MODULE DESCRIPTION Form

University Name: Northern Technical University.....

Faculty/Institute: Technical Engineering College Mosul.....

Scientific Department: Medical Instrumentation Techniques Engineering

Academic or Professional Program Name: Bachelor of Medical Instrumentation Techniques Engineering

Final Certificate Name: Bachelor of Medical Instrumentation Techniques Engineering

Academic System: Bologna Process.....

Description Preparation Date: 2/9/2025

File Completion Date: 2/9/2025

Signature:

Head of Department Name:

Zaid Husham Alahham

Date: 2/9/2025

Ministry of Higher Education and Scientific Research
Northern Technical University
Technical Engineering College - Mosul

Signature:

Scientific Associate Name:

Prof. Dr. Mohammed Sabah Jarjees

Date: 25/9/2025

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department: Assist. Lect. Warqaa Hashim Mahmood

Date:

Signature:

A.J

Approval of the Dean

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	**Arabic Language**	**Module Delivery**	
Module Type	**Basic**	☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE112**		
ECTS Credits	**2**		
SWL (hr/sem)	**60**		
Module Level	**First**	**Semester of Delivery**	**First**
Administering Department	**Med. Ins. Tech. Eng.**	**College**	**Technical Engineering College**
Module Leader	**Eesha Ibrahim Mohammed**	**e-mail**	**aysha.ibrahim@ntu.edu.iq**
Module Leader's Acad. Title	**Assistant Professor**	**Module Leader's Qualification**	**PhD**
Module Tutor	**Name (if available)**	**e-mail**	**E-mail**
Peer Reviewer Name	**Mohammed S Jarjees**	**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**
Scientific Committee Approval Date	**01/06/2023**	**Version Number**	**1.0**

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

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

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

Module Objectives أهداف المادة الدراسية	ينشأ الطالب على حب اللّغة العربيّة لغة القرآن الكريم. التعرّف على مواطن الجمال في اللّغة العربيّة وآدابها، وأن يكتسب الطالب القدرة على دراسة فروع اللّغة العربيّة. تعريف الطالب بألفاظ اللّغة العربيّة الصحيحة وتراكيبها وأساليبها السليمة بطريقة مشوقة وجذابة. أن يستغل الطالب وقت فراغه بالقراءة والاطلاع والرجوع إلى المكتبة . تمكين الطالب من القراءة الصحيحة، وأن يكتسب القدرة على استعمال اللغة استعمالاً صحيحاً في الاتّصال مع الآخرين؛ كالسرعة وجودة الإلقاء وحسن التعبير، وتعويده حسن الاستماع لما يسمع مما ييسّر له أموره ويعينه على قضاء حوائجه. تنمية الذوق الأدبي لدى الطالب حتى يدرك النواحي الجمالية في أساليب الكلام ومعانيه وصوره. تعويد الطالب التعبيرات السليمة الواضحة عن أفكاره وما يقع تحت حواسه نطقاً وكتابة وحسن استخدام علامات الترقيم. تنمية قدرة ومهارة الطالب الإملائية والخطية بحيث يستطيع الكتابة الصحيحة من جميع النواحي. إيقاظ وعي الطالب لإدراك شرف الكلمة وتوجيهه؛ للمحافظة على طهارتها ونقائها حتى لا تستعمل إلا في الخير. مساعدة الطالب على فهم التراكيب المعقدة والأساليب الغامضة .

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. معرفة القواعد النحوية والصرفية. 2- التعريف بأبرز المصنفات اللغوية والأدبية. 3- تحديد المشكلات اللغوية والأدبية لدى الدارسين. 4- القراءة المعاصرة للنصوص اللغوية والأدبية. 5- قراءة النصوص الأدبية وكتابتها وفق المعايير النحوية والصرفية 6- تعزيز الثقة بالنفس والجرأة والفصاحة 7- المنافسة والتميز في سوق العمل.
Indicative Contents المحتويات الإرشادية	مقدمة عن الأخطاء اللغوية التاء المربوطة والتاء المفتوحة (4 ساعات) تطبيقات الأخطاء اللغوية الشائعة واقسام الكلام (6 ساعات) همزة الوصل والقطع والهمزة المتوسطة والمتطرفة قواعد كتابة الالف الممدودة والمقصورة الحروف الشمسية والقمرية والضاد والظاء (12 ساعة) المشاكل والمعوقات ونقاشات (6 ساعات)

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	1- .تبسيط المعلومات وتنظيمها 2- .تسهيل عملية استرجاع المعلومات 3- ربط المفاهيم الجديدة بالمكتسبات السابقة 4- .إيجاد العلاقة بين المفاهيم 5 - تسهيل تذكر المعارف والمعلومات

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	30	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	30	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	60		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	10% (10)	3, 5, 7, 10	LO #1, 2, 5 and 7
	Assignments	0	0		
	Projects / Lab.	0	0		
	Report	4	10% (10)	Continuous	All
Summative assessment	**Midterm Exam**	2 hr	20% (20)	7	LO # 1-7
	Final Exam	3 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	مقدمة عن الأخطاء اللغوية
Week 2	التاء المربوطة والتاء المفتوحة
Week 3	همزة الوصل والقطع
Week 4	الهمزة المتوسطة والمتطرفة

Week 5	قواعد كتابة الالف الممدودة والمقصورة
Week 6	الحروف الشمسية والقمرية
Week 7	الضاد والظاء
Week 8	العـــدد
Week 9	المفاعيل
Week 10	أقسام الكلام
Week 11	معاني حروف الجر
Week 12	تطبيقات الأخطاء اللغوية الشائعة
Week 13	النون والتنوين
Week 14	مقدمة عن الأخطاء اللغوية
Week 15	الامتحان النهائي

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	الكامل في اللغة والادب لابي عباس المبرد	Yes
Recommended Texts	أخطاء لغوية شائعة لخالد بن هلال بن ناصر العبري	No
Websites	https://www.eshamel.ne https://www.ektebsa7.com	

APPENDIX:

GRADING SCHEME
مخطط الدرجات

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

Note:

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Direct Current Circuit Analysis

Module Information معلومات المادة الدراسية					
Module Title	**Direct Current Circuit Analysis**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☒ **Practical** ☒ **Seminar**	
Module Code	**MIE101**				
ECTS Credits	**8**				
SWL (hr/sem)	**202**				
Module Level	**First**		**Semester of Delivery**	**First**	
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Nasseer Moyasser Basheer**		**e-mail**	**nmbasheer@ntu.edu.iq**	
Module Leader's Acad. Title	**Assistant Professor**		**Module Leader's Qualification**	**Ph.D.**	
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	To introduce the student to the D.C. circuits topologies starting from the resistor types and how to read its value, to ohm's law and the circuit analysis theorems and laws. Also, the independent and the dependent sources are given. Node, mesh, Kirchhoff's, Thevenin's and Norton's all defined and used to analyze electrical circuits and networks. The conversion between Delta and Wye is given which is quite necessary when the circuit components cannot be categorized as combinations of series and parallel resistors.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Giving the necessary information about the resistor. 2. Introducing electrical quantities, sources, and Ohm's law. 3. Power terms, resistivity, conductivity, and heat effect on the resistor. 4. Electric circuit definitions then Kirchhoff's voltage and current laws. 5. Loops, nodes, sources connections, and resistors different connections. 6. Voltage and current division. Nodal and mesh analysis. 7. Linearity and superposition theorem. 8. Thevenin's to find the current or voltage in a branch. 9. Norton's to find circuit data. 10. Maximum power transfer in electrical sources.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Electrical D.C. circuit elements and definitions</u> Defining resistor types, reading, and characteristics. Introducing voltage, current, and power. Explaining dependent and independent voltage and current sources with its internal equivalents. Ohm's Law. Power calculations, resistivity, conductivity and heat effect. [16 hrs] <u>Part B – Circuit analysis by direct manipulation</u> Defining nodes, paths, loops, branches, and meshes. Kirchhoff's current and voltage laws. Finding equivalent resistance for all resistors connections. Voltage and current divisions. Nodal and mesh analysis. [20 hrs] <u>Part C – Circuit analysis by theorems</u> Discussing circuit analysis theorems. Superposition for multi sources circuits. Norton's and Thevenin's for current in a branch. Maximum power transfer for sources optimization, and delta-wye conversion for complicated connections that cannot be minimized by the previous methods. [24 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The strategies needed in this subject are concentrated on enhancing the students thinking horizons so that they get familiar with it and can feel able to manipulate its problems details. This can be achieved by using real life examples, videos, and schemes with many problems to be solved. Also, the student is requested to solve a lot of problems. When this is accompanied by good utilization of the laboratory, students will be able to go through the course successfully.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	**120**	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	**8**
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	**82**	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	**5.56**
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**202**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	10% (10)	3, 6, 9, 13	LO #3, #6, #9, #10
	Assignments	-	-	-	-
	Projects / Lab.	15	20% (20)	Continuous	All
	Report	-	-	-	-
Summative assessment	**Midterm Exam**	2hr	20% (20)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Symbols and abbreviations. Resistor types, and how to read resistors values. Resistor values according to different series.
Week 2	Voltage, current, charge, and power. Independent voltage and current sources. Dependent four types of voltage and current sources. Network and circuit definitions. Ohm's law.
Week 3, 4	Power absorption. Resistivity and Conductivity. Effect of heat on resistance value.
Week 5, 6	Nodes, Paths, Loops, and Branches. Kirchhoff's current and voltage laws.
Week 7	The single loop circuit and, the single node-pair circuit. Series and parallel connected sources. Resistors in series and parallel.

Week 8, 9	Voltage and current division. Nodal analysis, the super node, mesh analysis, the super mesh and, comparison between nodal and mesh analysis.
Week 10,11	Linearity and superposition and, source transformation.
Week 12	Thevenin's equivalent circuit.
Week 13	Norton's equivalent circuit.
Week 14	Maximum power transfer.
Week 15	Delta-Wye conversion.

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Materials Covered
Week 1	Lab 1: Basic Information (types of, and how to use the multi-meters. Method of writing the reports).
Week 2, 3, 4	Lab 2, 3, 4: Reading the resistors by color code. Ohm's law. Series and parallel connection. Effect of temperature on resistor value.
Week 5, 6	Lab 5, 6: Mesh analysis. Nodal analysis.
Week 7	Lab 7: Delta-Wye conversion.
Week 8, 9	Lab 8, 9: Thevinin's theorem, with maximum power transfer. Norton's theorem with maximum power transfer.
Week 10	Lab 10: Super position theorem.
Week 11, 12	Lab 11, 12: Effect of internal resistor for voltage source. Effect of internal resistor for current source.
Week 13, 14, 15	Lab 13, 14, 15: Network topology and experimenting simplifying circuits, then checking the steps practically to make sure of ordinary simplification strategies.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	"Engineering Circuit Analysis"; William H. Hayt, Jack E. Kemmerly, and Steven M. Durbin. Eighth edition, 2012, McGraw Hill.	No
Recommended Texts	"Hughes Electrical and Electronic Technology"; Edward Hughes, 10th edition, 2008, Pearson Education Limited.	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	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	**Physics**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☒ **Practical** ☒ **Seminar**	
Module Code	**MIE102**				
ECTS Credits	**7**				
SWL (hr/sem)	**172**				
Module Level	**First**		**Semester of Delivery**	**First**	
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Wameedh Baraq Edress**		**e-mail**	**wameedh.adress@ntu.edu.iq**	
Module Leader's Acad. Title	**Lecturer**		**Module Leader's Qualification**	**Ph.D.**	
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	Studying the physical phenomena of the human body and how to deal with its related medical instruments. Understanding the basic principles and physical laws related to the work and functions of the human body.

	Understand the basic principles and physical laws related to medical instrumentations. Familiarize students with physical explanations related to the functioning of the human body. Familiarize students with how to conduct physics experiments that simulate the functioning of the human body.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Demonstrate conceptual understanding of fundamental physics. 2. Understanding of the basic workings of physics in human body. 3. Understand the basic principles and physical laws 4. Familiarize students with physical explanations 5. Familiarize students with how to conduct physics experiments that simulate the functioning of the human body.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Irving P. Herman Physics of the Human Body Second Edition John R. Cameron and James G. Skofronick Medical Physics

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	105	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.46
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**172**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	6	10% (10)	3,8 and 11	LO #1, #3, #5
	Assignments	8	10% (10)	Continuous	All
	Projects / Lab.	15	10% (10)	Continuous	All
	Report	10	10% (10)	Continuous	All
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	All
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
1	Forces on and in the human body.
2	Physics of the skeleton.
3,4	Heat and cold in medicine.
5,6	Energy , work and power.
7	Sound in medicine and physics of hearing.
8	Light in medicine
9	Introduction to physical and engineering optics
10	Laser physics and laser in medicine
11	Physics of vision
12	Physics of x-rays.
13	introduction to nuclear radiation
14,15	Radiation protection

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
1	Forces and Motion
2	The Simple Pendulum
3,4	Hooke's Law
5	Masses and Springs
6	Mechanism of Friction
7	Sound properties
8	Light properties
9,10	Geometric Optics, Converging Lenses
11,12	Geometric Optics, Diverging Lenses
13	Geometric Optics, types of Mirrors
14,15	Geometric Optics, Bending of light

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Irving P. Herman Physics of the Human Body Second Edition	No
Recommended Texts	John R. Cameron and James G. Skofronick Medical Physics	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/physics-and-astronomy	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
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Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mathematics**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE103**				
ECTS Credits	**6**				
SWL (hr/sem)	**152**				
Module Level	**First**		**Semester of Delivery**	**First**	
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Layth Taha Khudhuir**		**e-mail**	**Layth.t.k@ntu.edu.iq**	
Module Leader's Acad. Title	**Assistant Lecturer**		**Module Leader's Qualification**	**MASTER**	
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	Introduce students and teach them some basics of mathematics (derivatives, integration, matrices and related topics) in this course. Where these subjects can be taught through advanced subjects in mathematics, as well as these mathematical subjects are related to the study of some engineering subjects that exist in all stages Department of Medical Instrumentation Techniques Engineering.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how to use mathematics in the educational program.. 2. List the different mathematical symbols associated with the curriculum. 3. Summarize what is meant by the derivative 4. Summarize what is meant by integration 5. Summarize what is meant by matrix 6. Discuss the derivative on how to find it using the definition 7. Describe the integral, the derivative and the matrix. 8. Identify The Trigonometric functions and derivatives of a trigonometric function. 9. Identify The Inverse trigonometric functions and derivatives of inverse functions. 10. Discuss the Matrix properties, and operations 11. Explain Solving linear System equations using the inverse of the coefficient matrix and Cramer's rule.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A -The Theory of Derivative •Limits and Continuous. Derivative by using the definition. Rule of derivative and Higher derivative. Implicit derivative and Chain rule. Transcendental functions. The Trigonometric functions and derivatives of a trigonometric function. The Inverse trigonometric functions and derivatives of inverse functions.[15 hrs] •The logarithms and the exponential functions with derivatives. Application of derivative. Concavity and Curve Sketching. Applied Optimization. Related Rates.[15 hrs] Part B - The Theory of Integration •The definite and indefinite integration. Integral of transcendental functions. Integration of trigonometric Functions. Integration of inverse trigonometric functions.[15 hrs] •Integration of exponential and logarithmic functions. Methods of integration. Integration by parts. Applications of integral : Area. [15 hrs] Part C – The Linear Algebra •Matrix, properties, and operations. Determinants and properties of determinants [10 hrs] •Inverse of square matrix by determinants. Solving linear System equations using the inverse of the coefficient matrix and Cramer's rule[10 hrs] •Eigenvalues . Eigenvectors [10 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy: -cooperative learning

	-Brainstorming -Dialogue and discussion. -Cooperative learning. -Solving mathematical problems that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	90	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**152**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	6	10% (10)	continuous	LO #1,3, 5, 8,10 ,12
	Assignments	7	10% (10)	2,4,6,8,10,12,14	LO #1,3, 5, 8,10
	Lab	0	0	-	-
	Report	0	0	-	-
Summative assessment	**Midterm Exam**	2hr	20% (20)	7	LO from #1 to 5
	Final Exam	3hr	60% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1 **+Week 2** **+Week 3** **+Week 4** **+Week 5**	The Theory of Derivative • Limits and Continuous • Derivative by using the definition. • Rule of derivative and Higher derivative. • Implicit derivative and Chain rule. • Transcendental functions • The Trigonometric functions and derivatives of a trigonometric function. • The Inverse trigonometric functions and derivatives of inverse functions. • The logarithms and the exponential functions with derivatives. • Application of derivative. • Concavity and Curve Sketching • Applied Optimization. • Related Rates.
Week 6 **+Week 7** **+Week 8** **+Week 9** **+Week 10**	The Theory of Integration • The definite and indefinite integration. • Integral of transcendental functions: • Integration of trigonometric Functions. • Integration of inverse trigonometric functions. • Integration of exponential and logarithmic functions. • Methods of integration. • Integration by parts. • Applications of integral: • Area.
Week 11 **+Week 12** **+Week 13** **+Week 14**	The Linear Algebra • Matrix, properties, and operations • Determinants and properties of determinants • Inverse of square matrix by determinants • Solving linear System equations using the inverse of the coefficient matrix and Cramer's rule • Eigenvalues . Eigenvectors
Week 15	• End of course exam.

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1.Thomas_Calculus_by_George_B_Thomas, _Joel_R_Hass, _Christopher_Heil.2018. 2.Linear Algebra, Serge Lang, 1987	Yes No
Recommended Texts	Advanced Engineering Mathematics, Erwin Kreyszig. 2010	Yes
Websites	1. https://www.google.iq/books/edition/Thomas_Calculus/U6kZvgAACAAJ?hl=ar 2.https://www.google.iq/books/edition/Linear_Algebra/0DUXym7QWfYC?hl=ar&gbpv=1&dq=linear+algebra&printsec=frontcover	

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	**Computer Principles**			**Module Delivery**	
Module Type	**Supported**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☒ **Practical** ☒ **Seminar**	
Module Code	**MIE104**				
ECTS Credits	**4**				
SWL (hr/sem)	**98**				
Module Level	**First**	**Semester of Delivery**	**First**		
Administering Department	**Med. Ins. Tech. Eng.**	**College**	**Technical Engineering College**		
Module Leader	**Raid Rafi Omar**	**e-mail**	**raidrafi3@ntu.edu.iq**		
Module Leader's Acad. Title	**Assistant Professor**	**Module Leader's Qualification**	**Ph.D.**		
Module Tutor	**Name (if available)**	**e-mail**	**E-mail**		
Peer Reviewer Name	**Mohammed S Jarjees**	**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**		
Scientific Committee Approval Date	**01/06/2023**	**Version Number**	**1.0**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	N/A	**Semester**	1
Co-requisites module	N/A	**Semester**	1

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Studying computer principles. 2. Defining keyboards and mice. 3. Presenting principles of memories. 4. Explaining disc drives. 5. Explaining principles of windows. 6. Illustrating accessories of windows.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Abilities to recognize different computer hardware parts. 2. Defining various types of keyboards and mice. 3. Getting knowledge about computer memories and drives. 4. Getting knowledge about windows. 5. Presenting different windows accessories.
Indicative Contents المحتويات الإرشادية	• Indicative content includes the following. • Computer types of: digital, analogues and hybrid. • Different memory types of: RAM, ROM, PROM, EPROM and EEPROM. • Different drives types of: magnetic and optical. • Windows facilities of: Notepad, Wordpad, Paint, Accessories and others.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Strategies that will be adopted for delivering this module are theoretical lectures, practical experiments, home works and exams. This will be achieved through classes, interactive tutorials and by considering practical experiments.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	38	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.53
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**98**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	N/A	LO #2, #4
	Assignments	8	10% (10)	10	LO #1, #3, #5
	Projects / Lab.	15	10% (10)	Continuous	All
	Report	0	0% (0)	N/A	N/A
Summative assessment	**Midterm Exam**	2hr	20% (20)	10	All
	Final Exam	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
1st	**Introducing to the Computer System Including: What is Computer? Computer System, Functions of Computer Input Storage Process & Output, Classification of Computers and Computer Units**
2nd, 3rd, 4th	**Explaining Types of Computer Keyboards and Types of Keyboard Keys**
5th	**Explaining Types of Computer Mice and Mouse Functions**
6th	**Explaining Different Plugs and Ports for Some Computer Parts**
7th	**Illustrating Computer Discs and Drives**
8th	**Illustrating RAM, Non-Volatile and Cache Memories**
9th, 10th, 11th	**Demonstrating Computer Hardware Parts and Definitions**
12th, 13th	**Presenting Windows, Windows Desktop and Windows Taskbar**
14th, 15th	**Illustrating Start Menu and Windows Accessories**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
1st	**Introducing to the Computer System Including: What is Computer?, Computer System, Functions of Computer Input Storage Process & Output, Classification of Computers and Computer Units**
2nd, 3rd, 4th	**Explaining Types of Computer Keyboards and Types of Keyboard Keys**
5th	**Explaining Types of Computer Mice and Mouse Functions**
6th, 7th	**Explaining Different Plugs and Ports for Some Computer Parts, and Illustrating Computer Discs and Drives**
8th	**Illustrating RAM, Non-Volatile and Cache Memories**
9th, 10th, 11th, 12th	**Demonstrating Computer Hardware Parts and Definitions, and Presenting Windows, Windows Desktop and Windows Taskbar**
13th, 14th, 15th	**Illustrating Start Menu and Windows Accessories**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	[1] Umar Farooq, "What is Computer - Definition & Basic Concept of Computer", Study Lecture Notes, 2016. [2] University Information Technology Services, "Microsoft Windows 10, Getting Started Guide", Kennesaw State University – UITS, 2016.	In the internet
Recommended Texts	Cre8te Opportunities, "Introduction to Computers (Windows 10)", Digital Skills Academy, 2016.	In the internet
Websites	[1] http://www.studylecturenotes.com/computer-science/what-is-computer-definition-basic-concept-of-computer [2] http://ergonomictrends.com/different-types-of-computer-keyboards/ [3] UKEssays, "Wireless Mouse: History and Types", 2018. [Online]. Available: https://www.ukessays.com/essays/computer-science/wireless-mouse-history-types-5302.php?vref=1. [4] https://searchstorage.techtarget.com/definition/RAM-random-access-memory [5] https://tldp.org/HOWTO/Network-boot-HOWTO/a610.html#:~:text=PROM%3A%20Pronounced%20prom%2C%20an%20acronym,the%20computer%20is%20turned%20off.	

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

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**English Language 1**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE105**				
ECTS Credits	**3**				
SWL (hr/sem)	**86**				
Module Level	**First**		**Semester of Delivery**	**First**	
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Marwa Mawfaq Mohamedsheet**		**e-mail**	**Marwa.alhatab@ntu.edu.iq**	
Module Leader's Acad. Title	**Assist. lecturer**		**Module Leader's Qualification**	**Master**	
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The objectives of this course are to assess language proficiency levels, build foundational grammar and vocabulary, develop speaking and writing skills, expand vocabulary, and consolidate learning and assess progress. Through a diagnostic assessment, students' proficiency levels will be determined, allowing

	for tailored instruction. The course will review and reinforce basic grammar concepts and vocabulary while focusing on developing speaking and writing abilities through various activities. Vocabulary expansion will be achieved by introducing new words and expressions. Finally, the course will consolidate learning through listening tasks, speaking practice, and a final exam to assess students' progress and proficiency.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Gain a solid understanding of basic grammar concepts and tenses, including present simple, past simple, present continuous, future simple, adjectives and adverbs, comparatives and superlatives, present perfect, modal verbs, reported speech, and conditional sentences. 2. Expand vocabulary related to daily routines, past events, future plans, descriptions of people and places, achievements, obligations, and hypothetical situations. 3. Develop effective speaking skills through regular practice in expressing personal experiences, describing routines and habits, discussing future plans, giving advice, and engaging in conversations. 4. Enhance reading comprehension abilities by understanding and interpreting texts on various topics, including personal anecdotes, future technologies, comparisons, and reported speech. 5. Improve writing skills through exercises in narrating memorable experiences, expressing future goals, describing people and places, writing advice letters or emails, and crafting hypothetical scenarios.
Indicative Contents المحتويات الإرشادية	Part A: 1. Introduction to the course and syllabus (2 hour) 2. Diagnostic assessment to determine language proficiency levels (1hours) 3. Review of basic grammar concepts and vocabulary (2 hours) 4. Speaking practice: Introducing oneself and interacting with classmates (1 hour) 5. Grammar focus on various topics(10 hours): a. Present simple tense b. Past simple tense c. Present continuous tense d. Future simple tense e. Adjectives and adverbs f. Comparatives and superlatives g. Present perfect tense h. Modal verbs i. Reported speech j. Conditional sentences 6. Vocabulary expansion related to the grammar topics (2 hours) 7. Listening comprehension exercises to improve listening skills (2 hours)

	8. Writing practice: Narrating personal experiences and expressing future goals (2 hours) Part B: 9. Reading comprehension exercises with texts relevant to the grammar topics (2 hours) 10. Final exam to assess language proficiency (2 hours) 11. Various speaking practice activities throughout the course (2 hours) 12. Review and consolidation of learned grammar and vocabulary (2 hours)
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Diagnostic Assessment: Conduct an initial assessment to determine the language proficiency levels of students and tailor the instruction accordingly. 2. Review of Basic Grammar and Vocabulary: Begin with a review of fundamental grammar concepts and vocabulary to ensure a strong foundation for further language development. 3. Speaking Practice: Provide opportunities for students to practice speaking by introducing themselves, getting to know classmates, and engaging in discussions on various topics. 4. Grammar Focus: Introduce and practice different grammar tenses and structures, such as present simple, past simple, present continuous, future simple, adjectives, adverbs, comparatives, superlatives, present perfect, modal verbs, reported speech, and conditional sentences. 5. Vocabulary Expansion: Expand students' vocabulary through themed units, such as daily routines, past events, current actions, future plans, describing people and places, comparisons, personal achievements, everyday situations, conversation expressions, and hypothetical scenarios. 6. Listening and Reading Comprehension: Enhance listening and reading skills through exercises and texts that cover a range of topics, including daily life, personal anecdotes, future technologies, comparisons, and reported speech. 7. Writing Practice: Develop writing skills through activities such as narrating memorable experiences, writing about future goals, describing people and places, sharing personal achievements, writing advice letters or emails, and expressing hypothetical scenarios.

	8. Review and Consolidation: Dedicate time for reviewing and consolidating grammar concepts, vocabulary, listening skills, and speaking skills through comprehensive exercises, role plays, and discussions.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	45	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	41	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.73
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**86**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	10% (10)	continuous	LO #1, 2, 3,
	Assignments	5	10% (10)	2,4,6,8,12	LO #1,2,3,4
	Lab	0	0	-	-
	Report	0	0	-	-
Summative assessment	**Midterm Exam**	2hr	20% (20)	13	LO #1,2,3
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to the course and syllabus ✓ Diagnostic assessment to determine language proficiency levels ✓ Review of basic grammar concepts and vocabulary Speaking practice: Introducing oneself and getting to know classmates
Week 2	Grammar focus: Present simple tense and frequency adverbs ✓ Vocabulary expansion: Daily routines and activities ✓ Listening comprehension: Conversations about daily life ✓ Speaking practice: Describing daily routines and habits
Week 3	Grammar focus: Past simple tense (regular and irregular verbs)

	✓ Vocabulary expansion: Past events and experiences ✓ Reading comprehension: Texts about personal anecdotes ✓ Writing practice: Narrating a memorable experience
Week 4	Grammar focus: Present continuous tense ✓ Vocabulary expansion: Current actions and temporary situations ✓ Speaking practice: Describing ongoing activities and future plans Writing practice: Writing about future goals and aspirations
Week 5	Grammar focus: Future simple tense and expressing future plans ✓ Vocabulary expansion: Future events and predictions ✓ Reading comprehension: Texts about future technologies ✓ Speaking practice: Discussing future plans and aspirations
Week 6	Grammar focus: Adjectives and adverbs ✓ Vocabulary expansion: Describing people, places, and things ✓ Speaking practice: Describing people and objects ✓ Writing practice: Describing a place or person
Week 7	Grammar focus: Comparatives and superlatives ✓ Vocabulary expansion: Describing size, quantity, and quality ✓ Reading comprehension: Texts comparing different products or places Speaking practice: Comparing and contrasting objects or places
Week 8	Grammar focus: Present perfect tense ✓ Vocabulary expansion: Personal achievements and life events ✓ Speaking practice: Sharing personal experiences and achievements Writing practice: Writing about memorable moments
Week 9	Grammar focus: Modal verbs (ability, possibility, necessity) ✓ Vocabulary expansion: Everyday situations and obligations ✓ Speaking practice: Giving advice and suggestions Writing practice: Writing advice letters or emails
Week 10	Grammar focus: Reported speech (statements and questions) ✓ Vocabulary expansion: Conversation and dialogue expressions ✓ Reading comprehension: Texts featuring reported speech ✓ Speaking practice: Practicing reported speech in different contexts
Week 11	Grammar focus: Conditional sentences (zero, first, and second conditionals) ✓ Vocabulary expansion: Hypothetical situations and consequences ✓ Speaking practice: Discussing hypothetical situations and giving advice Writing practice: Writing about hypothetical scenarios
Week 12 **Week 13**	Review of grammar concepts and tenses covered so far ✓ Vocabulary expansion: Review and consolidation of vocabulary ✓ Listening skills: Listening to dialogues and answering comprehension questions ✓ Speaking practice: Reviewing and applying learned language skills
Week 14 **Week 15**	Review and consolidation of grammar and vocabulary ✓ Speaking practice: Role plays and discussions on various topics

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. "English Grammar in Use" by Raymond Murphy: A comprehensive grammar reference book that covers essential grammar concepts and provides clear explanations and practice exercises. 2. "Oxford Wordpower Dictionary" by Oxford University Press: A reliable dictionary for expanding vocabulary and understanding word meanings in context.	No
Recommended Texts	1. "English Vocabulary in Use" by Michael McCarthy and Felicity O'Dell: A vocabulary resource book that offers a wide range of vocabulary exercises and activities to enhance vocabulary acquisition. 2. "Cambridge IELTS Series" or "Official Guide to the TOEFL Test": Test preparation books that include practice tests and strategies for the IELTS or TOEFL exams, depending on the course focus.	No
Websites	1. Duolingo (www.duolingo.com): A popular language learning platform that offers interactive exercises and gamified lessons for grammar and vocabulary practice. 2. BBC Learning English (www.bbc.co.uk/learningenglish): A website providing a variety of English learning resources, including grammar lessons, vocabulary exercises, and listening practice.	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
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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	**Democracy and Human rights**	**Module Delivery**	
Module Type	**Basic**	☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE106**		
ECTS Credits	**2**		
SWL (hr/sem)	**50**		
Module Level	**First**	**Semester of Delivery**	**First**
Administering Department	**Med. Ins. Tech. Eng.**	**College**	**Technical Engineering College**
Module Leader	**Eesha Ibrahim Mohammed**	**e-mail**	**aysha.ibrahim@ntu.edu.iq**
Module Leader's Acad. Title	**Assistant Professor**	**Module Leader's Qualification**	**PHD**
Module Tutor	**Name (if available)**	**e-mail**	**E-mail**
Peer Reviewer Name	**Mohammed S Jarjees**	**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**
Scientific Committee Approval Date	**01/06/2023**	**Version Number**	**1.0**

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

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

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

Module Objectives أهداف المادة الدراسية	تهدف الديمقراطية وحقوق الانسان للحفاظ على كرامة الفرد وحقوقه الأساسية وتعزيزها كما تحقيق العدالة الاجتماعية وتشجيع التنمية الاقتصادية والاجتماعية للمجتمع وتماسكه فضلا عن توطيد الأمان الوطني وإرساء مناخ مؤات للسلام الدولي وذلك لان حقوق الانسان والديمقراطية مرجعاً أساسياً للجميع لحماية حقوق الإنسان؛ وهي توفر بيئة لحماية حقوق الإنسان وإعمالها إعمالاً فعلياً. واليوم، بعد مضي فترة على تحقيق الديمقراطية في مختلف أنحاء العالم، يبدو أن العديد من النظم الديمقراطية تتراجع. ويظهر أن بعض الحكومات تتعمد إضعاف إجراء عمليات تحقق مستقلة بشأن سلطاتها، والقضاء على أي نقد، وتفكيك الرقابة الديمقراطية وضمان حكمها لمدة طويلة، مع أثر سلبي على حقوق الشعب.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1 - فهم ومعرفة وأدراك حقوقه التي اقرها الله له وللبشر جميعاً وبالتالي فهي هبه وليس مكسب من أحد ولا يحق لأي شخص انتزاعها. 2- يعبر الطالب بأسلوبه الخاص عن هذه الحقوق ويدافع عنها. 3- تعليل الظواهر واعطاء التفسيرات لما يحدث امامه من انتهاك لحقوق الانسان وحرياته من خلال تحديد اوجه النقص او الثغرات الموجودة في ضوء المعلومات المتوفرة لديه

	4- فهم اهم النظم السياسية والتي تعد ضمانه لحقوق الانسان وحرياته السياسية ومحاولة تطبيقه على ارض الواقع الا وهو النظام الديمقراطي.
Indicative Contents المحتويات الإرشادية	حقوق الانسان في التاريخ المعاصر والحديث: الاعتراف الدولي بحقوق الانسان منذ الحرب العالمية الأولى وعصبة الامم المتحدة حقوق الانسان، تعريفها، اهدافها وحقوق الانسان في الحضارات القديمة وخصوصا حضارة وادي الرافدين ضمانات واحترام وحماية حقوق الانسان على الصعيد الدولي: دور الأمم المتحدة ووكالاتها المتخصصة في توفير الضمانات دور المنظمات الاقليمية (الجامعة العربية، الاتحاد الأوربي، الاتحاد الافريقي، منظمة الدول الأمريكية، منظمة آسيان) دور المنظمات الدولية الاقليمية غير الحكومية والرأي العام في احترام وحماية حقوق الانسان المشاكل والمعوقات ونقاشات الطلبة

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	1-استراتيجية المناقشة 2-استراتيجية مهارة التفكير العالية 3-استراتيجية التفكير الناقد في التعلم 4-العصف الذهني

