b>e-mail</b>	<a href="mailto:Labed1970@mtu.edu.iq">Labed1970@mtu.edu.iq</a>
<b>Peer Reviewer Name</b>		Asst. Prof. Dr Ammar A. Hussain	<b>e-mail</b>	<a href="mailto:Drammar@mtu.edu.iq">Drammar@mtu.edu.iq</a>
<b>Scientific Committee Approval Date</b>		20 / 6/2023	<b>Version Number</b>	1.0

### Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	MPAC308	<b>Semester</b>	L3, S2
<b>Co-requisites module</b>	None	<b>Semester</b>	

### Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Aims</b> أهداف المادة الدراسية	The goal is to study English language and gain knowledge of it as benefit engineers in general, and to develop speaking skills and understand its basic rules taking the way to the acquisition of the ability to use technical key words in their work and the capability of communicating with other engineers correctly
<b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية	Developing speaking skills and understanding its basic rules to take the way to the acquisition of the ability to use technical keywords in their work and the capability of communicating with other engineers correctly .



<b>Indicative Contents</b> المحتويات الإرشادية	Through the prepared syllabus, the student acquires the ability to understand grammar English language through weekly lectures and classes in a gradual and sequential manner for a period of four years, starting from the first stage, such as interrogative, negative, formation of sentences, parts of speech, and others.
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<b>Learning and Teaching Strategies</b> استراتيجيات التعلم والتعليم	
<b>Strategies</b>	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

<b>Student Workload (SWL)</b> الحمل الدراسي للطالب			
<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	30	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	2
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	30	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	60		

<b>Module Evaluation</b> تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	<b>Assignments</b>	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	<b>Report</b>	1	10% (10)	13	LO # 5, 8 and 10
	<b>Midterm Exam</b>	2 hr	20% (10)	7	LO # 1-7

Summative assessment	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

<b>Delivery Plan (Weekly Syllabus)</b> المنهاج الاسبوعي النظري	
	Material Covered
<b>Week 1</b>	Grammar revision, vocabulary and comprehension
<b>Week 2</b>	Cause and effect clauses, State verbs, vocabulary and comprehension
<b>Week 3</b>	Academic writing (2), writing technical report
<b>Week 4</b>	Types of sentences in English (1), vocabulary and comprehension
<b>Week 5</b>	Types of sentences in English (2), vocabulary and comprehension
<b>Week 6</b>	Result clauses, vocabulary and comprehension
<b>Week 7</b>	conjunctions, vocabulary and comprehension
<b>Week 8</b>	Punctuation, vocabulary and comprehension
<b>Week 9</b>	Writing CV, passive voice, vocabulary and comprehension
<b>Week 10</b>	Technical writing, technical sentences, vocabulary and comprehension
<b>Week 11</b>	Writing essays, vocabulary and comprehension
<b>Week 12</b>	Writing summary and abstract
<b>Week 13</b>	Paraphrasing
<b>Week 14</b>	<b>General Revision</b>
<b>Week 15</b>	<b>Final Exam</b>

<b>Learning and Teaching Resources</b> مصادر التعلم والتدريس		
	Text	Available in the Library?

Required Texts	Headway plus for post intermediate	Yes
Recommended Texts	Any Grammar and comprehension for technical learning and academic writing 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
<p><b>Note:</b> 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.</p>				

#### MODULE DESCRIPTION FORM

### نموذج وصف المادة الدراسية

Module Information		
معلومات المادة الدراسية		
Module Title	<b>Control and Measurements</b>	Module Delivery
Module Type	<b>C</b>	<input type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial
Module Code	<b>MPAC410</b>	
ECTS Credits	<b>6</b>	
SWL (hr/sem)	<b>180</b>	

