MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Basics of Electrical Engineering I**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UoM221EE101**				
ECTS Credits	**8**				
SWL (hr./sem)	**200**				
Module Level		1	**Semester of Delivery**		1
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title		لقبه العلمي	**Module Leader's Qualification**		الشهادة
Module Tutor	Dr. Omar Muwafaq Mahmood		**e-mail**	omer_alyousif@uomosul.edu.iq	
Peer Reviewer Name		اسم مُراجع الملف	**e-mail**	بريده الالكتروني	
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 Aims أهداف المادة الدراسية	1. To develop problem solving skills and understanding of DC circuit theory through the application of techniques. 2. To understand voltage, current and power from a given DC circuit. 3. This course deals with the basic concept of DC electrical circuits. 4. This is the basic subject for all DC electrical and electronic circuits. 5. To understand Kirchhoff's current and voltage Laws problems. 6. To perform mesh and Nodal analysis. 7. To perform Thevenin and superposition theory.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how electricity works in electrical circuits. 2. List the various terms associated with electrical circuits. 3. Summarize what is meant by a basic electric circuit. 4. Describe electrical voltage, current and power. 5. Define Ohm's law. 6. Identify the basic circuit passive and active elements and their applications. 7. Discuss the various properties of resistors. 8. Explain the two Kirchhoff's laws used in circuit analysis. 9. Explain the Analysis Methods used in Electrical Circuits.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A - Circuit Components and values** DC circuits, Current and voltage definitions, Passive sign convention and circuit elements, Resistive networks, real and ideal elements, voltage and current sources. [9 hrs.] Lab. [6 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [1 hr.] **Part B- Circuit reduction** combining sources, Combining resistive elements in series and parallel, delta and star transformation. [12 hrs.] Revision problem and tutorial classes [8 hrs.] Lab. [8 hrs.] Quizzes [1 hr.] **Part C- Circuit Theory** Kirchhoff's laws and Ohm's law. Introduction to mesh and nodal analysis, Introduction to Thevenin and Norton theory, maximum power transfer, introduction to superposition theory. [24 hrs.] Revision problem and tutorial classes [16 hrs.] Lab. [16 hrs.] Quizzes [1 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	123	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	8
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	77	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	10% (10)	4,8,12	LO #1, 5, 8 and 9
	Assignments	10	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects / Lab.	2	25% (25)	Continuous	All
	Report	0	0% (0)	----	----
Summative assessment	**Midterm Exam**	2 hr.	10% (10)	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	Basic Concept & Units: Electricity & atomic structure of substance, current and current density, current flow, electric circuit, E.M. F& potential difference
Week 2	international system of unit, abbreviation for multiples & sub-multiples, quantities derived from SI units, units of force-energy-torque and power, relation between energy and heat, electric units, efficiency & percentage efficiency, electromechanical equivalent of element
Week 3	Ohm's law, resistivity & conductivity
Week 4	temperature affect, internal resistance of a source, open circuit & short circuit
Week 5	equivalent resistance: Series-parallel-circulating current method-floating source method & grouping of E.M.F. sources, double subscript
Week 6	power calculation in D.C circuit
Week 7	Kirchhoff's laws: KVL-KCL
Week 8	Mid-term Exam
Week 9	introduction to network theorems, types of source: independent and dependent voltage and current sources and their transformation
Week 10	Maxwell's circulating currents (mesh analysis)
Week 11	nodal analysis
Week 12	superposition theorem
Week 13	Thevenin's theorem and Norton's theorem
Week 14	maximum power transfer theorem
Week 15	millman theorem, substitution theorem and reciprocity theorem
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to lab. components
Week 2	Lab 2: Introduction to AVO meter (analog and digital)
Week 3	Lab 3: Introduction to resistance measurements (practical and color code)
Week 4	Lab 4: resistance temperature affect, internal resistance of a source, open circuit & short circuit
Week 5	Lab 5: ohm's Law
Week 6	Lab 6: series and parallel resistance
Week 7	Lab 7: resistance delta and star transformation
Week 8	Lab 8: Kirchhoff's Voltage Law
Week 9	Lab 9: Kirchhoff's Current Law
Week 10	Lab 10: implementation of Maxwell's circulating currents (mesh analysis)
Week 11	Lab 11: implementation of Nodal analysis
Week 12	Lab 12: implementation of Superposition theorem
Week 13	Lab 13: implementation of Thevenin's / Norton's Theorem
Week 14	Lab 14: implementation of maximum power transfer theorem
Week 15	Lab 15: DC power measurements (methods and instrumentations)