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	30	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	20	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.33
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	0	0	-	-
	Projects / Lab.	0	0	-	-
	Report	0	0	-	-
Summative assessment	**Midterm Exam**	1 hr	30% (20)	7	LO # 1-7
	Final Exam	3 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	حقوق الانسان، تعريفها، اهدافها حقوق الانسان في الحضارات القديمة وخصوصا حضارة وادي الرافدين
Week 2	حقوق الانسان في الشرائع السماوية مع التركيز على حقوق الانسان في الإسلام
Week 3	حقوق الانسان في التاريخ المعاصر والحديث : الاعتراف الدولي بحقوق الانسان منذ الحرب العالمية الأولى وعصبة الامم المتحدة

Week 4	الاعتراف الاقليمي بحقوق الانسان : الاتفاقية الاوربية لحقوق الانسان 1950 ، الاتفاقية الامريكية لحقوق الانسان 1969 ، الميثاق الافريقي لحقوق الانسان 1981 ، الميثاق العربي لحقوق الانسان 1994
Week 5	حقوق الانسان في التاريخ المعاصر والحديث : الاعتراف الدولي بحقوق الانسان منذ الحرب العالمية الأولى وعصبة الامم المتحدة
Week 6	حقوق الانسان في الدساتير العراقية بين النظرية والواقع
Week 7	حقوق الانسان الاقتصادية والاجتماعية والثقافية و حقوق الانسان المدنية والسياسية
Week 8	حقوق الانسان الحديثة : الحقائق في التنمية ، الحق في البيئة النظيفة ، الحق في التضامن ، الحق في الدين
Week 9	ضمانات احترام وحماية حقوق الانسان على الصعيد الوطني ، الضمانات في الدستور والقوانين الضمانات في الرقابة الدستورية ، الضمانات في حرية الصحافة والرأي العام ، دور المنظمات غير الحكومية في احترام وحماية حقوق الانسان
Week 10	ضمانات واحترام وحماية حقوق الانسان على الصعيد الدولي : دور الأمم المتحدة ووكالاتها المتخصصة في توفير الضمانات دور المنظمات الاقليمية (الجامعة العربية ، الاتحاد الأوربي ، الاتحاد الافريقي ، منظمة الدول الأمريكية ، منظمة آسيان) دور المنظمات الدولية الاقليمية غير الحكومية والرأي العام في احترام وحماية حقوق الانسان
Week 11	مصطلح الديمقراطية ، نشأته، دلالته، تاريخ الديمقراطية.
Week 12	الاسلام والديمقراطية ومساوئ الحكم الاستبدادي .
Week 13	الانتقادات الموجهة للديمقراطية، ومحاسن النظام الديمقراطي.
Week 14, 15	الأنظمة الديمقراطية في العالم/الديمقراطية في العالم الثالث/ المشاكل التي تواجه البلدان العربية في التحول الديمقراطي

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	حقوق الانسان والديمقراطية – المفاهيم والمرتكزات للدكتور سماح مهدي العلياوي والدكتور سلمان كاظم البهادلي	Yes
Recommended Texts	الديمقراطية وحقوق الانسان في الاسلام للدكتور راشد الغنوشي	No
Websites	https://www.neelwafurat.com https://studies.aljazeera.ne	

GRADING SCHEME
مخطط الدرجات

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

Note:

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Alternating Current Circuit Analysis

Module Information معلومات المادة الدراسية					
Module Title	**Alternating Current Circuit Analysis**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☒ **Practical** ☒ **Seminar**	
Module Code	**MIE107**				
ECTS Credits	**8**				
SWL (hr/sem)	**202**				
Module Level		**First**	**Semester of Delivery**		**Second**
Administering Department		**Med. Ins. Tech. Eng.**	**College**	**Technical Engineering College**	
Module Leader		**Nasseer Moyasser Basheer**	**e-mail**	**nmbasheer@ntu.edu.iq**	
Module Leader's Acad. Title		**Assistant Professor**	**Module Leader's Qualification**		**Ph.D.**
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name		**Mohammed S Jarjees**	**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date		**01/06/2023**	**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	This course aims to introduce the electrical components other than the resistor to the student. Starting by knowing their structure and how they respond to the electrical or magnetic fields, then establishing their current voltage relationships, and time constants. Also introducing the principle of Alternating Current (A.C.) generating, wave characteristics and the components response to the sine wave. The power triangle is of great importance in such circuits so it should be

	considered also. Also studying the three phase systems being with wide range of applications, with balanced and un-balanced loads.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Introduction to capacitors and inductors with integral v or I relationships. 2. Connections combinations of capacitors and inductors. 3. Unit-step and rectangular pulse functions, with natural and forced responses. 4. The laws needed to analyze RLC circuits. 5. An introduction to Electromagnetics. 6. Duality between magnetic circuit and Electric circuit. 7. Generating sine waves, generator principles. 8. The mean, and RMS of different signals. 9. The power considerations in A.C. circuits. 10. The poly-phase circuits. 11. Balanced and Unbalanced three phase loads with power considerations.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A - AC circuits components and sine waves</u> This part shows the AC circuit components, the capacitor and the inductor regarding their construction and their behavior in response to the AC signal, the voltage and current integral relationships and their physical meanings. Introducing the unit-step function and the rectangular pulse function. The combinations include RC, RL, and RLC. [20 hrs] Electromagnetics and sine waves: Principles of electromagnetics and sine wave generation. Comparison with electrical circuits, mean and RMS calculation. [20 hrs] <u>Part B-Power calculations and poly-phase circuits</u> Instantaneous power calculation, active power, apparent power …etc. Single phase, Poly phase, and three phase systems. Balanced and unbalanced three phase systems. [20 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The strategies needed in this subject are concentrated on enhancing the students thinking horizons so that they get familiar with it and can feel able to manipulate its problems details. This can be achieved by using real life examples, videos, and schemes with many problems to be solved. Also, the student is requested to solve a lot of problems. When this is accompanied by good utilization of the laboratory, students will be able to go through the course successfully.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	**120**	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	**8**
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	**82**	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	**5.56**
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**202**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	5% (5)	3, 6, 9, 13	LO #3, #6, #9, #11
	Assignments	5	5% (5)	2, 5, 7, 11	LO #2, #5, #7
	Projects / Lab.	15	10% (10)	Continuous	All
	Report	15	10% (10)	Continuous	All
Summative assessment	**Midterm Exam**	2hr	20% (20)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Capacitors, integral voltage current relationships, energy storage.
Week 2	Inductors, integral voltage current relationships, energy storage.
Week 3	Inductors and capacitors combinations (series and, parallel), linearity and duality.
Week 4	The unit-step function, physical sources and the unit-step, the rectangular pulse function, driven RL circuits, driven RC circuits. Natural and forced responses.
Week 5	The RLC circuit.
Week 6	Electromagnetics.
Week 7, 8	Similarity in principles in simplifying magnetic circuits, with electric circuits.
Week 9	Generation of alternating current. The sinusoidal current.
Week 10	The mean and effective values of current and voltage.
Week 11	The instantaneous power and, mean power of AC relatives. Apparent power.
Week 12	Poly-phase and three phase systems.
Week 13	The power in balanced phase circuits.
Week 14, 15	Unbalanced Wye and Delta loads, the rotating magnetic field.

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1, 2	Lab 1, 2: Principles and block diagram of the oscilloscope. Operating the Oscilloscope.
Week 3	Lab 3: Using the oscilloscope to measure DC, AC sine wave, average, and root mean square values.
Week 4, 5	Lab 4, 5: RC circuit time constant. RL circuit time constant.
Week 6	Lab 6: RLC circuits.
Week 7, 8	Lab 7, 8: RC circuit response to sine waves. RL circuits response to sine waves. (Phasor diagram, etc)
Week 9, 10	Lab 9, 10: RLC response to sine waves (Phasor diagram and power triangle).
Week 11, 12	Lab 11, 12: Balanced three phase loads with different loads, pure resistive, capacitive, and inductive. Then combination of loads. Giving all power considerations.
Week 13, 14, 15	Lab 13, 14, 15: Un-balanced three phase loads, with different pure loads and combinations of them. Giving load measurements and neutral current measurement.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	"Engineering Circuit Analysis"; William H. Hayt, Jack E. Kemmerly, and Steven M. Durbin. Eighth edition, 2012, McGraw Hill.	No
Recommended Texts	"Hughes Electrical and Electronic Technology"; Edward Hughes, 10th edition, 2008, Pearson Education Limited.	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	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

Mechanics

Module Information معلومات المادة الدراسية					
Module Title	**Mechanics**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE108**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	**First**		**Semester of Delivery**	**Second**	
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Layth Taha Khudhuir**		**e-mail**	**layth.t.k@ntu.edu.iq**	
Module Leader's Acad. Title	**Assistant Lecturer**		**Module Leader's Qualification**	**MASTER**	
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	Module Objectives for Engineering Mechanics/Statics: 1. Understand the fundamental concepts and principles of Statics, including motion, forces, and acceleration. 2. Apply kinematic equations to analyze the motion of particles and rigid bodies in various scenarios. 3. Determine the relationship between forces, mass, and acceleration using Newton's laws of motion. 4. Apply the principles of work and energy to analyze and solve dynamic problems. 5. Analyze and calculate linear and angular momentum, and apply the principle of impulse and momentum to dynamic systems. 6. Understand and apply the principles of vibrations and oscillations in mechanical systems.

	7. Apply principles of balancing rotating masses and vibrations to ensure smooth operation of machinery. 8. Analyze multi-degree of freedom systems and determine their natural frequencies and mode shapes. 9. Apply dynamic principles to real-world engineering problems and systems. 10. Develop critical thinking and problem-solving skills in the context of engineering Statics. 11. Communicate effectively, both orally and in writing, to present and explain the analysis, results, and solutions of dynamic problems. By achieving these module objectives, students will gain a comprehensive understanding of the principles and applications of engineering Statics. They will be able to analyze and solve problems related to motion, forces, and vibrations in mechanical systems, and apply their knowledge to real-world engineering scenarios. They will also develop skills in critical thinking, problem-solving, and effective communication, which are valuable in the field of engineering.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Apply fundamental concepts of engineering mechanics/statics to analyze and solve problems related to the equilibrium of rigid bodies. 2. Demonstrate a deep understanding of vector mathematics and its application in statics, including vector addition, subtraction, dot product, and cross product. 3. Apply the principles of static equilibrium to solve problems involving forces and moments acting on rigid bodies in two and three dimensions. 4. Analyze and calculate the internal forces, such as axial forces, shear forces, and bending moments, in statically determinate structures using methods such as the method of sections and the method of joints. 5. Utilize free-body diagrams to model and analyze the forces acting on a structure or a rigid body, and determine the resultant forces and moments at specific points. 6. Analyze and calculate the centroid and moment of inertia of various two-dimensional shapes, including rectangles, triangles, and circles, and apply these concepts to determine the stability and strength of structures. 7. Apply the concepts of friction and its effects on the equilibrium of bodies in statics, including calculating static and kinetic friction forces and determining the angle of friction. 8. Analyze and calculate the forces in trusses and frames, including the method of joints and the method of sections, and determine the stability and structural integrity of these systems. 9. Apply the principles of equilibrium to solve real-world engineering problems, such as determining the stability of structures, calculating the forces on supports and connections, and analyzing the behavior of mechanical systems. 10. Communicate effectively, both orally and in writing, to present and explain the analysis, results, and solutions of engineering mechanics/statics problems. By achieving these module learning outcomes, students will develop a strong foundation in engineering mechanics/statics and be equipped with the necessary knowledge and skills to analyze and solve a wide range of engineering problems involving static equilibrium and structural stability.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Introduction to Statics ● Definition and scope of statics ● Fundamental concepts and principles ● Importance of statics in engineering 2. Vectors and Vector Analysis ● Vector representation and operations ● Vector components and coordinate systems ● Vector addition, subtraction, and scalar multiplication

	3. Forces and Moments • Forces and their characteristics • Resultant and equilibrium of forces • Moment of a force and its properties • Couples and their effects 4. Equilibrium of Rigid Bodies • Free body diagrams and force analysis • Equations of equilibrium in two and three dimensions • Solving equilibrium problems using scalar and vector approaches • Applications to simple systems and structures 5. Truss Structures • Introduction to truss analysis • Method of joints and method of sections • Determination of member forces and support reactions 6. Friction • Laws of friction and frictional forces • Types of friction and their characteristics • Calculation of frictional forces and moments • Applications to inclined planes, wedges, and screws 7. Center of Gravity and Centroids • Definitions and properties of center of gravity and centroids • Determination of center of gravity and centroids of simple shapes • Composite bodies and distributed loads 8. Moments of Inertia • Moment of inertia and its physical significance • Calculating moments of inertia for simple shapes • Parallel-axis and perpendicular-axis theorems • Application of moments of inertia in engineering analysis

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	40	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.66
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation تقييم المادة الدراسية				
	Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**

Formative assessment	**Quizzes**	4	5% (5)	5, 7, 9, 13	LO #2, #3, #5, #8
	Assignments	5	10% (10)	2, 6, 8, 10, 14	LO #1, #4, #6, #7, #9
	Projects / Lab.	-	-	-	-
	Report	1	5% (5)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	20% (20)	7	LO #1 - #5
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction, Fundamental Concepts, Units Conversion, Scalar and Vector Quantities.
Week 2-4	Resultant force Resolution & Composition of Forces. Triangle & parallelogram law
Week 5	Addition of a System of Coplanar Forces: Scalar Notation, Cartesian Vector Notation
Week 6-7	Equilibrium of a Particle
Week 8	Moment of a Force, Varignon Theorem.
Week 9	Moment of a Couple
Week 10-11	Equilibrium of a Rigid Body
Week 12	Distributed loads.
Week 13, 14	Friction, Centroid,
Week 15	First moment of area. Area moment of inertia, Second moment of area.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Engineering Mechanics/ Statics, Fourteen Edition	yes
Recommended Texts	1- Engineering Mechanics , Ferdinand L. Singer 2- Engineering Mechanics/ Statics, Arthur P. Boresi & Richard J. Schmidt	No

Grading Scheme

مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Medical Physics**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☒ **Practical** ☒ **Seminar**	
Module Code	**MIE109**				
ECTS Credits	**7**				
SWL (hr/sem)	**172**				
Module Level	**First**	**Semester of Delivery**	**First**		
Administering Department	**Med. Ins. Tech. Eng.**	**College**	**Technical Engineering College**		
Module Leader	**Wameedh Baraq Edress**	**e-mail**	**wameedh.adress@ntu.edu.iq**		
Module Leader's Acad. Title	**Lecturer**	**Module Leader's Qualification**	**Ph.D.**		
Module Tutor	**Name (if available)**	**e-mail**	**E-mail**		
Peer Reviewer Name	**Mohammed S Jarjees**	**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**		
Scientific Committee Approval Date	**01/06/2023**	**Version Number**	**1.0**		

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	Studying the physical phenomena of the human body and how to deal with its related medical instruments. Understanding the basic principles and physical laws related to the work and functions of the human body. Understand the basic principles and physical laws related to medical instrumentations. Familiarize students with physical explanations related to the functioning of the human body. Familiarize students with how to conduct physics experiments that simulate the functioning of the human body.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Demonstrate conceptual understanding of fundamental physics and medical physics principles. 2. Study of physics promotes understanding of the basic workings of physics in human body. 3. Understanding of the basic workings of physics in human body. 4. Familiarize students with how to conduct physics experiments that simulate the functioning of the human body.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Irving P. Herman Physics of the Human Body Second Edition John R. Cameron and James G. Skofronick Medical Physics

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

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

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

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	105	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.46
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**172**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	6	5% (5)	3,8 and 11	LO #2,#3 and, #4
	Assignments	8	10% (10)	3,4,6, 11	LO #3, #4
	Projects / Lab.	1	10% (10)	7	LO #3

	Report	10	5% (5)	Continuous	All
Summative assessment	**Midterm Exam**	2hr	20% (20)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
1	Forces on and in the human body.
2	Physics of the skeleton.
3,4	Heat and cold in medicine.
5,6	Energy , work and power.
7	Sound in medicine and physics of hearing.
8	Light in medicine
9	Introduction to physical and engineering optics
10	Laser physics and laser in medicine
11	Physics of vision
12	Physics of x-rays.
13	introduction to nuclear radiation
14,15	Radiation protection

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
1	Forces and Motion
2	The Simple Pendulum
3,4	Hooke's Law
5	Masses and Springs
6	Mechanism of Friction
7	Sound properties
8	Light properties
9,10	Geometric Optics, Converging Lenses
11,12	Geometric Optics, Diverging Lenses
13	Geometric Optics, types of Mirrors
14,15	Geometric Optics, Bending of light

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Irving P. Herman	No

	Physics of the Human Body Second Edition	
Recommended Texts	John R. Cameron and James G. Skofronick Medical Physics	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/physics-and-astronomy	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering drawing**			**Module Delivery**	
Module Type	**Support**			☐**Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE110**				
ECTS Credits	**4**				
SWL (hr/sem)	**102**				
Module Level	**First**		**Semester of Delivery**		**Second**
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Enas Ali Ahmed**		**e-mail**	**enasali@ntu.edu.iq**	
Module Leader's Acad. Title	**Assistant Lecturer**		**Module Leader's Qualification**		**Master**
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Learn how to use the AutoCAD program. 2. Learn to draw 2D drawings using basic elements (line, circle, rectangular…etc.). 3. Learn to modify, edit the 2D drawing (move, copy, mirror…etc.). 4. Learn to add dimensions to the 2D drawings. 5. Learn to add text to the 2D drawings. 6. Identify, formulate and solve engineering problems

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	At the completion of the course, students will be able to 1. Understand fundamental of the AutoCAD drawings, engineering drawings. 2. Analyze and draw any engineering drawing using the facilities that the 2010 AutoCAD program produces such as using basic elements (line, circle, rectangular…etc.). 3. Modify any drawing using the tools (move, copy, mirror, offset, array,…etc.) 4. After complete the 2D drawing the student could add the dimensions to the drawing. 5. Design and draw any engineering drawing using any AutoCAD Program Version. 6. Draw any drawing using different methods, techniques and facilities submitted by the AutoCAD program.
Indicative Contents المحتويات الإرشادية	**Getting started with AutoCAD** Opening and creating drawings Exploring the AutoCAD interface Zooming and panning [4 hr] **Basic Draw Commands** Lines, Circles, Rectangles ..ect [12 hr] **Drawing Precision in AutoCAD** Polar and Ortho Tracking Entering Coordinates and Angles Object Snaps and Tracking [4 hr] **Modify commands** Move, Copy, Rotate, Mirror...ect [4 hr] **Advanced Draw Commands** Polylines, Arcs, Polygons, Ellipses...ect [12 hr] **Advanced Modify Commands** Trim , Extend, Fillet, Chamfer, Polyline Edit , Spline, Offset , Explode, Join...ect [8 hr] **Creating More Complex Objects [4 hr]** **Adding Dimensions** Using Dimensioning Tools Dimension Styles Editing Dimensions [4 hr] **Hatching / Text** The Hatch Command The Multiline Text Tool The Single Line Text Tool Editing Text [4 hr] **Setting Up a Layout** Using Layouts and Viewports, Scaling Viewports [4 hr]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• A lecturer explains the proper commands needed to create a simple drawing. • A lecturer uses the data projector to show the students the various commands needed to draw a simple drawing. • A lecturer uses active learning to help the students completing their assignments. • A lecturer uses Problem-Based Learning method that challenges students to "learn to learn" by working in groups to seek solutions to problems. The students will work in groups to complete the drawings assigned.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	42	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**102**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	5% (5)	5 and 9	LO #1, #2, #8, #9
	Assignments	0	0		
	Projects / Lab.	15	10% (10)	Continuous	All
	Report	5	5% (5)	4, 6, 8, 10,13	All
Summative assessment	**Midterm Exam**	1hr	20% (20)	7	LO #1 - #7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Getting Started with AutoCAD
Week 2,3 ,4	Lab 2,3 ,4: Basic Draw Commands

Week 5	Lab5: Drawing Precision in AutoCAD
Week 6	Lab 6: Modify commands
Week 8,9,7	Lab 8,9,7: Advanced Draw Commands
Week 10,11	Lab 10,11: Advanced Modify Commands
Week 12	Lab 12: Creating More Complex Objects
Week 13	Lab 13: Adding Dimensions
Week 14	Lab 14: Hatching / Text
Week 15	Lab 15: Setting Up a Layout

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Textbook of Engineering Drawing	no
Recommended Texts	Introduction To AutoCAD	No
Websites	https://www.unm.edu/~bgreen/autocad/AutoCAD%201.pdf	

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	**Chemistry**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE111**				
ECTS Credits	**5**				
SWL (hr/sem)	**126**				
Module Level		**First**	**Semester of Delivery**		**Second**
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Shatha Sabeeh Othman**		**e-mail**	**shathasabeeh@ntu.edu.iq**	
Module Leader's Acad. Title		**Assist. Professor**	**Module Leader's Qualification**		**Ph.D.**
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. the module helps the students to learn the core concepts of chemistry and understand how those concepts apply to their lives and the world around them. 2. This course deals with the basic concept of analytical chemistry ,qualitative and quantitative analysis and steps that make up for analysis..

	3. This is the basic subject for solution and all methods expressing for analytical concentration (molarity ,formality, normality, mole fraction,pH function) ,dilution law of solution . 4. To understand electrolytes, types, physiological importance ,dissociation of water and slight solid salt . 5. In this course students get the knowledge for volumetric analysis,types,standard solution and its types, end and equivalence point and the methods to detect end point, buffer solution. 6. To understand gravimetric analysis principles,types,steps of precipitation, application. 7. To understand statistical analysis rules for analytical data. 8. To understand thermodynamic science, types of process and systems. First and second law of thermodynamic law. 9. To understand electrochemistry definition , and various types of cells, electrochemical techniques and various types of electrodes and batteries. 10. To understand photochemistry concept and Beer lambert laws and its application.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Identify the basic types of traditional and instrumental of analytical techniques. 2. Use molarity and other types of concentrations to calculate the concentration of solution and perform dilution calculations 3. Describe the behavior of Brønsted-Lowry acids and bases. 4. Discuss the various properties of primary and secondary solution. 5. Recognize how buffer solution works in human body. 6. List the various types of sources of errors for analytical data. . 7. Apply thermodynamic equations to calculate,work,enthalpy,internal energy . 8. Explain spontaneous and entropy concept. 9. Identify the basic types of conductance and Nernst equation. 10. Identify forms of electromagnetic radiation and how they are related to the electronic structure
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Analytical chemistry</u> Qualitative analytical chemistry, Quantitative analytical chemistry, Applications of quantitative analysis. Traditional and instrumental of analytical techniques. First steps in making analysis. Methods of Expressing analytical concentrations: Normality, Formality, Molarity .p-function,Mole fraction , Mill equivalent . Electrolytes. Acid and base theory.Equilibrium Constant Volumetric analysis : principles , standard solution .Classification of volumetric method, End point , buffer solution . Precipitation reaction , the PH- scale . Gravimetric analysis , calculations .Salability of precipitations . Errors & treatment of analytical data: sources of errors , Determinates of errors - indeterminate errors.Presion term. mode , range , median , deviation Average deviation , standard deviation , variance . Method of expressing accuracy . Absolute error , relative error , rejecting pf experimental result . <u>Part B – Physical Chemistry</u> Thermodynamic : First law of thermodynamic ,Reversible and irreversible expansion . Heat capacities , adiabatic expansion , Introduction to Second law of thermodynamic spontaneous processes ,Application of Second law. Entropy

	Electrochemistry, Electrochemistry : electrochemical cells ,Types of electrodes , electrolytes ,Electromotive force ,Nernst equation , cell potential . Batteries. Photochemistry (spectrophotometer analysis) ,Regions of electromagnetic spectrum . Absorption and emission of electromagnetic spectrum .Beer , Lambert law instrumentation ,Components of spectrophotometer .,Analysis by spectrophotometers .

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

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

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

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	75	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	51	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**126**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	5% (5)	5 and 10	LO #1 and #10
	Assignments	6	10% (10)	Continuous	All
	Projects / Lab.	15	10% (10)	Continuous	All
	Report	2	5% (5)	7, 13	LO #5, and #8
Summative assessment	**Midterm Exam**	2hr	20% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1,2,3	Introduction to analytical chemistry. Methods of Expressing analytical concentrations
Week 4,5	Volumetric analysis: principles.
Week 6,7	Gravimetric analysis
Week 8	Errors & treatment of analytical data
Week 9,10	Thermodynamic: First law of thermodynamic.
Week 11	Second law of thermodynamic
Week 12,13	Electrochemistry Batteries
Week 14,15	Photochemistry

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Laboratory safety.
Week 2,3	Laboratory Equipment. Analytical Balance
Week 4,5,6	Preparation different types of solutions
Week 7,8	Titration reactions, Neutralization.
Week 9	Precipitation titration
Week 10	Oxidation reduction titration
Week 11,12	Potentiometric titration using pH meter.
Week 13	Conduct metric titration
Week 14,15	Spectrophotometric Determine the maximum wavelength λmax.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Skoog. 2007. Fundamental of Analytical Chemistry, 7th Ed., Sanders. Hasan Maridi 2016 Physical Chemistry	Yes
Recommended Texts	David Harvey 1996 Modern Analytical Chemistry	No
Websites	https://www.infobooks.org/free-pdf-books/chemistry/physical-chemistry/	

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	**Systematic Training 1**			**Module Delivery**	
Module Type	**Core**			☐**Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☒ **Seminar**	
Module Code	**MIE212**				
ECTS Credits	**4**				
SWL (hr/sem)	**101**				
Module Level	**Second**		**Semester of Delivery**	**Forth**	
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Mohammed Sabah Jarjees**		**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**	
Module Leader's Acad. Title	**Assistant Professor**		**Module Leader's Qualification**	**Ph.D.**	
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1-Assessment and diagnosis inspecting the malfunctioning medical instrument to identify the problem. 2-Disassembly and Following the manufacturer guidelines and safety precautions. 3-Component Testing and Replacement by Inspecting individual components and 4-Functional Testing by perform functional tests to ensure proper operation.

	5-Documentation and Quality Control by create detailed documentation of the repair process, including the identified problem, replaced components, cleaning procedures, and test results.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Assess and diagnose malfunctioning medical instruments to identify the problem. 2. Safely disassemble medical instruments following manufacturer guidelines and safety precautions. 3. Test and replace individual components by inspecting and evaluating their functionality. 4. Perform functional tests on repaired instruments to ensure proper operation. 5. Create detailed documentation of the repair process, including the identified problem, replaced components, cleaning procedures, and test results. 6. Apply quality control measures to ensure the repaired instruments meet the required standards. 7. Demonstrate proficiency in using water baths, ovens, autoclaves, water distillers, incubators, centrifuges, microscopes, analyzers, biosensors, and transducers in a healthcare setting. 8. Apply fundamental practical applications in hospitals using the mentioned instruments. 9. Understand the importance of quality control and assurance in maintaining the accuracy and reliability of medical instruments. 10. Demonstrate knowledge of the principles and operation of various medical instruments. 11. Develop problem-solving skills to effectively troubleshoot and repair malfunctioning instruments. 12. Apply critical thinking and analytical skills to evaluate and interpret test results. 13. Adhere to ethical guidelines and safety protocols while handling and repairing medical instruments. 14. Collaborate effectively with healthcare professionals and technical support teams in the maintenance and repair of medical instruments. 15. Prepare and organize the necessary materials and equipment for instrument repair and maintenance. 16. Demonstrate effective communication skills in documenting and reporting the repair process.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Assessment and diagnosis: (3 hours) - Assessment techniques for malfunctioning medical instruments - Diagnostic procedures to identify problems in medical instruments 2. Safe disassembly and following manufacturer guidelines: (3 hours) - Importance of following manufacturer guidelines and safety precautions - Safe disassembly techniques for medical instruments 3. Testing and replacement of individual components: (5 hours)

	- Techniques for testing and evaluating the functionality of components: 4 hours - Procedures for proper replacement of malfunctioning components: 4 hours 4. Functional testing of repaired instruments: (3 hours) 5. Documentation and quality control: (3 hours) - Creation of detailed documentation for the repair process - Implementation of quality control measures to meet required standards 6. Practical applications of specific instruments in a healthcare setting: (30 hours) 7. Understanding principles and operation of various medical instruments: (8 hours) 8. Problem-solving and critical thinking skills: (8 hours) 9. Ethical guidelines and safety protocols: (2 hours) 10. Collaboration with healthcare professionals and technical support teams: (3 hours)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Hands-on Practical Demonstrations: Provide practical demonstrations of the instruments and equipment. Allow students to observe their operation and gain familiarity with their use through hands-on experience. 2. Laboratory Sessions: Organize dedicated laboratory sessions where students can actively engage in practical activities. Guide them through disassembling, diagnosing, and repairing medical instruments under supervision. 3. Case Studies and Problem-solving: Present case studies that simulate real-life scenarios in healthcare settings. Encourage students to analyze and discuss the cases, applying their knowledge and problem-solving skills to diagnose and repair malfunctioning instruments. 4. Group Discussions and Collaborative Learning: Foster active learning through group discussions and debates. Encourage students to exchange ideas, share experiences, and collaborate on solving problems related to the module content. 5. Assessments and Feedback: Design varied assessments to evaluate students' understanding.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	75	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	26	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.73
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**101**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	-	-	-	-
	Assignments	-	-	-	-
	Projects / Lab.	8	20% (10)	Continuous	All
	Report	1	10% (10)	13	All
Summative assessment	Midterm Exam	1hr	20% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Practical Plan (Weekly Syllabus)
المنهاج الاسبوعي العملي

	Material Covered
Week 1	Fundamental practical application in hospitals
Week 2	Quality control and assurance
Week 3	Water baths
Week 4	Ovens
Week 5	Autoclave
Week 6	Water distiller
Week 7	Incubators
Week 8	Centrifuge
Week 9	BIOSENSORS & TRANSDUCERS
Week 10 Week 11 Week 12	Microscopes
Week 13 Week 14 Week 15	Analyzers

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. "Medical Instrumentation: Application and Design" by John G. Webster and William J. Tompkins 2. "Introduction to Biomedical Equipment Technology" by Joseph J. Carr and John M. Brown 3. "Biomedical Instrumentation and Measurements" by Leslie Cromwell, Fred J. Weibell, and Erich A. Pfeiffer 4. "Introduction to Hospital and Health-System Pharmacy Practice" by David A. Holdford and Thomas R. Brown	No
Recommended Texts	1. "Principles of Medical Electronics and Biomedical Instrumentation" by C.R. Choudhary 2. "Biomedical Signal Processing and Signal Modeling" by Swamy Laxminarayan and Amit Acharyya 3. "Clinical Engineering Handbook" by Joseph Dyro 4. "Medical Instrumentation: Accessibility and Usability Considerations" by Oliver Faust 5. "Laboratory Manual for Biomedical Instrumentation and Measurements" by Alok Gupta and Megh R. Goyal	No
Websites	1. Association for the Advancement of Medical Instrumentation (AAMI) - www.aami.org 2. Medical Device Manufacturers Association (MDMA) - www.medicaldevices.org 3. National Electrical Manufacturers Association (NEMA) - www.nema.org	

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	**Medical Laboratory Instrumentation**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE201**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	**Second**		**Semester of Delivery**	**Third**	
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Ali Rakan Hasan Ahmed**		**e-mail**	**ali.rakan@ntu.edu.iq**	
Module Leader's Acad. Title	**Assistant Lecturer**		**Module Leader's Qualification**	**Master**	
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Introduction to Medical Laboratory Instrumentation: This section aims to introduce students to the principles of medical laboratory instrumentation and their applications in healthcare. The objective is to provide students with a basic understanding of laboratory instrumentation and its importance in the healthcare industry. 2. Fundamentals of Medical Laboratory Instrumentation: This section aims to cover the fundamental principles of medical laboratory instrumentation, including measurement techniques, calibration, and accuracy. The

	objective is to provide students with a solid foundation in the principles of laboratory instrumentation. 3. Analytical Techniques in Medical Laboratory Instrumentation: This section aims to focus on the various analytical techniques used in medical laboratory instrumentation, including chemical and biological analysis. The objective is to provide students with an understanding of the different analytical techniques used in medical laboratories. 4. Medical Laboratory Safety: This section aims to cover the safety protocols and guidelines for medical laboratory instrumentation. The objective is to provide students with an understanding of the importance of safety in medical laboratories and the measures to be taken to ensure safety. 5. Quality Control in Medical Laboratory Instrumentation: This section aims to cover the principles and techniques for quality control in medical laboratory instrumentation. The objective is to provide students with an understanding of the importance of quality control in medical laboratories and the techniques used to ensure quality control. 6. Medical Laboratory Instrumentation Applications: This section aims to focus on the applications of medical laboratory instrumentation in healthcare, including clinical diagnostics, research, and development. The objective is to provide students with an understanding of the practical applications of laboratory instrumentation in the healthcare industry. 7. Emerging Trends in Medical Laboratory Instrumentation: This section aims to cover the emerging trends and advancements in medical laboratory instrumentation, including automation, miniaturization, and point-of-care testing. The objective is to provide students with an understanding of the latest developments in laboratory instrumentation and their potential impact on the healthcare industry.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explain the principles of medical laboratory instrumentation and their applications in healthcare. 2. Demonstrate knowledge of the fundamental principles of medical laboratory instrumentation, including measurement techniques, calibration, and accuracy. 3. Explain the different analytical techniques used in medical laboratory instrumentation, including chemical and biological analysis. 4. Identify the safety protocols and guidelines for medical laboratory instrumentation and demonstrate the ability to implement them. 5. Explain the importance of quality control in medical laboratory instrumentation and demonstrate the ability to implement quality control techniques. 6. Identify and describe the practical applications of medical laboratory instrumentation in healthcare, including clinical diagnostics, research, and development.