			<input type="checkbox"/> Practical
			<input type="checkbox"/> Seminar
<b>Module Level</b>	4	<b>Semester of Delivery</b>	2
<b>Administering Department</b>	Mechanical Power Eng. Dep.	<b>College</b>	TCB
<b>Module Leader</b>	Mouayed Hassan AL-Toki	<b>e-mail</b>	<a href="mailto:mouayedaltoki@mtu.iq.edu">mouayedaltoki@mtu.iq.edu</a>
<b>Module Leader's Acad. Title</b>	Lecturer	<b>Module Leader's Qualification</b>	Ph.D.
<b>Module Tutor</b>	Name (if available)	<b>e-mail</b>	E-mail
<b>Peer Reviewer Name</b>	Name	<b>e-mail</b>	E-mail
<b>Scientific Committee Approval Date</b>	20/06/2023	<b>Version Number</b>	1.0

### Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	MPAC304	<b>Semester</b>	L3,S2
<b>Co-requisites module</b>		<b>Semester</b>	

### Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Aims</b> أهداف المادة الدراسية	<p><b>Course Objectives:</b> as an example</p> <ol style="list-style-type: none"> <li>23. Students become familiar with various types of sensors which have been used in HVAC control systems.</li> <li>24. Knowing the aims of the control systems and their importance in the HVAC.</li> <li>25. Providing enough details to understand each element in the HVAC control system.</li> </ol>
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	<p>26. Providing a more in-depth understanding of troubleshooting HVAC control systems.</p> <p>27. The student will be able to follow and read wiring diagrams.</p>
<p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p>	<p><b>Outcomes: as an example</b></p> <ol style="list-style-type: none"> <li>1. Applying fundamentals of control systems.</li> <li>2. Reading, drawing, and interpreting HVAC control system diagrams.</li> <li>3. Select the HVAC control systems.</li> <li>4. Controlling required indoor air quality and thermal comfort conditions.</li> <li>5. Applying knowledge of how energy savings can be achieved by HVAC control systems.</li> <li>6. Identifying problems with the HVAC control systems.</li> </ol>
<p><b>Indicative Contents</b></p> <p>المحتويات الإرشادية</p>	<p>Control engineering is applied in many different fields and at many different levels. The components of all control systems are diverse in nature and may include electrical, electronic, mechanical, thermal, and fluidic devices. The aims behind using control systems in HVAC are:</p> <ol style="list-style-type: none"> <li>1. Maintain thermal comfort conditions.</li> <li>2. Maintain optimum indoor air quality.</li> <li>3. Reduce energy use.</li> <li>4. Safe plant operation.</li> <li>5. To reduce manpower costs.</li> <li>6. Identify maintenance problems.</li> <li>7. Efficient plant operation to match the load.</li> <li>8. Monitoring system performance.</li> </ol>

<p><b>Learning and Teaching Strategies</b></p> <p>استراتيجيات التعلم والتعليم</p>	
<p><b>Strategies</b></p>	<p>Assessment is based on hand-in assignments, written exams, Case studies, Quizzes, report presentations, Practical testing</p>

### Student Workload (SWL)

#### الحمل الدراسي للطالب

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	116	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعياً	8
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	64	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعياً	4
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	180		

### Module Evaluation

#### تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	4	20% (10)	3,6,9,12	All
	<b>Assignments</b>	2	5% (10)	6,12	All
	<b>Projects / Lab.</b>	1	10% (10)	Continuous	
	<b>Report</b>	1	5% (10)	14	All
<b>Summative assessment</b>	<b>Midterm Exam</b>	2 hr	10% (10)	8	All
	<b>Final Exam</b>	3hr	50% (50)	16	All
<b>Total assessment</b>			100% (100 Marks)		

### Delivery Plan (Weekly Syllabus)

#### المنهاج الأسبوعي النظري

	Material Covered
<b>Week 1</b>	Fundamentals of control systems and measurements include principles, elements, purposes for HVAC systems, open and close loop control, energy sources, accuracy, the standard of measurements, and description of measurement devices.
<b>Week 2</b>	Controlled variables, sensors, time response, measurements, feedback, and Control actions include two position controllers, proportional controllers, proportional plus integral controllers, and proportional plus integral plus derivative controllers. Control devices, valves, dampers, relays thermostats, humidistats, and pressure transducers.