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Engineering Circuit Analysis 7th Edition by William Hayt , Jack Kemmerly , Steven Durbin	Yes
Recommended Texts	Schaum's Outline of Basic Circuit Analysis, Second Edition (Schaum's Outlines) 2nd Edition, by John O'Malley	No
Websites	DC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2017.	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mathematics I**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EE102**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level		1	**Semester of Delivery**		1
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title		لقبه العلمي	**Module Leader's Qualification**		الشهادة
Module Tutor	Dr. Saad Enad Mohammed		**e-mail**	saadmohamed@uomosul.edu.iq	
Peer Reviewer Name		اسم مُراجع الملف	**e-mail**	بريده الالكتروني	
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 Aims أهداف المادة الدراسية	1. Student be able to solve simultaneous liner equations and inequalities involving the square root and modulus function. 2. know addition and double-angle formulas for trigonometric functions and use them to express values of trigonometric functions in the surds form. 3. Student be able to recognize odd, even, periodic, increasing, decreasing functions. 4. understand the operation of composition of functions and the concept of functional inverse. 5. recognize linear, quadratic, power, polynomial, algebraic, rational, trigonometric, exponential, hyperbolic and logarithmic functions and sketch their graphs. 6. be able to calculate limits by substitution and by eliminating zero denominators. 7. know derivatives of power, trigonometric, exponential, hyperbolic, logarithmic and inverse trigonometric functions. 8. know the basic rules of differentiation and use them to find derivatives of products and quotients. 9. know the chain rule and use it to find derivatives of composite functions.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of this course students will be expected to 1. be able to solve algebraic equations and inequalities involving the square root and modulus function. 2. understand the difference between equations and identities, and be able to prove simple identities and inequalities. 3. know addition and double-angle formulas for trigonometric functions and use them to express values of trigonometric functions in the surds form. 4. be able to recognize odd, even, periodic, increasing, decreasing functions. 5. understand the operation of composition of functions and the concept of functional inverse. 6. to able to recognize linear, quadratic, power, polynomial, algebraic, rational, trigonometric, exponential, hyperbolic and logarithmic functions and sketch their graphs. 7. be able to calculate limits by substitution and by eliminating zero denominators. 8. be able to calculate limits at infinity of rational functions. 9. know derivatives of power, trigonometric, exponential, hyperbolic, logarithmic and inverse trigonometric functions. 10. know the basic rules of differentiation and use them to find derivatives of products and quotients. 11. know the chain rule and use it to find derivatives of composite functions.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A – Matrices** Basic Definitions, Addition, Subtraction and Multiplication, Determinants, The Inverse of a 3 x 3 Matrix, Cramers Rule, Solve equations by Matrices: Gaussian Elimination. the method of finding the inverse of a square matrix, solution of simultaneous linear equations by matrix method. [8 hrs.] Revision problem and tutorial classes [2 hrs.] Quizzes [1 hr.] **Part B - Coordinates and Graphs in the Plane** Directions and Quadrants, Distance between Points, Graphs of Equations, Intercepts and More about Graphing, Slope and Equations for Lines: Slope of Non-vertical Lines, Lines that are Parallel or Perpendicular, Point – Slope Equations, Slope – Intercept Equations, Functions and their Graphs, Domains and Ranges are Often Intervals, Even Functions and Odd Functions, Functions Defined in Pieces, Shifts, Circles, and Parabolas: How to Shift a Graph, Equations for Circles in the Plane, Equations for Parabolas, A Review of Trigonometric Functions: Radian Measure, The Six Basic Trigonometric Functions, Calculating Sines and Cosines, Graphs of Trigonometric Functions, Limits and Continuity: Limits, Examples of Limits, The Sandwich Theorem and $(\sin\theta)/\theta$, Limits Involving Infinity, Continuous Functions.. [14 hrs.] Revision problem and tutorial classes [4 hrs.] Quizzes [2 hr.] **Part C- Derivatives** Slopes, Tangent Lines, and Derivatives, Defining Slopes and Tangent Lines, The Derivative of a function, The Slope of Lines, Differentiation Rules: Integer Powers, Multiples, Sums, and Differences, Second and Higher Order Derivatives, Negative Integer Powers of x, Velocity, Speed, and Other Rate of Change: Velocity, Speed, Acceleration, Derivatives of Trigonometric Functions: The Derivative of the Sine, The Derivative of the Cosine, The Derivative of the Other Basic Functions, The Chain Rule: Integer Powers of Differentiable Functions, Derivative Formulas that Include the Chain Rule, Implicit Differentiation and Fractional Powers: Lenses, Tangents, and Normal Lines, Using Implicit Differentiation to Find Derivatives of Higher Order, Fractional Powers of Differentiable Functions, Linear Approximations and Differentials. [24 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [2 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1/5	20% (20)	4,8,12	LO #2, 5, 8, 9 and 11
	Assignments	5	20% (20)	2 to 12	LO #1, 2, 4, 6 7, and 11
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	7	LO # 1-6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Matrices:** Basic Definitions, Addition, Subtraction and Multiplication, Determinants, The Inverse of a 3 x 3 Matrix, Creamers Rule.
Week 2	**Solve equations by Matrices:** Gaussian Elimination. the method of finding the inverse of a square matrix, solution of simultaneous linear equations by matrix method.
Week 3	**Coordinates and Graphs in the Plane:** Directions and Quadrants, Distance between Points, Graphs of Equations, Intercepts and More about Graphing.
Week 4	**Slope and Equations for Lines:** Slope of Non-vertical Lines, Lines that are Parallel or Perpendicular, Point – Slope Equations, Slope – Intercept Equations.
Week 5	**Functions and their Graphs:** Domains and Ranges are Often Intervals, Even Functions and Odd Functions, Functions Defined in Pieces.
Week 6	**Shifts, Circles, and Parabolas:** How to Shift a Graph, Equations for Circles in the Plane, Equations for Parabolas.
Week 7	**A Review of Trigonometric Functions:** Radian Measure, The Six Basic Trigonometric Functions, Calculating Sines and Cosines, Graphs of Trigonometric Functions.
Week 8	**Limits and Continuity:** Limits, Examples of Limits, The Sandwich Theorem and $(\sin\theta)/\theta$, Limits Involving Infinity, Continuous Functions.
Week 9	**Derivatives:** Slopes, Tangent Lines, and Derivatives, Defining Slopes and Tangent Lines The Derivative of a function, The Slope of Lines.
Week 10	**Differentiation Rules:** Integer Powers, Multiples, Sums, and Differences Second and Higher Order Derivatives, Negative Integer Powers of x.
Week 11	**Velocity, Speed, and Other Rate of Change:** Velocity, Speed, Acceleration
Week 12	**Derivatives of Trigonometric Functions:** The Derivative of the Sine, The Derivative of the Cosine, The Derivative of the Other Basic Functions.
Week 13	**The Chain Rule:** Integer Powers of Differentiable Functions, Derivative Formulas that Include the Chain Rule.
Week 14	**Implicit Differentiation:** Lenses, Tangents, and Normal Lines Using Implicit Differentiation to Find Derivatives of Higher Order.
Week 15	**Fractional Powers:** Fractional Powers of Differentiable Functions, Linear Approximations and Differentials.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Calculus, Thirteenth Edition, by George B. Thomas,	Yes
Recommended Texts	Calculus, Mathematics for Engineers and Technologists, 2002, by Huw Fox and Bill Bolton.	No
Websites	Khan Academy math (https://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	**Engineering Drawing**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EE104**				
ECTS Credits	**4**				
SWL (hr./sem)	**100**				
Module Level		1	**Semester of Delivery**		1
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title		لقبه العلمي	**Module Leader's Qualification**		الشهادة
Module Tutor	Sura Mohammad Adil Alhayali		**e-mail**	sura_alhayali@uomosul.edu.iq	
Peer Reviewer Name		اسم مُراجع الملف	**e-mail**	بريده الالكتروني	
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 Aims أهداف المادة الدراسية	1. To develop the engineer's ability to imagine projections and their models. 2. Engineering drawing exercises hand movement to complete quick sketches. 3. This course deals with theory of Orthographic Projection. 4. This is the basic subject for isometric drawing. 5. To teach students engineering drawings using AutoCAD program, and this includes both theoretical lectures and Lab. 6. To help students to use AutoCAD for engineering drawings efficiently in their designs & projects.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Absorbing all the engineering characteristics of an object or a product in a clear manner. 2. Know the tools used in engineering drawing and how to use them correctly 3. understand and apply the basics of engineering processes. 4. Conclude projections and isometric for each geometric figure and recognize its dimensions. 5. students will be able to use AutoCAD commands to make drawings 6. create & insert symbols, dimension in a drawing, create blocks, and plot drawings with certain scales.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A – tools, lines, scale, Engineering processes (part 1) & Getting started, view commands** Introduction to engineering drawing, learn about engineering tools and how to use them. Types of pens, Billboard layout and address field preparation, Types of lines [3 hrs.] Classwork 1. [2 hrs.] Defining the drawing scale and its types, apply and draw engineering processes [3 hrs.] Classwork 2. [2 hrs.] Lab: Getting started, view Commands [10 hrs.] Quizzes [1 hr.] **Part B- Engineering processes (part 2) , Orthographic Projection (part 1) &Drawing , modify I Commands** Draw tangents, Types of projections resulting from vertical projection. [6 hrs.] Classwork 3. [2 hrs.] , Classwork 4. [2 hrs.] Lab: Drawing Commands, modify I Commands [10 hrs.] Quizzes [1 hr.] **Part C- Orthographic Projection (part 2) , Isometric Drawing & Modify II, Dimensions , text Commands** Arrangement and drawing of projections, draw the isometrically axis, Imagine and draw the isometrically body [8 hrs.] Classwork 5. [2 hrs.] , Classwork 6. [2 hrs.] Lab: Modify II Commands, Dimension Commands, Text Commands [8 hrs.] Quizzes [1 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
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**	1	10% (10)	4,8,12	LO #1, 5, 8 and 9
	Assignments	10	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects / Lab.	2	25% (25)	Continuous	All
	Report	0	0% (0)	----	----
Summative assessment	**Midterm Exam**	2 hr	10% (10)	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	Introduction and definition of engineering drawing, learn about engineering tools, Types of pens used, Drawing board layout
Week 2	Types of lines in engineering drawing, Defining the drawing scale and its types
Week 3	Classwork 1
Week 4	Engineering processes (part 1): Teaching students how to apply and draw line relationships
Week 5	Classwork 2
Week 6	Engineering processes (part 2): Making tangents, reverse curves
Week 7	Classwork 3
Week 8	Mid-term Exam
Week 9	Orthographic Projection (part 1): theory of Orthographic Projection, combination of views
Week 10	Classwork 4
Week 11	Orthographic Projection (part 1): Arrangement and drawing of projections
Week 12	Classwork 5
Week 13	Isometric Drawing, I: draw the isometrically axis, Imagine and draw the isometrically body
Week 14	Classwork 6
Week 15	Isometric Drawing II: isometric circles
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: start a new drawing, user Interface, units, limits
Week 2	Lab 2: grid, snap, absolute & relative coordinate system, ortho.
Week 3	Lab 3: zoom, pan, osnap, polar tracking
Week 4	Lab 4: pline, pedit, selecting object, erase
Week 5	Lab 5: ltype, ltscale.
Week 6	Lab 6: line, arc, circle, ellipse
Week 7	Lab 7: polygon, rectangle
Week 8	Lab 8: copy, move, mirror, trim, rotate
Week 9	Lab 9: scale, undo, redo, stretch, divide
Week 10	Lab 10: extend, offset.
Week 11	Lab 11: array, Lweight , Measure
Week 12	Lab 12: Fillet , Chamfer, Explode
Week 13	Lab 13: Text, Mtext, Area
Week 14	Lab 14: Dimensions & Leaders, color
Week 15	Lab 15: Block, plot.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Engineering Drawing and Graphic Technology , By French & Vierk , Steven Durbin , Twelve Edition	No
Recommended Texts	كتاب الرسم الهندسي تأليف : الأستاذ عبد الرسول الخفاف , 1986	No
Websites	دروس تعليم اوتوكاد 2014 : https://www.dailymotion.com/video/x31bg6x	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
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Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Physics**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EE104**				
ECTS Credits	**4**				
SWL (hr./sem)	**100**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	Dr. Mohammed Tariq Yaseen		**e-mail**	mtyaseen@uomosul.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	Doctor	
Module Tutor	Mr. Shamil Hamzah Hussein		**e-mail**	Shamil_alnajjar84@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date	18/11/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To understand many principles and units and their abbreviations correctly in the physics, such as State SI units, determine whether a physical quantity is a vector or a scalar, and distinguish between kinematic and kinetic energy. 2. To understand Differentiate between static and kinetic friction, and solve friction problems; State and apply Hooke's law for ideal springs; Define work, and calculate the work done by a constant force in one and two dimensions. 3. This course deals with Define, calculate, and distinguish between distance and displacement, average and instantaneous speed and velocity, and average and instantaneous acceleration; State, explain, and apply Newton's three laws of motion. 4. This course deals with the basic concept of the State the work–energy theorem, and use it to solve problems; Apply the principle of conservation of mechanical energy to solve simple problems in mechanics; Calculate both kinetic and potential energy; Calculate the power. 5. To develop problem, solve problems using Newton's law of universal gravitation and calculate the gravitation for different locations (i.e., Earth, Moon, Sun and etc.); Derive the equation of continuity for fluids. 6. To perform and analysis of heat transfer through the facades of the buildings; Define and describe the flow of heat through a material by direct molecular contact (conduction); Derive the equation of heat transfer by conduction. 7. To understand energy level and atomic structure through energy-band theory of materials; Internal structure of materials of materials including metals, insulators and semiconductors; Electrical conduction and characteristics of the all materials such as conductivity, Mobility, energy distribution of electrons, Fermi levels, work function, and electronic emission. 8. To perform current-voltage characteristics, charge control description for all types of both the diode and transistors. 9. To model small signal and large signal of the active electronic devices such as DC load line and AC load line concept.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Determine whether a physical quantity is a vector or a scalar; State, explain, and apply Newton's three laws of motion; State and apply Hooke's law for ideal springs; State the work–energy theorem, and use it to solve problems; Express Newton's laws in terms of rates of change of linear momentum; Calculate the pressure and density of fluid at different depth. 2. Define and describe the Bohr model of an atom; Define electron, proton, neutron, and nucleus; Explain electron shells and orbits; Explain insulators, conductors, and semiconductors and how they differ; Define valence band and conduction band Compare a semiconductor atom to a conductor atom. 3. Understanding of the fundamental concepts of current and voltage; Explain the of electrical circuit element and its objects; Define Ohm's Law; Define Power and Energy; Calculate Power and Energy. 4. Describe Analysis the Electric Circuits in Parallel and Series connection; Define Kirchhoff's law; Analysis the Electric Circuits using Kirchhoff's law; Solve