	7. Describe the emerging trends and advancements in medical laboratory instrumentation, including automation, miniaturization, and point-of-care testing, and their potential impact on the healthcare industry.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Introduction to Medical Laboratory Instrumentation • Overview of medical laboratory instrumentation • Importance of laboratory instrumentation in healthcare • Types of laboratory instrumentation 2. Fundamentals of Medical Laboratory Instrumentation • Principles of measurement • Calibration of medical laboratory instruments • Accuracy and precision in laboratory instrumentation 3. Analytical Techniques in Medical Laboratory Instrumentation • Chemical analysis techniques • Biological analysis techniques • Chromatography and spectroscopy 4. Medical Laboratory Safety • Hazardous materials in medical laboratories • Safety protocols and guidelines • Personal protective equipment (PPE) 5. Quality Control in Medical Laboratory Instrumentation • Quality control principles • Quality control techniques for medical laboratory instrumentation • Quality assurance in laboratory instrumentation 6. Medical Laboratory Instrumentation Applications • Clinical diagnostics • Research and development • Forensic science • Biotechnology 7. Emerging Trends in Medical Laboratory Instrumentation • Automation in laboratory instrumentation • Miniaturization of laboratory instrumentation • Point-of-care testing • Integration of laboratory instrumentation with healthcare information systems

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Strategies for teaching Medical Laboratory Instrumentation for 2nd year Department of Medical Instrumentation Technology may include the following:

	1. Lecture-based Teaching: Lectures can be used to provide an overview of the principles of laboratory instrumentation and their applications in healthcare. Lectures can also be used to introduce students to the different types of laboratory instrumentation, the different analytical techniques used in medical laboratory instrumentation, and the emerging trends and advancements in laboratory instrumentation. 2. Practical-based Teaching: Practical sessions can be used to provide hands-on experience with laboratory instrumentation. Practical sessions can be used to demonstrate the principles of measurement, calibration, and accuracy, as well as the different analytical techniques used in medical laboratory instrumentation. Practical sessions can also be used to demonstrate the implementation of safety protocols and guidelines, and the techniques used for quality control in laboratory instrumentation. 3. Case-based Learning: Case studies can be used to illustrate the practical applications of laboratory instrumentation in healthcare. Case studies can be used to demonstrate the use of laboratory instrumentation in clinical diagnostics, research and development, and other areas of healthcare. Case studies can also be used to highlight the importance of safety and quality control in laboratory instrumentation. 4. Group-based Learning: Group-based learning can be used to promote collaboration and peer-to-peer learning. Students can be divided into groups and assigned tasks related to laboratory instrumentation, such as developing safety protocols, implementing quality control techniques, or using laboratory instrumentation to solve specific healthcare problems. 5. E-learning: Online resources, such as videos, tutorials, and interactive quizzes, can be used to supplement classroom teaching. E-learning can be used to provide additional information on laboratory instrumentation, the different analytical techniques used in medical laboratory instrumentation, and the emerging trends and advancements in laboratory instrumentation.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	105	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	70	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.66
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**175**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	5% (5)	5 and 10	LO #1, #2, #5, #7
	Assignments	8	10% (10)	Continuous	All
	Projects / Lab.	15	10% (10)	Continuous	All
	Report	4	5% (5)	2, 5, 10, 13	LO #3, #6 and #7
Summative assessment	**Midterm Exam**	2hr	20% (20)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	• Fundamentals of Medical Instrumentation • ROLE OF TECHNOLOGY IN MEDICINE • LANDMARK DEVELOPMENTS IN BIOMEDICAL INSTRUMENTATION • SOURCES OF BIOMEDICAL SIGNALS
Weeks 2, 3, 4	• BASIC MEDICAL INSTRUMENTATION SYSTEM • Measurand • Transducer/Sensor • Signal Conditioner • Display System • Alarm System • Data Storage • Data Transmission • PERFORMANCE REQUIREMENTS OF MEDICAL INSTRUMENTATION SYSTEMS • INTELLIGENT MEDICAL INSTRUMENTATION SYSTEMS • Use of Microprocessors in Medical Instruments • Interfacing Analog Signals to Microprocessors • IMPLANTABLE MEDICAL DEVICES • MICRO-ELECTRO-MECHANICAL SYSTEMS (MEMS) • WIRELESS CONNECTIVITY IN MEDICAL INSTRUMENTS • WiMAX (Worldwide Interoperability for Microwave Access) • WLAN (Wireless Local Area Network) • WPAN (Wireless Personal Area Network) • WBAN (Wireless Body Area Network) • Wireless Connectivity with ZigBee • Wireless Connectivity with Bluetooth • GENERAL CONSTRAINTS IN THE DESIGN OF MEDICAL INSTRUMENTATION SYSTEMS • REGULATION OF MEDICAL DEVICES

	• Types of Standards • Regulatory Requirements • Definitions of Common Terms • Equipment Classifications Based on Method of Protection • Equipment Types based on Degree of Protection • ROLE OF ENGINEERS IN HEALTHCARE FACILITIES
Week 5	• Physiological Transducers • WHAT IS A TRANSDUCER? • CLASSIFICATION OF TRANSDUCERS • PERFORMANCE CHARACTERISTICS OF TRANSDUCERS • Static Characteristics • Dynamic Characteristics • Other Characteristics • DISPLACEMENT, POSITION AND MOTION TRANSDUCERS • PRESSURE TRANSDUCERS • TRANSDUCERS FOR BODY TEMPERATURE MEASUREMENT • PHOTOELECTRIC TRANSDUCERS • OPTICAL FIBRE SENSORS • BIOSENSORS • SMART SENSORS
Week 6	• Sterilization Equipment used in Medical LABs • Water baths • Ovens • Autoclave • Water distiller • Incubators • Other thermal instruments
Weeks 7, 8	• Separation and Weighing Devices Used in Medical LABs • Centrifuges • What is a Centrifuge • Construction of a Centrifuge • Refrigeration System • Security Protection System • Principle of Centrifuges • Classifications and Types of Centrifuges • Low Speed Centrifuge • High Speed Centrifuge • Basket Centrifuge • Continuous Centrifuge • Decanter Centrifuge • High Speed Centrifuge • Oil Centrifuge • Horizontal Peeler Centrifuge • Applications and Benefits of Centrifuges • Laboratory balances
Weeks 9, 10	• Microscopes • What is a Microscope • Principles of operation

	• Classification and Types of Microscopes • Applications of Microscopes
Weeks 11 - 15	• Laboratory Analyzing Equipment • PCR • HPLC analyzer • Immune assay analyzer • Hematology Analyzer • Biochemistry analyzer

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Principles of medical device design
Week 2	Basics of testing and validation
Week 3	Quality control and assurance
Week 4	Evaluating student learning
Week 5	Hands-on training hands-on training in the laboratory to help students develop practical skills in the testing and validation of medical devices. This should include training on how to use testing equipment, how to conduct tests, and how to interpret test results.
Week 6	Practical training about operating and maintaining the Sterilization Equipment used in Medical LABs
Weeks 7, 8	Practical training about operating and maintaining the Separation and Weighing Devices used in Medical LABs
Weeks 9, 10	Practical training about operating and maintaining the different types of Microscopes
Weeks 11 - 15	Practical training about operating and maintaining the Laboratory Analyzing Equipment

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. "Medical Laboratory Instrumentation" by John C. R. Hunt and Mary P. Allen 2. "Clinical Laboratory Instrumentation and Automation: Principles, Applications, and Selection" by Wallace H. Coulter and Gregory J. Tsongalis 3. "Introduction to Medical Laboratory Technology" by F. J. Baker 4. "Clinical Laboratory Science Review: A Bottom Line Approach" by Patsy Jarreau	No
Recommended Texts	1. Khandpur, R.S. (2014). Handbook of Biomedical Instrumentation, 3rd Edition. McGraw-Hill Education.	No

Websites	1. https://ascls.org/ 2. https://clsi.org/ 3. https://www.nist.gov/ 4. https://labtestsonline.org.uk/ 5. https://www.mlo-online.com/

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Programming Languages**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE202**				
ECTS Credits	**4**				
SWL (hr/sem)	**97**				
Module Level	**Second**		**Semester of Delivery**	**Third**	
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Mohammed Basil Shukur**		**e-mail**	**mohammed.basil@ntu.edu.iq**	
Module Leader's Acad. Title	**Assistant Lecturer**		**Module Leader's Qualification**	**Master**	
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. This course introduces students to C++ programming language. 2. Understanding the effort needed to successfully develop engineering-oriented software. 3. Introduce fundamental programming concepts 4. Teach C++ syntax and data types 5. Explain control structures (such as if-else statements, loops)

	6. Introduce arrays and their usage 7. Teach functions and their implementation 8. Provide hands-on practice to develop basic software applications
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	CLO1: Understand the fundamentals of programming. Demonstrate knowledge of C++ syntax, keywords, and basic program construction principles. Apply the concepts of identifiers, variables, assignment statements, and input/output operations. CLO2: Develop competence in constructing arithmetic and logical expressions in C++. Utilize arithmetic operators, logical operators, and relational operators to manipulate data. Create efficient and accurate arithmetic and logical expressions in engineering-oriented software development. CLO3: Implement control flow structures in C++ programs. Design and implement selection statements (if, if-else, switch/-case) for decision making. Utilize loop statements (for, while, do-while) for repetitive tasks and iteration. CLO4: Apply functions, arrays, and vectors in C++ programming. Design and implement user-defined functions to modularize code and improve code reusability. Utilize arrays and vectors for efficient data storage and manipulation. CLO5: Understand and utilize pointers and structures in C++ programming. By achieving these outcomes, students will develop a solid understanding of These Course Learning Outcomes (CLOs) highlight the key objectives of the "Programming using C++" course, focusing on the fundamental concepts and skills necessary to develop engineering-oriented software using the C++ programming language. By achieving these outcomes, students will gain a solid understanding of C++ programming principles and be able to apply them effectively in practical programming scenarios.
Indicative Contents المحتويات الإرشادية	Introduction, Algorithms and Flowcharts, Basic program construction: Keywords, Identifiers, comments, variables, Assignment statements, Input and output Statements, Arithmetic and logical expression: Arithmetic operators, logical operators, relational operators, Selection statements: if, if-else, switch. Case, Loop statements: for, while, do…while, functions, Arrays and Vectors, Pointers, Structures and Structure type functions.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.46
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**97**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	5% (5)	5 and 10	LO# 1, 2, 3 ,4
	Assignments	2	10% (10)	2 and 12	LO# 1,2,3 ,4
	Lab	15	10% (10)	Continuous	all
	Report	2	5% (5)	7, 14	LO# 1-4
Summative assessment	**Midterm Exam**	2hr	20% (20)	13	LO# 1-4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to programing language
Week 2	Algorithms and Flowcharts.
Week 3	Basic program construction: Keywords, Identifiers, comments, variables, Assignment statements, Input and output Statements.
Week 4	Arithmetic and logical expression: Arithmetic operators.
Week 5	Selection statements: if, if-else, switch case.
Week 6	

Week 7	Loop statements: for, while, do…while
Week 8	
Week 9	functions
Week 10	
Week 11	Arrays and Vectors
Week 12	
Week 13	Mid-term Exam
Week 14	Pointers
Week 15	Structures and Structure type functions
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Downloading and installing the development environment
Week 2	A simple C++ program using basic program construction (Identifiers, comments, variables, Assignment statements, output statement(cin).
Week 3	A simple C++ program using input and output statements (cin, cout).
Week 4	Arithmetic and logical expression: Arithmetic operators, logical operators, relational operators.
Week 5	programs using selection statement (if-statement)
Week 6	programs using selection statements(if-statement and switch statement)
Week 7	programs using loop statements(for statement)
Week 8	programs using loop statements(while and do statements)
Week 9	Functions (call by value)
Week 10	Functions (call by reference)
Week 11	One dimensional array
Week 12	Two dimensional array
Week 13	Mid-term Exam
Week 14	Pointers
Week 15	Structures and Structure type functions
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**

Required Texts	1-C++ How to Program, 8/E, Paul Deitel & Harvey Deitel, ©2012 2-The Complete Reference in C++ By Herbert Schildt, 4th edition,2003.	No
Recommended Texts	The Complete Reference in C++ By Herbert Schildt, 4th edition,2003.	No
Websites		

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
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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	**Principle Electronic Circuits**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE203**				
ECTS Credits	**6**				
SWL (hr/sem)	**154**				
Module Level	**Second**		**Semester of Delivery**		**First**
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Sinan Salim Mohammed Sheet**		**e-mail**	**Sinan_sm76@ntu.edu.iq**	
Module Leader's Acad. Title	**Lecturer**		**Module Leader's Qualification**		**Master**
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. This course aims to give a general introduction to Electronic materials and semiconductors . 2. Be familiar with the current and voltage characteristics in the semiconductor materials. 3. Types of semiconductor material. 4. Current generating and movement of electron in the material. 5. It also introduces the student to voltage rectifying and filtering. 6. Type of semiconductors and their function and specifications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how currents generates in the material. 2. Elements of semiconductors and their functions and specifications. 3. How to build half wave rectifiers. 4. How to build a full wave rectifier. 5. How to add filter to the rectifier circuits. 6. How to design a voltage regulating circuits. 7. How to build a power supply circuit. 8. Describe how noise affects a communication system. 9. Discuss a electron movement in material and how to improve it. 10. Identify the basic voltage multiplier circuit elements and their applications. 11. Identify the basic voltage lamper and clipping circuit elements and their applications. 12. Familiar with Multisim programming.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • principle of electronic device concepts: Electronic devices such as diodes, rectifying circuits are made of a semiconductive material. To understand how these devices work, you should have a basic knowledge of the structure of atoms and the interaction of atomic particles. An important concept is that of the pn junction that is formed when two different types of semiconductive material are joined. The pn junction is fundamental to the operation of devices such as the solar cell, the diode, and certain types of transistors.[15 hrs] • Representation of Diode. you learned that many semiconductor devices are based on the pn junction. In this section, the operation and characteristics of the diode are covered. [15] • Also, three diode models representing three levels of approximation are presented and testing is discussed. [45] • The importance of the diode in electronic circuits cannot be overemphasized. Its ability to conduct current in one direction while blocking current in the other direction is essential to the operation of many types of circuits. One circuit in particular is the ac rectifier.[15] • Other important applications are circuits such as diode limiters, diode clampers, and diode voltage multipliers. [27] A datasheet is discussed for specific diodes.[3 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategies that will be adopted in this module will be focused on engaged learning. This is achieved by keeping the students working together throughout the semester by engaging them in lab groups in addition to a project to be built during the semester and presented on final week. Engagement will be stimulated in the class for better comprehension of the lectures.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	90	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	64	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.26
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**154**		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Material used in electronic, current in semiconductor**
Week 2	**N-type and P-type semiconductor, the PN-junction**
Week 3	**Diode operation, Voltage-current characteristic of diode**
Week 4	**Diode models**
Week 5	**half-wave and full wave rectifiers**
Week 6	**Filters and regulators**
Week 7	**Diode limiter and clampers**
Week 8	**diode multiplier**
Week 9	**Zener diode characteristic**
Week 10	**The Varactor diode**
Week 11	**The optical diode**
Week 12	**Other types of diodes**
Week 13	**Application activity: regulator DC power supply**
Week 14	**Troubleshooting on all diode's types**
Week 15	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Diode characteristic
Week 2	Half wave rectifier
Week 3	full wave rectifier
Week 4	Half wave rectifier and filters
Week 5	full wave rectifier and filters
Week 6	Diode clipping
Week 7	Diode clampers
Week 8	Diode Voltage Doubler
Week 9	Zener characteristic
Week 10	Zener voltage regulators
Week 11	Light emitter diode
Week 12	Photo cell diode
Week 13	DC power supply activity
Week 14	Photosensor circuits using diodes
Week 15	Varactor diode

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	electronic-devices-by-floyd-9th-edition	yes
Recommended Texts		
Websites		

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Mathematics**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE204**				
ECTS Credits	**6**				
SWL (hr/sem)	**152**				
Module Level	**Second**		**Semester of Delivery**		**First**
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Layth Taha Khudhuir**		**e-mail**	**Layth.t.k@ntu.edu.iq**	
Module Leader's Acad. Title	**Assistant Lecturer**		**Module Leader's Qualification**	**MASTER**	
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	After studying the basic subjects in the previous stage, it is now time to present more specialized topics in this advanced stage in order to teach advanced subjects in mathematics such as functions of multiple variables, integrals and multiple transformations, series and series, as well as some other topics that have an impact on the study of engineering specialization .
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how to use mathematics in the educational program. 2. List the different mathematical symbols associated with the curriculum. 3. Summarize what is meant by Functions of several variables 4. Summarize what is meant by Partial Derivative 5. Summarize what is meant by Sequence and series 6. Discuss Sequence and series on how to test of convergence and divergence. 7. Describe Differential equations. Laplace Transform. 8. Identify Method of solution for Differential equations. 9. Identify The Inverse trigonometric functions and derivatives of inverse functions. 10. Discuss the Complex number and complex variable (Cauchy– Riemann). 11. Summarize what is meant by Taylor and Maclaren series 12. Summarize what is meant by Improper Integral. Multiple Integration. 13. Explain application of Multiple Integration 14. Identify Greens theorem and stokes theorem. 15. Identify Fourier series and Z-transform.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A</u> Vector analysis, Operations on vectors, scalars, and unit vector. Orthogonal vector, dot product and cross product. Functions of several variables. Limit and continuous of the function of several variables. Partial Derivative, directed derivative, Chain rule.[18 hrs] <u>Part B</u> Sequence and series (test of convergence and divergence). Differential equations. Method of solution for Differential equations.[12 hrs]. Laplace Transform. Complex number and complex variable (Cauchy– Riemann). Taylor and Maclaren series[24 hrs] <u>Part C</u> Polar coordinate and Cartesian 3-d. Polar spherical coordinate and Polar cylinders coordinate.[6 hrs] Improper Integral. Multiple Integration. Application of Multiple Integration [12 hrs]. Greens theorem and stokes theorem. Fourier series. Z-transform. [18 hrs]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	90	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**152**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	6	10% (10)	continuous	LO #1,3, 5, 8,10 ,12
	Assignments	7	10% (10)	2,4,6,8,10, 12,14	LO #1,3, 5, 8,10
	Lab	0	0	-	-
	Report	0	0	-	-
Summative assessment	**Midterm Exam**	2hr	20% (20)	7	LO from #1 to 5
	Final Exam	3hr	60% (60)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	• Vector analysis, Operations on vectors, scalars, and unit vector. Orthogonal vector, dot product and cross product
Week 2 +Week 3	• Functions of several variables • Limit and continuous of the function of several variables • Partial Derivative, directed derivative, Chain rule.
Week 4	• Sequence and series (test of convergence and divergence)
Week 5	• Differential equations. • Method of solution for Differential equations
Week 6 +Week 7	• Laplace Transform
Week 8 +Week 9	• Complex number and complex variable (Cauchy– Riemann). • Taylor and Maclaren series
Week 10	• Polar coordinate and Cartesian 3-d. • Polar spherical coordinate and Polar cylinders coordinate
Week 11 +Week 12	• Improper Integral • Multiple Integration • Application of Multiple Integration
Week 13 +Week 14	• Greens theorem and stokes theorem. • Fourier series
Week 15	• Z-transform.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Advanced Engineering Mathematics, Erwin Kreyszig. 2010	Yes
Recommended Texts	Thomas_Calculus_by_George_B_Thomas,_Joel_R_Hass,_Christopher_Heil.2018.	Yes
Websites	https://www.google.iq/books/edition/Advanced_Engineering_Mathematics/UnN8DpXI74EC?hl=ar&gbpv=1&dq=ERWIN+KREYSZIG++ADVANCED+ENGINEERING++MATHEMATICS&printsec=frontcover	

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	**Anatomy & Physiology**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE205**				
ECTS Credits	**4**				
SWL (hr/sem)	**103**				
Module Level	**Second**		**Semester of Delivery**	**Third**	
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Anfal Abdulsalam Daoud**		**e-mail**	**anfalsalam@ntu.edu.iq**	
Module Leader's Acad. Title	**Lecturer**		**Module Leader's Qualification**	**Master**	
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	• Preparing the student to study and understand medical instruments by clarifying the physiological changes, especially the electrical ones, which occur when the various organs of the body perform their function and their relationship to the instruments that are used to measure and diagnose various phenomena and diseases. • Understand the principles of human physiology and their relevance to biomedical engineering. • Learn about the structure and function of various physiological systems in the body.

	Gain knowledge of physiological measurements and instrumentation used in biomedical engineering.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After participating in the course, students would be able to: 1- Practice safe procedures within a laboratory. 2- Identify the types of microscopes, the parts of optical microscope, and how to use it. 3- Identification of blood components and RBC. WBC count. 4- - Understand and demonstrate anatomical position of body systems. 5- The student will be able to measure hemoglobin in blood using different methods. 6- Measurement of vital signs: blood pressure heart rate & pulse & Body temperature. 7- Differentiate between different types of tissues and describe their functions. 8- Identify anatomical structures of human body systems. 9- Understand pulmonary function testing and basic spirometry. 10- Learn about the anatomical structure of the heart and how to measure and analyze the electronic signal of the heart.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A Identify the body parts, blood compound, structure of the cell, structure and function of all system of the body (circulation, urinary , integumentary, skeletal, respiration, digestion, nervous and sensory). Part B Fundamentals Cell physiology: Membrane transport and signaling, tissues & gland, integumentary system, the skeletal system & articulations, cardiovascular system: Heart anatomy and physiology, cardiovascular system: Blood, blood vessels and blood pressure regulation, nervous system: Structure and function. Neurophysiology: Neurons, action potentials, and synapses, respiratory system: Structure and function, gas exchange and transport, sensory systems: Vision and hearing, renal physiology: Kidney structure and function, Ac id-base balance and fluid regulation, digestive system: Anatomy and physiology, nutrient absorption and metabolism, musculoskeletal system: Structure and function, Endocrine system: Hormones and their regulation.

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	43	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.86
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**103**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	1	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	15			
	Report	2	10% (10)	5,13	LO #5and #13
Summative assessment	**Midterm Exam**	2hr	20% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	• **Introduction to Physiology and its relevance to Biomedical Engineering.** • **Homeostasis and regulatory mechanisms.**
Week 2	**Cell physiology: Membrane transport and signaling.**
Week 3	**Tissues & Gland.**
Week 4	**Integumentary system.**
Week 5	**The skeletal system & Articulations.**
Week 6	**Cardiovascular system: Heart anatomy and physiology.**
Week 7	**Cardiovascular system: Blood, blood vessels and blood pressure regulation.**
Week 8	• **Nervous system: Structure and function.** • **Neurophysiology: Neurons, action potentials, and synapses.**
Week 9	• **Respiratory system: Structure and function.** • **Respiratory system: Gas exchange and transport.**

Week 10	**Sensory systems: Vision and hearing.**
Week 11	• **Renal physiology: Kidney structure and function.** • **Renal physiology: Acid-base balance and fluid regulation.**
Week 12	**Digestive system: Anatomy and physiology.**
Week 13	**Digestive system: Nutrient absorption and metabolism.**
Week 14	**Musculoskeletal system: Structure and function.**
Week 15	**Endocrine system: Hormones and their regulation.**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: **Introduction to laboratory techniques and safety in physiological measurements.**
Week 2	Lab 2: **Types of microscope.**
Week 3	Lab 3: **Total count (RBCs&WBCs Count).**
Week 4	Lab 4: **Measurement of hemoglobin by using Sahly method.**
Week 5	Lab 5: **Measurement of hemoglobin by using Chromatography method.**
Week 6	Lab 6: **Measurement of vital signs : blood pressure**
Week 7	Lab 7: **Measurement of vital signs: heart rate & pulse & Body temperature.**
Week 8	**Lab 8: PCV (Packed Cell Volume).**
Week 9	**Lab** 9: **Blood Group.**
Week 10	**Lab** 10: **Clotting time & bleeding time.**
Week 11	**Lab 11: Reflex.**
Week 12	**Lab 12: Blood sugar.**
Week 13	**Lab 13: Electrocardiography (ECG) measurement and analysis.**
Week 14	**Lab 14: Pulmonary function tests.**
Week 15	• **Review of key topics.** • **Final assessment.**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Structure and Function of the human body ,Ruth Lundeen Memmler and Dena Lin Wood , Copyright Year:1990	Yes
Recommended Texts	Essentials of Anatomy and Physiology: Valerie C. Scanlon and Tina Sanders, Copyright Year: 2022.	No
Websites	https://www.getbodysmart.com	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**English Language 2**			**Module Delivery**	
Module Type	**Assistant**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE206**				
ECTS Credits	**3**				
SWL (hr/sem)	**79**				
Module Level	**Second**		**Semester of Delivery**		**Third**
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Marwa Mawfaq Mohamedsheet**		**e-mail**	**marwa.alhatab@ntu.edu.iq**	
Module Leader's Acad. Title	**Assist. Lecturer**		**Module Leader's Qualification**		**Master**
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The objective of this subject is to reinforce grammar concepts and tenses, expand vocabulary, enhance speaking and writing skills, and consolidate and apply learned language skills. Through a comprehensive review, students will solidify their understanding of grammar rules and tenses, while also increasing their vocabulary. Speaking practice will improve fluency and confidence, while writing exercises will develop coherence and accuracy. Ultimately, the objective

	is to equip students with the ability to effectively communicate in English and demonstrate their knowledge through a final exam.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	LO1: mastering grammar concepts like present perfect continuous, past perfect, future perfect, passive voice, gerunds and infinitives, conditional sentences, reported speech, noun clauses, relative clauses, and indirect questions. LO2: expand vocabulary related to various topics and engage in speaking activities such as group discussions, presentations, debates, and practicing formal language. LO3: develop writing skills through descriptive writing, formal letters, and dialogues. LO4: enhance their listening comprehension by extracting key information from speeches and presentations.
Indicative Contents المحتويات الإرشادية	Part A: 1. Review of grammar concepts and tenses from the intermediate level, focusing on consolidation and vocabulary expansion: 6 hours 2. Grammar focus (including various topics): 16hours 3. Vocabulary expansion related to different topics: 16 hours 4. Speaking practice through group discussions, presentations, and conversations on various topics: 6 hours Part B: 5. Writing practice including descriptive writing, formal letters, and dialogues: 6 hours 6. Listening skills through speeches, presentations, and comprehension exercises: 6 hours 7. Review and consolidation of grammar and vocabulary: 8 hours
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Strategies for the course can include: 1. Active Participation: Encourage students to actively participate in group discussions, presentations, and speaking activities. This helps build their confidence, fluency, and communication skills. 2. Scaffolded Learning: Provide step-by-step guidance and support to help students understand and apply grammar concepts. Break down complex topics into manageable parts and provide clear examples and explanations. 3. Contextualized Practice: Ensure that language practice activities are relevant and meaningful to students' lives. Use real-life situations, authentic texts, and engaging topics to make the learning experience more interactive and relatable. 4. Feedback and Reflection: Provide regular feedback on students' speaking and writing performance. Encourage self-reflection and self-assessment to help them identify areas for improvement and set goals for their language development.

	5. Integration of Skills: Promote the integration of language skills by incorporating reading, writing, listening, and speaking activities. 6-Encourage students to apply their grammar knowledge and vocabulary in various contexts to enhance their overall language proficiency.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	45	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	34	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.66
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**79**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	10% (10)	2,5,7,13	Lo# 1, 3
	Assignments	5	10%(10)	8,12	Lo# 2,3,4
	Lab	0	0	-	-
	Report	0	0	-	-
Summative assessment	**Midterm Exam**	2hr	20%(20)	13	Lo# 1-4
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Stage 2 topics and objectives ✓ Review of grammar concepts and tenses covered in the intermediate level ✓ Vocabulary expansion: Review and consolidation of vocabulary ✓ Speaking practice: Group discussions and presentations
Week 2	Grammar focus: Present perfect continuous tense ✓ Vocabulary expansion: Actions and situations in progress ✓ Reading comprehension: Texts about ongoing trends or developments ✓ Writing practice: Describing ongoing activities or trends

Week 3	Grammar focus: Past perfect tense ✓ Vocabulary expansion: Past actions and completed events ✓ Speaking practice: Narrating personal experiences and events ✓ Writing practice: Writing about past achievements or milestones
Week 4	Grammar focus: Future perfect tense ✓ Vocabulary expansion: Future actions and accomplishments ✓ Reading comprehension: Texts about future technologies or innovations Speaking practice: Discussing future predictions and possibilities
Week 5	Grammar focus: Passive voice ✓ Vocabulary expansion: Agents and actions ✓ Speaking practice: Discussing processes and procedures ✓ Writing practice: Describing processes or explaining how things work
Week 6	Grammar focus: Gerunds and infinitives ✓ Vocabulary expansion: Verbs followed by gerunds or infinitives ✓ Reading comprehension: Texts about hobbies or personal interests ✓ Speaking practice: Discussing hobbies and interests
Week 7	Grammar focus: Conditional sentences (third and mixed conditionals) ✓ Vocabulary expansion: Hypothetical situations and consequences ✓ Speaking practice: Discussing hypothetical scenarios and consequences Writing practice: Writing about imaginary situations
Week 8	Grammar focus: Reported speech (commands, requests, and suggestions) ✓ Vocabulary expansion: Reporting verbs and expressions ✓ Speaking practice: Practicing reported speech in various contexts Writing practice: Writing a dialogue using reported speech
Week 9	Grammar focus: Noun clauses and relative clauses ✓ Vocabulary expansion: Describing people, places, and things ✓ Reading comprehension: Texts with complex sentence structures Speaking practice: Describing people and objects in detail
Week 10 **Week 11**	Grammar focus: Indirect questions ✓ Vocabulary expansion: Polite and formal language ✓ Speaking practice: Practicing polite and formal conversations ✓ Writing practice: Writing a formal letter or email
Week 12 **Week 13**	Review of grammar concepts and tenses covered so far ✓ Vocabulary expansion: Review and consolidation of vocabulary ✓ Listening skills: Listening to speeches or presentations and extracting key information ✓ Speaking practice: Reviewing and applying learned language skills
Week 14 **Week 15**	Review and consolidation of grammar and vocabulary ✓ Speaking practice: Debates and discussions on various topics
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. Textbook: A comprehensive textbook that covers grammar concepts, vocabulary expansion, reading passages, and writing	No

	exercises relevant to the course syllabus. 2. Workbook: A supplementary workbook with additional practice exercises and activities to reinforce learning and provide opportunities for self-assessment.	
Recommended Texts	1. Grammar Guide: A comprehensive grammar guidebook that provides detailed explanations, examples, and practice exercises for specific grammar topics covered in the course. 2. Vocabulary Builder: A vocabulary book or resource that focuses on expanding students' vocabulary in various thematic areas, including idioms, collocations, and word families.	No
Websites	1. Online Language Learning Platforms: Websites or platforms that offer interactive exercises, quizzes, and resources for grammar and vocabulary practice. 2. Online Dictionaries: Online dictionaries that provide definitions, examples, and usage of words and phrases. 3. Educational Websites: Websites that offer resources, articles, and videos related to the course topics, providing additional learning materials and insights. for vocabulary practice and other language learning topics. 5. Purdue Online Writing Lab (https://owl.purdue.edu/): A comprehensive resource for academic writing, including writing tips, grammar explanations, and citation guides.	

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	**Logic circuit**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE207**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	**Second**	**Semester of Delivery**	**Forth**		
Administering Department	**Med. Ins. Tech. Eng.**	**College**	**Technical Engineering College**		
Module Leader	**Tahini Ghanim Mahmood**	**e-mail**	**Tahini.ghanim@ntu.edu.iq**		
Module Leader's Acad. Title	**Assistant lecturer**	**Module Leader's Qualification**	**Master**		
Module Tutor	**Name (if available)**	**e-mail**	**E-mail**		
Peer Reviewer Name	**Mohammed S Jarjees**	**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**		
Scientific Committee Approval Date	**01/06/2023**	**Version Number**	**1.0**		

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Examine the structure of various number system 2. codes and logic gates Knowledge 3. List out different types of number system 4. code and convert one to another 5. Perform various binary arithmetic operation. 6. To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits. 7. To impart how to design Digital Circuits.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Convert different type of codes and number systems which are used in digital communication and computer systems. 2. Employ the codes and number systems converting circuits and compare different types of logic families which are the basic unit of different types of logic gates in the domain of economy, performance and efficiency. 3. Analyze different types of digital electronic circuit using various mapping and logical tools and know the techniques to prepare the most simplified circuit using various mapping and mathematical methods. 4. Design different types of with and without memory element digital electronic circuits for particular operation, within the realm of economic, performance, efficiency, user friendly and environmental constraints. 5. Apply the fundamental knowledge of analog and digital electronics to get different types analog to digitalized signal and vice-versa converters in real world with different changing circumstances. 6. Assess the nomenclature and technology in the area of memory devices and apply the memory devices in different types of digital circuits for real world application.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – Digital logic and circuit Number system: Binary, Octal and Hexadecimal representation and their conversion, Signed binary numbers representation with 1's and 2's complement methods, Binary arithmetic. Part B - Measurements Number system , logic gates , Additional gates, binary codes, De Margan's theorems , Boolean algebra , Simplifying logic circuits, fudamentals products, algebraic simplification , Karnaugh map, Application of BCD and don't care in Karnaugh map, combinational logic circuit, Sequential logic circuit, Digital to analogue conversion , Analogue to digital conversion .

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	90	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	60	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem)	**150**		

الحمل الدراسي الكلي للطالب خلال الفصل	

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	5% (5)	4,10	LO #1,4
	Assignments	0	0	-	-
	Projects / Lab.	15	10% (10)	Continuous	All
	Report	3	10% (10)	3,7,13	LO #2,3,6
Summative assessment	Midterm Exam	2hr	20% (20)	8	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Number system
Week 2	Basic logic gate
Week 3	Additional logic gate
Week 4	Binary code
Week 5	Demorgan's theorem
Week 6	Boolean algebra
Week 7	Fundamental of product
Week 8	Algebraic simplification
Week 9	Karnaugh map
Week 10	Application of BCD and don't care in karnaugh map
Week 11	Type of logic circuit
Week 12	Latch and flip-flop.
Week 13	Special counter and shift register
Week 14,15	Digital\analog converter

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered

Week 1	**Introduction about the device and component in the laboratory**
Week 2	**Logic gate**
Week 3	**Design AND, OR and NOT from NAND and NOR gate**
Week 4	**EX- OR , EX-NOR**
Week 5	**Demorgan's theorem**
Week 6	**The realization of Boolean function**
Week 7	**Designing a combinational logic circuit**
Week 8	**H.A, F.A**
Week 9	**H.S , F.S**
Week 10	**COMPARETOR**
Week 11	**DECODER**
Week 12	**ENCODER**
Week 13	**MUX , DE-MUX**
Week 14	**FLIP-FLOP (1)**
Week 15	**FLIP-FLOP (2)**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	DIGITAL FUNDAMENTAL\ by Thomas L.floyd	Yes
Recommended Texts	DIGITAL CIRCUITS AND DESIGN\ by S. Salivahanan And S. Arivazhagan	No
Websites	https://india.oup.com/product/digital-circuits-and-design-9780199488681	

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	**Measurements and Medical Transducers**			**Module Delivery**	
Module Type	**Core**			☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	**MIE208**				
ECTS Credits	**6**				
SWL (hr/sem)	**151**				
Module Level	**Second**		**Semester of Delivery**	**Forth**	
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Warqaa Hashim AL khaled**		**e-mail**	**warqqaa.hashim@ntu.edu.iq**	
Module Leader's Acad. Title	**Assistant lecturer**		**Module Leader's Qualification**	**Master**	
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. This course deals with define measurement. 2. Knowledge of measurement errors, their types, their effect on measurements, and how to reduce their effect on measurements. 3. Know the methods of measurement. 4. Know the system measurement. 5. Measurement the high voltage and high current . 6. This course deals with the basic concept of transducer in general. 7. To understand the principle of medical transformers. 8. Learn about some types of medical transducers and the principle of their work.