<b>Week 3</b>	Pneumatic control systems and their sensors. Errors in Measurements: Types of errors and Statistical Analysis.
<b>Week 4</b>	Principles of electrical control systems include their elements, electrical symbols and wiring drawings, control, and power circuit diagrams.
<b>Week 5</b>	Electrical control of air handling units, variable speed controller, and multispeed starters.
<b>Week 6</b>	Fundamentals of electronic control systems include their elements, sensors, transducers, amplifiers, and Wheatstone bridge.
<b>Week 7</b>	Digital Direct Control (DDC), components and operating cycle, microprocessor, pneumatic to electronic control system,
<b>Week 8</b>	Input and output signals – digital and analog, system network controller.
<b>Week 9</b>	Complete control systems, single-zone systems, single-zone AHU; minimum outside air, single-zone AHU; economy cycle outside air, multizone air handling systems
<b>Week 10</b>	Single-zone humidity control, static pressure control of outside air, preheat with outside air thermostat
<b>Week 11</b>	Enthalpy control, outside air; enthalpy economy cycle, economizer control
<b>Week 12</b>	Energy savings in HVAC systems, HVAC energy efficiency ratio (EER), energy-efficient heating and cooling systems, seasonal energy efficiency ratio (SEER), and energy management system (EMS).
<b>Week 13</b>	PLCs, types of PLCs, study hardware and software used in PLC.
<b>Week 14</b>	Implementation of logic gates, implementation of On-Delay Timer,
<b>Week 15</b>	Troubleshooting HVAC control systems.
<b>Week 16</b>	<b>Preparing for the final exam</b>

### Delivery Plan (Weekly Lab. Syllabus)

#### المنهاج الاسبوعي للمختبر

	<b>Material Covered</b>
<b>Week 1</b>	Workplace safety rules, knowing about the instruments, tools, and supplies.
<b>Week 2</b>	Measurements of controlled variables (temperature, humidity, pressure, etc.).
<b>Week 3</b>	Domestic and commercial refrigerator and freezer controls.
<b>Week 4</b>	Ice maker controls and water cooler controls, vendor machine controls.
<b>Week 5</b>	Defrost control, defrost timers, wiring diagram of the evaporator defrosting, hot gas defrosting, and hot gas bypass.
<b>Week 6</b>	Compressor protection devices, oil pressure controls, low- and high-pressure controls, and overload controls.
<b>Week 7</b>	Air conditioning power and control circuits and reversing valves.

<b>Week 8</b>	Residential central air conditioning control systems,
<b>Week 9</b>	Reversing the rotating direction in 3-phase AC. Motor (power and control circuit). Reversing the rotating direction in 3-phase AC. Motor by using PLC.
<b>Week 10</b>	Star-delta starter (power and control circuit). Star-delta starter (power and control circuit) by using PLC.
<b>Week 11</b>	Chilled controls.
<b>Week 12</b>	Chilled controls by using PLC.
<b>Week 13</b>	Control systems of air handling units (AHU).
<b>Week 14</b>	Control systems of air handling units (AHU) by using PLC.
<b>Week 15</b>	Troubleshooting.

<b>Learning and Teaching Resources</b> مصادر التعلم والتدريس		
	<b>Text</b>	<b>Available in the Library?</b>
<b>Required Texts</b>	Haines, Roger W., and Douglas C. <i>Control heating, ventilating, and air conditioning systems</i> . Springer Science & Business Media, 2006.	Yes
<b>Recommended Texts</b>	Montgomery, Ross, and Robert McDowall. <i>Fundamentals of HVAC control systems</i> . Elsevier, 2008	Yes
<b>Websites</b>		

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