	problems using Kirchhoff's law; Explain the electrical symbol for a diode; Define bias and its effect on the depletion region; Define barrier potential and its effects; Several Diode Applications. 5. Discuss the various properties of diodes and transistors. 6. Explain the homo-junction and Hetero-junction materials such as PN junction diodes, PNP transistors, and NPN transistors. 7. Explain the other types of semiconductor diodes: Varactor diode, tunnel diode, photodiode and photovoltaic (solar) cell, Light emitting diode, metal electronic.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A - Introduction to physics** Physics quantities, Length, mass and time; Kinematics; Position, Displacement and Distance; Speed, Velocity and Acceleration; Forces and motion; Mass and gravity force; Newton's three laws of motion. Spring forces and Hooke's law; Friction forces; Uniform circular motion; Work; Kinetic and Potential Energy; The work-kinetic energy theorem; Conservation of total mechanical energy; and Power. Linear momentum; Momentum and kinetic energy; Rate of change of linear momentum and Newton's laws; Law of conservation of linear momentum; Impulse; and Simple Harmonic Motion. [**8 hrs**.] Revision problem and tutorial classes [**2 hrs**.] Quizzes [**1 hr**.] **Part B- Atoms:** Atoms Structure; Atomic Energy Level; and Materials Used in Electronics. Current and Voltage; electrical circuit; and Ohm's Law. Power and Energy; and Parallel and Series Networks. Kirchhoff's Law. [**8 hrs**.] Quizzes [**1 hr**.] **Part C- Diode Circuit Applications:** p-n junction in equilibrium, current-voltage characteristics, charge-control description of a diode, Transition and diffusion capacitance's, diode switching times, diode models, small-signal model and load line concept, and introduction to Hetero-junctions and double Hetero-junctions Rectifiers, Zener diodes voltage regulators, clipping circuits, clamping circuits and wave form generation. Other Types of Semiconductor Diodes: Varactor diode, tunnel diode, photodiode and photovoltaic (solar) cell, Light emitting diode, metal electronic. Transistors Principle of Operation and type, Transistor biasing circuits, Application Circuit. [**8 hrs**.] Revision problem and tutorial classes [**4 hrs**.] Quizzes [**1 hr**.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
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**	1	10% (10)	4,8,11,14	LO #1, 4, 6 and 7
	Assignments	10	5% (5)	2 to 13	LO #1, 2, 3, 4, 5 and 7
	Projects	0	0% (0)	----	-----
	Report	2	25% (25)	Continuous	All
Summative assessment	**Midterm Exam**	2 hr.	10% (10)	7	LO # 4-7
	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 physics; Standards of length, mass and time; Scalar and Vector quantities; Kinematics; Position, Displacement and Distance; Speed, Velocity and Acceleration; Forces and motion; Mass and gravity force; Newton's three laws of motion.
Week 2	Spring forces and Hooke's law; Friction forces; Uniform circular motion; Work; Kinetic and Potential Energy; The work-kinetic energy theorem; Conservation of total mechanical energy; and Power.
Week 3	Linear momentum; Momentum and kinetic energy; Rate of change of linear momentum and Newton's laws; Law of conservation of linear momentum; Impulse; and Simple Harmonic Motion.
Week 4	Universal gravitation; Newton's law of universal gravitation; Free-fall acceleration and the gravitational force; and Solve problems using Newton's law of universal gravitation and calculate the gravitation for different locations.
Week 5	Fluid mechanics; Pressure and density of fluid at different depth; Hydrostatic pressure; Pascal's principle and the operation of a hydraulic lift; Buoyant forces and Archimedes's principle; the equation of continuity for fluids; and the Bernoulli's equation.
Week 6	Basic of Architectural Physics; and Solar Radiation.
Week 7	Basic of Architectural Physics; and Solar Radiation.
Week 8	Sound; Noise; Sound Intensity
Week 9	Sound Insulation; and Thermal Behavior of Materials
Week 10	Atoms Structure; Atomic Energy Level; and Materials Used in Electronics.
Week 11	Current and Voltage; electrical circuit; and Ohm's Law.
Week 12	Introduction of Diodes, current-voltage characteristics of diode. Forward and reverse biasing of diodes, Temperature effects for diode characteristics.
Week 13	Diode Circuit Applications: Rectifiers, clipping circuits, clamping circuits.
Week 14	Zener diodes voltage regulators, and wave form generation. Varactor diode, tunnel diode, photodiode and photovoltaic (solar) cell, Light emitting diode, metal electronic.
Week 15	Introduction of transistors, Principle of Operation and type. Current-Voltage characteristics of transistors, DC Load line with state Q-Point. Transistors biasing circuits.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Floyd, Thomas L. Electronics Fundamentals: Circuits, Devices and Applications (Floyd Electronics Fundamentals Series). Prentice-Hall, Inc., 2006.	Yes
Recommended Texts	Donald A. Neamen. (2003). "SEMICONDUCTOR PHYSICS AND DEVICES". 3rd Edition, ISBN 0-07-232107-05, USA. (can be downloaded from the Course web page/classroom).	Yes