	9. Learn about medical devices that use medical transducers.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Develop the knowledge of theoretical and mathematical principles of electrical measuring instruments. 2. Have knowledge and critical understanding of the well-established principles underpinning measurement. 3. Have knowledge and critical understanding of the well-established principles of measurement and instrument design. 4. Have an understanding of measurement's errors. 5. Understand the role of various factors in calibration. 6. Choose the proper type and specification of measuring procedure and measuring instruments for different plication. 7. Have an understanding of Statistical analysis. 8. Understand the working of various potentiometers, instruments for measurement of R,L and C 9. Have knowledge and critical understanding of transducer. 10. Integrate understanding of key principles related to transducers and medical transducers. 11. Understand principles of operation of important transducer used in biomedical instrumentation and measurement.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A - Fundamentals of Electronic Measurements and Instrumentation D.C circuits, Current and voltage definitions, circuit elements, Combining resistive elements in series and parallel Ohm's law. Resistive networks, voltage and current sources, Thevenin equivalent circuits, current and voltage division, Capacitance and inductance RL, RC and RLC circuits Part B - Measurements Fundamental definitions, Measurements units, error of Measurements, Statistical analysis, D.c. measurement instrument. Ohmmeter as measurement instrument, Alternating - current indicating instruments, Electrodynamometer and application. Bridges, applications of D.c. Bridges, applications of A.c Bridges. Oscilloscope. transducers, applications of medical transducers, Medical Ultrasonic transducer, Medical Pressure transducer.

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	90	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.06
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**151**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	5% (5)	4,10	LO #1-#4, #5-#10
	Assignments	2	5% (5)	3,12	LO #3, #12
	Projects / Lab.	15	10% (10)	Continuous	All
	Report	14	10% (10)	Continuous	All
Summative assessment	**Midterm Exam**	1hr	20% (20)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Measurements & error.
Week 2	Statistical analysis.
Week 3	D.c Ammeter.
Week 4	D.c Voltmeter.
Week 5	series type ohmmeter.
Week 6	Alternating - current indicating instruments.
Week 7	Electrodynamometer.
Week 8	Aplications of Electrodynamometer
Week 9	D.c Bridges & their applications.
Week 10	A.c Bridges & their applications.
Week 11	Review of fundamentals of electrical measurements.

Week 12	Electronic measuring instrument, Oscilloscope.
Week 13	Medical transducers.
Week 14,15	Some examples about medical transducers.

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	**Identify the devices used in the laboratory and the components used in practical experiments in the laboratory**
Week 2	**Loading effect on measurment**
Week 3	**Measurment of D.C current**
Week 4	**Measurment of D.C voltage**
Week 5	**series type ohmmeter**
Week 6	**Measurment of frequency**
Week 7	**Electrodynamometer**
Week 8	**D.C bridge (wheatston bridge)**
Week 9	**Inductance comparison bridge**
Week 10	**Capacitance comparison bridge**
Week 11	**Maxwell bridge**
Week 12	**Oscilloscope, Measurment of Phase angle**
Week 13	**Study how transducers works**
Week 14	**Medical Ultrasonic transducer and principle of work**
Week 15	**Medical Pressure transducer and principle of work**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Electronic instrumentation and measurement techniques, William David Cooper,	Yes
Recommended Texts	Electronic Instrumentation and Measurements, Third Edition, David A. Bell	No
Websites	https://www.abebooks.co.uk/book-search/title/electronic-instrumentation-and-measurements/	

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	**Clinical Chemistry Techniques**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE209**				
ECTS Credits	**6**				
SWL (hr/sem)	**149**				
Module Level	**Second**		**Semester of Delivery**	**Forth**	
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Ahmed Yousif Ghazal**		**e-mail**	**ahmed_ghazal@ntu.edu.iq**	
Module Leader's Acad. Title	**Lecturer**		**Module Leader's Qualification**	**Ph.D.**	
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	Study the techniques of devices that are used in clinical chemistry by understanding the importance and types of chemical reactions within the human body and methods of their analysis and detection.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. List the various terms associated with Clinical Chemistry Techniques Devices. 2. distinguish between the functions of the different clinical laboratory divisions(departments) 3. explain the basic approach to the laboratory in the laboratory diagnosis of discuss 4. collect clinical specimens of an acceptable quality suitable for laboratory testing for public health intervention or for epidemiological studies 5. comprehend the general principle and techniques employed in clinical laboratory practice 6. have the basic knowledge required to perform some common and simple laboratory procedures 7. Summarize what is meant by a basic clinical chemistry. 8. Discuss the analysis methods. 9. understanding the importance and types of chemical reactions within the human body. 10. Learn spectroscopy methods 11. Learn beer Lambert law 12. Identify the basic instrument components. 13. Discuss the results of patients.
Indicative Contents المحتويات الإرشادية	The Clinical Laboratory and Diagnostic Skills in Health Practice Specimen Collection for Medical Laboratory Testing Principles and Techniques of Clinical Laboratory Test Conducting Simple Laboratory Tests

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary approach employed to deliver this module will focus on fostering active student engagement during exercises, alongside the enhancement and broadening of their critical thinking abilities. This will involve: distinguishing between the functions of the different clinical laboratory divisions, explaining the basic approach to the laboratory in the laboratory diagnosis of discussion, collecting clinical specimens of an acceptable quality suitable for laboratory testing for public health intervention or for epidemiological studies, comprehending the general principle and techniques employed in clinical laboratory practice have the basic knowledge required to perform some common and simple laboratory procedures and highlight the essentials of managing a clinical laboratory.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	90	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	59	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.93
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**149**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	6	5% (5)	2,4,6,8,10,12	LO #1, #2, #10, #11
	Assignments	5	5% (5)	3,5,7,9,11	LO #3, 4, 6, 7, 10
	Projects / Lab.	15	10% (10)	Continuous	All
	Report	6	10% (10)	8-13	All
Summative assessment	**Midterm Exam**	2hr	20% (20)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Work security in laboratories.
Week 2	Quality control and best laboratory use.
Week 3	Spectrum instruments and uses
Week 4	Salts and Ions measurement instrument and its uses.
Week 5	Clinical Chemistry Automation (Auto–analysis instruments)
Week 6	Minerals measurement instrument.
Week 7	Elisa instrument and its uses.
Week 8	Electrical conduction, Electrophoresis.
Week 9	Osmatic conduction.
Week 10	Enzymes and their measurements.
Week 11	Proteins and importance.
Week 12	Fats and importance.

Week 13	Hemoglobin.
Week 14	Minerals and nutrition.
Week 15	Immunological chemistry.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Safety procedures in the laboratory
Week 2	Colorimetry and Spectrophotometry
Week 3	Determination of inorganic phosphate in serum
Week 4	Determination of calcium
Week 5	Determination of blood (serum) urea concentration.
Week 6	Determination of blood (serum) glucose concentration.
Week 7	Estimate iron in serum
Week 8	Flame Photometry, Determination of sodium and potassium in serum by flame photometry.
Week 9	Water purification, Distillators, and deionizers
Week 10	Determination of total protein in serum (or plasma)
Week 11	Protein Electrophoresis.
Week 12	Atomic Absorption Photometry, determination of trace metals presents in biological fluids.
Week 13	Chromatography Technique, Separation of amino acid, organic compound or drugs analysis from serum or urine.
Week 14	The Enzyme Linked Immunosorbent Assay (ELISA)
Week 15	Safety procedures in the laboratory

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Baker, F.J.; Silverton, R.E. & Pallister, C.J. (1998). "Introduction to Haematology", In: Introduction to Medical Laboratory Technology.(7th ed.). Butterworth: Heinemann.	Yes
Recommended Texts	Clinical Laboratory Chemistry (Pearson Clinical Laboratory Science Series) 2nd Edition by Robert Sunheimer (Author)	No
Websites	https://www.coursera.org www.khanacademy.org	

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	**Professional Ethics**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE210**				
ECTS Credits	**2**				
SWL (hr/sem)	**58**				
Module Level	**Second**		**Semester of Delivery**	**Forth**	
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Mohammed Sabah Jarjees**		**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**	
Module Leader's Acad. Title	**Assistant Professor**		**Module Leader's Qualification**	**Ph.D.**	
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The objective of "Professional Ethics" subject is to provide students with a comprehensive understanding of ethical principles and standards in their chosen profession. It aims to familiarize students with the importance of professional ethics, explore ethical theories and codes of ethics, develop ethical reasoning skills, address ethical responsibilities, and examine ethical issues specific to their profession. By promoting ethical decision-making, leadership, and professionalism, the subject aims to equip students with the knowledge and skills

	necessary to navigate ethical challenges, uphold integrity, and make ethical choices throughout their professional careers.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the importance of ethical considerations in the field of medical instrumentation engineering and biomedical engineering. 2. Demonstrate knowledge of ethical principles and regulations relevant to MIE & BME practice, such as human subjects research, data privacy, and intellectual property rights. 3. Apply ethical decision-making frameworks to analyze and resolve ethical dilemmas in biomedical engineering. 4. Recognize and address ethical issues related to the design, development, and use of medical devices and technologies. 5. Exhibit ethical leadership and professional behavior in MIE & BME practice, considering global health, diversity, and sustainability aspects. 6- Acquire the necessary knowledge and skills in ethics within the context of medical instrumentation and biomedical engineering.
Indicative Contents المحتويات الإرشادية	Part A: 1. Overview of the course objectives and structure (1 hour) 2. Importance of ethical considerations in MIE & BME (1 hour) 3. Historical perspectives on biomedical engineering ethics (2 hours) 4. Standards for Regulatory Compliance (2 hours) 5. Responsible Conduct of Research and Development (2 hours) 6. Use and Collection of Data and Computer Code (2 hours) 7. Respect and Protections for Human Subjects (2 hours) Part B: 8. Respect for Non-Human Animals (1 hour) 9. Recognition of Common Humanity and Disparate Needs (1 hour) 10. Privacy, Confidentiality, and Data Security (2 hours) 11. Ethical Issues in Medical Device Design and Development (2 hours) 12. Engineering and Environment (1 hour) 13. Ethical Issues in Medical Imaging and Diagnostic Technologies (2 hours) 14. Ethical Issues in Implantable Medical Devices (2 hours) 15. Ethical Reflection and Personal Values (1 hour) 16. Integration of ethical principles into MIE & BME (1 hour)
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Conduct lectures: Begin the course by delivering lectures that provide an overview of medical instrumentation engineering and biomedical engineering ethics. Cover foundational concepts, principles, and theories to establish a solid understanding among students. 2. Present case studies: Introduce real-life scenarios or examples that involve ethical considerations in MIE & BME. Engage students in analyzing and discussing these case studies, encouraging them to apply ethical principles and frameworks to practical situations.

	3. Facilitate group discussions: Organize group discussions where students can share their perspectives, debate ethical issues, and learn from each other's experiences. As the instructor, guide the discussions to ensure active participation and exploration of different viewpoints. 4. Engage in ethical dilemma exercises: Pose ethical dilemmas specific to MIE & BME to the students. Encourage them to analyze the situations, consider potential courses of action, and justify their decisions based on ethical principles and guidelines. 5. Invite guest speakers: Arrange for guest speakers who have expertise or experience in medical instrumentation engineering and biomedical engineering ethics. These speakers can share their knowledge, discuss ethical challenges they have encountered, and engage students in interactive discussions. 6. Teach ethical decision-making models: Introduce and teach various ethical decision-making models and frameworks, such as utilitarianism, deontology, and virtue ethics. Guide students in applying these models to analyze ethical issues systematically. 7. Assign research projects: Assign research projects that focus on ethical issues in MIE & BME. Encourage students to explore current ethical debates, analyze research papers or case studies, and present their findings and recommendations. 8. Facilitate collaborative assignments: Assign group projects or presentations that require students to work together to explore ethical challenges and propose solutions. This promotes teamwork, communication, and the exchange of diverse perspectives. 9. Encourage ethical reflection and self-assessment: Provide opportunities for students to reflect on their personal values, ethical frameworks, and biases. Use activities like journaling, self-assessment questionnaires, or class discussions to facilitate this reflection process. 10. Arrange field visits or internships: Organize field visits to medical instrumentation engineering facilities or facilitate internships in biomedical engineering companies. These experiences allow students to observe and engage in discussions about ethical considerations in real-world settings.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	30	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	28	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.86
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**58**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	continuous	Lo# 1, 2, 3
	Assignments	0	0	-	-
	Lab	0	0	-	-
	Report	0	0	-	-
Summative assessment	Midterm Exam	2hr	30% (30)	13	Lo# 1-4
	Final Exam	3hr	60% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Introduction to Medical Instrumentation Engineering and Biomedical Engineering (MIE & BME) Ethics:** ✓ Overview of the course objectives and structure ✓ Importance of ethical considerations in medical instrumentation engineering and biomedical engineering ✓ Historical perspectives on biomedical engineering ethics
Week 2	**Standards for Regulatory Compliance** ✓ Understanding local regulations and their impact on MIE & BME practice ✓ Discussion on ethical considerations in adhering to applicable laws and norms
Week 3	**Responsible Conduct of Research and Development** ✓ Ethics in scientific inquiry and technology development ✓ Honest and thorough conduct of research ✓ Stewardship of the scientific record and publication ethics
Week 4	**Use and Collection of Data and Computer Code** ✓ Ethical considerations in handling biomedical data ✓ Responsible use, collection, and analysis of data ✓ Transparency and accessibility of methodologies and computer code
Week 5	**Respect and Protections for Human Subjects** ✓ Ethics in human subjects research ✓ Confidentiality, informed consent, and risk-benefit analyses ✓ Compliance with regulations for human subjects work ✓ Gives examples of some of the experiments applied in internationally accredited medical laboratories on the subject
Week 6	**Respect for Non-Human Animals** ✓ Ethical considerations in the use of animals in biomedical research ✓ Justification of animal research and minimizing distress ✓ Gives examples of some of the experiments applied in internationally accredited medical laboratories on the animals with rules

Week 7	**Recognition of Common Humanity and Disparate Needs** ✓ Accessibility of biomedical technology ✓ Designing technology for diverse populations and addressing global health needs Ensuring technology enhances standard of care and avoids marginalization
Week 8	**Privacy, Confidentiality, and Data Security** ✓ Ethical and legal aspects of protecting patient privacy in medical instrumentation ✓ Health Insurance Portability and Accountability Act (HIPAA) regulations and implications for medical instrumentation engineers ✓ Data security and cybersecurity in healthcare technology
Week 9	**Ethical Issues in Medical Device Design and Development** ✓ Safety and risk assessment in medical device design ✓ Ethical considerations in balancing innovation and patient safety Human factors engineering and user-centered design in medical instrumentation
Week 10	**Engineering and Environment** ✓ Ethics in manipulating technologies with potential environmental impacts ✓ Minimizing direct and off-target impacts
Week 11	**Ethical Issues in Medical Imaging and Diagnostic Technologies** ✓ Ethical considerations in medical imaging and diagnostic procedures ✓ Informed consent and patient communication in medical instrumentation imaging ✓ Radiation safety and ethical implications in medical imaging
Week 12	**Ethical Issues in Implantable Medical Devices** ✓ Ethical considerations in the design, development, and use of implantable devices ✓ Informed consent and patient autonomy in implantable medical device procedures • Long-term safety and ethical implications of implantable devices
Week 13	**Ethical Reflection and Personal Values** ✓ Reflecting on personal values and ethical frameworks ✓ Ethical leadership and professional development in MIE & BME Integration of ethical principles into MIE & BME practice
Week 14	**Ethical Issues in Biomedical Research** ✓ Ethics in preclinical and clinical trials ✓ Research misconduct and data falsification ✓ Ethical considerations in data interpretation and reporting **Ethical Issues in Intellectual Property and Commercialization** ✓ - Ethical considerations in patenting and intellectual property rights ✓ - Balancing innovation and commercialization with public health and patient access •
Week 15	**Ethical Decision-Making Frameworks:** ✓ Introduction to ethical theories and frameworks (e.g., utilitarianism, deontology, virtue ethics) ✓ Applying ethical decision-making models to real-life case studies in biomedical engineering **Ethical Considerations in Global MIE & BME** ✓ Ethical challenges in global health technology development and deployment Equity, access, and cultural considerations in global biomedical engineering initiatives

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts		No
Recommended Texts	**Ethics for Biomedical Engineers** **Biomedical Ethics for Engineers: Ethics and Decision Making in Biomedical and Biosystem Engineering (Biomedical Engineering Series) 1st Edition**	No
Websites	**https://engineering.uiowa.edu/bme/resources/ethics-and-integrity**	

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	**Electronic Circuits**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE211**				
ECTS Credits	**6**				
SWL (hr/sem)	**153**				
Module Level	**Second**		**Semester of Delivery**		**Second**
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Sinan Salim Mohammed Sheet**		**e-mail**	**Sinan_sm76@ntu.edu.iq**	
Module Leader's Acad. Title	**Lecturer**		**Module Leader's Qualification**		**Master**
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. This course aims to give a general introduction to electronic Transistors and their various types and applications. 2. Be familiar with the current and voltage characteristics of the Transistors circuits. 3. Types of Transistors basing circuits. 4. Current and voltage amplifier circuit using Transistor. 5. The identify a several types of Transistor amplifiers based on their functions.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Describe the basic structure of the BJT 2. Discuss basic BJT operation 3. Discuss basic BJT parameters and characteristics and analyze transistor circuits. 4. Discuss how a BJT is used as a voltage amplifier 5. Discuss how a BJT is used as a switch 6. Discuss the phototransistor and its operation 7. Identify various types of transistor packages 8. Discuss and determine the dc operating point of a linear 9. amplifier 10. Analyze a voltage-divider biased circuit 11. Analyze an emitter bias circuit, a base bias circuit, an emitter-feedback bias circuit, and a collector-feedback bias circuit 8. Describe amplifier operation 9. Discuss transistor models 10. Describe and analyze the operation of common-emitter amplifiers 11. Describe and analyze the operation of common-collector amplifiers 12. Describe and analyze the operation of common-base amplifiers 13. Describe and analyze the operation of multistage amplifiers 14. Discuss the differential amplifier and its operation 15. Explain and analyze the operation of common-source 16. FET amplifiers 17. Explain and analyze the operation of common-drain FET amplifiers 18. Explain and analyze the operation of common-gate FET amplifiers 19. Discuss the operation of a class D amplifier 20. Describe how MOSFETs can be used in analog switching applications 21. Describe how MOSFETs are used in digital switching applications 22. Familiar with Multisim programming.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Bipolar Junction Transistor (BJT) Structure, Basic BJT Operation, BJT Characteristics and Parameters, The BJT as an Amplifier, The BJT as a Switch, The Phototransistor.[18 hrs] • The DC Operating Point, Voltage-Divider Bias, Other Bias Methods. [15 hrs] • Amplifier Operation, Transistor AC Models, The Common-Emitter Amplifier, The Common-Collector Amplifier, The Common-Base Amplifier, Multistage Amplifiers, The Differential Amplifier. [21 hrs]

	• The Common-Source Amplifier, The Common-Drain Amplifier, The Common-Gate Amplifier, The Class D Amplifier, MOSFET Analog Switching, MOSFET Digital Switching.[18 hrs] • A datasheet is discussed for specific diodes.[3 hrs]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The main strategies that will be adopted in this module will be focused on engaged learning. This is achieved by keeping the students working together throughout the semester by engaging them in lab groups in addition to a project to be built during the semester and presented on final week. Engagement will be stimulated in the class for better comprehension of the lectures.

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

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	90	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	63	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**153**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	10% (10)	3,5,7,9	LO # 3, 5,10, 11
	Assignments	8	10% (10)	1,2,4,6,8,10,12 ,14	ALL
	Projects / Lab.	15	10% (10)	Continuous	All
	Report	5	10% (10)	4,6,8,10,12	LO #3-10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - 7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Bipolar junction transistor (BJT)(structure and operation)
Week 2	Bipolar junction transistor (BJT) characteristics and parameters
Week 3	Bipolar junction transistor (BJT) as an amplifier
Week 4	Bipolar junction transistor (BJT) as switch and photosensor
Week 5	Transistor Biasing (The DC operation point)
Week 6	Transistor Biasing (The Voltage divider biasing)
Week 7	Transistor Biasing (The other biasing circuits)
Week 8	BJT amplifiers (amplifier operation, the Common-emitter amplifier)
Week 9	BJT amplifiers (the Common-collector and common-base amplifiers)
Week 10	BJT amplifiers (the Multi-stage and differential amplifiers)
Week 11	FET (amplifier and switching circuits(common-source, common- drain amplifiers)
Week 12	FET (amplifier and switching circuits(common-gate, class D amplifiers)
Week 13	MOSFET analog switch and MOSFET digital switch circuits
Week 14	Bipolar junction transistor (BJT)(structure and operation)
Week 15	Bipolar junction transistor (BJT) characteristics and parameters

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Transistor characteristics
Week 2	Transistor voltage divider biasing circuit
Week 3	Transistor voltage other biasing circuits(part1)
Week 4	Transistor voltage other biasing circuits(part2)
Week 5	Transistor amplifier circuits (common emitter)
Week 6	Transistor amplifier circuits (common collector amplifier)
Week 7	Transistor amplifier circuits (common base amplifier)
Week 8	FET Transistor characteristics circuits
Week 9	FET Transistor class A amplifier
Week 10	FET Transistor class B amplifier
Week 11	Inverting amplifier
Week 12	no-inverting amplifiers

Week 13	Analog comparator
Week 14	The integrator
Week 15	The differential circuit

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	electronic-devices-by-floyd-9th-edition	yes
Recommended Texts		
Websites		

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Systematic Training 2**			**Module Delivery**	
Module Type	**Core**			☐**Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☒ **Seminar**	
Module Code	**MIE312**				
ECTS Credits	**4**				
SWL (hr/sem)	**101**				
Module Level	**Third**		**Semester of Delivery**	**Sixth**	
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Mohammed Sabah Jarjees**		**e-mail**	**mohammed.s.jarjees@ntu.edu.iq**	
Module Leader's Acad. Title	**Assistant Professor**		**Module Leader's Qualification**	**Ph.D.**	
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1-Assessment and diagnosis inspecting the malfunctioning medical instrument to identify the problem. 2-Disassembly and Following the manufacturer guidelines and safety precautions. 3-Component Testing and Replacement by Inspecting individual components and 4-Functional Testing by perform functional tests to ensure proper operation.

	5-Documentation and Quality Control by create detailed documentation of the repair process, including the identified problem, replaced components, cleaning procedures, and test results.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Assess and diagnose malfunctioning medical instruments in hospitals, including ECG, EMG, EEG devices, X-ray machines, CT scanners, MRI machines, diagnostic ultrasound devices, endoscopy equipment, hemodialysis machines, surgical diathermy units, dental units, anesthetic machines, audiometers and hearing aids, and intensive care units. 2. Safely disassembles medical instruments following manufacturer guidelines and safety precautions. 3. Tests and replace individual components by inspecting and evaluating their functionality. 4. Perform functional tests on repaired instruments to ensure proper operation. 5. Creates detailed documentation of the repair process, including the identified problem, replaced components, cleaning procedures, and test results. 6. Applying quality control measures to ensure the repaired instruments meet the required standards.
Indicative Contents المحتويات الإرشادية	Week 1: Fundamental Practical Application in Hospitals (4 hours) • Introduction to medical instruments used in hospitals • Importance of proper maintenance and repair • Overview of common issues and troubleshooting techniques Week 2: ECG (Electrocardiography) (6 hours) • Principles and functioning of ECG machines • Common ECG abnormalities and interpretation • Hands-on practice with ECG equipment and lead placement Week 3: EMG (Electromyography) (6 hours) • Introduction to electromyography and its applications • Understanding muscle activity and nerve conduction • Performing and interpreting EMG tests Week 4: EEG (Electroencephalography) Devices (6 hours) • Basics of brainwave measurement and EEG equipment • Electrode placement and signal acquisition • Analysis and interpretation of EEG data Week 5: X-ray Machine (6 hours) • Principles of X-ray imaging and radiation safety • Operation and maintenance of X-ray machines • Image quality assessment and troubleshooting Week 6: CT-Scanner (6hours) • Working principles of CT-scanners • Image reconstruction and interpretation • Quality assurance and calibration of CT-scanners Week 7: MRI (Magnetic Resonance Imaging) (6 hours) • Fundamentals of MRI technology and safety considerations • Image acquisition and interpretation • Common artifacts and troubleshooting in MRI Week 8: Diagnostic Ultrasound (6 hours) • Principles of ultrasound imaging and transducer technology

	• Performing ultrasound examinations in various medical fields • Interpretation of ultrasound images and diagnostic criteria Week 9: Endoscopy (6 hours) • Overview of endoscopic procedures and equipment • Techniques for proper handling and cleaning of endoscopes • Troubleshooting common issues and ensuring optimal performance Week 10: Hemodialysis Machine (4 hours) • Functions and components of hemodialysis machines • Maintenance and calibration of hemodialysis equipment • Ensuring patient safety during dialysis procedures Week 11: Surgical Diathermy (4 hours) • Introduction to surgical diathermy devices and their applications • Safe operation and precautions during surgical procedures • Maintenance and troubleshooting of diathermy equipment Week 12: Dental Units (6hours) • Components and functions of dental units • Sterilization procedures for dental instruments • Preventive maintenance and troubleshooting techniques Week 13: Anesthetic Machine (6 hours) • Operating principles of anesthetic machines • Safety considerations and gas delivery systems • Routine maintenance and troubleshooting Week 14: Audiometers and Hearing Aids (4 hours) • Introduction to audiometric testing and hearing assessment • Calibration and usage of audiometers • Overview of hearing aid technology and fitting Week 15: Intensive Care Units (4 hours) • Essential equipment and monitoring devices in ICU settings • Proper usage, calibration, and troubleshooting of ICU equipment • Critical care considerations and patient safety measure

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Presentations: Delivering presentations to provide theoretical explanations, principles, and important concepts related to each medical instrument. 2. Hands-on Practical Sessions: Conducting practical sessions where participants can gain hands-on experience in using the medical instruments, practicing lead placement, performing tests, and operating the equipment under guidance. 3. Case Studies and Problem-Solving: Using case studies and problem-solving activities to encourage critical thinking and application of knowledge, allowing participants to analyze situations and propose solutions related to the medical instruments. 4. Group Discussions and Peer Learning: Facilitating group discussions and peer learning to encourage active engagement, knowledge sharing, and collaborative learning among participants.

	5. Practical Demonstrations: Providing practical demonstrations by instructors to showcase the proper usage, maintenance, and troubleshooting techniques of the medical instruments. 6. Interactive Online Resources: Supplementing the course with interactive online resources, such as videos, simulations, and modules, to enhance understanding and retention of the material, allowing participants to access these resources outside of class hours.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	75	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	26	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.73
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**101**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	-	-	-	-
	Assignments	-	-	-	-
	Projects / Lab.	8	20% (10)	Continuous	All
	Report	1	10% (10)	13	All
Summative assessment	**Midterm Exam**	1hr	20% (10)	7	LO #1 - #6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Practical Plan (Weekly Syllabus)

المنهاج الاسبوعي العملي

	Material Covered
Week 1	Fundamental practical application in hospitals
Week 2	ECG
Week 3	EMG
Week 4	EEG devices

Week 5	X-RAY machine
Week 6	CT-SCANNER
Week 7	MRI
Week 8	Diagnostic Ultrasound
Week 9	Endoscopy
Week 10	Hemodialysis Machine
Week 11	Surgical Diathermy
Week 12	dental units
Week 13	anesthetic machine
Week 14	Audiometers and Hearing Aids
Week 15	Intensive care units

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. "Medical Instrumentation: Application and Design" by John G. Webster and William J. Tompkins 2. "Introduction to Biomedical Equipment Technology" by Joseph J. Carr and John M. Brown 3. "Biomedical Instrumentation and Measurements" by Leslie Cromwell, Fred J. Weibell, and Erich A. Pfeiffer	No
Recommended Texts	1. "Principles of Medical Electronics and Biomedical Instrumentation" by C.R. Choudhary 2. "Biomedical Signal Processing and Signal Modeling" by Swamy Laxminarayan and Amit Acharyya 3. "Clinical Engineering Handbook" by Joseph Dyro 4. "Medical Instrumentation: Accessibility and Usability Considerations" by Oliver Faust	No
Websites	1. Association for the Advancement of Medical Instrumentation (AAMI) - www.aami.org 2. Medical Device Manufacturers Association (MDMA) - www.medicaldevices.org 3. National Electrical Manufacturers Association (NEMA) - www.nema.org 4. Food and Drug Administration (FDA) - www.fda.gov/medicaldevices	

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	**Medical Diagnostic Instrumentation**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE301**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	**Third**		**Semester of Delivery**	**Fifth**	
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Zaid Husham Dahham**		**e-mail**	**zaidalsawaff@ntu.edu.iq**	
Module Leader's Acad. Title	**Lecturer**		**Module Leader's Qualification**	**Ph.D.**	
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Understanding the basic principles of instrumentation and measurement techniques used in all types of medical diagnosing machines.

	2. Familiarize students with the different types of diagnosing equipment used in clinics and hospitals, such as x-ray machines, MRI machines, Gamma cameras, etc. 3. Developing an understanding of the appropriate use and maintenance of equipment to ensure accurate and reliable results. 4. Understanding the principles of quality control and quality assurance in laboratory testing, including the use of equipment validation and calibration procedures. 5. Developing skills in instrument troubleshooting and problem-solving in order to ensure accurate and reliable laboratory results. 6. Understanding the importance of safety and regulatory compliance in laboratory settings, including the safe handling and disposal of hazardous materials.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explain the principles and operation of medical diagnostic instruments used in clinical practice. 2. Demonstrate knowledge of the different types of medical diagnostic instruments, including imaging systems, electrocardiography machines, and other diagnostic devices. 3. Identify and describe the safety protocols and guidelines for medical diagnostic instruments and demonstrate the ability to implement them. 4. Describe the principles of data acquisition, processing, and interpretation for medical diagnostic instruments. 5. Explain the importance of quality control in medical diagnostic instruments and demonstrate the ability to implement quality control techniques. 6. Demonstrate an understanding of the practical applications of medical diagnostic instruments in healthcare, including clinical diagnoses, treatment planning, and patient monitoring. 7. Analyze and evaluate the performance of medical diagnostic instruments in a clinical setting, including their accuracy, precision, and reliability.
Indicative Contents المحتويات الإرشادية	Indicative contents for Medical Diagnostic Instruments for 3rd year Department of Medical Instrumentation Technology may include the following: 1. Introduction to Medical Diagnostic Instruments • Overview of medical diagnostic instruments • Importance of diagnostic instruments in healthcare • Types of diagnostic instruments 2. Imaging Systems • Principles of medical imaging • X-ray imaging • Computed tomography (CT) • Magnetic resonance imaging (MRI) • Ultrasound imaging 3. Electrocardiography (ECG) and other bioelectric signal recording systems

	• Principles of ECG • ECG waveforms and interpretation • ECG machines and electrodes 4. Other Diagnostic Devices • Blood pressure monitors • Pulse oximeters • Spirometry devices • Glucose meters 5. Safety Protocols and Guidelines • Hazardous materials in diagnostic instruments • Safety protocols and guidelines • Personal protective equipment (PPE) 6. Data Acquisition, Processing, and Interpretation • Principles of data acquisition and processing • Data interpretation for different diagnostic instruments • Quality control in data acquisition and processing 7. Practical Applications of Medical Diagnostic Instruments • Clinical diagnoses • Treatment planning • Patient monitoring 8. Performance Evaluation of Medical Diagnostic Instruments • Accuracy, precision, and reliability of diagnostic instruments • Performance evaluation in a clinical setting • Emerging trends and advancements in medical diagnostic instruments

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lecture-based Teaching: Lectures can be used to provide an overview of the principles and operation of medical diagnostic instruments used in clinical practice. Lectures can also be used to introduce students to the different types of medical diagnostic instruments, their practical applications, and the emerging trends and advancements in diagnostic instruments. 2. Practical-based Teaching: Practical sessions can be used to provide hands-on experience with medical diagnostic instruments. Practical sessions can be used to demonstrate the principles of data acquisition, processing, and interpretation, as well as the safety protocols and guidelines for medical diagnostic instruments. Practical sessions can also be used to demonstrate the implementation of quality control techniques in medical diagnostic instruments.

	3. Case-based Learning: Case studies can be used to illustrate the practical applications of medical diagnostic instruments in healthcare. Case studies can be used to demonstrate the use of medical diagnostic instruments in clinical diagnoses, treatment planning, and patient monitoring. Case studies can also be used to highlight the importance of safety and quality control in medical diagnostic instruments. 4. Group-based Learning: Group-based learning can be used to promote collaboration and peer-to-peer learning. Students can be divided into groups and assigned tasks related to medical diagnostic instruments, such as developing safety protocols, implementing quality control techniques, or analyzing and evaluating the performance of diagnostic instruments in a clinical setting. 5. E-learning: Online resources, such as videos, tutorials, and interactive quizzes, can be used to supplement classroom teaching. E-learning can be used to provide additional information on medical diagnostic instruments, the principles of data acquisition and processing, safety protocols and guidelines, and the practical applications of diagnostic instruments in healthcare.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	105	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	70	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.66
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**175**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	6	5% (5)	2,4,8,10,12, 14	LO #1, #2 and #6, #7
	Assignments	8	5% (5)	Continuous	All
	Projects / Lab.	15	10% (10)	Continuous	All
	Report	4	10% (10)	3,6,9,13	LO #5, #6 and #7
Summative assessment	**Midterm Exam**	2hr	20% (20)	7	LO #1 - #5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	• Bioelectric Signals and Electrodes • Origin of Bioelectric Signals • Recording Electrodes • Silver-Silver Chloride Electrodes • Electrodes for ECG • Electrodes for EMG • Electrical Conductivity of Electrode Jellies and Creams • Microelectrodes
Weeks 2-4	• Biomedical Recorders • Electrocardiograph ECG • Vectorcardiograph VCG • Phonocardiograph PCG • Digital Stethoscope • Electroencephalograph EEG • Electromyograph • Other Biomedical Recorders • Biofeedback Instrumentation
Weeks 5, 6	• Pulmonary Function Analyzers • Pulmonary Function Measurements • Spirometry • Pneumotachometers • Measurement of Volume • Pulmonary Function Analyzers • Respiratory Gas Analyzers
Weeks 7, 8	• Modern Imaging Systems • X-Ray Machines and Digital Radiography • Basis of Diagnostic Radiology • Nature of X-Rays • Production of X-Rays • X-Ray Machine • Visualization of X-Rays • Dental X-Ray Machines • Portable and Mobile X-Ray Units • Physical Parameters for X-Ray Detectors • Digital Radiography
Week 9	• X-Ray Computed Tomography • Computed Tomography • System Components • Gantry Geometry • System Electronics • Patient Dose in CT Scanners
Week 10	• Nuclear Medical Imaging Systems • Radio-Isotopes in Medical Diagnosis • Physics of Radioactivity • Radiation Detectors

	• Pulse Height Analyzer • Uptake Monitoring Equipment • The Gamma Camera • Whole Body Gamma Cameras • Emission Computed Tomography • Single-Photon-Emission-Computed Tomography (SPECT) • Positron Emission Tomography (PET) Scanner
Week 11	• Magnetic Resonance Imaging System • Principle of NMR Imaging System • Image Reconstruction Techniques • Basic NMR Components • Biological Effect of NMR Imaging • Advantages of NMR Imaging System • Ultrasonic Imaging Systems
Weeks 12, 13	• Diagnostic Ultrasound • Physics of Ultrasonic Waves • Medical Ultrasound • Basic Pulse-Echo Apparatus • Imaging Modes • Real-Time Ultrasonic Imaging Systems • Mechanical Sector Scanner • Multi-Element Linear Array Scanners • Duplex Scanner • Modern Ultrasound Imaging Systems • Area Array Systems • Three-Dimensional Ultrasound Imaging Systems • Intravascular Imaging • Tissue Harmonic Imaging • Portable Ultrasound Systems • Biological Effects of Ultrasound
Weeks 14, 15	• Endoscopy • Introduction to Endoscopy: history, basic principles, and Applications • Anatomy and Physiology of the gastrointestinal tract • Components of endoscopes: light sources, cameras, lenses, and image processors • Types of endoscopes: rigid, flexible, capsule, and robotic • Techniques for image enhancement: contrast agents, chromoendoscopy, and virtual chromoendoscopy • Complications associated with endoscopy: bleeding, perforation, and infection • Patient safety during endoscopic procedures: sedation, monitoring, and emergency response • Emerging technologies in endoscopy: artificial intelligence, virtual reality, and nanotechnology

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Weeks 1 - 4	Studying the biomedical signal using the Biomedical Measurement training system KL-730 kit ECG signal, EMG signals, EEG signals, EOG signals, etc.
Weeks 5, 6	Practical training about operating and maintaining the Pulmonary Function Analyzers
Weeks 7, 8	Practical training about operating and maintaining the X-Ray Machines
Week 9	Practical training about operating and maintaining the X-Ray Computed Tomography
Week 10	Practical training about operating and maintaining the Nuclear Medical Imaging Systems
Week 11	Practical training about operating and maintaining Magnetic Resonance Imaging System
Weeks 12, 13	Practical training about operating and maintaining Diagnostic Ultrasound
Weeks 14, 15	Practical training about operating and maintaining Endoscopic system

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. "Medical Instrumentation: Application and Design" by John G. Webster 2. "Introduction to Biomedical Equipment Technology" by Joseph J. Carr and John M. Brown	No
Recommended Texts	1. Khandpur, R.S. (2014). Handbook of Biomedical Instrumentation, 3rd Edition. McGraw-Hill Education.	No
Websites	1. https://www.nibib.nih.gov/ 2. https://www.rsna.org/	

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 Electronic**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE302**				
ECTS Credits	**4**				
SWL (hr/sem)	**105**				
Module Level		**Third**	**Semester of Delivery**		**Fifth**
Administering Department		**Med. Ins. Tech. Eng.**	**College**	**Technical Engineering College**	
Module Leader	**Osamah Basheer Noori**		**e-mail**	**usamaengeng@ntu.edu.iq**	
Module Leader's Acad. Title		**Assistant Lecturer**	**Module Leader's Qualification**		**Master**
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name		**Mohammed S Jarjees**	**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date		**01/06/2023**	**Version Number**	**1.0**	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Fundamentals of electrical engineering	**Semester**	1
Co-requisites module	Electrical Technology	**Semester**	2

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	After completing the course, the student will: 1. Have an in-depth understanding of the theory of electrical energy conversion using power electronic systems that perform AC/DC, DC/DC or DC/AC conversion. 2. Understand operating principles and modulation strategies for single-phase and three phase diode rectifiers, as well as, switch-mode DC/DC power electronic converters and DC/AC inverters.

	3. Recognize, define, and analyze power electronic converters that perform AC/DC, DC/DC and DC/AC electrical energy conversions. 4. Analyze the operating principles and modulation strategies for single-phase and three phase diode rectifiers, thyristor-based converters, as well as, switch-mode DC/DC power electronic converters and DC/AC inverters. 5. Efficient use instruments and equipment in the laboratory.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Acquire knowledge about fundamental concepts and techniques used in power electronics. 2. Ability to analyze various single phase and three phase power converter circuits and understand their applications. 3. Foster ability to identify basic requirements for power electronics based design application. 4. To develop skills to build, and troubleshoot power electronics circuits. 5. Foster ability to understand the use of power converters in commercial and industrial applications.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction to power electronics, Switching devices, power & control device, Types and characteristic, rating (diode, transistor …). Methods of turning – on & turning – off ,Protection of power devices, Triggering & base drive circuits [16 hrs] Controlled rectifiers, 1 – phase & 3 – phase circuits, Half – wave & full – wave circuits [6 hrs] D.C choppers; step – up & step – down choppers. [2 hrs] A.C phase controllers. [2 hrs] Invertors, 1 – phase & 3 – phase bridges [2 hrs] Some applications: uninterruptible power supply (UPS), switching mode power supply (SMP). [2 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is the Discovery learning, experiments, demonstrations, questioning, discussion, feedback, and lecturing. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	45	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**105**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	10% (10)	2,4,6,10	LO #1, #2, #3
	Assignments	5	10% (10)	3,5,8,9,11	LO #3, #4
	Projects / Lab.	15	10% (10)	Continuous	All
	Report	2	10% (10)	13	LO #2, #3 and #5
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #3
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to power electronics, Switching devices, power & control device
Week 2	Introduction to power electronics, Switching devices, power & control device
Week 3	Introduction to power electronics, Switching devices, power & control device
Week 4	Types and characteristic, rating (diode, transistor …).
Week 5	Methods of turning – on & turning – off
Week 6	Methods of turning – on & turning – off
Week 7	Protection of power devices
Week 8	Triggering & base drive circuits
Week 9	Controlled rectifiers , 1 – phase & 3 – phase circuits
Week 10	Controlled rectifiers , 1 – phase & 3 – phase circuits
Week 11	Half – wave & full – wave circuits
Week 12	D.C choppers ; step – up & step – down choppers
Week 13	A.C phase controllers
Week 14	Invertors, 1 – phase & 3 – phase bridges
Week 15	Some applications : uninterruptible power supply (UPS), switching mode power supply (SMP)
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: 1 – phase Controlled rectifiers
Week 2	Lab 2: 3 – phase Controlled rectifiers
Week 3	Lab 3: 3 – phase Controlled rectifiers
Week 4	Lab 4: Half – wave & full – wave circuits
Week 5	Lab 5: Half – wave & full – wave circuits
Week 6	Lab 6: D.C choppers ; step – up & step – down choppers
Week 7	Lab 7: D.C choppers ; step – up & step – down choppers
Week 8	Lab 8: D.C choppers ; step – up & step – down choppers
Week 9	Lab 9: A.C phase controllers
Week 10	Lab 10: A.C phase controllers
Week 11	Lab 11: A.C phase controllers
Week 12	Lab 12: A.C phase controllers
Week 13	Lab 13: Invertors, 1 – phase & 3 – phase bridges
Week 14	Lab 14: Invertors, 1 – phase & 3 – phase bridges
Week 15	Lab 15: Invertors, 1 – phase & 3 – phase bridges

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Power Electronics: Converter, Applications and Design" by N Mohan and W P Robbins	No
Recommended Texts	Power Electronics: Circuits, Devices and Applications" by M H Rashid	No
Websites	https://www.coursera.org/learn/power-electronics	

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	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded

(0 – 49)	**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	**Signal Processing**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE 303**				
ECTS Credits	**6**				
SWL (hr/sem)	**154**				
Module Level	**Third**		**Semester of Delivery**	**Fifth**	
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Eanass Usama Taha**		**e-mail**	**eshabkhoontc@ntu.edu.iq**	
Module Leader's Acad. Title	**Lecturer**		**Module Leader's Qualification**	**Ph.D**	
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To going on translating signal indication to formula. 2. To provide an actual description of system linearly. 3. To deal with linear equation instead of higher order differential equation. 4. To analyze system based on band. 5. To analyze analog signal to harmonics frequencies.

	6. To synthesis module of system and signal from fraction.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Expect stability of system. 2. Expect compatibility between signal rate and system characteristic. 3. Test system response. 4. Provide system model and Expect Output. 5. Provide signal model. 6. Provide signal spectrum. 7. Deal with signal interference. 8. Deal with random signal. 9. Deal with denoising. 10. Deal with medical likes ECG.
Indicative Contents المحتويات الإرشادية	Fundamentals: Basically, subject depend on means of: Function and integral by part. Complex number and function. Laplace transform and properties. Fourier series. Fourier transform and properties. MATLAB Programming. Part A – Analog Signal: Analog signal can represent a function output, indication of variation, sample, event, etc. and it can be an energy, power signal, continuous, discrete, deterministic, non-deterministic, or random, dealing with them needs for definition. Part B – Analog System in Time and **S**-Domain S- Domain is mathematical description of integral formula, whenever the variable **(s)** is occurring it can convert higher order differential equation to linear equation based on Laplace Transformation Method, **(s)** has a full physical mean for electronic device, and it can control the work status of system by modelling, furthermore it can convert real analog system to digital system. System output can be given in S-Domain by rational function, or by convoluting in time domain after describing impulse response by inverse Laplace transform. Part C - Fourier (Series and Transform) to Frequency Domain: Fourier Series is mathematical tool to transfer periodic (power) signal to frequency domain, where it makes a periodic signal a sum of sinusoidal signals called harmonics, and it have two forms trigonometric and complex that constructed from (sine and cosine bases) and (complex exponential base) respectively. In the other hand Fourier transform can deal with energy signal (pluses).

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Telling the story of subject starting, description of Importance, defining the state of problems, solving problems, making cross check, visualization of actual state, making experiment test, talking about recent projects, beside encourage student questions and ideas as participation.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	90	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	64	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.26
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**154**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	5% (5)	5 and 10	LO #1, #2 and #10
	Assignments	4	5% (5)	2, 6,10,12	LO #3, #4 and #6, #7
	Projects / Lab.	15	10% (10)	Continuous	All
	Report	8	10% (10)	Continuous	All
Summative assessment	**Midterm Exam**	2hr	20% (20)	8	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction – signal processing functions –(Dirac, unit step, rect, tri, sgn, sine, cosine, exp)
Week 2	Dealing with complex functions and random signal
Week 3	Frequency Response of LTI System
Week 4	Impulse response of system
Week 5	Principles of convolution and problems + Assignment Home Work 1
Week 6	Trigonometric Fourier Series and Problems
Week 7	Problems for even and odd functions
Week 8	Complex Fourier Series and Problems + Assignment Home Work 2
Week 9	Mid Term exam in – Signal, System, and Fourier Series
Week 10	Introduction to Fourier and Inverse Fourier Transform – start with $[\delta(t), u(t), rect\ (t), \ldots$
Week 11	Derivation of standard Fourier forms - …. $sgn(t), t\,u(t),\ tri(t)]$ + Short Quiz 1

Week 12	Fourier Transform Properties – Part I
Week 13	Fourier Transform Properties – Part II + Short Quiz 2
Week 14	ButterWorth Filters
Week 15	Chebyshev Filters
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Dating, Arranging, Starting Google Class
Week 2	Lab 2: Getting Start in MATLAB Through Subject
Week 3	Lab 3: Dealing with MATLAB variables work space
Week 4	Lab 4: Plotting base function
Week 5	Lab 5: plotting signal processing function
Week 6	Lab 6: Study unit step response of 1st order System
Week 7	Lab 7: Study filtration of noise and harmonics
Week 8	Lab 8: Mid exam in signal generation and filtration
Week 9	Lab 9: Reconstruct data signal from sinusoidal function
Week 10	Lab 10: Reconstruct saw tooth signal from sinusoidal function
Week 11	Lab 11: Prepare Bode Plot of Analog System
Week 12	Lab 12: Prepare Bode Plot for Butterworth Filters
Week 13	Lab 13: Prepare Bode Plot for Chebyshev Filter
Week 14	Lab 14: Representation for Heart Function and Coherent ECG Signal – First Groups
Week 15	Lab 15: Representation for Heart Function and Coherent ECG Signal – Second Groups

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Signals and Systems, Schaum's Outline Series, Copyright© 2011, 1995 by The McGraw-Hill Companies,	No
Recommended Texts	Biomedical Signal and Image Processing, CRC Press, © 2012 by Taylor & Francis Group, LLC	No
Websites	Fourier Transforms Properties (tutorialspoint.com)	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Fundamentals of Communication Engineering**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE304**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	**Third**		**Semester of Delivery**	**Fifth**	
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Hussein Ali Hussein**		**e-mail**	**hussein.kwasme@ntu.edu.iq**	
Module Leader's Acad. Title	**Assistant Lecturer**		**Module Leader's Qualification**	**Master**	
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. This course aims to give a general introduction to communication systems for the student to be able to describe the system parts and 2. be familiar with the elements that affect the delivery of information.

	3. It also introduces the student to filtering of signals and 4. signal modulation and demodulation in AM and FM systems. 5. Additionally, it gives an introduction to the radiation of wireless signal. 6. Finally, it introduces the state-of-the-art system: fiber optic communication.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how communication systems work. 2. List the various terms associated with signals and systems. 3. Summarize what is meant by deterministic and random signals. 4. Describe how noise affects a communication system. 5. Discuss a channel's bandwidth and how to improve it. 6. Identify the basic RLC circuit elements and their filtering applications. 7. Explain how modulation is performed in AM system. 8. Explain how modulation is performed in FM system. 9. Explain how modulation is performed in both AM and FM systems. 10. Explain the propagation of radio waves and what constitutes the received power at the receiver. 11. Familiar with the modern communication method of Fiber Optic. 12. Familiar with MATLAB programming.
Indicative Contents المحتويات الإرشادية	• Communication system concepts: Learn to model complete communication systems including transmitter and receiver structures. Study bandwidth efficient communication techniques.[12 hrs] • Representation of signals and systems. Study characteristics of communication channels. Learn basic modulation techniques for efficient transmission of signals over communication channels. Learn modulation techniques to counteract frequency-dependent limitations of transmission (attenuation, frequency-selective fading). Learn effects of noise on systems and signals.[12 hrs] • Noise, bandwidth, gain, attenuation, and decibels: Learn to formulate and analyze effects of noise on model communication systems and signal propagation. Introduction; External noise; Internal noise; Thermal agitation noise; Shot noise; Noise figure; Noise figure measurement; Noise figure in amplifiers; Noise temperature; Noise in communication systems. [12 hrs] • Fundamentals of electronic RLC tuned circuit filters: Describe and analyze the basic types of filter circuits used in communication circuits, Low Pass Filter, High Pass Filter, Band-Pass filter, Band-stop filter. [12 hrs] • Modulation (AM & FM): Learn how to use the measurements of AM and FM signals to extract signal characteristics (e.g., modulation indices), so that signal characteristics can be modified to conform to regulatory conditions. Study different amplitude- and frequency modulation systems, study their characteristics, power efficiency and limitations. Learn coherent and non-coherent coherent communication systems. [12 hrs] • Demodulation (AM, FM): AM detectors; Envelope detection; Practical diode detector; VSB demodulators; Synchronous detector; Phase-Locked Loop (PLL); FM discriminators; Ratio detector; PLL frequency discriminator; Demodulation of phase modulated waves. [6 hrs] • Propagation of Radio Waves: Reflection/refraction of radio waves; Ground waves; Atmospheric absorption; Tropospheric scatter; Ionospheric layers; Sky waves; Virtual height. [6 hrs] • Fiber Optic Communications: Optical communication; Basic fiber optic system; Advantages; Optical fiber construction; Modes of propagation; Numerical aperture; Losses in optical fiber; Optical communication system. [6 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategies that will be adopted in this module will be focused on engaged learning. This is achieved by keeping the students working together throughout the semester by engaging them in lab groups in addition to a project to be built during the semester and presented on final week. Engagement will be stimulated in the class for better comprehension of the lectures.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	90	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	60	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	6	5% (5)	2,4,6,8,9,11	LO #1, #2 and #10, #11
	Assignments	6	5% (5)	3,5,6,7,9,12	LO #3, #4 and #6, #7
	Projects / Lab.	13	10% (10)	Continuous	All
	Report	4	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	20% (20)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Communication system concepts
Week 2	Communication system concepts

Week 3	Representation of signals and systems.
Week 4	Representation of signals and systems.
Week 5	Noise, bandwidth, gain, attenuation, and decibels
Week 6	Noise, bandwidth, gain, attenuation, and decibels
Week 7	Fundamentals of electronic RLC tuned circuit filters
Week 8	Fundamentals of electronic RLC tuned circuit filters
Week 9	Modulation (Amplitude Modulation)
Week 10	Modulation (Amplitude Modulation)
Week 11	Modulation (Frequency Modulation)
Week 12	Modulation (Frequency Modulation)
Week 13	Demodulation (AM, FM)
Week 14	Propagation of Radio Waves
Week 15	Fiber Optic Communications
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to MATLAB
Week 2	Introduction to MATLAB
Week 3	Introduction to MATLAB
Week 4	Introduction to MATLAB
Week 5	Signal Demodulation in MATLAB
Week 6	Small group project in MATLAB
Week 7	RLC Circuits in MATLAB
Week 8	RLC Circuits in MATLAB
Week 9	RLC Circuits in MATLAB
Week 10	Signal Modulation in MATLAB
Week 11	Signal Modulation in MATLAB
Week 12	Signal Demodulation in MATLAB
Week 13	Signal Demodulation in MATLAB
Week 14	Small group project in MATLAB
Week 15	Small group project in MATLAB

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Principles of Communication Engineering, Anokh Singh	No
Recommended Texts	Modern Digital and Analog Communication Systems; B. P. Lathi, Zhi Ding - Oxford University Press (2009)	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	**English Language 3**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE305**				
ECTS Credits	**3**				
SWL (hr/sem)	**78**				
Module Level	**Third**		**Semester of Delivery**	**Fifth**	
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Marwa Mawfaq Mohamedsheet**		**e-mail**	**marwa.alhatab@ntu.edu.iq**	
Module Leader's Acad. Title	**Assist. lecturer**		**Module Leader's Qualification**	Master	
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The objective of this subject is to reinforce and expand upon advanced grammar concepts and tenses, enhance vocabulary, develop speaking and writing skills, and consolidate learning through review and assessment. The course aims to solidify understanding of complex grammar structures such as subjunctive mood, phrasal verbs, complex sentence structures, causative verbs, conditionals, modal perfects, and reported speech. Vocabulary expansion will focus on expressing wishes, hypothetical situations, regrets, and using idiomatic

	expressions. Speaking and writing practice will involve engaging in group discussions, presentations, incorporating advanced language structures, and utilizing cohesive devices. The course will culminate in a final exam, while reviewing and assessing progress through listening tasks and the application of learned language skills.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Grammar Proficiency: Students will demonstrate a solid understanding of advanced grammar concepts and tenses, including the subjunctive mood, phrasal verbs, complex sentence structures, causative verbs, conditionals, discourse markers, modal perfects, and reported speech. 2. Vocabulary Expansion: Students will expand their vocabulary by learning and consolidating new words and expressions related to various thematic areas, such as expressing wishes, hypothetical situations, colloquial language, connectors and transition words, actions performed by others, hypothetical scenarios, regrets, and reporting different types of speech acts. 3. Speaking Skills Development: Students will engage in group discussions and presentations, applying their language skills to express opinions, provide reasons, discuss situations where someone is made to do something, talk about regrets and unreal situations, and use discourse markers effectively. 4. Writing Skills Improvement: Students will practice writing in different formats, including writing about ideal scenarios or utopian societies, incorporating phrasal verbs and idioms, writing argumentative essays or persuasive speeches, writing about missed opportunities or hypothetical scenarios, and composing dialogues using mixed reported speech. 5. Listening Comprehension: Students will enhance their listening skills by effectively extracting key information from complex lectures or speeches, demonstrating the ability to understand and comprehend the content.
Indicative Contents المحتويات الإرشادية	Part A: 1. Review of grammar concepts and tenses covered in the advanced level: 10 hours 2. Vocabulary expansion: Review and consolidation of vocabulary: 8 hours 3. Speaking practice: Engaging in group discussions and presentations: 7 hours 4. Writing practice: Expressing ideas and opinions in written form: 10 hours Part B: 1. Grammar focus: Advanced grammar topics and structures: 8 hours 2. Vocabulary expansion: Building a wider range of vocabulary: 6 hours 3. Listening skills: Developing listening comprehension through various activities: 7 hours 4. Speaking practice: Expressing thoughts and engaging in conversations: 10 hours
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	

Strategies	1. Active Participation: Engage actively in class discussions and presentations, contribute ideas, and ask questions to enhance understanding and communication skills. 2. Regular Practice: Consistently practice grammar exercises, vocabulary expansion activities, and writing prompts to reinforce learning and develop fluency and accuracy. 3. Utilize Resources: Make use of recommended texts, online platforms, and authentic materials to supplement learning, improve language proficiency, and gain exposure to real-world contexts. 4. Time Management: Plan study schedules, allocate dedicated time for each skill area, and prioritize tasks to ensure comprehensive coverage and efficient progress. 5. Seek Feedback: Actively seek feedback from instructors and peers on speaking and writing tasks, utilize feedback to identify areas for improvement, and incorporate suggestions to refine language skills and enhance performance.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	45	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	33	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**78**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	10% (10)	2,4,6,8	Lo# 1, 2, 3,4
	Assignments	3	10% (10)	9,10,12	Lo# 3,4,5
	Lab	0	0	-	-
	Report	0	0	-	-
Summative assessment	**Midterm Exam**	2hr	20% (20)	13	Lo# 1-4
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Stage 3 topics and objectives ✓ Review of grammar concepts and tenses covered in the advanced level ✓ Vocabulary expansion: Review and consolidation of vocabulary ✓ Speaking practice: Group discussions and presentations
Week 2	Grammar focus: Subjunctive mood ✓ Vocabulary expansion: Expressing wishes and hypothetical situations ✓ Reading comprehension: Texts featuring subjunctive mood ✓ Writing practice: Writing about ideal scenarios or utopian societies
Week 3	Grammar focus: Phrasal verbs and idiomatic expressions ✓ Vocabulary expansion: Colloquial language and informal expressions ✓ Speaking practice: Using phrasal verbs and idioms in conversations ✓ Writing practice: Incorporating phrasal verbs and idioms in written compositions
Week 4	Grammar focus: Complex sentence structures ✓ Vocabulary expansion: Connectors and transition words ✓ Speaking practice: Expressing opinions and providing reasons Writing practice: Writing argumentative essays or persuasive speeches
Week 5	Grammar focus: Causative verbs (make, have, get) ✓ Vocabulary expansion: Actions performed by others ✓ Reading comprehension: Texts with causative verb structures ✓ Speaking practice: Discussing situations where someone is made to do something
Week 6	Grammar focus: Conditionals (mixed and unreal conditionals) ✓ Vocabulary expansion: Hypothetical situations and regrets ✓ Speaking practice: Discussing regrets and unreal situations ✓ Writing practice: Writing about missed opportunities or hypothetical scenarios
Week 7 **Week 8**	Grammar focus: Discourse markers and cohesive devices ✓ Vocabulary expansion: Using cohesive devices to connect ideas ✓ Reading comprehension: Texts with complex sentence structures Speaking practice: Using discourse markers in conversations
Week 9 **Week 10**	Grammar focus: Modal perfects (should have, could have, might have) ✓ Vocabulary expansion: Regrets and missed opportunities ✓ Speaking practice: Discussing past decisions and their consequences ✓ Writing practice: Writing about personal regrets or lessons learned
Week 11	Grammar focus: Reported speech (mixed types) ✓ Vocabulary expansion: Reporting different types of speech acts ✓ Speaking practice: Practicing reported speech in various contexts ✓ Writing practice: Writing a dialogue using mixed reported speech
Week 12	✓ Review of grammar concepts and tenses covered so farVocabulary
Week 13	✓ Expansion: Review and consolidation of vocabulary Speaking practice: Reviewing and applying learned language skills

Week 14 **Week 15**	✓ Listening skills: Listening to complex lectures or speeches and extracting key information ✓ Final exam
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. "English Grammar in Use" by Raymond Murphy: A comprehensive grammar reference book with explanations and practice exercises. 2. "Academic Vocabulary in Use" by Michael McCarthy and Felicity O'Dell: A vocabulary resource specifically designed for academic purposes. 3. "Cambridge IELTS series" or "Official Guide to the TOEFL Test": Official practice test books for the respective exams, providing authentic test materials. 4-"The Practice of English Language Teaching" by Jeremy Harmer: A popular reference book that covers various aspects of English language teaching methodology and techniques	No
Recommended Texts	1. "Speakout" by Frances Eales and Steve Oakes: A comprehensive English coursebook with interactive activities and integrated skills practice. 2. "Advanced Writing with English in Use" by Martin Hewings: A writing resource book focusing on advanced writing skills and language usage. 3. "Oxford Advanced Learner's Dictionary" or "Cambridge Advanced Learner's Dictionary": Comprehensive dictionaries providing definitions, examples, and pronunciation guides.	No
Websites	1. British Council LearnEnglish (https://learnenglish.britishcouncil.org/): Offers a wide range of resources, including grammar and vocabulary exercises, listening activities, and interactive lessons. 2. Cambridge English (https://www.cambridgeenglish.org/): Provides official exam information, sample papers, and practice materials for IELTS and Cambridge English exams. 3. ETS TOEFL (https://www.ets.org/toefl): Official website for the TOEFL exam, offering test preparation resources, sample questions, and practice tests. 4. Quizlet (https://quizlet.com/): An online platform with flashcards, quizzes, and study sets for vocabulary practice and other language learning topics. 5. Purdue Online Writing Lab (https://owl.purdue.edu/): A comprehensive resource for academic writing, including writing tips, grammar explanations, and citation guides.	

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	**Computer Applications**			**Module Delivery**	
Module Type	**Supported**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE 306**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	**Third**	**Semester of Delivery**	**Fifth**		
Administering Department	**Med. Ins. Tech. Eng.**	**College**	**Technical Engineering College**		
Module Leader	**Azza Qays abdulaljabbar**	**e-mail**	**azzakays@ntu.edu.iq**		
Module Leader's Acad. Title	**Assistant lecturer**	**Module Leader's Qualification**	**Master**		
Module Tutor	**Name (if available)**	**e-mail**	**E-mail**		
Peer Reviewer Name	**Mohammed S Jarjees**	**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**		
Scientific Committee Approval Date	**01/06/2023**	**Version Number**	**1.0**		

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Learning students features of MATLAB as a programming tool. They are fully familiar to all the features of MATLAB software and easily handle the software. 2. Students are able to use MATLAB as Simulink tool by Building Simulink models to solve the mathematical problems and solve electrical circuits. 3. Learning the graphical user interface and how implement many designs by it.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how to open MATLAB and recognize the main windows of it. 2. Introduction to some mathematical function and applied it in command window. 3. Define the matrices and how to write it in MATLAB and define the type of it.

	4. Applied basic operation and mathematical operation on matrices in MATLAB. 5. Learn the programming in MATLAB with M-file. 6. Applied program about flow control statement (if –else, switch, for loop, ….) 7. Recognition to Simulink toolbox with component. 8. Sole mathematical equation by Simulink. 9. Design Simulink models to solve electric and power electric circuit. 10. Recognition to graphic user interface (GUI) and learn how to build the project with GUI. 11. Design project to solve mathematical equation and plot graphs.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – programming in matlab • Recognition of MATLAB with all windows, write program in command window and in script file, introduction to matrices and all math operation and advanced operation on it. • Learning the logical and relational operators, writing programs by using: flow control (if-elseif-else-end), the {switch} statement, the {for loop} statement the {while loop} statement and the continue statement. Part B – designs by MATLAB: • Introduction the Simulink in MATLAB, learning designs in Simulink, solve mathematical operation by Simulink models, analysis the electrical circuit by simscape library as designing models for operational amplifier application by simscape library. Also design models to sole and analysis the half and full rectifier by simpower system library. • Learning the graphical user interface(GUI) and how to design projects by it.

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	40	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.66
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	5% (10)	5 and 10	LO #1, #10
	Assignments	3	5% (10)	2,6,10	LO #3, #4 and #6, #7
	Projects / Lab.	15	10% (10)	Continuous	All
	Report	7	10% (10)	Continuous	All
Summative assessment	**Midterm Exam**	1hr	20% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to matlab program and importance of matlab in engineering fields Introduction to matlab windows: command windows and editor and debugged windows and its function. Also main menu of matlab (file, edit, view and tools)
Week 2	Introduction to mathematical functions: Cos (), sin (), tan (), exp (), sqrt (), abs(), log(). Examples about mathematical function in command window. uses the useful function in matlab DIR, Demos, date, time, fix(date)
Week 3	Fundamentals of programming in Matlab . Introduction to matrices (input the matrix, vectors) ,function deals with matrices array(), dimension(). والتعرف على طرق ادخال المصفوفات Learn about types of matrices zeros(), ones(), rand(), magic function Basic operation on matrices
Week 4	Mathematical operation on matrices Advanced operation on operation Eigen value, eigenvector, transpose, inverse, determent, multiplication, horez, vert, verti, max(), min(), find(), mod(), fix().
Week 5, 6, 7	Programing in matlab : Learn to write program in M-FILE and learn the input and output statement (input, fprintf and display). Logical and relational operators Flow control (if-elseif-else-end) The {switch} statement The {for loop} statement The {while loop} statement. The continue statement.
Week 8	Introduction to Simulink in matlab and importance of matlab in engineering fields. Introduction to Simulink windows and Simulink libraries sources, sinks, math operation, logic operation and advanced library and how to build the model and run it
Week 9	Build Simulink model to implement the math operation by using math operation toolbox. sqrt, sum, product, math func., trigonometric function and etc.

Week 10	learn how to plot and process the signals dsp toolbox
Week 11, 12	Introduction to simscape library. Design electrical circuit models by simscape library. Design power electronic circuit by simpower system toolbox.
Week 13	Introduction to GUI system in matlab and starting action with a GUI element Learn about guide window and each component of it (push button, slider, text box, static box, …)
Week 14	use GUI to implement the math operation design (simple calculator) use GUI to implement the operation on the matrices (input matrix-operation- output matrix)
Week 15	GUI with graphics.

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Open matlab, recognition to matlab windows and apply main function about matlab: Clc , clear all, and input the variables.
Week 2	Apply the functions on command windows: Cos (), sin (), tan (), exp (), sqrt (), abs(), log(). Apply Examples about mathematical function in command window. Apply the following function and write the results DIR, Demos, date, time, fix(date)
Week 3	Input the matrix, vectors) , in several way and apply the function about it. Such as size(), array(), dimension(). والتعرف على طرق ادخال المصفوفات apply these instruction(zeros(), ones(), rand(), magic() function) Basic operation on matrices
Week 4	Apply the math operation on matrices (addition, subtraction, multiplication, division, transpose, determinate and other operations.
Week 5, 6, 7	Programing in matlab : Write simple program in M-FILE and learn the input and output statement (input, fprintf and display). Apply examples about Logical and relational operators Apply programs about : Flow control (if-elseif-else-end) The {switch} statement The {for loop} statement The {while loop} statement. The continue statement.
Week 8	Open Simulink, identify the libraries: sources, sinks, math operation, logic operation and advanced library and blocks included. Example to build new model, add blocks to model and run it.
Week 9	Apply examples to solve the mathematical function in Simulink.
Week 10	Examples to plot the sine wave and cosine with dsp toolbox
Week 11	Design models to implement the op-amp circuit with application of it by simscape library
Week 12	Design circuit with simpower system to implement half and full wave rectifier
Week 13	Identify the GUIDE widows with all component and design new model step by step collect the figure component and programing it.

Week 14	Design simple calculator by GUI, Apply another examples about matrices and it is operation by GUI.
Week 15	Implement GUI programs to display different signal (sin, cosine….)