Websites	Nashelsky, L., & Boylestad, R. L. (2021). Electronic Devices and Circuit Theory Eleventh Edition.

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	**Electronics Physics**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EE112**				
ECTS Credits	**3**				
SWL (hr./sem)	**75**				
Module Level	1		**Semester of Delivery**	2	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	Dr. Mohammed Tariq Yaseen		**e-mail**	mtyaseen@uomosul.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	Doctor	
Module Tutor	Mr. Shamil Hamzah Hussein		**e-mail**	Shamil_alnajjar84@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To develop problem solving skills of electronic circuit through the understanding solid state for each electronic passive and active elements such as RLC, diodes, transistors, and integrated circuits. 2. To understand energy level and atomic structure through energy-band theory of materials. 3. This course deals with the basic concept and Internal structure of materials of materials including metals, insulators and semiconductors. 4. To understand electrical conduction and characteristics of the all materials such as conductivity, Mobility, energy distribution of electrons, Fermi levels, work function, and electronic emission. 5. To understand the intrinsic and extrinsic semiconductors parameters. 6. To perform current-voltage characteristics, charge control description for all types of both the diode and transistors. 7. To model small signal and large signal of the active electronic devices such as DC load line and AC load line concept.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize the Semiconductors and compound semiconductors materials such as Si, Ge, and GaAs. 2. List the various terms associated with active electronics elements. 3. Summarize what is meant by an electronic circuit. 4. Describe energy band theory of all materials. 5. Discuss the various properties of diodes and transistors. 6. Explain the homo-junction and Hetero-junction materials such as PN junction diodes, PNP transistors, and NPN transistors. 7. Explain the other types of semiconductor diodes: Varactor diode, tunnel diode, photodiode and photovoltaic (solar) cell, Light emitting diode, metal electronic.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **<u>Part A - Energy Level and Atomic Structure</u>** The atom, models, wave nature of light, dual nature of matter, energy-band theory of metals, insulators and semiconductors, crystal structure, ionic, covalent and metallic bonding, energy band of crystals, Internal structure of materials cell, packing miller indices, crystal planes and directions. [**8 hrs**.] Revision problem and tutorial classes [**4 hrs**.] Quizzes [**1 hr**.] **<u>Part B- Electrical Conduction in Metals:</u>** Mobility and conductivity, energy distribution of electrons, Fermi levels, work function, electronic emission. Semiconductors: Semiconductors materials (Si, Ge and compound semiconductors), extrinsic semiconductors, Fermi-level in semiconductor, diffusion and carrier life time, Hall effect. [**8 hrs**.] Revision problem and tutorial classes [**4 hrs**.] Quizzes [**1 hr**.]