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	INTRODUCTION TO MATLAB FOR ENGINEERING STUDENTS David Houcque, August 2005	Yes
Recommended Texts	Learning to Program with MATLAB: Building GUI Tools, 2nd Edition, Craig S. Lent	No
Websites	www.mathworks.com	

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Medical Electronic Systems**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE302**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	**Third**	**Semester of Delivery**	**Sixth**		
Administering Department	**Med. Ins. Tech. Eng.**	**College**	**Technical Engineering College**		
Module Leader	**Khaleel Nawfal Khaleel**	**e-mail**	**khalil.nawfeal@ntu.edu.iq**		
Module Leader's Acad. Title	**Assistant Lecturer**	**Module Leader's Qualification**	**Master**		
Module Tutor	**Name (if available)**	**e-mail**	**E-mail**		
Peer Reviewer Name	**Mohammed S Jarjees**	**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**		
Scientific Committee Approval Date	**01/06/2023**	**Version Number**	**1.0**		

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1) To develop problem solving skills and understanding of circuit theory through the application of techniques. 2) To understand voltage and current from a given circuit. 3) This course deals with the advance concept of electronic circuits. 4) This is the basic subject for all electronic circuits. 5) To understand Operational Amplifier, Active Filters, Voltage Regulator and Oscillator circuits. 6) To perform Medical Electronic systems.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how electronics work in electronic circuits. 2. List the various terms associated with electronic circuits. 3. Summarize what is meant by a primary electronic circuit. 4. Discuss the reaction and involvement of atoms in electric circuits. 5. Describe electronic circuits, operation amplifiers, and oscillators. 6. Define gain law. 7. Identify the basic circuit elements and their applications. 8. Discuss the operational amplifier in an electronic circuit. 9. Discuss the various properties of resistors, capacitors, and inductors. 10. Explain the 555 timer in circuit analysis. 11. Identify the capacitor and inductor relationship with voltage regulators.
Indicative Contents المحتويات الإرشادية	Part A - Circuit Theory The Operational Amplifier (Introduction, Input Modes, and Parameters, Op-amp with negative feedback, Basic Op-Amp Circuits Active Filters, Voltage Regulator and Oscillator) Revision problem classes Part B - Analogue Electronics Fundamentals Comparators, Level Detection, Output Bounding, Comparators Applications Circuits, Summing Amplifiers, Op-Amp Integrator, and Differentiator Circuit, Analoge to Digital Converters (ADC), Digital to Analoge Converters (DAC), Active Low Pass Filters, Active High Pass Filters, Step Down Switching Regulators, Step Up Switching Regulators, Inverting Switching Regulators

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Training students to design advanced electronic circuits that are used in medical devices and basic circuits that connect electronic sensors in the design of electronic circuits, whether they are diagnostic or therapeutic, in addition to the method of getting and analyzing analog signals from the human body.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	90	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	60	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	0	-	-	-
	Assignments	0	-	-	-
	Projects / Lab.	15	15% (15)	Continuous	All
	Report	15	15% (15)	Continuous	All
Summative assessment	**Midterm Exam**	2hr	20% (20)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	The Operational Amplifier (Introduction, Input Modes and Parameters, Op-amp with negative feedback)
Week 2	Effects of negative feedback on op-amp impedance, Close loop frequency response for op-amp
Week 3,4,5	Basic Op-Amp Circuits (Comparators, Level Detection, Output Bounding, Comparators Applications Circuits, Summing Amplifiers, Op-Amp Integrator and Differentiator Circuit , Analoge To Digital Converters (ADC) , Digital To Analoge Converters (DAC))
Week 6	Active Filters (Basic Filter Responses, Filter Response Characteristic)
Week 7	Active Low Pass Filters, Active High Pass Filters
Week 8	Active Band Pass Filters, Active Band Stop Filters
Week 9	Voltage Regulator (Line and Load Regulators), Linear Series Regulators , Regulator With Fold Back Current Limiting, Linear Shunt Regulators.
Week 10	
Week 11	Step Down Switching Regulators, Step Up Switching Regulators, Inverting Switching Regulators
Week 12,13	Oscillator, Positive Feedback Oscillators, RC Feedback Oscillators (Wien-Bridge Oscillator), LC Feedback Oscillators (Colpitts Oscillator), 555 Timer as an Oscillator
Week 14	Medical Electronic systems
Week 15	Medical Electronic systems
Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Operational Amplifier with Negative Feedback

Week 2	Output Bounding Using Zener Diode
Week 3	The Operation Amplifier As An Integrator
Week 4	The Zener Diode As a Voltage Regulator
Week 5	Active Low Pass Filter [LPF]
Week 6	Sallen And Key Low Pass Filter
Week 7	Active High Pass Filter [HPF]
Week 8	Sallen And Key High Pass Filter
Week 9	Active Band Pass Filter by Cascading High pass and Low Pass Filters
Week 10	Band Stop Filter [BSF]
Week 11	State-Variable Band stop Filter [BSF]
Week 12	Series Regulator with Constant Current Limiting
Week 13	Shunt Voltage Regulator
Week 14	Relaxation oscillator
Week 15	A stable 555 timer

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	ELECTRONIC DEVICES, Thomas L. Floyd, Pearson Education Limited	No
Recommended Texts	THE ART OF ELECTRONICS, Paul Horowitz and Winfield Hill, Cambridge University Press.	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	**Medical Communication systems**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE308**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		**Third**	**Semester of Delivery**		**Sixth**
Administering Department		**Med. Ins. Tech. Eng.**	**College**	**Technical Engineering College**	
Module Leader	**Hussein Ali Hussein**		**e-mail**	**hussein.kwasme@ntu.edu.iq**	
Module Leader's Acad. Title		**Assistant Lecturer**	**Module Leader's Qualification**		**Master**
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name		**Mohammed S Jarjees**	**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date		**01/06/2023**	**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	Upon completion of this course, the student will be able to: 1. Define signals and system. 2. Define the main parts of AM and FM communication systems and their operation. 3. Explain the types of signal modulation and sampling requirements of the signals.

	4. Characterize the noise types can occur in communication systems and methods of evading data loss. 5. Familiar with wireless signals and antenna operation. 6. Able to represent signal sampling, modulation and demodulation, and noise using MATLAB.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Describe how Sampling of signal work. 2. List the various pulse modulation methods. 3. Explain the concepts of digital data communication. 4. List the types of digital modulation and know their differences. 5. Summarize how digital modulation is performed. 6. Explain the operation concept of Quadrature Amplitude Modulation. 7. Discuss effects of noise in both analogue and digital communication systems. 8. Explain microwave passive devices. 9. Summarize the operation concept of Antennas. 10. Familiar with MATLAB.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Sampling Theorem: Digital Signals: sampling, aliasing, quantization and introduction to pulse code modulation. [6 hrs] • Pulse Modulation (PAM, PWM, PPM, PCM): Pulse Amplitude Modulation, Pulse Width Modulation, Pulse Position Modulation, Pulse Code Modulation. [12 hrs] • Digital Data Communication (ASK, FSK, PSK, QPSK): Amplitude Shift Keying, Frequency Shift Keying, Phase Shift Keying, Quadrature Phase Shift Keying. • Quadrature amplitude modulation (QAM): Quadrature Amplitude Modulation. [12 hrs] • Fourier transform: Fourier transform; Properties of Fourier transforms; Convolution theorem [12 hrs] • Transmission and Propagation: Introduction—Open wire lines; Coaxial cables; Strip and microstrip lines; Wave guides; General line equations; Classification of lines; Loading; Reflection; Standing waves; Impedance matching in lines [12 hrs] • Noise in analogue & digital systems: Learn effects of noise on systems and signals, Learn to formulate and analyze effects of noise on model communication systems and signal propagation. [12hrs] • Microwave passive devices: Co-Axial Cables, Connectors and Adapters [6 hrs] • Antennas: Introduction; Radiation from a short dipole and power radiated by it; Effective height; Ground systems; Antenna excitation; Short wave and medium wave antennas. Parabolic Antennas. [6 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategies that will be adopted in this module will be focused on engaged learning. This is achieved by keeping the students working together throughout the semester by engaging them in lab groups in addition to a project to be built during the semester and presented in the final week. Engagement will be stimulated in the class for better comprehension of the lectures.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	90	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	60	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	6	5% (5)	2,4,6,8,9,10	LO #1, #2 and #10
	Assignments	8	5% (5)	3,5,6,7,8,11	LO #3, #4 and #6, #7
	Projects / Lab.	13	10% (10)	Continuous	All
	Report	4	10% (10)	12,13,14,15	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	20% (20)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Sampling Theorem
Week 2	Pulse Modulation (PAM, PWM, PPM, PCM)
Week 3	Pulse Modulation (PAM, PWM, PPM, PCM)
Week 4	Digital Data Communication (ASK, FSK, PSK, QPSK)
Week 5	Digital Data Communication (ASK, FSK, PSK, QPSK)
Week 6	Quadrature amplitude modulation (QAM)
Week 7	Quadrature amplitude modulation (QAM)
Week 8	Fourier transform.
Week 9	Fourier transform.
Week 10	Transmission and Propagation
Week 11	Transmission and Propagation
Week 12	Noise in analogue & digital systems.

Week 13	Noise in analogue & digital systems.
Week 14	Microwave passive devices.
Week 15	Antennas.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to MATLAB
Week 2	Introduction to MATLAB
Week 3	Introduction to MATLAB
Week 4	Introduction to MATLAB
Week 5	Sampling in MATLAB
Week 6	Sampling in MATLAB
Week 7	Filters in MATLAB
Week 8	Filters in MATLAB
Week 9	Modulation in MATLAB
Week 10	Modulation in MATLAB
Week 11	Noise in signals (MATLAB)
Week 12	Noise in signals (MATLAB)
Week 13	Small group project in MATLAB
Week 14	Small group project in MATLAB
Week 15	Small group project in MATLAB

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Principles of Communication Engineering, Anokh Singh	No
Recommended Texts	Modern Digital and Analog Communication Systems; B. P. Lathi, Zhi Ding - Oxford University Press (2009)	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	**Microprocessors**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐**Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE309**				
ECTS Credits	**5**				
SWL (hr/sem)	**132**				
Module Level	**Third**		**Semester of Delivery**		**Second**
Administering Department	**Type Dept. Code**		**College**	**Type College Code**	
Module Leader	**Sinan Salim Mohammed Sheet**		**e-mail**	**Sinan_sm76@ntu.edu.iq**	
Module Leader's Acad. Title	**Lecturer**		**Module Leader's Qualification**		**Master**
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. This course aims to give a general introduction to Microprocessor 8086 and their hardware. 2. Be familiar with the Assembly language and their instructions. 3. Be able to program a microprocessor to perform a specific job using assembly language. 4. Able to define the microprocessors versions and their differences.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1.Converse by using appropriate computer terminology such as bit, byte, data, real memory system, protected mode memory system, Windows, DOS, I/O, and so forth. 2. Briefly detail the history of the computer and list applications performed by computer systems. 3. Provide an overview of the various 80086. 4. Draw the block diagram of a computer system and explain the purpose of each block. 5. Describe the function of the microprocessor and detail its basic operation. 6. Convert between binary, decimal, and hexadecimal numbers. 7.Describe the function and purpose of each program-visible register in the 8086–Core2 microprocessors. 8. Detail the flag register and the purpose of each flag bit. 9. Describe how memory is accessed using real mode memory-addressing techniques. 10. Describe how memory is accessed using protected mode memory-addressing techniques. 11. Explain the operation of each data-addressing mode. 12. Use the data-addressing modes to form assembly language statements. 13. Explain the operation of each program memory-addressing mode. 14. Use the program memory-addressing modes to form assembly and machine language statements. 15. Select the appropriate addressing mode to accomplish a given task. 16. Detail the difference between addressing memory data using real mode and protected mode operation. 17. Describe the sequence of events that place data onto the stack or remove data from the stack. 18. Explain how a data structure is placed in memory and used with software. Explain the operation of each data movement instruction with applicable addressing modes. 19. Explain the purposes of the assembly language. 20. Select the appropriate assembly language instruction to accomplish a specific data movement task. 21. Determine the symbolic opcode, source, destination, and addressing mode for a hexadecimal machine language instruction. 22. Use the assembler to set up a data segment, stack segment, and code segment.

	23. Use arithmetic and logic instructions to accomplish simple binary, BCD, arithmetic, Use AND, OR, and Exclusive-OR to accomplish binary bit manipulation. Use the shift and rotate instructions. 24.Use both conditional and unconditional jump instructions to control the flow of a program. 24. Describe the function of each 8086 and 8088 pin. Understand the microprocessor's DC characteristics and indicate its fan-out to common logic families. Use the clock generator chip (8284A) to provide the clock for the microprocessor. Connect buffers and latches to the buses. Interpret the timing diagrams. Describe wait states and connect the circuitry required to cause various numbers of waits. Explain the difference between minimum and maximum mode operation.
المحتويات الإرشادية **Indicative Contents**	• This chapter presents the microprocessor as a programmable device by first looking at its internal programming model and then how its memory space is addressed. The architecture of the family of Intel microprocessors is presented simultaneously.[6] • Addressing Modes. the MOV (move data) instruction is used to describe the data-addressing modes. The MOV instruction transfers bytes or words of data between two registers or between registers and memory in the 8086 through the 80286. Bytes, words, or doublewords are transferred in the 80386 and above by a MOV. In describing the program memory-addressing modes, the CALL and JUMP instructions show how to modify the flow of the program.[18] • The arithmetic instructions include addition, subtraction, multiplication, division, comparison, negation, increment, and decrement. The logic instructions include AND, OR, Exclusive-OR, NOT, shifts, rotates, and the logical compare (TEST). [18 hrs] • The program control instructions direct the flow of a program and allow the flow to change. A change in flow often occurs after a decision made with the CMP or TEST instruction is followed by a conditional jump instruction. This chapter explains the program control instructions, including the jumps, calls, returns, and machine control instructions.[18 hrs] • A the pin functions of both the 8086 and 8088 microprocessors are detailed and information is provided on the following hardware topics: clock generation, bus buffering, bus latching, timing, wait states, and minimum mode operation versus maximum mode operation. These simple microprocessors are explained first, because of their less intricate structures, as an introduction to the Intel microprocessor family.[12 hrs]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم	
Strategies	The main strategies that will be adopted in this module will be focused on engaged learning. This is achieved by keeping the students working together throughout the semester by engaging them in lab groups in addition to a project to be built during the semester and presented on final week. Engagement will be stimulated in the class for better comprehension of the lectures.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	75	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**132**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	10% (10)	3,5,7,9	LO #1, 4,10, 12
	Assignments	2	10% (10)	2 ,9	LO # 4 ,10
	Projects / Lab.	15	10% (10)	Continuous	All
	Report	14	10% (10)	Continuous	All
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction to microprocessor, Types of Addressing Modes**
Week 2	**Data of addressing modes,** **(1) Register Addressing** **(2) Immediate Addressing**
Week 3	**(3) Direct Addressing** **(4) Register Indirect Addressing** **(5) Base–Plus–Index Addressing**
Week 4	**(6) Register Relative Addressing** **(7) Base Relative–Plus–Index Addressing**
Week 5	**Program-Memory Addressing Modes in Microprocessor 8086/8088, Stack-Memory Addressing Modes in Microprocessor 8086/8088,** **Arithmetic Instructions in Microprocessor 8086/8088(part 1) (add-un-signed-signed, subtract--unsigned-signed)**
Week 6	**Compare instruction** **Arithmetic Instructions in Microprocessor 8086/8088(part 2) Div & mult (unsigned -signed).**
Week 7	**Logic Instructions in Microprocessor 8086/8088 and Shift and rotate instructions**
Week 8	**Program Control Instructions in Microprocessor 8086/8088 and Jump, loop, and call instructions.**
Week 9,10	**Hardware Specifications of 8086/8088 microprocessor**
Week 11,12	**Memory Interface of 8086/8088 microprocessor**
Week 13,14	**Basic I/O Interface Microprocessor 8086**
Week 15	**Basic I/O Interface Microprocessor 8088**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Emu8086 program
Week 2,3,4	Move instructions, Addition and Subtraction, Multiplication and division
Week 5	Other transfer instructions
Week 6,7	Other Arithmetic Instructions, Logic Instructions
Week 8	Shift and rotate instructions
Week 9,10,11,12	Jumps instructions and loops, CALL and RETURN instructions, IN/OUT and other control instructions
Week 13,14	Arduino program introduction
Week 15	Design a thermometer using Arduino

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Architecture, Programming, and Interfacing, Eighth Edition BARRY B. BREY	yes
Recommended Texts		
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Digital Signal Processing**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MIE 310**				
ECTS Credits	**6**				
SWL (hr/sem)	**148**				
Module Level	**Third**		**Semester of Delivery**	**Sixth**	
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Eanass Usama Taha**		**e-mail**	**eshabkhoontc@ntu.edu.iq**	
Module Leader's Acad. Title	**Lecturer**		**Module Leader's Qualification**	**Ph.D**	
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To going on describing formula numerically. 2. To provide a finite number of samples in time and frequency domain. 3. To deal with digital system. 4. To export and import data base in field of specialization. 5. To deal with the required rate of digital system. 6. To realize digital system model.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Expect the size, rate, and resolution of discrete signal. 2. Expect compatibility between signal rate and digital system. 3. Provide digital signal model. 4. Provide digital system model from analog LTI. 5. Provide digital system by means of Z-Transform properties. 6. Provide discrete signal spectrum. 7. Deal with samples interference. 8. Deal with samples of random signal. 9. Deal with IIR and FIR filters. 10. Deal with data base of medical signal likes ECG. 11. Finally, by Digital Signal Processing Engineer have the ability of: • Recognize the feature of data. • Building up to date, flexible, computerize system.
Indicative Contents المحتويات الإرشادية	Fundamentals: Basically, subject depend on means of: Sampling Theory. Z-Transform. DFT and FFT. Digital Filter Design and realization. MATLAB Programming. <u>Part A – Analog Signal:</u> Studying sampling theory in details. <u>Part B – Z-Transform</u> Z- Domain is mathematical description of discrete Fourier transform, and it be a tool for transferring discrete that extend from minus infinity to infinity, unilateral Z-Transform is causal, and it have a standard table. Region of convergence states the stability of digital system. Accumulation unit can satisfy the processing that depend on digital analysis by Z-transform. <u>Part C – DFT and FFT:</u> Discrete Fourier Transform is developed to state a finite number of signal samples and a band limit spectrum. FFT is the butter-fly algorithm of DFT. <u>Part E – Digital Filters:</u> Although ability of designing a digital filter is available but performance is required and a specific window are used to specify the requirements, behind the ability of transferring features of analog filters to discrete domain.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Telling the story of subject starting, description of Importance, defining the state of problems, solving problems, making cross check, visualization of actual state, making experiment test, talking about recent projects, beside encourage student questions and ideas as participation.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	90	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	58	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.86
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**148**		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Details of sampling Theory and Quantization Error
Week 2	Digital signals
Week 3	Introduction to Z-Transform
Week 4	Standard Digital Signal Transformation + Assignment Home Work 1
Week 5	Z-Transform Properties – Patr I
Week 6	ZT Properties – Part II + Problems + Assignment Home Work 2
Week 7	Mid Term exam in – Sampling Theory and Z-Transform.
Week 8	Details of Discrete Fourier Transform
Week 9	Details of Fast Fourier Transform
Week 10	First Order Digital System

Week 11	Derivation of standard Fourier forms - …. $sgn(t), t\,u(t),\ tri(t)]$ + Short Quiz 1
Week 12	Finite Impulse Response Filter – Part I
Week 13	Finite Impulse Response Filter Part II + Short Quiz1
Week 14	Infinite Impulse Response Filter – Part I
Week 15	Infinite Impulse Response Filter Part II + Short Quiz2
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Sampling considerations of sinusoidal signals
Week 2	Lab 2: Sampling considerations of LPF
Week 3	Lab 3: Interpolating digital signal – Part I
Week 4	Lab 3: Interpolating digital signal – Part II
Week 5	Lab 5: Plotting transfer function of second order digital system
Week 6	Lab 6: Transforming rect and ramp pulses to Z-Domain
Week 7	Lab 7: Transforming tri pulse to Z-Domain
Week 8	Lab 8: Mid exam in sampling theory and ZT
Week 9	Lab 9: ZT of delayed pulses – Part I
Week 10	Lab 10: ZT of delayed pulses – Part II
Week 11	Lab 11: ZT of a truncated cosine
Week 12	Lab 12: Filtration of Noisy Signal Part I
Week 13	Lab 13: Filtration of Noisy Signal Part II
Week 14	Lab 14: Importing ECG data base (Web browsing hours)
Week 15	Lab 15: Representation for ECG spectrum by FFT – Short Project

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Schaum's Outline of Theory and Problems of Digital Signal Processing, Schaum's Outline Series, Copyright © 1999 by The McGraw-Hill Companies, Inc.	No
Recommended Texts	Biomedical Signal and Image Processing, CRC Press, © 2012 by Taylor & Francis Group, LLC	No
Websites	Digital Signal Processing Tutorial (tutorialspoint.com)	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electrical Technology**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE309**				
ECTS Credits	**3**				
SWL (hr/sem)	**74**				
Module Level	**Third**		**Semester of Delivery**	**Sixth**	
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Osamah Basheer Noori**		**e-mail**	**usamaengeng@ntu.edu.iq**	
Module Leader's Acad. Title	**Assistant Lecturer**		**Module Leader's Qualification**	**Master**	
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Study the basics of the electrical components and devices. 2. Study and application of electrical systems and devices 3. Study the principle of working for the electrical systems and devices. 4. Improve the use of these devices and systems in the practical life. 5. Defining and repairing the different types of electrical faults. 6. Perform the preventive maintenance.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. 2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors. 3. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions. 4. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies. 5. Students who study electrical technology will graduate with strong theoretical and practical knowledge in areas such as power generation, electric machines, power distribution design, industrial electrical systems, and measurement of power quality issues. 6. Students who study electrical engineering may pursue successful careers in electric power engineering technology and related fields, pursue lifelong learning opportunities like graduate degrees or professional studies to adapt to evolving technological changes, and contribute to society in professional and leadership roles while adhering to the highest level of ethical standards.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Transformers : single phase transformer and construction, Theory of operation , no load and short circuit test , Equivalent circuit, auto–transformers, instrument transformers, Three phase transformers, constructions methods of connection. [8 hrs] Electromechanical energy conversion principles, relay operation, D.C machines: e.m.f and torque equation, equivalent circuit , methods of excitation, generator characteristics ,Motor characteristics, testing, calculation of losses and efficiency [8 hrs] Induction machines : equivalent circuit , basic equation , simple analysis testing, Single phase induction motor , methods of starting , split phase , capacitor short , capacitor run and shaded pole motors. [6 hrs] Synchronous machines, generators and motors, equivalent circuit, basic equation. [2 hrs] Special machines: Reluctance motor, hysteresis motor, linear motor, stepper motor, drag cup type motor, servo motor, etc [2 hrs] Control switches: pilot switches, push buttons, limit switch, Switches, float switches, Contactors, pressure switches, High voltage circuits. [4 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is the Discovery learning, experiments, demonstrations, questioning, discussion, feedback, and lecturing. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	14	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	0.93
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**93**		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Theory of operation , no load and short circuit test
Week 2	Transformers : single phase transformer and construction
Week 3	Equivalent circuit, auto–transformers, instrument transformers
Week 4	Three phase transformers, constructions methods of connection
Week 5	Electromechanical energy conversion principles, relay operation.
Week 6	D.C machines: e.m.f and torque equation, equivalent circuit , methods of excitation, generator characteristics
Week 7	D.C machines: e.m.f and torque equation, equivalent circuit , methods of excitation, generator characteristics
Week 8	Motor characteristics, testing, calculation of losses and efficiency
Week 9	Induction machines : equivalent circuit , basic equation , simple analysis testing

Week 10	Single phase induction motor , methods of starting , split phase , capacitor short , capacitor run and shaded pole motors
Week 11	Single phase induction motor , methods of starting , split phase , capacitor short , capacitor run and shaded pole motors
Week 12	Synchronous machines , generators and motors , equivalent circuit , basic equation
Week 13	Special machines: Reluctance motor, hysteresis motor, linear motor, stepper motor, drag cup type motor, servo motor, etc
Week 14	Control switches : pilot switches , push buttons , limit switch
Week 15	Switches, float switches , Contactors , pressure switches, High voltage circuits
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Transformers : single phase transformer and construction
Week 2	Lab 2: Three phase transformers, constructions methods of connection
Week 3	Lab 3: D.C machines
Week 4	Lab 4: DC machines
Week 5	Lab 5: DC machines
Week 6	Lab 6: Induction machines
Week 7	Lab 7: Induction machines
Week 8	Lab 8: Induction machines
Week 9	Lab 9: Synchronous machines
Week 10	Lab 10: Synchronous machines
Week 11	Lab 11: Synchronous machines
Week 12	Lab 12: Special machines
Week 13	Lab 13: Special machines
Week 14	Lab 14: Special machines
Week 15	Lab 15: Control Switches

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	A Textbook of Electrical Technology 24th revised edition 2005, Kindle Edition by B.L. Theraja	No

Recommended Texts	Textbook of Electrical Technology: Part 1: Basic Electrical Engineering (Pt. 1) [Jun 01, 2006] Therja, B. K. and Therja, A. K. Paperback – January 1, 1959	No
Websites	https://electrical-engineering-portal.com/download-center/books-and-guides/electrical-engineering/course-basic-electrical-technology	

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Project**			**Module Delivery**	
Module Type	**Core**			☐ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☒ **Practical** ☒ **Seminar**	
Module Code	**MIE411**				
ECTS Credits	**8**				
SWL (hr/sem)	**210**				
Module Level	**Forth**		**Semester of Delivery**	**Eighth**	
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Mohammed Sabah Jarjees**		**e-mail**	**mohammed.s.jarjees@ntu.edu.iq**	
Module Leader's Acad. Title	**Assistant Professor**		**Module Leader's Qualification**		
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The objectives of the Course Project in medical instruments engineering include applying knowledge and skills to real-world problems, integrating concepts from different areas of biomedical engineering, conducting research and investigation, developing problem-solving and design and implementation of medical devices in the available capabilities. fostering collaboration and teamwork, enhancing project management abilities, improving communication and presentation skills,

	addressing ethical considerations, and promoting reflection and continuous improvement as future engineers.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand project selection criteria and guidelines in biomedical engineering. 2. Identify and define a research problem or engineering challenge in the field. 3. Formulate a project proposal with clear objectives and scope. 4. Conduct a comprehensive literature review and evaluate existing research and technologies relevant to the project. 5. Analyze and synthesize information to inform the design of the project solution. 6. Develop a detailed project plan, including milestones, timelines, and resource requirements. 7. Build prototypes or design experiments to test and validate the proposed solution. 8. Analyze and interpret data collected from experiments using appropriate statistical or analytical methods.
Indicative Contents المحتويات الإرشادية	Part A: 1. Introduction and project selection (4 hours) - Overview of project selection criteria and guidelines - Importance of choosing a research problem or engineering challenge in biomedical engineering - Discussion on the process of selecting a project topic 2. Problem identification and proposal formulation (10 hours) - Techniques for identifying a research problem or engineering challenge - Brainstorming sessions and discussions to generate project ideas - Formulating a clear and concise project proposal with well-defined objectives and scope - Guidance on structuring the proposal and including relevant background information 3. Literature review and project planning (12 hours) - Conducting a comprehensive literature review to understand existing research and technologies related to the project - Evaluating the strengths and weaknesses of previous work - Developing a project plan with milestones, timelines, and resources required - Defining project requirements and specifications based on the literature review 4. Prototyping and experimental work (8 hours) - Hands-on guidance in building prototypes or designing experiments to test proposed solutions - Assistance in acquiring necessary components and equipment for prototyping - Conducting experiments, collecting data, and troubleshooting any technical challenges Part B: 5. Data analysis and interpretation (8 hours) - Teaching statistical or analytical methods for analyzing and interpreting experimental or collected data - Providing guidance on selecting appropriate data analysis techniques - Assisting students in drawing meaningful conclusions from the data and interpreting the results 6. Documentation, reporting, and visual aids (6 hours)

	- Instructing students on effective documentation practices, including recording design decisions, experimental setups, and results - Teaching technical report writing skills and formatting guidelines - Guidance on creating visual aids such as charts, graphs, and diagrams to enhance project reports and presentations 7. Presentation and demonstration (6 hours) - Preparing students to deliver final project presentations, showcasing the functionality, experimental setup, and design outcomes of their projects - Providing tips on effective presentation delivery and engaging with the audience - Preparing students to answer questions and address feedback from the audience 8. Project evaluation and reflection (4 hours) - Facilitating project evaluation sessions where students assess their own and peers' projects - Encouraging constructive feedback and discussion on strengths and areas for improvement - Guiding students in reflecting on their project outcomes, challenges faced, and lessons learned
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Active Learning: Promote active engagement and participation of students through hands-on activities, group discussions, and problem-solving exercises. Encourage students to take ownership of their learning by actively seeking information and applying it to their project. 2. Scaffolded Approach: Provide a structured framework for the project development process, with clearly defined milestones and timelines. Break down complex tasks into smaller, manageable steps to help students navigate the project effectively. 3. Peer Collaboration: Foster a collaborative learning environment where students can work in teams, exchange ideas, and provide feedback to one another. Encourage peer-to-peer learning and collaboration through group projects, discussions, and peer reviews. 4. Integration of Theory and Practice: Help students bridge the gap between theoretical knowledge and practical application by integrating relevant concepts and principles into project activities. Encourage students to critically analyze and apply their understanding of biomedical engineering principles in their project solutions. 5. Reflection and Iteration: Incorporate regular opportunities for students to reflect on their project progress, evaluate their outcomes, and identify areas for improvement. Encourage iterative design and problem-solving processes to enhance learning and project outcomes. 6. Mentorship and Guidance: Provide guidance and support through regular interactions with instructors or mentors. Offer resources, expertise, and feedback to help students overcome challenges and make informed decisions throughout the project.

	7. Authentic Assessment: Use assessment methods that reflect real-world scenarios and tasks encountered in biomedical engineering projects. Assess students based on their ability to apply knowledge, problem-solving skills, effective communication, and the quality of their project outcomes. 8. Technology Integration: Utilize relevant technologies, software, and tools commonly used in biomedical engineering to enhance students' technical skills and familiarity with industry practices. Incorporate software for data analysis, design simulations, and project management to provide a realistic project experience.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	90	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	120	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**210**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	0	0	-	-
	Assignments	0	0	-	-
	Lab	15	10% (10)	Continuous	All
	Report	8	10% (10)	Continuous	All
Summative assessment	**Midterm Exam**	2hr	20% (20)	13	Lo# 1-7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Project Selection and Proposal • Introduction to project selection criteria and guidelines • Identifying a research problem or engineering challenge in biomedical engineering

	• Formulating a project proposal with clear objectives and scope
Week 2 **Week 3**	Literature Review and Background Research • Conducting a comprehensive literature review on the chosen project topic • Evaluating existing research and technologies relevant to the project ✓ Analyzing and synthesizing information to inform the project design
Week 4 **Week 5** **Week 6**	Project Planning and Design • Developing a detailed project plan with milestones and timelines • Defining project requirements and specifications ✓ Conceptualizing and designing solutions to address the identified problem or challenge
Week 7 **Week 8**	Prototyping and Experimental Work • Building prototypes or designing experiments to test and validate the proposed solution • Acquiring and assembling necessary components or materials for the project • Conducting experiments, data collection, and measurements as required
Week 9 **Week 10**	Data Analysis and Interpretation • Analyzing experimental or collected data using appropriate statistical or analytical methods • Interpreting and drawing conclusions from the data • Iterating and refining the project design based on data analysis results
Week 11 **Week 12**	Documentation and Reporting • Documenting the project progress, including design decisions, experimental setups, and results • Writing technical reports or project documentation • Creating visual aids (e.g., diagrams, graphs, charts) to effectively communicate the project findings
Week 13	Presentation and Demonstration • Preparing and delivering a final project presentation to an audience of peers, instructors, or industry professionals • Demonstrating the project functionality, experimental setup, or design outcomes Addressing questions and feedback from the audience
Week 14 **Week 15**	Project Evaluation and Reflection • Conducting self-evaluation and reflection on the project outcomes, strengths, and areas for improvement • Participating in project evaluation sessions with instructors or evaluators • Providing constructive feedback to peers on their projects

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1-"Biomedical Engineering: Bridging Medicine and Technology" by W. Mark Saltzman 2-"Introduction to Biomedical Engineering" by John Enderle, Susan M. Blanchard, and Joseph Bronzino	No

	3-"Principles of Biomedical Engineering" by Sundararajan V. Madihally	
Recommended Texts	1. Biomedical Engineering: A Historical Perspective" by Anthony C. Eastman 2. "Biomedical Instrumentation and Measurements" by Leslie Cromwell, Fred J. Weibell, and Erich A. Pfeiffer 3. "Bioengineering Fundamentals" by Ann Saterbak, Ka-Yiu San, Larry V. McIntire, and Joseph D. Bronzino	No
Websites	1-National Institutes of Health (NIH) - Biomedical Engineering and Bioengineering: www.nih.gov 2-Biomedical Engineering Society (BMES): www.bmes.org 3-IEEE Engineering in Medicine and Biology Society (EMBS): www.embs.org 4-OpenAI: www.openai.com (for access to AI and natural language processing resources relevant to biomedical engineering projects) 5-PubMed: www.pubmed.ncbi.nlm.nih	

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	**Medical Therapeutic Instrumentation**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE401**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	**Forth**		**Semester of Delivery**	**Seventh**	
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Alaa Ibrahim Ahmed**		**e-mail**	**alaa_ibrahim@ntu.edu.iq**	
Module Leader's Acad. Title	**Assistant Lecturer**		**Module Leader's Qualification**	**Master**	
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Understanding the basic principles of instrumentation and measurement techniques used in all types of medical therapeutic machines. 2. Familiarize students with the different types of therapeutic equipment used in clinics and hospitals, such as Artificial Kidney machines, Dental systems, Anesthetic units, etc. 3. Developing an understanding of the appropriate use and maintenance of equipment to ensure accurate and reliable results.

	4. Understanding the principles of quality control and quality assurance in laboratory testing, including the use of equipment validation and calibration procedures. 5. Developing skills in instrument troubleshooting and problem-solving in order to ensure accurate and reliable laboratory results. 6. Understanding the importance of safety and regulatory compliance in laboratory settings, including the safe handling and disposal of hazardous materials.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Describe the principles of operation and applications of different medical therapeutic instruments, including electrotherapy devices, laser therapy devices, ultrasound therapy devices, and other therapeutic instruments. 2. Understand the physiological and therapeutic effects of different medical therapeutic instruments on the human body. 3. Analyze and interpret therapeutic data, including parameters such as dosage, frequency, and duration of treatment, to determine the most effective therapeutic approach for a given condition. 4. Understand the safety protocols and guidelines for each therapeutic instrument, and be able to implement these protocols in a clinical setting. 5. Understand the ethical and legal issues related to the use of medical therapeutic instruments, including patient privacy, informed consent, and liability. 6. Evaluate the performance of medical therapeutic instruments in a clinical setting, including their accuracy, precision, and reliability. 7. Understand the latest advancements and emerging trends in medical therapeutic instruments technology, including the use of robotics and artificial intelligence in therapy. 8. Demonstrate effective communication skills with patients and healthcare team members, and be able to educate and inform patients about the use of medical therapeutic instruments.
Indicative Contents المحتويات الإرشادية	1. Electrotherapy Devices: Principles of operation and applications of electrotherapy devices, including transcutaneous electrical nerve stimulation (TENS), neuromuscular electrical stimulation (NMES), and interferential therapy (IFT). 2. Laser Therapy Devices: Principles of operation and applications of laser therapy devices, including low-level laser therapy (LLLT) and high-power laser therapy (HPLT). 3. Ultrasound Therapy Devices: Principles of operation and applications of ultrasound therapy devices, including therapeutic ultrasound and extracorporeal shockwave therapy (ESWT). 4. Other Therapeutic Instruments: Principles of operation and applications of other therapeutic instruments, including pneumatic compression devices, continuous passive motion (CPM) machines, and compression therapy devices.

	5. Physiological and Therapeutic Effects: Understanding the physiological and therapeutic effects of different therapeutic instruments on the human body, including pain relief, tissue repair, and muscle strengthening. 6. Treatment Planning: Analyzing and interpreting therapeutic data, including dosage, frequency, and duration of treatment, to determine the most effective therapeutic approach for a given condition. 7. Safety Protocols and Guidelines: Understanding the safety protocols and guidelines for each therapeutic instrument, and implementing these protocols in a clinical setting to ensure patient safety. 8. Ethical and Legal Issues: Understanding the ethical and legal issues related to the use of medical therapeutic instruments, including patient privacy, informed consent, and liability. 9. Performance Evaluation: Evaluating the performance of medical therapeutic instruments in a clinical setting, including accuracy, precision, and reliability. 10. Advancements and Emerging Trends: Understanding the latest advancements and emerging trends in medical therapeutic instruments technology, including the use of robotics and artificial intelligence in therapy. 11. Patient Communication: Developing effective communication skills with patients and healthcare team members, and educating and informing patients about the use of medical therapeutic instruments.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Strategies for teaching Medical therapeutic Instruments for 4th year class Department of Medical Instrumentation Technology may include the following: 1. Active Learning: Encourage active learning through hands-on laboratory activities, case studies, and group discussions. This will help students to apply their knowledge to real-world clinical scenarios and develop problem-solving skills. 2. Technology Integration: Incorporate technology, such as simulation software and virtual reality, into the curriculum to enhance students' understanding of the principles and applications of therapeutic instruments. 3. Interdisciplinary Collaboration: Encourage interdisciplinary collaboration between students in different healthcare fields, such as physical therapy, occupational therapy, and nursing, to promote a holistic approach to patient care. 4. Clinical Practice: Provide opportunities for students to gain clinical experience through internships, shadowing, and other hands-on experiences in healthcare settings. This will help students to develop practical skills and

	gain a better understanding of the clinical applications of therapeutic instruments. 5. Assessment and Feedback: Provide regular assessment and feedback to students to help them track their progress and identify areas for improvement. This will help students to stay motivated and engaged in the learning process. 6. Professional Development: Encourage students to engage in professional development opportunities, such as attending conferences and workshops, to stay up-to-date with the latest advancements and trends in therapeutic instruments technology. 7. Ethical Considerations: Incorporate discussions on ethical considerations related to the use of therapeutic instruments, such as patient privacy, informed consent, and liability, into the curriculum to help students develop a better understanding of their professional responsibilities.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	105	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	70	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.66
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**175**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	6	5% (5)	2,4,5,7,9,11	LO #1, #2 and #6, #8
	Assignments	8	10% (10)	Continuous	All
	Projects / Lab.	15	10% (10)	Continuous	All
	Report	4	5% (5)	3,6,10,13	LO #5, #7 and #8
Summative assessment	**Midterm Exam**	2hr	20% (20)	7	LO #1 - #5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	• An introduction to surgical tools: (Ophthalmic microsurgical Instruments, Open heart & cardiovascular instruments, Gynecology Instruments, etc.)
Week 2	• Hemodialysis Machines • The function of the Kidneys • The Artificial Kidney • The Dialyzers • The Membranes for Hemodialysis • The Hemodialysis Machine • The Home (Portable) Kidney Machines
Week 3	• Instruments for Surgery • Principle of Surgical Diathermy • Surgical Diathermy Machine • Safety Aspects in Electrosurgical Units • Surgical Diathermy Analyzers
Week 4	• An introduction to Artificial organs (internal & external), historical perspectives and the latest innovations regarding this topic
Weeks 5-7	• Introduction to dental units: history, basic principles, and Applications • Anatomy and Physiology of the oral cavity • Components of dental units: handpieces, air and water syringes, suction units, and control systems • Types of dental units: standalone, mobile, and chair-mounted units • Dental instruments: handpieces, ultrasonic scalers, curing lights, and intraoral cameras • Infection control in dental units: sterilization, disinfection, and cross-contamination prevention • Patient safety in dental units: anesthesia, monitoring, and emergency response • Emerging technologies in dental units: digital dentistry, 3D printing, and teledentistry
Weeks 8, 9	• Audiometers and Hearing Aids • Mechanism of Hearing • Measurement of Sound • Basic Audiometer • Pure-Tone Audiometer • Speech Audiometer • Audiometer System Bekesy • Evoked Response Audiometry System • Calibration of Audiometers • Hearing Aids
Weeks 10-12	• Introduction to anesthetic units: history, basic principles, and applications • Anatomy and physiology of the respiratory and cardiovascular systems • Components of anesthetic units: vaporizers, flowmeters, breathing circuits, and monitoring devices • Types of anesthetic units: anesthesia machines, portable anesthesia units, and regional anesthesia equipment • Anesthetic agents: inhalational anesthetics, intravenous anesthetics, and local anesthetics

	• Patient safety during anesthesia administration: airway management, ventilation, and cardiovascular monitoring • Emergencies during anesthesia: prevention and management • Emerging technologies in anesthetic units: closed-loop anesthesia delivery, simulation, and tele-anesthesia
Week 13	• Lithotripters • The Stone Disease Problem • The Shock Wave • The First Lithotripter Machine • Modern Lithotripter Systems • Laser Lithotripsy
Weeks 14, 15	• Intensive care units ICUs • Introduction to intensive care units: history, basic principles, and applications • Components of ICUs: ventilators, monitors, infusion pumps, and beds • Types of ICUs: medical, surgical, cardiac, and neonatal • Monitoring devices: electrocardiography, pulse oximetry, capnography, and invasive monitoring • Patient safety in ICUs: infection control, fall prevention, and pressure ulcer prevention • Emergencies in ICUs: prevention and management • Emerging technologies in ICUs: artificial intelligence, telemedicine, and remote monitoring • The Role of Biomedical Engineer in ICUs

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Practical demonstration of surgical tools with presentations about each type
Week 2	Practical training about operating and maintaining the Hemodialysis Machines
Week 3	Practical training about operating and maintaining the Surgical Diathermy
Week 4	Practical demonstration of Artificial organs (internal & external)
Weeks 5-7	Practical training about operating and maintaining the dental units
Weeks 8, 9	Practical training about operating and maintaining Audiometers and Hearing Aids
Weeks 10-12	Practical training about operating and maintaining anesthetic machines
Week 13	Practical training about operating and maintaining Lithotripters
Weeks 14, 15	Practical demonstration of The Role of Biomedical Engineer in ICUs

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. "Therapeutic Modalities: The Art and Science" by Kenneth L. Knight and David O. Draper. "Physical Agents in Rehabilitation: From Research to Practice" by Michelle H. Cameron. "Clinical Electrotherapy" by Tim Watson. 4. "Laser Therapy in Veterinary Medicine: Photobiomodulation" by Ronald J. Riegel and John C. Godbold Jr.	No
Recommended Texts	1. Khandpur, R.S. (2014). Handbook of Biomedical Instrumentation, 3rd Edition. McGraw-Hill Education.	No
Websites	1. https://www.physio-pedia.com/home/ 2. https://www.ncbi.nlm.nih.gov/ 3. https://www.apta.org/ 4. https://www.isla-laser.org/en/	

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	**Medical Laser system**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE 403**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	**Forth**		**Semester of Delivery**		
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Bassam Tahseen Ahmed**		**e-mail**	**bassam_raoof@ntu.edu.iq**	
Module Leader's Acad. Title	**Assistant Lecturer**		**Module Leader's Qualification**	**Master**	
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Understanding the basic principles of the generation of the laser system. 2. Familiarize students with the components of a laser system. 3. Understanding what is a laser beam, and what is its difference from ordinary light. 4. To teach students some common types of lasers in the medical field. 5. Developing skills in instrument troubleshooting and problem-solving in order to ensure accurate and reliable laboratory results. 6. Understanding the importance of safety and regulatory compliance in

	laboratory settings, including the safe handling and disposal of hazardous materials.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Describe the principles of operation and applications of different medical laser instruments, including dermatology, angioplasty, and other therapeutic instruments. 2. Understand the physiological and therapeutic effects of different medical laser instruments on the human body. 3. Analyze and interpret therapeutic data, including parameters such as dosage, frequency, and duration of treatment, to determine the most effective therapeutic approach for a given condition. 4. Understand the safety protocols and guidelines for each therapeutic instrument, and be able to implement these protocols in a clinical setting. 5. Understand the ethical and legal issues related to the use of medical laser systems, including patient privacy, informed consent, and liability. 6. Evaluate the performance of medical laser systems in a clinical setting, including their accuracy, precision, and reliability. 7. Understand the latest advancements and emerging trends in medical laser systems technology. 8. Demonstrate effective communication skills with patients and healthcare team members, and be able to educate and inform patients about the use of medical laser systems.
Indicative Contents المحتويات الإرشادية	1. laser generation: Light nature and the electromagnetic spectrum, Spontaneous and stimulated emission, absorption, and the optical components of a laser system, and lasing action. 2. The types of laser: Solid – state laser, gas laser, dye laser, and diode laser. 3. Transmission line: optical fiber, refractive index, total internal reflection, and the properties of optical fiber 4. The optical detectors: Quantum detectors, The general characteristics of quantum detectors, photo emissive, photodiode, and photomultiplier 5. Medical laser applications: Analyzing and interpreting therapeutic data, including dosage, frequency, and duration of treatment, to determine the most effective therapeutic approach for a given condition. 6. Safety Protocols and Guidelines: Understanding the safety protocols and guidelines for each therapeutic instrument, and implementing these protocols in a clinical setting to ensure patient safety.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Active Learning: Encourage active learning through hands-on laboratory activities, case studies, and group discussions. This will help students to apply their knowledge to real-world clinical scenarios and develop problem-solving skills. 2. Technology Integration: Incorporate technology, such as simulation

	software and virtual reality, into the curriculum to enhance students' understanding of the principles and applications of therapeutic instruments. 3. Interdisciplinary Collaboration: Encourage interdisciplinary collaboration between students in different healthcare fields, such as physical therapy, occupational therapy, and nursing, to promote a holistic approach to patient care. 4. Clinical Practice: Provide opportunities for students to gain clinical experience through internships, shadowing, and other hands-on experiences in healthcare settings. This will help students to develop practical skills and gain a better understanding of the clinical applications of therapeutic instruments. 5. Assessment and Feedback: Provide regular assessment and feedback to students to help them track their progress and identify areas for improvement. This will help students to stay motivated and engaged in the learning process. 6. Professional Development: Encourage students to engage in professional development opportunities, such as attending conferences and workshops, to stay up-to-date with the latest advancements and trends in therapeutic instruments technology. 7. Ethical Considerations: Incorporate discussions on ethical considerations related to the use of laser systems, such as patient privacy, informed consent, and liability, into the curriculum to help students develop a better understanding of their professional responsibilities.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	90	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	60	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	6	5% (5)	2,4,5,7,9,11	LO #1, #2 and #6, #8
	Assignments	8	10% (10)	Continuous	All
	Projects / Lab.	15	10% (10)	Continuous	All
	Report	4	5% (5)	3,6,10,13	LO #5, #7 and #8
Summative assessment	**Midterm Exam**	2hr	20% (20)	7	LO #1 - #5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1,2	Laser generation:
Week 3,4	Longitudinal modes (Axial Modes)
Week 5	Types of laser
Week 6	light propagation in glass fiber
Weeks 7	Optical fiber waveguide, and fiber power losses
Weeks 8	Attenuation, dispersion, Splices , couplers
Weeks 9	Receiver devices and circuits photo diode light detector .
Week 10	Photoemissive detectors, Thermal detectors
Weeks 11	Photoconductive Detectors, Photovoltaic detectors
Weeks 12,--14	Types of medical applications of laser
Weeks 15	Laser hazards , the standard level for a safe working environment , lab–safety .

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Diffraction form one slit
Week 2	Measure the Distance Between Tracks of CD and DVD
Week 3	Polarization of Light
Week 4	Brewster s Angle determination
Weeks 5,6	Refractive Index and Snell's Law
Weeks 7	laser system operation
Weeks 8	The construction and work of Helium-neon laser
Week 9	The characteristic of the laser diode
Weeks 10	numerical aperture and acceptance angle of an optical fiber
Weeks 11	Transmission(Attenuation) Characteristics of Optical Fiber
Weeks 12	Bending losses in Multi-mode Optical Fiber
Weeks 13	Light Dependent Resistors (LDRs)
Weeks 14,15	Phototransistor characteristics

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. "Principles of laser" by Orazio Svelto 2. " Handbook of low – level laser therapy "by Michael R. Hamlolin 3. "Laser Therapy in Veterinary Medicine: Photobiomodulation" by Ronald J. Riegel and John C. Godbold Jr. 4. "Fiber optics Handbook " by Michael Bass	No
Recommended Texts	1. "Optoelectronics An Introduction " J.Wilson	No
Websites	1. https://taylorandfrancis.com 2. https://www.academia.edu/24751465/Principles_of_lasersfourth_edition_orazio_svelto_springer	

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	**Digital Image Processing**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE403**				
ECTS Credits	**6**				
SWL (hr/sem)	**152**				
Module Level	**Forth**		**Semester of Delivery**	**Seventh**	
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Nasseer Moyasser Basheer**		**e-mail**	**nmbasheer@ntu.edu.iq**	
Module Leader's Acad. Title	**Assistant Lecturer**		**Module Leader's Qualification**	**Ph.D.**	
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Give students the ability to know the structure of the different digital images. 2. The course deals with image processing in the spatial domain. 3. Introducing the histogram to decide image quality. 4. To learn the pixel wise image processing techniques.

	5. To have a clear idea about image processing by using the filters for different applications. 6. Having an introduction to Discrete Wavelet Transform (DWT). 7. Having knowledge about image compression as a coding procedure.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Introduce image processing, image types, eye structure, and HVS. 2. Gray scale image characteristics, shrinking, and zooming. 3. Pixel neighbors, and introducing spatial domain processing. 4. Pixel wise processing, the basic gray level transformations. 5. Pixel wise processing, piece-wise line transformation, histogram and its equalization. 6. Pixel wise processing, arithmetic/logic operations, and image averaging. 7. Basics of spatial filters, and order-statistics non-linear filters. 8. The Laplacian as sharpening filters. 9. The Gradient filters for sharpening. 10. Image segmentation in the spatial domain. 11. Image restoration in the spatial domain. 12. Discrete Wavelet Transform (DWT) principles. 13. Embedded image compression, the EZW. 14. SPIHT image compression. 15. No List SPIHT image compression.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Digital image processing in the spatial domain</u> This includes principles of digital image representation with relations between pixels as neighbors, eye structure and the human visual system. Also the effects of reducing number of bits per pixel, zooming and shrinking, image contents distribution. [6 hrs] Image processing by pixel wise methods including different transformations and arithmetic/logic operations, …etc. [9 hrs] Image processing by using filters for low pass effects (integration), and high pass effect (differentiation in 1^{st} and 2^{nd} derivatives). [9 hrs] Image segmentation and its importance by filters. Also image restoration to put the image back to its initial condition before noise is added to it. [6 hrs] <u>Part B – Image compression by embedded coding</u> Introducing the Discrete Wavelet Transform for one- and two-dimensional signals and its benefit for image compression. [6 hrs] Image compression by Embedded Zero-tree Wavelet (EZW) as an introduction to the Set Partitioning In Hierarchical Trees (SPIHT). [6 hrs] Image compression by No List SPIHT as a method to compress the image digitally in an easier method by eliminating the lists normally used in SPIHT. [3 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The teaching strategies aim to encourage the students to pay the required attention for the subject. This include mentioning the importance of the subject especially for medical applications, also showing the different image processing items in the laboratory, and trying to establish discussions with the students to give reasons for each fact implemented.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	90	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**152**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	5% (5)	3, 6, 9, 13	LO #3, #6, #9, #13
	Assignments	4	5% (5)	2, 5, 8, 11	LO #3, #6, #9, #13
	Projects / Lab.	15	10% (10)	Continuous	All
	Report	15	10% (10)	Continuous	All
Summative assessment	**Midterm Exam**	2hr	20% (20)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Fundamental image processing steps, General purpose image processing system, Structure of the human eye, and HVS. Image acquisition and sensor resolution in brief.
Week 2	Representing digital images, Size of them, Spatial gray level resolution. Shrinking then zooming by down and up sampling. Effect of gray level varying on images with variable details.

Week 3	Methods of zooming, and respective image quality. The three types of pixel neighbors and its use with filters. Concept of edge and boundary. Introduction to processing in spatial domain.
Week 4	Basic gray level transformations; Image negative, Log transformations, Power law transformations.
Week 5	Piece-wise line transformations, histogram definition and its need, histogram equalization.
Week 6	Enhancements using Arithmetic/Logic operations. Image averaging.
Week 7	Basics of spatial filtering, smoothing filters, Linear and non-linear filtering. Order-Statistics filters.
Week 8	Sharpening spatial filters, Foundation of differentiation filters. Laplacian and composite Laplacian filters.
Week 9	Un-sharp masking and high boost filtering. The Gradient filter for enhancement, Robert's and Sobel masks. Combining spatial enhancement methods.
Week 10	Image segmentation in the spatial domain, definitions, principles, and methods.
Week 11	Image restoration, noise effect, noise model, types of noise. Judging noise type and choosing the proper filter in spatial domain.
Week 12	Discrete Wavelet Transform, Principles, means, one and two dimensions, and energy compactness.
Week 13	Image compression metrics, principles, embedded coding. EZW coding.
Week 14	Set Partitioning In Hierarchical Trees (SPIHT) compression algorithm.
Week 15	No List SPIHT (NLS) compression algorithm.
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to Digital Image Processing. Reading and showing digital images on MAATLAB.
Week 2, 3, 4	Lab 2, 3, 4: Histogram for an image and its meanings. Equalizing the histogram. Contrast stretching and thresholding. Enhancement by pixel wise processing (gamma, negative, log transformation, etc.).
Week 5	Lab 5: Spatial domain filtering (mean, median, Gaussian, un-sharp, etc.).
Week 6	Lab 6: Frequency domain filtering (Fourier, high-pass, low-pass).
Week 7	Lab 7: Image de-noising techniques (median, wiener).
Week 8	Lab 8: Image segmentation by thresholding and edge detection algorithms (Sobel and canny).
Week 9	Lab 9: Image segmentation by region growing and watershed algorithm.
Week 10	Lab 10: Feature detection and extraction algorithms (e.g. Harris corner detection).
Week 11	Lab 11: Scale-space representation and texture analysis.
Week 12	Lab 12: Image registration and alignment.
Week 13	Lab 13: Low-light image enhancement.
Week 14	Lab 14: Object recognition and tracking.
Week 15	Lab 15: K-mean segmentation for medical images.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1-Digital Image Processing; 2nd edition, Rafael C. Gonzalez, and Richard E. Woods, Prentice Hall, 2002. 2- Digital Image Processing Using MATLAB; Rafael C. Gonzalez, Richard E. Woods, and Steven L. Eddins, Prentice Hall, 2004. 3- Architectural Implementation of Modified ROI in No List SPIHT Wavelet Image Coding; Ph.D. Thesis, Nasseer M. Basheer. University of Mosul. 2007.	No
Recommended Texts	Digital Image Processing, Bernd Jahne, 6th revised edition, Springer, 2005, Netherland.	No
Websites	https://www.mathworks.com/discovery/digital-image-processing.html	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Research Methodology**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE404**				
ECTS Credits	**3**				
SWL (hr/sem)	**81**				
Module Level	**Forth**		**Semester of Delivery**	**Seventh**	
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Mohammed Sabah Jarjees**		**e-mail**	**mohammed.s.jarjees@ntu.edu.iq**	
Module Leader's Acad. Title	**Assistant Lecturer**		**Module Leader's Qualification**	**Ph.D.**	
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The Research Methodology course aims to provide students with a comprehensive understanding of the research process in biomedical engineering. Throughout the course, students will learn to formulate research questions, select appropriate study designs, and employ various data collection methods including quantitative and qualitative techniques. They will acquire skills in data collection, analysis, and statistical inference, utilizing software tools for data manipulation and visualization. Additionally, ethical considerations in research, literature review techniques, scientific writing principles, and project

	management strategies will be addressed. By the end of the course, students will be equipped with the knowledge and skills necessary to conduct rigorous and ethical research, interpret findings, and effectively communicate their work in the field of biomedical engineering.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the scientific research process and its components. 2. Demonstrate knowledge of research design principles and the importance of planning in research. 3. Identify ethical considerations in conducting research and adhere to ethical guidelines. 4. Formulate research problems, identify gaps in existing literature, and develop research questions. 5. Define clear objectives and hypotheses for research studies. 6. Conduct a comprehensive literature review and critically analyze research articles. 7. Understand the principles and structure of scientific writing. 8. Retrieve relevant information from scientific databases and apply citation and referencing guidelines. 9. Select appropriate study designs and sampling techniques for research studies. 10. Collect quantitative and qualitative data using suitable methods and ensure data validation and reliability. 11. Analyze data using statistical analysis software, including MATLAB and related tools. 12. Apply descriptive statistics, statistical inference, and hypothesis testing in data analysis. 13. Utilize advanced statistical analysis techniques, such as multiple comparison tests and regression analysis. 14. Present data effectively using appropriate data visualization techniques. 15. Interpret research findings and draw conclusions, discussing implications and limitations. 16. Present research projects and receive feedback from peers and instructors. 17. Understand methods of publishing scientific research and identify approved websites and their classifications.
Indicative Contents المحتويات الإرشادية	Part A: 1. Introduction to Research Methodology (5 hour): - Overview of scientific research process and its significance - Introduction to research design and planning - Understanding ethical considerations in research 2. Research Problem Formulation (4hour): - Identifying research gaps and formulating research questions - Defining research objectives and hypotheses - Conducting a literature review to inform the research

	3. Study Design and Sampling Techniques (5 hour): - Selecting an appropriate study design (experimental, observational, etc.) - Determining sample size and selecting sampling techniques 4. Data Collection Methods (10 hour): - Using quantitative methods (surveys, experiments) for data collection - Using qualitative methods (interviews, focus groups) for data collection - Ensuring data validation and reliability Part B: 5. Data Analysis and Interpretation (10 hour):: - Introduction to statistical analysis software and tools - Analyzing data using descriptive statistics and graphical representation - Performing statistical inference, hypothesis testing, and multivariate analysis 6. Data Presentation and Visualization (5 hour): - Applying effective techniques for data visualization - Creating graphical representations of data - Interpreting data visualizations 7. Data Interpretation and Discussion (5 hour): - Interpreting research findings and drawing conclusions - Discussing the limitations of the research and suggesting future directions
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The learning and teaching strategies for the course include: 1. Active learning: Encouraging students to actively engage in the learning process through discussions, group activities, and hands-on exercises. 2. Inquiry-based learning: Promoting critical thinking and problem-solving skills by challenging students to explore research questions and develop their own investigations. 3. Collaborative learning: Fostering a collaborative learning environment where students work together in groups, sharing ideas, and collaborating on projects. 4. Use of technology: Integrating technology tools and resources to enhance learning, such as online research databases, statistical analysis software, and multimedia presentations. 5. Formative assessment and feedback: Providing regular formative assessments to monitor student progress and offering constructive feedback to support their learning journey.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	45	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	36	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**81**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	5% (5)	3, 8	LO# 1, 2, 8
	Assignments	2	5% (5)	5, 10	LO# 1,2,3, 7
	Lab	0	0	-	-
	Report	2	10% (10)	4, 12	Lo# 1-9
Summative assessment	**Midterm Exam**	2hr	20% (20)	13	Lo# 1-8
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Research Methodology • Overview of the scientific research process • Principles of research design and planning • Ethical considerations in research
Week 2	Research Problem Formulation • Identifying research gaps and formulating research questions • Defining objectives and hypotheses • Literature review and critical analysis
Week 3 **Week 4**	Scientific Writing and Communication • Scientific writing principles and structure • Literature Review and Information Retrieval • Conducting a comprehensive literature review • Searching scientific databases • Critical evaluation of research articles • Citation and referencing guidelines

Week 5	Study Design and Sampling Techniques • Experimental, observational, and quasi-experimental study designs • Randomization and control groups • Determining sample sizes and selecting appropriate sampling techniques
Week 6 **Week 7**	Data Collection Methods • Quantitative data collection methods (surveys, experiments, etc.) • Qualitative data collection methods (interviews, focus groups, etc.) • Data validation and reliability assessment
Week 8 **Week 9**	Data Analysis and Interpretation • Introduction to statistical analysis software MATLAB language and MATLAB TOOLS SPM, GIFT, EEG, PET, ML and DL • Descriptive statistics and graphical representation • Statistical inference and hypothesis testing • Multivariate analysis techniques - Data preprocessing and cleaning
Week 10 **Week 11**	Advanced Statistical Analysis • Multiple comparison tests • Regression analysis and correlation
Week 12	Data Presentation and Visualization • Effective data visualization techniques • Graphical representation of data • Interpretation of data visualizations
Week 13	Data Interpretation and Discussion • Interpreting research findings • Drawing conclusions and implications Discussing limitations and future directions
Week 14 **Week 15**	Final Project Presentations and Wrap-up • Presentation of research projects • Discussion and feedback on final projects • Methods of publishing scientific research, approved websites and their classifications • Course review and wrap-up

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. "Research Methodology: A Step-by-Step Guide for Beginners" by Ranjit Kumar 2. "Research Design: Qualitative, Quantitative, and Mixed Methods Approaches" by John W. Creswell 3. "The Literature Review: Six Steps to Success" by Lawrence A. Machi and Brenda T. McEvoy	No
Recommended Texts	1. "Qualitative Inquiry and Research Design: Choosing Among Five Approaches" by John W. Creswell 2. "Experimental Design: Procedures for the Behavioral Sciences" by Roger E. Kirk	No

	3. "Research Methods in Applied Linguistics" by Brian Paltridge.	
Websites	1. ResearchGate (www.researchgate.net) 2. Google Scholar (scholar.google.com) 3. American Psychological Association (APA) website (www.apa.org) These resources provide students with the necessary knowledge, tools, and references to understand research methodology, design their studies, conduct literature reviews, collect and analyze data, and present their findings effectively.	

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	**Management Engineering**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE405**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	**Forth**	**Semester of Delivery**	**Seventh**		
Administering Department	**Med. Ins. Tech. Eng.**	**College**	**Technical Engineering College**		
Module Leader	**Zaid Husham Dahham**	**e-mail**	**zaidalsawaff@ntu.edu.iq**		
Module Leader's Acad. Title	**Lecturer**	**Module Leader's Qualification**	**Ph.D.**		
Module Tutor	**Name (if available)**	**e-mail**	**E-mail**		
Peer Reviewer Name	**Mohammed S Jarjees**	**e-mail**	**mohammed.s.jarjees@ntu.edu.iq**		
Scientific Committee Approval Date	**01/06/2023**	**Version Number**	**1.0**		

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	Provide students with an understanding of the principles and practices of hospital administration management. Students will learn about the structure and organization of hospitals, healthcare financing, and reimbursement, healthcare laws and regulations, patient safety, and quality improvement. The course will also cover the role of technology in hospital administration management, including biomedical engineering applications
Module Learning Outcomes	1. Understand the structure and organization of hospitals 2. Understand healthcare financing and reimbursement

مخرجات التعلم للمادة الدراسية	3. Understand healthcare laws and regulations 4. Understand patient safety and quality improvement 5. Understand the role of technology in hospital administration management 6. Apply biomedical engineering skills to hospital administration management
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Hospital Administration Management for Biomedical Engineering involves the application of management techniques and principles to the healthcare industry, with a focus on the effective management of medical equipment and technology. Some indicative contents for this subject may include: 1. Introduction to Hospital Administration Management for Biomedical Engineering: This section provides an overview of the role of biomedical engineers in hospital administration and management. 2. Healthcare Delivery Systems: This section covers the various healthcare delivery systems, including hospitals, clinics, and other healthcare facilities. It also includes an analysis of the healthcare industry and its challenges. 3. Healthcare Quality Management: This section focuses on quality management in healthcare, including quality control, quality assurance, and quality improvement. 4. Medical Equipment Management: This section covers the management of medical equipment, including maintenance, repair, and replacement. 5. Healthcare Technology Management: This section focuses on the management of healthcare technology, including medical devices, information systems, and other technologies used in healthcare. 6. Healthcare Regulations and Standards: This section covers the regulatory environment in healthcare, including federal and state regulations, accreditation standards, and industry standards. 7. Risk Management in Healthcare: This section focuses on the management of risk in healthcare, including risk assessment, risk mitigation, and risk communication. 8. Healthcare Finance and Accounting: This section covers the financial management of healthcare organizations, including budgeting, cost control, and financial reporting. 9. Healthcare Human Resource Management: This section focuses on the management of human resources in healthcare organizations, including recruitment, training, and retention. 10. Healthcare Information Management: This section covers the management of healthcare information, including electronic health records, privacy and security, and data analysis.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy for teaching Hospital Administration Management for Biomedical Engineering to 4th-year students may include the following: 1. Active Learning: Encourage active learning among students through group discussions, case studies, problem-solving exercises, and simulation scenarios. This will help students to apply their knowledge and skills to real-world situations. 2. Industry Experts: Invite industry experts from the healthcare and biomedical engineering sectors to deliver guest lectures, share their experiences, and provide insights into the latest trends and challenges in the industry. 3. Practical Training: Provide hands-on training and practical experience to students through internships, field visits, and laboratory exercises. 4. Assignments and Assessments: Assign regular assignments and assessments to evaluate students' understanding of the subject matter. 5. Case Studies: Use case studies to help students understand the practical applications of hospital administration management and biomedical engineering in healthcare facilities. This will help students to develop critical thinking skills and problem-solving abilities. 6. Collaborative Learning: Encourage collaborative learning among students by assigning group projects and team-based assignments. 7. Technology Integration: Integrate technology into the teaching and learning process by using online resources, e-learning platforms, and virtual simulations.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	40	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.66
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	5% (5)	5 and 10	LO #1, #2 and #6
	Assignments	2	5% (5)	2 and 12	LO #3, #4 and #5
	Projects / Lab.	0	-	-	-
	Report	2	10% (10)	13	All
Summative assessment	Midterm Exam	2hr	20% (20)	7	LO #1 - #4
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	• Introduction to Hospital Administration Management • Overview of healthcare systems and Hospitals • History of hospital administration management • Key stakeholders in hospital administration management
Week 2	• Hospital Organization and Management • Hospital governance • Hospital organizational structure • Hospital management functions and responsibilities
Week 3	• Healthcare Financing and Reimbursement • Healthcare financing models • Healthcare reimbursement systems • Healthcare payment structures
Week 4	• Healthcare Laws and Regulations • Healthcare regulations and standards • Legal and ethical issues in Healthcare • Healthcare Policy and Reform
Week 5	• Patient Safety and Quality Improvement • Patient safety concepts and strategies • Quality improvement methodologies • Healthcare analytics and data management
Week 6	• Technology in Hospital Administration Management • Biomedical engineering applications in hospitals • Electronic health records (EHRs) and health information technology (HIT(• Telemedicine and remote patient monitoring
Week 7	• Healthcare Marketing and Public Relations • Overview of healthcare marketing and public relations • Strategies for effective healthcare marketing and public relations • Ethics and Regulations in healthcare marketing and public relations

Week 8	• Healthcare Human Resources Management • Overview of healthcare human resources management • Recruitment, retention, and training of healthcare professionals • Healthcare workforce planning and development
Week 9	• Healthcare Operations Management • Overview of healthcare operations management • Healthcare process improvement methodologies • Capacity Planning and resource allocation in healthcare
Week 10	• Healthcare Project Management • Overview of healthcare project management • Project management methodologies and tools • Healthcare project planning, execution, and control
Week 11	• Healthcare Supply Chain Management • Overview of healthcare supply chain management • Supply chain strategy and design • Procurement, inventory management, and logistics in healthcare
Week 12	• Healthcare Information Technology Management • Overview of healthcare information technology (HIT) management • HIT governance and strategic planning • HIT implementation, adoption, and evaluation
Week 13	• Healthcare Ethics and Leadership • Overview of healthcare ethics and leadership • Ethical issues and challenges in healthcare • Leadership principles and practices in healthcare
Week 14	• Healthcare Innovation and Entrepreneurship • Overview of healthcare innovation and entrepreneurship • Emerging trends and challenges in healthcare innovation • Healthcare entrepreneurship and venture creation
Week 15	• Final Project • Students will apply the concepts learned in the course to develop a hospital administration management project using biomedical engineering skills.
Week 16	• Introduction to Hospital Administration Management • Overview of healthcare systems and Hospitals • History of hospital administration management • Key stakeholders in hospital administration management

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. "Biomedical Engineering Principles in Healthcare" by Daniel J. Valentini and James E. Moore Jr. (2019): This textbook provides an overview of biomedical engineering principles and their applications in healthcare, including medical equipment management,	No

	healthcare technology management, and healthcare delivery systems. 2. "Healthcare Operations Management" by Daniel McLaughlin and John Olson (2018): This textbook covers the principles and practices of healthcare operations management, including quality management, risk management, and healthcare finance and accounting.	
Recommended Texts	1. "Healthcare Management: An Introduction" by Sharon B. Buchbinder and Nancy H. Shanks (2018): This textbook provides an introduction to healthcare management, including healthcare delivery systems, healthcare regulations and standards, and healthcare human resource management. 2. "Introduction to Biomedical Engineering Technology" by Laurence J. Street and Joseph J. Carr (2019): This textbook covers the principles and applications of biomedical engineering technology, including medical equipment management, healthcare technology management, and healthcare information management.	No
Websites	1. https://www.himss.org/ 2. https://www.ashe.org/ 3. https://www.bmes.org/	

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	**Object Oriented Programing**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE406**				
ECTS Credits	**4**				
SWL (hr/sem)	**104**				
Module Level	**Forth**		**Semester of Delivery**	**Seventh**	
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Mohammed Basil Shukur**		**e-mail**	**mohammed.basil@ntu.edu.iq**	
Module Leader's Acad. Title	**Assistant lecturer**		**Module Leader's Qualification**	**Master**	
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Understand the principles and advantages of OOP in Python 2. Differentiate between classes and objects 3. Define attributes and methods within a class 4. Apply encapsulation techniques to hide data and implementation details 5. Create and use getter and setter methods 6. Understand the concept of data abstraction and its benefits 7. Implement inheritance to create hierarchies of classes

	8. Utilize polymorphism to write code that operates on objects of different classes 9. Handle exceptions in object-oriented programs 10. Implement custom exception classes 11. Understand the importance of error management in OOP 12. Apply OOP concepts and techniques to a real-world project 13. Design and develop a software solution using OOP principles 14. Present the project, documentation, and code assessment
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of this module, the student will be able to: LO1: Design OOP classes to represent unseen general concepts. LO2: Devise OOP class hierarchies and structures that relate to these classes. LO3: Implement these classes in the Python programming languages. LO4: Communicate an OOP solution that solves real-world design.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. The course " Object Oriented Programming" provides students with the following: Objects and Classes, Encapsulation, Abstraction, Binding. Methods and Behavior, Inheritance, and Multiple Inheritance.