	Part C- Semiconductor p-n Junction: p-n junction in equilibrium, current-voltage characteristics, charge-control description of a diode, Transition and diffusion capacitance's, diode switching times, diode models, small-signal model and load line concept, and introduction to Hetero-junctions and double Hetero-junctions. [**6 hrs**.] Revision problem and tutorial classes [**3 hrs**.] Quizzes [**1 hr**.] **Part D- Diode Circuit Applications:** Rectifiers, Zener diodes voltage regulators, clipping circuits, clamping circuits and wave form generation. Other Types of Semiconductor Diodes: Varactor diode, tunnel diode, photodiode and photovoltaic (solar) cell, Light emitting diode, metal electronic. Transistors Principle of Operation and type, Transistor biasing circuits, Application Circuit. [**8 hrs**.] Revision problem and tutorial classes [**4 hrs**.] Quizzes [**1 hr**.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	27	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation

تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1	10% (10)	4,8,11,14	LO #1, 4, 6 and 7
	Assignments	10	5% (5)	2 to 13	LO #1, 2, 3, 4, 5 and 7
	Projects	0	0% (0)	----	-----
	Report	2	25% (25)	Continuous	All
Summative assessment	Midterm Exam	2 hr.	10% (10)	7	LO # 4-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Energy Level and Atomic Structure: The atom, models, wave nature of light, dual nature of matter. Energy-band theory of metals, Insulators and semiconductors, Crystal structure, Ionic, Covalent and metallic bonding.
Week 2	Energy band of crystals, Internal structure of materials cell, packing miller indices, crystal planes and directions.
Week 3	Electrical Conduction in Metals: Mobility and conductivity, energy distribution of electrons.
Week 4	Electrical Conduction in Metals: Fermi levels, Work function, Diffusion Current, Electronic emission.
Week 5	Introduction of semiconductors: Semiconductors materials (Si, Ge and compound semiconductors).
Week 6	Introduction of semiconductors: Intrinsic semiconductors, and Fermi-level in semiconductor.
Week 7	Introduction of semiconductors: Extrinsic semiconductors, and Fermi-level in semiconductor.
Week 8	Introduction of semiconductors: Demonstrated of electrical conductance in semiconductors materials. Diffusion Current in semiconductors, carrier life time, and Hall effect.
Week 9	Introduction semiconductor P-N junction: P-N junction in equilibrium, current-voltage characteristics. charge-control description of a diode.
Week 10	Diffusion current, diffusion current density, draw Energy-band level. Transition and diffusion capacitance's, diode switching times.
Week 11	diode models, small-signal model and load line concept, and introduction to Hetero-junctions and double Hetero-junctions.
Week 12	Introduction of Diodes, current-voltage characteristics of diode. Forward and reverse biasing of diodes, Temperature effects for diode characteristics.
Week 13	Diode Circuit Applications: Rectifiers, clipping circuits, clamping circuits.
Week 14	Zener diodes voltage regulators, and wave form generation. Varactor diode, tunnel diode, photodiode and photovoltaic (solar) cell, Light emitting diode, metal electronic.
Week 15	Introduction of transistors, Principle of Operation and type. Current-Voltage characteristics of transistors, DC Load line with state Q-Point. Transistors biasing circuits.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Floyd, Thomas L. Electronics Fundamentals: Circuits, Devices and Applications (Floyd Electronics Fundamentals Series). Prentice-Hall, Inc., 2006.	Yes
Recommended Texts	Donald A. Neamen. (2003). "SEMICONDUCTOR PHYSICS AND DEVICES". 3rd Edition, ISBN 0-07-232107-05, USA. (can be downloaded from the Course web page/classroom).	Yes
Websites	Nashelsky, L., & Boylestad, R. L. (2021). Electronic Devices and Circuit Theory Eleventh Edition.	

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	**Mechanics Engineering**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EE105**				
ECTS Credits	**3**				
SWL (hr./sem)	**75**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	Dr. Mohammed Tariq Yaseen		**e-mail**	mtyaseen@uomosul.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	Doctor	
Module Tutor	Dr.ammar younis Ibrahim		**e-mail**	drammar2020@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date	08/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. The module aims of Mechanical and Thermodynamics typically include providing students with a comprehensive understanding of the principles and applications of mechanical engineering and thermodynamics. The specific aims may vary depending on the educational institution or course, but here are some common objectives: 2. Understanding Fundamental Concepts: The module aims to introduce students to the fundamental concepts and principles of mechanical engineering and thermodynamics. This includes topics such as mechanics, kinematics, dynamics, energy, heat transfer, and thermodynamic processes. 3. Analytical and Problem-Solving Skills: The module aims to develop students' analytical and problem-solving skills related to mechanical and thermodynamic systems. This involves teaching them how to apply mathematical and scientific principles to solve engineering problems, analyze mechanical systems, and evaluate thermodynamic processes. 4. Thermodynamic Systems: The module aims to familiarize students with the behavior of thermodynamic systems and their applications. This includes studying topics such as the laws of thermodynamics, properties of pure substances, gas laws, energy conversion processes, power cycles, and refrigeration cycles. 5. Heat Transfer: The module aims to teach students about the principles of heat transfer and its applications in engineering. This involves studying modes of heat transfer, including conduction, convection, and radiation, as well as heat exchangers, thermal insulation, and heat transfer analysis in various systems. 6. Mechanical Systems and Dynamics: The module aims to provide students with an understanding of mechanical systems and their dynamics. This includes topics such as statics, dynamics, forces, motion, and mechanical components like gears, bearings, and linkages.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Mechanical Engineering: 1. Apply fundamental principles of mechanics to analyze and solve engineering problems. 2. analyze mechanical components and systems considering factors such as strength, stiffness, and safety. 3. knowledge of thermodynamics and fluid mechanics to analyze energy conversion systems. Thermodynamics: 4. Understand the basic concepts and laws of thermodynamics, including energy, entropy, and the First and Second Laws of Thermodynamics. 5. Apply thermodynamic principles to analyze and solve problems related to heat transfer, work, and energy conversion. 6. Analyze thermal systems, including power cycles, refrigeration cycles, and heat exchangers. 7. Apply thermodynamic principles to analyze combustion processes and internal combustion engines.