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	There are a number of teaching and learning activities including lectures, laboratories, and group projects. The assessment requires students to design OOP classes and hierarchies related to a specific problem, to implement a solution in the Python language.

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

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	44	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.93
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**104**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	5% (5)	5 and 10	LO #1, 2, and 3
	Assignments	2	5% (5)	2 and 12	LO # 1, 2, and 3
	Lab	15	10% (10)	Continue	All
	Report	2	10% (10)	6, 14	LO # 4
Summative assessment	**Midterm Exam**	2hr	20% (20)	13	LO # 1-3
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to OOP and Python Basics
Week 2	
Week 3	Classes
Week 4	Objects
Week 5	Data Abstraction.
Week 6	Inheritance
Week 7	Polymorphism
Week 8	Exception Handling
Week 9	Error Handling
Week 10	Constructors, destructors, and object creation.
Week 11	File Handling and Modules
Week 12	
Week 13	Mid-term Exam
Week 14	Database Connectivity and ORM
Week 15	
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Setting Up Development Environment and Version Control
Week 2	Classes
Week 3	Objects
Week 4	Data Abstraction.
Week 5	Inheritance
Week 6	Polymorphism
Week 7	Exception Handling
Week 8	Error Handling
Week 9	File Handling and Modules
Week 10	Database Connectivity and ORM in python (Par1)
Week 11	Database Connectivity and ORM in python (Part 2)

Week 12	Project Work and Integration
Week 13	Mid-term Exam
Week 14	Project Presentation and Assessment
Week 15	Study week and preparations for Exam. Students support.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Dusty Phillips - Python 3 Object Oriented Programming_ Harness the power of Python 3 objects-Packt Publishing (2010)	No
Recommended Texts	Steven F. Lott - Mastering Object-oriented Python-Packt Publishing (2014)	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	**Radiation Engineering in Medical Applications**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE408**				
ECTS Credits	**7**				
SWL (hr/sem)	**171**				
Module Level	**Forth**		**Semester of Delivery**	**Eighth**	
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Mazin Nadher Farhan**		**e-mail**	**Mazin.nadheer@ntu.edu.iq**	
Module Leader's Acad. Title	**Assistant Professor**		**Module Leader's Qualification**	Master	
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S. Jarjees**		**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1- Understanding Radiation Physics: One of the primary objectives of studying Radiation Engineering in Medical Applications is to gain a comprehensive understanding of the fundamental principles of radiation physics. This includes topics such as the nature of radiation, its properties, interaction with matter, and the behavior of radiation in medical applications. 2- Radiation Safety and Protection: A crucial aspect of studying Radiation Engineering in Medical Applications is to develop expertise in radiation safety and protection measures. This involves learning about the potential

	hazards of radiation exposure, implementing appropriate safety protocols, and understanding the principles of shielding and containment to ensure the well-being of both patients and healthcare professionals. 3- Medical Imaging Techniques: Another objective is to explore various medical imaging techniques that employ radiation, such as X-ray radiography, computed tomography (CT), positron emission tomography (PET), and single-photon emission computed tomography (SPECT). Students will learn about the principles, equipment, image acquisition, and interpretation methods for each modality. 4- Radiation Therapy: Radiation therapy plays a critical role in the treatment of cancer. By studying Radiation Engineering in Medical Applications, students aim to develop expertise in the principles and techniques of therapeutic radiology. This includes learning about treatment planning, dose calculation, radiation delivery systems, and the biological effects of radiation on cancer cells. 5- Radiation Dosimetry: Accurate measurement and calculation of radiation doses are essential in medical applications. The objective of studying Radiation Engineering in Medical Applications is to acquire knowledge and skills in radiation dosimetry, which involves understanding different dosimetric techniques, radiation measurement devices, and methods for calculating and verifying radiation doses in medical procedures. 6- Radiation Biology: To comprehend the effects of radiation on living organisms, students studying Radiation Engineering in Medical Applications will explore radiation biology. This field covers topics such as radiation-induced biological damage, cellular and molecular responses to radiation, radiation effects on tissues and organs, and radiation-related risks and complications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the fundamentals of radiation physics: Gain knowledge of the basic principles of radiation, including the nature of ionizing radiation, its properties, interactions with matter, and the effects on living tissues. 2. Comprehend the principles of radiation therapy: Learn about the various techniques and technologies used in radiation therapy, including external beam radiation therapy, brachytherapy, and intensity-modulated radiation therapy (IMRT). Understand the underlying physics behind these techniques. 3. Familiarity with radiation safety protocols: Acquire a thorough understanding of radiation safety guidelines, regulations, and best practices in medical environments. Develop skills to ensure the safe handling, use, and disposal of radiation sources. 4. Learn about radiation detection and measurement: Gain knowledge of different types of radiation detectors and measurement techniques used in medical applications. Understand the principles of dosimetry and methods for accurate measurement and calculation of radiation doses. 5. Explore imaging techniques in radiology: Study the principles and applications of medical imaging technologies, including X-ray radiography, computed tomography (CT), magnetic resonance imaging (MRI), and nuclear medicine imaging. Understand how these techniques utilize radiation and their role in medical diagnosis.

	6. Understand the biological effects of radiation: Learn about the biological responses and risks associated with exposure to ionizing radiation. Study the concepts of radiation biology, radiation oncology, and radiation protection in medical settings. 7. Gain practical skills in radiation equipment and treatment planning: Develop hands-on experience in using radiation therapy equipment, treatment planning systems, and simulation tools. Learn to optimize treatment plans, calculate radiation doses, and evaluate treatment outcomes. 8. Explore emerging trends and advancements in radiation technology: Stay updated with the latest developments in radiation engineering and its applications in the medical fields. Study emerging technologies such as proton therapy, stereotactic radiosurgery, and image-guided radiation therapy (IGRT). 9. Critical thinking and problem-solving: Develop analytical and critical thinking skills to assess complex radiation-related problems and propose effective solutions. Apply theoretical knowledge to practical scenarios in medical radiation engineering.
Indicative Contents المحتويات الإرشادية	The indicative contents of a Radiation Engineering in Medical Applications module include: Radiations Physics: Nature of ionizing radiation, Types of radiation (X-rays, gamma rays, alpha and beta particles), Interactions of radiation with matter, Radiation detection and measurement techniques, Principles of radiation dosimetry. Medical Radiological Protection: Radiation safety guidelines and regulations, Radiation shielding design and calculations, Occupational radiation exposure limits, Patient and public safety considerations, Radiation monitoring and personal protective equipment Medical Radiation Imaging: X-ray radiography and fluoroscopy, Computed tomography (CT) imaging, Magnetic resonance imaging (MRI), Nuclear medicine imaging (positron emission tomography, single-photon emission computed tomography). External Beam Radiation Therapy: Principles and techniques of external beam radiation therapy (EBRT), Treatment machines and beam delivery systems, Treatment planning and optimization, Clinical applications and treatment protocols. Stereotactic Radiosurgery and Stereotactic Body Radiation Therapy (SBRT): Principles and indications for stereotactic radiosurgery (SRS), Treatment planning and image-guided localization, Equipment and techniques for precise radiation delivery. Clinical applications and treatment considerations. Brachytherapy: Principles and techniques of brachytherapy, Radioactive sources and applicators, Treatment planning and dose optimization, Clinical applications (gynecological, prostate, etc.). Radiation Therapy Dosimetry: Dosimetric principles and concepts, Calibration of radiation measurement devices, Treatment verification and quality assurance,

	Dose calculation algorithms and planning optimization, Plan evaluation and reporting. Radiations and Biological Effects: Basic radiobiology principles, Cellular and molecular responses to radiation, Tumor response and normal tissue effects, Radiosensitivity and dose-response relationships, Late effects of radiation and risk assessment.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The learning and teaching strategies for a Radiation Engineering in Medical Applications module can be designed to engage students actively, promote critical thinking, and facilitate the application of theoretical concepts to real-world scenarios. Here are some effective strategies that can be incorporated: Lectures: Traditional lectures can be used to deliver foundational knowledge, principles, and theoretical concepts related to radiation engineering in medical applications. This can include explanations of radiation physics, radiation therapy techniques, imaging technologies, and radiation safety protocols. Laboratory Sessions: Hands-on laboratory sessions provide students with opportunities to work with radiation detection equipment, imaging technologies, and treatment planning systems. They can perform measurements, calibrations, and simulations to reinforce theoretical concepts and gain practical experience. Problem-Based Learning (PBL): Implementing PBL approaches can enhance critical thinking and problem-solving skills. Students can work in small groups to analyze complex radiation engineering problems, identify relevant information, propose solutions, and present their findings. This approach encourages collaboration and active engagement. Interactive Discussions: Engage students in interactive discussions to explore various aspects of radiation engineering. This can involve analyzing research papers, discussing ethical considerations, debating the pros and cons of different radiation therapy techniques, and sharing insights on emerging technologies. Encourage students to express their opinions and engage in respectful debates. Multimedia Resources: Utilize multimedia resources such as videos, animations, and interactive simulations to enhance learning. Visual representations can aid in understanding complex concepts, demonstrate radiation interactions with matter, or showcase the operation of radiation therapy equipment. Assessments: Use a variety of assessment methods, including written exams, presentations, and practical demonstrations, to evaluate students' understanding of the subject matter. Assessments should align with the learning outcomes and encourage students to apply their knowledge effectively.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	105	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	66	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**171**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Seminars**	2	10% (10)	7 and 13	LO #2 and #5
	Lab.	14	10% (10)	14	All
	Report	14	10% (10)	13	LO #7, #8 and #9
Summative assessment	**Midterm Exam**	2hr	20% (20)	7	LO #1 - #8
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Radiations Physics
Week 2	
Week 3	Medical Radiological Protection
Week 4	Medical Radiation Imaging
Week 5	
Week 6	
Week 7	External Beam Radiation Therapy
Week 8	
Week 9	
Week 10	Stereotactic Radiosurgery and Stereotactic Body Radiation Therapy (SBRT)
Week 11	
Week 12	Brachytherapy

Week 13	Radiation Therapy Dosimetry
Week 14	
Week 15	Radiations and Biological Effects

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Poisson's distribution and Gaussian distribution of radioactive decay
Week 2	Operating Plateau for the Geiger Tube.
Week 3	Inverse Square Law for Gamma-Ray
Week 4	The deflection of beta radiation in a magnetic field. Spectrum analysis of some standard source Using Scintillation
Week 5	Detector and MCA and by using Rad lab software
Week 6	Absorption coefficient for – rays.
Week 7	The study of Compton scattering for gamma rays using MCA.
Week 8	Level control (Foundation of material height in closed containers).
Week 9	Determination of Operating Voltage for Scintillation Detector.
Week 10	Energy Calibration of the Scintillation Detector and Energy
Week 11	determination of the unknown Gamma Emitter Source.
Week 12	Determination of dead time (resolving time) of G.M. counters by two –source method.
Week 13	Determination half- life of protactinium
Week 14	The activity of protactinium decays

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. "The Essential Physics of Medical Imaging" by Jerrold T. Bushberg, J. Anthony Seibert, Edwin M. Leidholdt Jr., and John M. Boone, this comprehensive book provides an in-depth understanding of the physics and technology behind medical imaging modalities, including X-ray imaging, CT, MRI, ultrasound, and nuclear medicine. 2. "Radiation Therapy Physics" by William R. Hendee and Geoffrey S. Ibbott 3. "Introduction to Radiological Physics and Radiation Dosimetry" by Frank Herbert Attix, This textbook presents the fundamental concepts of radiological physics and radiation dosimetry, covering topics such as radiation interactions, radiation dosimetry techniques, and radiation protection.	No

	4. "Principles and Practice of Radiation Therapy" by Charles M. Washington and Dennis T. Leaver 5. "Radiation Protection in Medical Radiography" by Mary Alice Statkiewicz Sherer, Paula J. Visconti, E. Russell Ritenour, and Kelli Haynes 7. "Brachytherapy: Applications and Techniques" edited by Phillip M. Devlin and Frank A. Vicini 8. "Image-Guided Radiation Therapy in Lymphoma Management: The Increasing Role of Functional Imaging" by Richard Tsang and Andrew Scarsbrook (Journal of Oncology Practice) 9. Medical Imaging: Principles and Practices" by Mostafa Analoui and Kalyanmoy Deb. This book covers the principles and practices of various medical imaging techniques, including X-ray, computed tomography (CT), magnetic resonance imaging (MRI), and nuclear medicine. 10. "Radiation Detection and Measurement" by Glenn F. Knoll This book provides a comprehensive introduction to the principles of radiation detection and measurement, including radiation sources, detectors, and measurement techniques.	
Recommended Texts	1. "Medical Imaging Physics" by William R. Hendee and E. Russell Ritenour " 2. "Radiation Therapy Planning" by Gunilla C. Bentel. This book focuses on the planning and delivery of radiation therapy in cancer treatment, covering topics such as treatment planning techniques, dose calculation, and quality assurance. 3. "Radiation Oncology: A Physicist's-Eye View" by Peter Metcalfe, Tomas Kron, and Peter Hoban. This textbook provides a physicist's perspective on radiation oncology, covering topics such as radiation therapy equipment, treatment planning, quality assurance, and emerging technologies. 4. "Introduction to Health Physics" by Herman Cember and Thomas E. Johnson. This introductory textbook covers the principles of health physics, including radiation physics, radiation biology, radiation protection, and regulatory aspects. 5. "Radiation Science for Physicians and Public Health Workers" by Peter J. Bryant. This book provides an overview of radiation science for healthcare professionals and public health workers, covering topics such as radiation biology, radiation measurement, and radiation protection.	No
Websites	RadiologyInfo.org: This website, developed by the American College of Radiology (ACR) and the Radiological Society of North America (RSNA), provides reliable and easy-to-understand information on various radiology and radiation therapy topics. It covers radiation physics, imaging techniques, radiation safety, and different types of medical procedures involving radiation. The website includes patient-oriented materials as well as resources for healthcare professionals.	

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	**Artificial Intelligence**			**Module Delivery**	
Module Type	**Supported**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE408**				
ECTS Credits	**6**				
SWL (hr/sem)	**141**				
Module Level	**Forth**	**Semester of Delivery**	**Eighth**		
Administering Department	**Med. Ins. Tech. Eng.**	**College**	**Technical Engineering College**		
Module Leader	**Raid Rafi Omar**	**e-mail**	**Raidrafi3@ntu.edu.iq**		
Module Leader's Acad. Title	**Assistant Professor**	**Module Leader's Qualification**	**Ph.D.**		
Module Tutor	**Name (if available)**	**e-mail**	**Raidrafi3@ntu.edu.iq**		
Peer Reviewer Name	**Mohammed S. Jarjees**	**e-mail**	**Mohammed.s.jarjees@ntu.edu.iq**		
Scientific Committee Approval Date	**01/06/2023**	**Version Number**	**1.0**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	N/A	**Semester**	
Co-requisites module	N/A	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Studying fundamentals of artificial intelligence. 2. Presenting principles of machine learning. 3. Explaining artificial neural networks. 4. Explaining deep learning. 5. Illustrating fuzzy logic. 6. Describing optimization methods.
Module Learning Outcomes	1. Abilities to recognize among different techniques of artificial intelligence, machine learning and deep learning. 2. Dealing efficiently with various artificial neural network types.

مخرجات التعلم للمادة الدراسية	3. Increasing the students' capabilities in advanced artificial neural network, which is known as deep learning. 4. Defining and dealing with fuzzy logic. 5. Presenting different optimization methods.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Artificial neural networks of: Hebb, Perceptron, Hetero-associative, Auto-Associative, SOM and Backpropagation. Deep learning of: CNN and Autoencoder networks. Fuzzy logic of: Mamdani and Sugeno Optimizations of: Genetic Algorithm, Whale Optimization Algorithm, Polar Bear Optimization, Red Fox optimization and others.

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Strategies that will be adopted for delivering this module are theoretical lectures, practical experiments, home works and exams. This will be achieved through classes, interactive tutorials and by considering practical experiments.

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

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	90	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	51	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**141**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	0% (0)	2,5,7,10	LO #1 - #3
	Assignments	10	15% (15)	10	LO #1 - #4
	Projects / Lab.	15	15% (15)	Continuous	All
	Report	0	0% (0)	-	-
Summative assessment	**Midterm Exam**	2hr	20% (20)	10	LO #1 - #4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
1st	**Introducing Artificial Neural Network (ANN)**
2nd, 3rd, 4th	**Explaining Hebb and Perceptron Neural Network**
5th	**Explaining Adaline Neural Network**
6th	**Explaining Heteroassociative Neural Network**
7th	**Explaining Autoassociative Neural Network**
8th	**Explaining Backpropagation Neural Network**
9th, 10th, 11th	**Illustrating the Deep Learning**
12th, 13th	**Illustrating the Fuzzy Logic**
14th, 15th	**Illustrating the Optimizations**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
1st	**Introducing Artificial Neural Network (ANN) software**
2nd, 3rd, 4th	**Explaining Hebb and Perceptron Neural Network**
5th	**Explaining Adaline Neural Network**
6th, 7th	**Explaining Heteroassociative Neural Network and Autoassociative Neural Network**
8th	**Explaining Backpropagation Neural Network**
9th, 10th, 11th, 12th	**Illustrating the Deep Learning and Fuzzy Logic**
13th, 14th, 15th	**Illustrating the Optimizations**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	L. Fausett, "Fundamentals of Neural Networks, Architectures, Algorithms, and Applications", Printice Hall Int. Snc., 1994.	In the internet
Recommended Texts	Raid Rafi Omar Al-Nima, "Signal Processing and Machine Learning Techniques for Human Verification Based on Finger Textures", PhD thesis, School of Engineering, Newcastle University, UK, 2017.	In the internet
Websites	https://www.mathworks.com/help/fuzzy/fuzzy-inference-process.html	

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Control Systems**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE 409**				
ECTS Credits	**6**				
SWL (hr/sem)	**153**				
Module Level	**Forth**		**Semester of Delivery**	**Eighth**	
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Mohammed Basil Shukur**		**e-mail**	**mohammed.basil@ntu.edu.iq**	
Module Leader's Acad. Title	**Assistant lecturer**		**Module Leader's Qualification**	**Master**	
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Understand the fundamentals of control systems: This objective involves gaining knowledge about the basic principles and concepts of control systems, including feedback, open-loop and closed-loop control, control algorithms, and system dynamics. 2. Learn about Programmable Logic Controllers, their architecture, and their role in industrial automation and medical applications. Understand the advantages and applications of PLCs in control systems.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding Control System Principles: Students will develop a solid understanding of the principles and fundamentals of control systems, including the concepts of open and closed loop systems, transfer functions, block diagram models, and the differential equations governing physical systems. 2. Analyzing and Designing State Variable Models: Students will learn to analyze and design control systems using state variable models, including understanding the concepts of controllability and observability, solving state equations, constructing state diagrams, and applying state feedback for system design. 3. Evaluating System Performance: Students will gain the ability to evaluate the performance of control systems, particularly focusing on the time response and dynamic performance of second-order systems. They will learn techniques for analyzing system stability, such as the Routh-Hurwitz criterion, relative stability, and the root locus method. 4. Analyzing Frequency Response: Students will learn to analyze control systems in the frequency domain, including topics such as Bode diagrams, and frequency response analysis. They will understand the relationship between frequency response and system stability and be able to interpret and design control systems accordingly. 5. Designing PID Controllers and Digital Control Systems: Students will acquire the knowledge and skills to design proportional-integral-derivative (PID) controllers and understand their application in control systems. They will also explore the stability analysis of digital control systems in the Z-plane and learn techniques like Jury's test. 6. Describe the role and function of Programmable Logic Controllers (PLCs) in industrial automation and control systems. 7. Develop basic skills in PLC programming using commonly used programming languages.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: 1. Differential equations of physical systems open & closed loop systems, transfer function of linear systems block diagram models. 2. Signal flow graph Models, State variables of dynamic systems. 3. Solution of state equation State diagram. 4. Root locus. 5. Frequency response, Bode diagram. 6. PID controller design. 7. Digital control system. 8. Programmable Logic Controllers (PLCs). 9. Architecture, components, and programming of PLC.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	90	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	63	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**153**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	5% (5)	4, 7, 10,14	LO #1,4,7
	Assignments	2	5% (5)	6,12	LO # 2,3,6
	Lab	15	10% (10)	Continuous	All
	Report	4	10% (10)	3,5,8,11	Lo# 1-4, Lo # 6
Summative assessment	**Midterm Exam**	2hr	20% (20)	7	LO # 1-7
	Final Exam	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to linear control engineering, Mathematical background.
Week 2	Laplace transform, complex variable.
Week 3	Matrices, Transfer function.
Week 4	block diagram representation and reduction , signal flow diagram.
Week 5	Time domain analysis , steady–state transient analysis.
Week 6	Root locus technique.
Week 7	Frequency domain analysis, Gain margin , phase margin and bode plot .
Week 8	Frequency domain synthesis , phase lead .
Week 9	Compensation , phase–lag compensation lag–lead compensation .
Week 10	PID controllers design .
Week 11	

Week 12	Introduction to PLC: Microprocessor, I/O Ports, Isolation, Filters, Drivers.
Week 13	Mid-term Exam
Week 14	Introduction to PLC Memory
Week 15	Stepper Motor, Servo Motor and DC Motor
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Alternating current control motors using (ON-OFF)switching
Week 2	Three steps control
Week 3	Control the operation of two single phase motors in sequence
Week 4	Level control liquids
Week 5	Control circuit to change the direction of three phase induction motor
Week 6	Introduction to PLC lab, Configuration and Software Install, Ladder logic programming concepts
Week 7	PLC Boolean logic operations (Part 1)
Week 8	PLC Boolean logic operations (Part 2)
Week 9	Industrial Applications and Case Studies: PLC Latching program
Week 10	PLC Timers and counters
Week 11	Industrial Applications and Case Studies: Conveyor Control
Week 12	Industrial Applications and Case Studies: Tank Fill and Discharge control
Week 13	Mid-term Exam
Week 14	Project Presentation and Assessment
Week 15	Industrial Applications and Case Studies: Mixer control, Bottle filling plant control
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1- R.C. Dorf and R.H. Bishop, "Modern Control Systems," Pearson Prentice Hall, 13th edition, 2017. 2- W. Bolton and D.J. Wetherall “Programmable Logic Controllers,” 4th edition, Elsevier, 2006.	No
Recommended Texts	Royce D. Hrbor "Feedback control system"	No
Websites	https://cache.industry.siemens.com/dl/files/461/16527461/att_82564/v1/Logo_e.pdf	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**English Language 4**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MIE410**				
ECTS Credits	**3**				
SWL (hr/sem)	**77**				
Module Level	**Forth**		**Semester of Delivery**	**Eighth**	
Administering Department	**Med. Ins. Tech. Eng.**		**College**	**Technical Engineering College**	
Module Leader	**Mazin Nadher Farhan**		**e-mail**	**Mazin.nadheer@ntu.edu.iq**	
Module Leader's Acad. Title	**Assistant lecturer**		**Module Leader's Qualification**	**Master**	
Module Tutor	**Name (if available)**		**e-mail**	**E-mail**	
Peer Reviewer Name	**Mohammed S Jarjees**		**e-mail**	**mohammed.s.jarjees@ntu.edu.iq**	
Scientific Committee Approval Date	**01/06/2023**		**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1-Skill Enhancement: Improve reading, listening, speaking, and writing skills through targeted practice exercises and strategies specific. 2-Vocabulary and Grammar Development: Expand vocabulary and refine grammatical accuracy to effectively communicate ideas and demonstrate language proficiency in both spoken and written tasks. 3-Speaking Proficiency: Develop fluency, coherence, and confidence in spoken communication by practicing short introductions, responding to prompts,

	delivering prepared talks or lectures, and engaging in discussions on abstract topics. 4-Exam-Specific Strategies for IELTS or TOEFL: Learn time management techniques, test-taking tips, and strategies to maximize performance, minimize errors, and demonstrate proficiency in each section of the exam.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	LO 1: Language Skills Review and Expansion - Review grammar concepts and tenses covered at the proficiency level. - Consolidate and expand vocabulary knowledge. LO 2: Speaking Skills Development - Engage in group discussions and presentations. - Practice expressing opinions and ideas effectively. LO 3: Exam Preparation Strategies - Understand the structure and question types of either the IELTS or TOEFL exam. - Learn effective strategies to approach each section of the exam. LO 4: Reading and Listening Skills Enhancement - Develop reading skills such as skimming, scanning, and comprehension techniques. - Practice note-taking, inference, and comprehension strategies for listening. LO 5: Writing Skills Improvement - Learn the format, structure, and language requirements for either IELTS Writing Task 1 or TOEFL Integrated Writing. - Develop essay writing skills, including argument development, critical thinking, coherence, and cohesion.
Indicative Contents المحتويات الإرشادية	Part A: 1. Grammar and Vocabulary Review (6 hours) - Reviewing key grammar concepts and tenses at the proficiency level - Practicing grammar exercises and drills - Consolidating vocabulary knowledge and expanding vocabulary usage through exercises and activities 2. Speaking Skills Development (10 hours) - Engaging in group discussions on various topics to enhance fluency and communication skills - Practicing expressing opinions, ideas, and providing supporting arguments - Delivering presentations to develop confidence and effective speaking skills 3. Exam Preparation Strategies (8 hours) - Understanding the structure and question types of either the IELTS or TOEFL exam - Learning effective strategies to approach each section of the exam - Practicing with sample exam questions and exercises 4. Reading and Listening Skills Enhancement (8 hours)

	- Developing reading skills such as skimming, scanning, and comprehension techniques - Improving note-taking, inference, and comprehension strategies for listening - Engaging in reading and listening exercises and practice tests Part B: 5. Writing Skills Improvement - IELTS Writing Task 1 or TOEFL Integrated Writing (8 hours) - Understanding the format, structure, and language requirements for either IELTS Writing Task 1 or TOEFL Integrated Writing - Analyzing sample responses and model essays - Practicing writing essays with a focus on argument development, critical thinking, coherence, and cohesion 6. Essay Writing Skills Enhancement (4 hours) - Developing skills in writing well-structured and cohesive essays - Practicing different essay types, such as opinion essays and argumentative essays - Receiving feedback and guidance on essay writing techniques
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Review of grammar concepts and tenses: Refresh knowledge of advanced grammar concepts and tenses covered in the proficiency level. 2. Vocabulary expansion: Consolidate and expand vocabulary through exercises and practice. 3. Speaking practice: Engage in group discussions and presentations to enhance speaking skills. 4. Exam format and strategies: Understand the structure and question types of the IELTS or TOEFL exam. Learn effective strategies for approaching each section. 5. Reading skills: Develop techniques for skimming, scanning, and comprehension. Practice reading passages and answering related questions. 6. Listening skills: Improve note-taking, inference, and comprehension strategies. Practice listening to audio clips and answering related questions. 7. Writing Task 1 or Integrated Writing: Learn the format, structure, and language requirements of the task. Analyze and respond to writing prompts. Practice coherence and cohesion in speaking. 8. Writing Task 2 or Independent Writing: Master essay structure, argument development, and critical thinking. Write essays on various topics and receive feedback. 9. Grammar and vocabulary review: Identify common grammatical errors and enhance vocabulary usage. Correct grammar mistakes and expand vocabulary through exercises.

	10. Speaking Part 1 or Independent Speaking: Answer personal questions and express opinions. Simulate speaking test scenarios and receive feedback. Write coherent and cohesive paragraphs. 11. Speaking Part 2 or Integrated Speaking: Structure and deliver prepared talks or lectures. Deliver presentations and practice pronunciation and intonation. Write structured and well-supported essays. 12. Speaking Part 3 or Independent Speaking: Discuss abstract topics and express opinions. Engage in discussions and provide logical arguments. Write argumentative essays and develop strong thesis statements. 13. Exam-specific strategies: Learn time management techniques, test-taking tips, and how to avoid common pitfalls. Complete practice tests to simulate exam conditions. Mock speaking tests with examiner-style feedback. 14. Review of exam content and skills: Focus on areas that need improvement. Targeted practice in weak areas identified during mock tests. 15. Writing practice: Timed essay writing and reviewing essay structures. Final exam preparation through practice tests to assess readiness and identify any remaining areas of improvement.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	45	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	32	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**77**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	10%(10)	3,6,9,13	All
	Assignments	2	10%(10)	8, 12	All
	Lab	0	0	-	-
	Report	0	0	-	-
Summative assessment	**Midterm Exam**	2hr	20%(20)	13	Lo# 1-4
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Stage 4 topics and exam objectives ✓ Review of grammar concepts and tenses covered in the proficiency level ✓ Vocabulary expansion: Review and consolidation of vocabulary ✓ Speaking practice: Group discussions and presentations
Week 2	Exam format and strategies: Overview of the IELTS or TOEFL exam structure and question types ✓ Reading skills: Skimming, scanning, and comprehension techniques ✓ Practice exercises: Reading passages and answering related questions ✓ Speaking practice: Short introductions and familiarization with speaking prompts
Week 3	Listening skills: Note-taking, inference, and comprehension strategies ✓ Practice exercises: Listening to audio clips and answering related questions ✓ Speaking practice: Responding to audio-based prompts and practicing fluency
Week 4 **Week 5**	Writing Task 1 (IELTS) or Integrated Writing (TOEFL): Format, structure, and language requirements ✓ Practice exercises: Analyzing and responding to writing prompts ✓ Speaking practice: Giving presentations and practicing coherence and cohesion
Week 6 **Week 7**	Writing Task 2 (IELTS) or Independent Writing (TOEFL): Essay structure, argument development, and critical thinking ✓ Practice exercises: Writing essays on various topics and receiving feedback ✓ Speaking practice: Engaging in debates and discussing pros and cons of different issues
Week 8	Grammar and vocabulary review: Common grammatical errors and advanced vocabulary usage ✓ Practice exercises: Correcting grammar mistakes and expanding vocabulary ✓ Speaking practice: Using advanced vocabulary and idiomatic expressions in conversations
Week 9	Speaking Part 1 (IELTS) or Independent Speaking (TOEFL): Answering personal questions and expressing opinions ✓ Practice exercises: Simulating speaking test scenarios and receiving feedback ✓ Writing practice: Writing coherent and cohesive paragraphs on different topics
Week 10	Speaking Part 2 (IELTS) or Integrated Speaking (TOEFL): Structuring and delivering a prepared talk or lecture ✓ Practice exercises: Delivering presentations and practicing pronunciation and intonation ✓ Writing practice: Writing structured and well-supported essays
Week 11	Speaking Part 3 (IELTS) or Independent Speaking (TOEFL): Discussing abstract topics and expressing opinions ✓ Practice exercises: Engaging in discussions and providing logical arguments ✓ Writing practice: Writing argumentative essays and developing strong thesis statements
Week 12	Exam-specific strategies: Time management, test-taking tips, and avoiding common pitfalls ✓ Practice tests: Complete practice tests to simulate exam conditions ✓ Speaking practice: Mock speaking tests with examiner-style feedback

Week 13	Review of exam content and skills: Focus on areas that need improvement ✓ Practice exercises: Targeted practice in weak areas identified during mock tests Writing practice: Timed essay writing and reviewing essay structures
Week 14 **Week 15**	✓ Final exam preparation: Practice tests to assess readiness and identify any remaining areas of improvement

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1-"English Grammar in Use" by Raymond Murphy: A comprehensive guide to English grammar with explanations, examples, and practice exercises. 2-"IELTS Official Cambridge Guide" (for IELTS preparation) or "Official Guide to the TOEFL Test" (for TOEFL preparation): These official guides provide sample questions, practice tests, and test-taking strategies for the respective exams. 3-"Academic Writing for Graduate Students" by John M. Swales and Christine B. Feak: A useful resource for academic writing skills, including essay structure, critical thinking, and citation techniques. 4-"The Practice of English Language Teaching" by Jeremy Harmer: A popular reference book that covers various aspects of English language teaching methodology and techniques	No
Recommended Texts	1. "English Vocabulary in Use" by Michael McCarthy and Felicity O'Dell: A comprehensive resource for expanding and practicing vocabulary through exercises and word usage examples. 2. "How to Teach English" by Jeremy Harmer: A practical guidebook for English language teachers, covering lesson planning, classroom management, and teaching strategies. 3. "Advanced Grammar in Use" by Martin Hewings: A more advanced grammar reference book that covers complex grammar topics and provides practice exercises.	No
Websites	1. British Council LearnEnglish (https://learnenglish.britishcouncil.org/): Offers a wide range of resources, including grammar explanations, vocabulary activities, and practice exercises. 2. Cambridge English (https://www.cambridgeenglish.org/): Provides official exam	

	information, sample papers, and teaching resources for IELTS and Cambridge English exams. 3. Purdue Online Writing Lab (https://owl.purdue.edu/): A comprehensive resource for academic writing, covering topics such as essay structure, citation styles, and grammar explanations. 4. ETS TOEFL (https://www.ets.org/toefl): Official website for the TOEFL exam, offering test preparation resources, sample questions, and practice tests. 5. Quizlet (https://quizlet.com/): An online platform with a variety of user-generated flashcards and study sets for vocabulary practice and other language learning topics.

Grading Scheme مخطط الدرجات				
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