	8. Apply thermodynamic principles to analyze renewable energy systems, such as solar and wind power systems. 9. Understand the impact of thermodynamics on environmental sustainability and energy efficiency.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A** Static: Force system, Units system, Forces + Components, Resultant, Moment and Couples, Equilibrium, Centroid, Moment of Inertia, Friction. Revision problem and tutorial classes. [**15 hr.**] Revision problem and tutorial classes **[5 hrs.]** Quizzes [**1 hr**.] **Part B** Dynamics: Rectilinear motion, Curvilinear motion, Projectile, Circular motion, Acceleration Components (Rectangular Comp., Normal Tangential Comp.), Kinetic -2nd Law of Newton**.** **[15 hrs.]** Revision problem and tutorial classes **[5 hrs.]** Quizzes [**1 hr**.] **Part C** Thermodynamics: Properties of Substance, Pressure and Temperature, Work and Energy, Ideal Gas, First Law of Thermodynamics, 2nd Law of Thermodynamics. Hook's law. [**15 hr**.] Revision problem and tutorial classes [**5 hrs**.] Revision problem and tutorial classes **[6 hrs.]** Quizzes [**1 hr**.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	42	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation تقييم المادة الدراسية					
		Time/ Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5,10	LO #1, 4, 6 and 7
	Assignments	5	5% (5)	2 to 13	LO #1, 2, 3, 4, 5 and 7
	Projects	0	0% (0)	----	-----
	Report	2	25% (25)	Continuous	All
Summative assessment	**Midterm Exam**	2 hr.	10% (10)	8	LO # 4-8
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Static: Force system
Week 2	Units system, Forces and Components
Week 3	Resultant, Moment and Couples
Week 4	Equilibrium and Centroid
Week 5	Moment of Inertia and Friction
Week 6	Dynamics: Rectilinear motion

Week 7	Curvilinear motion, Projectile and Circular motion
Week 8	Midterm Exam
Week 9	Acceleration Components (Rectangular Comp., Normal Tangential Comp.)
Week 10	Kinetic - 2nd Law of Newton
Week 11	Thermodynamics: Properties of Substance and Pressure and Temperature
Week 12	Work and Energy and Ideal Gas
Week 13	First Law of Thermodynamics
Week 14	2nd Law of Thermodynamics
Week 15	Hook's law
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts		
Recommended Texts		
Websites		

Grading Scheme

مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Computer**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UOM 103**				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	**Dam and Water Resources Engineering (DWRE)**		**College**	**College of Engineering**	
Module Leader	Dr. Talal Ahmed Basheer		**e-mail**	t.basheer@uomosul.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Omar Kanaan Taha		**e-mail**	omar.alsultan@uomosul.edu.iq	
Peer Reviewer Name	**Dr. Anmar Abdulazeez Al Talib**		**e-mail**	Anmar.altalib@uomosul.edu.iq	
Scientific Committee Approval Date			**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The Module aim is to prepare student to deal with computers. In addition to, teach the student the fundamentals of computers and its components. Furthermore, learning how to use two of Microsoft Office applications (Word and Excel).
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. An ability to identify, analyze, and solve complex engineering problems according to principles of engineering, science, and mathematics. 2. An ability to acquire and apply new knowledge and using appropriate learning strategies. 3. An ability to participate and work professionally and ethically in different projects to function on multi-disciplinary teams. It is expected from the student who passes this module learn the following topics:

	1. Computers and Operating System 2. Software and Hardware Interaction 3. Windows File Management 4. Operating System Customization 5. Computer Hardware 6. Monthly LAB Exam 7. Exploring Microsoft Office 2013 8. Getting Started with Word Essentials 9. Editing and Formatting Documents 10. Getting Started with Excel Essentials 11. Organizing and Enhancing Worksheets 12. Creating Formulas and Charting Data
Indicative Contents المحتويات الإرشادية	Computers and Operating System [6 hr] Software and Hardware Interaction [6 hr] Windows File Management [3 hr] Operating System Customization [3 hr] Computer Hardware [6 hr] Exploring Microsoft Office 2013 [3 hr] Getting Started with Word Essentials [3 hr] Editing and Formatting Documents [3 hr] Getting Started with Excel Essentials [3 hr] Organizing and Enhancing Worksheets [3 hr] Creating Formulas and Charting Data [3 hr]

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 Lab activities, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, laboratory and by considering type of external search involving some of computer technology that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	12	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعياً	0.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 11	LO #Q1: 1-2, Q2: 7-9
	Assignments	2	5% (5)	3, 10	LO #A1: 1-2, A2: 7-9
	Lab.	10	20% (20)	Continuous	All
	Report	1	5% (5)	14	All
Summative assessment	Midterm Exam	2 hr	10% (10)	9	LO # 1-5
	Final Exam	3hr	50% (50)		
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Computers and Operating System
Week 2	Computers and Operating System (Continued)
Week 3	Software and Hardware Interaction
Week 4	Software and Hardware Interaction (Continued)
Week 5	Windows File Management
Week 6	Operating System Customization
Week 7	Computer Hardware
Week 8	Computer Hardware (Continued)
Week 9	Monthly Exam
Week 10	Exploring Microsoft Office 2013
Week 11	Getting Started with Word Essentials
Week 12	Editing and Formatting Documents
Week 13	Getting Started with Excel Essentials
Week 14	Organizing and Enhancing Worksheets
Week 15	Creating Formulas and Charting Data
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1, 2	Computers and Operating System
Week 3, 4	Software and Hardware Interaction
Week 5	Windows File Management
Week 6	Operating System Customization
Week 7, 8	Computer Hardware
Week 9	Monthly LAB Exam
Week 10	Exploring Microsoft Office 2013
Week 11	Getting Started with Word Essentials
Week 12	Editing and Formatting Documents
Week 13	Getting Started with Excel Essentials
Week 14	Organizing and Enhancing Worksheets
Week 15	Creating Formulas and Charting Data

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	2015 Computer Literacy BASICS: A Comprehensive Guide to IC3 Connie Morrison, Dolores Wells, Lisa Ruffolo Cengage Learning. ISBN: 128576658X	Available as PDF
Recommended Texts	IC3 GS5 Certification Guide Using Windows 10 & Office 2016	Available as PDF
Websites	Google Classroom	

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 اسم المنهج	اللغة العربية			**Module Delivery**	
Module Type نوع المنهج	داعم			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐**Practical** ☒ **Seminar**	
Module Code رمز المنهج	UOM101				
ECTS Credits عدد الوحدات	2				
SWL (hr/sem) الحمل الكلي	50				
Module Level / المستوى	1		**Semester of Delivery /** سحب المنهج	1	
Administering Department القسم الإداري	ENV8		**College** الكلية	ENG4	
Module Leader اسم التدريسي			**e-mail** البريد الالكتروني		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name	------		**e-mail**	E-mail	
Scientific Committee Approval Date	26/11/2023		**Version Number**	2.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	الهدف من هذا الفصل الدراسي هو تعريف الطلاب بالموضوعات الرئيسية لمادة اللغة العربية. سيغطي الفصل الدراسي المتطلبات الأساسية لتعاريف اللغة العربية، قواعد نحوية للأزمنة، تنمية القدرات النحوية لصيغ المفرد والجمع والممنوع من الجرد، بالإضافة الى البلاغة والتطبيق. وفي نهاية الفصل، سيكون لدى الطلاب معرفة واسعة بالمفاهيم وسيتم تحقيق ذلك من خلال المحاضرات النظرية والدروس والواجبات البتية والتقارير ذات الصلة بالمواضيع المطروقة.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**CLO1:** تعريف الطالب بألفاظ اللّغة العربيّة الصحيحة وتراكيبها وأساليبها السليمة بطريقة مشوقة وجذابة. **CLO2:** أن يستغل الطالب وقت فراغه بالقراءة والاطلاع والرجوع إلى المكتبة. **CLO3:** تمكين الطالب من القراءة الصحيحة، وأن يكتسب القدرة على استعمال اللغة استعمالاً صحيحاً في الاتّصال مع الآخرين. **CLO4:** تنمية الذوق الأدبي لدى الطالب حتى يدرك النواحي الجمالية في أساليب الكلام ومعانيه وصورة. **CLO5:** تنمية قدرة ومهارة الطالب الإملائية والخطية بحيث يستطيع الكتابة الصحيحة للكتب والمخاطبات الرسمية. **CLO6:** تمكين الطالب على كتابة التقارير العملية والنظرية والعروض التقديمية بلغة عربية واضحة وصحيحة. **CLO7:** القدرة على اكتساب وتطبيق المعرفة الجديدة واستخدام استراتيجيات تعليم مناسبة. **CLO8:** القدرة على المشاركة والعمل بمهنية واخلاقية للعمل في فرق متعددة التخصصات.
Indicative Contents المحتويات الإرشادية	**الجزء الأول:** مقدمة عن اللغة العربية (4 ساعات) • مقدمة عن اللغة العربية • تعريف اللغة العربية ومميزاتها **الجزء الثاني:** قواعد نحوية وتشمل: (6 ساعات) • الفعل الماضي • الفعل الماضي • الافعال الخمسة **الجزء الثالث:** تنمية القواعد النحوية وتشمل: (6 ساعات) • المثنى والجمع (المذكر السالم والمؤنث السالم) • التعجب • الممنوع من الصرف • المجرد والمزيد **الجزء الرابع:** البلاغة والتطبيق (8 ساعات) • الاستعارة • الجناس • الطباق • التشبيه **الجزء الخامس:** قواعد املائية: (3 ساعات) سوف يتم تعريف الطالب عن الأخطاء الاملائية الشائعة وطرق تجنبها بالإضافة الى كتابة المخاطبات الادرية. **الجزء السادس:** قواعد العد والمعدود: (3 ساعات)

تعريف الطالب بقواعد واحكام العد والمعدود في اللغة العربية.	

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies الاستراتيجيات	توسيع مدارك الطلاب لمادة اللغة العربية، والإلمام بالمفاهيم الأساسية للغية العربية والبلاغة، والقدرة على التمييز بين الأزمنة. يحتوي هذه الفصل على العديد من المكونات التي تشمل دراسة المحاضرات والبرامج التعليمية والمناقشة والواجبات المنزلية ومنصات التعلم الإلكتروني. سيتم تدريس الدورة باللغة العربية، ويجب تقديم جميع المهام الإلزامية في غضون المواعيد النهائية للقبول في الامتحان.

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

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.1
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 التقويم التكويني	**Quizzes** الكويز	3	6% (18)	4, 9, and 13	All
	H.W Assignments الواجبات البيتية	2	4% (8)	5, 11	CLO4, CLO5, and CLO6
	Seminars السمنار	1	6% (6)	12	All
	On-site Assignment واجبات داخل الصف	2	4% (8)	6, 10	CLO4, CLO5, and CLO6
Summative Assessment التقويم التلخيصي	**Midterm Exam** امتحان نصف الفصل	2 hrs	10% (10)	7	All
	Final Exam الامتحان النهائي	3 hrs	50% (50)	16	All
Total Assessment / التقويم النهائي			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered / المواضيع المغطاة
Week 1	مقدمة عن اللغة العربية وتعريف اللغة العربية ومميزاتها
Week 2	قواعد نحوية: الفعل الماضي
Week 3	قواعد نحوية: الفعل المضارع

Week 4	قواعد نحوية: الأفعال الخمسة
Week 5	تنمية القواعد النحوية: المثنى والجمع (المذكر السالم والمؤنث السالم)
Week 6	تنمية القواعد النحوية: التعجب، الممنوع من الصرف والمجرد والمزيد
Week 7	الامتحان الفصلي
Week 8	البلاغة والتطبيق: الاستعارة
Week 9	البلاغة والتطبيق: الجناس
Week 10	البلاغة والتطبيق: الطباق
Week 11	البلاغة والتطبيق: التشبيه
Week 12	الأخطاء الاملائية
Week 13	المخاطبات الإدارية
Week 14	قواعد واحكام العد والمعدود
Week 15	قواعد واحكام العد والمعدود
Week 16	الامتحان النهائي

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered / المواضيع المغطاة
Week 1	لا يوجد
Week 2	لا يوجد
Week 3	لا يوجد
Week 4	لا يوجد
Week 5	لا يوجد
Week 6	لا يوجد
Week 7	لا يوجد

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text الاسم	**Available in the Library?** هل متوفر في المكتبة؟
Required Texts المنهج المطلوب	جامع الدروس العربية / مصطفى الغلاييني	نعم
Recommended Texts المنهج الموصى به	النحو الوافي / عباس حسن	نعم
Websites المواقع الالكترونية	https://uomosul.edu.iq/en/engineering/environmental-engineering-dept/	

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	**Basics of Electrical Engineering II**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EE108**				
ECTS Credits	**8**				
SWL (hr./sem)	**200**				
Module Level		1	**Semester of Delivery**		2
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title		لقبه العلمي	**Module Leader's Qualification**		الشهادة
Module Tutor	Dr. Omar Muwafaq Mahmood		**e-mail**	omer_alyousif@uomosul.edu.iq	
Peer Reviewer Name		اسم مُراجع الملف	**e-mail**	بريده الالكتروني	
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 Aims أهداف المادة الدراسية	1. To develop problem solving skills and understanding of AC circuit theory through the application of techniques. 2. To understand voltage, current and power from a given AC circuit. 3. This course deals with the basic concept of AC electrical circuits. 4. This is the basic subject for all AC electrical and electronic circuits. 5. To understand Kirchhoff's current and voltage Laws problems. 6. To perform mesh and Nodal analysis. 7. To perform Thevenin and superposition theory. 8. To understand the resonant circuits.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how electricity works in electrical circuits. 2. List the various terms associated with electrical circuits. 3. Summarize what is meant by a basic AC electric circuit. 4. Describe electrical AC voltage, current and power. 5. Define Ohm's law in AC circuits. 6. Identify the basic circuit passive and active elements and their applications. 7. Discuss the various properties of impedance. 8. Explain the two Kirchhoff's laws used in AC circuit analysis. 9. Explain the Analysis Methods used in AC Electrical Circuits.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A - Circuit Components and values** AC circuits, Current and voltage definitions, circuit elements, impedance networks, real and ideal elements, voltage and current sources. [9 hrs.] Lab. [6 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [1 hr.] **Part B- Circuit reduction** combining sources, Combining impedances elements in series and parallel, delta and star transformation. [12 hrs.] Revision problem and tutorial classes [8 hrs.] Lab. [8 hrs.] Quizzes [1 hr.] **Part C- Circuit Theory** Kirchhoff's laws and Ohm's law. Introduction to mesh and nodal analysis, Introduction to Thevenin and Norton theory, maximum power transfer, introduction to superposition theory, the resonant circuits. [24 hrs.] Revision problem and tutorial classes [16 hrs.] Lab. [16 hrs.] Quizzes [1 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	107	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	10% (10)	4,8,12	LO #1, 5, 8 and 9
	Assignments	10	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects / Lab.	2	25% (25)	Continuous	All
	Report	0	0% (0)	----	----
Summative assessment	**Midterm Exam**	2 hr.	10% (10)	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	Basic Concept & Units in AC circuits, waveforms of AC sources
Week 2	Average and RMS values, Form Factor, Crest Factor
Week 3	Ohm's law, impedance and admittance calculations
Week 4	equivalent impedance: Series-parallel and delta – star transformation
Week 5	power calculation in A.C circuit and power factor
Week 6	Kirchhoff's laws: KVL-KCL
Week 7	Phasor diagram
Week 8	Mid-term Exam
Week 9	introduction to network theorems, types of source: independent and dependent voltage and current sources and their transformation
Week 10	Maxwell's circulating currents (mesh analysis)
Week 11	nodal analysis
Week 12	superposition theorem
Week 13	Thevenin's theorem and Norton's theorem
Week 14	maximum power transfer theorem
Week 15	Resonant circuits
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to lab. components
Week 2	Lab 2: Introduction to AVO meter (using in AC circuits) and oscilloscope
Week 3	Lab 3: Introduction to AC function generator
Week 4	Lab 4: ohm's Law application in AC circuit
Week 5	Lab 5: series and parallel impedance, delta and star transformation
Week 6	Lab 6: Kirchhoff's Voltage Law
Week 7	Lab 7: Kirchhoff's Current Law
Week 8	Lab 8: implementation of Maxwell's circulating currents (mesh analysis)
Week 9	Lab 9: implementation of Nodal analysis
Week 10	Lab 10: implementation of Superposition theorem
Week 11	Lab 11: implementation of Thevenin's / Norton's Theorem
Week 12	Lab 12: implementation of maximum power transfer theorem
Week 13	Lab 13:AC power measurements (methods and instrumentations)
Week 14	Lab 14: power factor measurements
Week 15	Lab 15: resonance circuits validation

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Engineering Circuit Analysis 7th Edition by William Hayt , Jack Kemmerly , Steven Durbin	Yes
Recommended Texts	Schaum's Outline of Basic Circuit Analysis, Second Edition (Schaum's Outlines) 2nd Edition, by John O'Malley	No
Websites	AC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2017.	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mathematics II**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EE109**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level		1	**Semester of Delivery**		2
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title		لقبه العلمي	**Module Leader's Qualification**		الشهادة
Module Tutor	Dr. Saad Enad Mohammed		**e-mail**	saadmohamed@uomosul.edu.iq	
Peer Reviewer Name		اسم مُراجع الملف	**e-mail**	بريده الالكتروني	
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 Aims أهداف المادة الدراسية	1. Provide students with a strong support for basic learning calculus concepts: limits, derivatives, and integration. 2. Help students communicate mathematical ideas through the practice of proper mathematical notations. 3. Help students to verify mathematical ideas through the practice of proper mathematical proof techniques. 4. Developing mathematical thinking and understanding in students by guiding them towards deep thinking rather than "memorizing all the rules". 5. Increase students' awareness of alternate means of learning such as group study, as well as strategies that will enhance the learning of mathematics.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completion of the course, the student will be able to: 1. how to calculate the area under and between curves. 2. interpret a volume of revolution of a function's graph around a given axis as a (Riemann) sum of disks or cylindrical shells, convert to definite integral form and compute its value. 3. express the length of a curve as a (Riemann) sum of linear segments, convert to definite integral form and compute its value. 4. express the surface area of revolution of a function's graph around a given axis as a (Riemann) sum of rings, convert to definite integral form and compute its value. 5. antidifferentiate products of functions by parts. 6. recognize and implement appropriate techniques to anti-differentiate products o trigonometric functions. 7. devise and apply a trigonometric substitution in integrals involving Pythagorean Quotients. 8. decompose a rational integrand using partial fractions. 9. determine convergence of improper integrals with discontinuities in their domain or infinite limits of integration.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following.

	Definite Integrals **Areas between Curves**: The Basic Formula, Curves That Cross Boundaries with Changing Formulas, Integrating with Respect to y, Combining Integrals with Formulas from Geometry, **Volumes of Solids of Revolution:** Disc Method, Washer Method, Cylindrical Shells Method, **Lengths of Curves in the Plane:** The Basic Formula, Dealing with Discontinuities in dy/dx, The Short Differential Formula**, Area of Surfaces of Revolution:** The Basic Formula, Revolution about the y-axis, The Short Differential Form**.** [16 hrs.] Revision problem and tutorial classes [4 hrs.] Quizzes [2 hr.] **Techniques of Integration:** **Basic Integration Formulas:** Algebraic Procedures and Trigonometric Identities, **Integration by Parts:** The Formula, Repeated Use, Solving for the Unknown Integral, Tabular Integration, **Trigonometric Integrals:** Products of Sines and Cosines, Eliminating Square Roots, Integrals of Powers of tanx and secx, Integrals of Odd Functions, Definite Integrals of Even Functions, **Trigonometric Substitution:** Trigonometric Substitution for Combining Squares, Integrals involving $ax2+bx+c$,$a\neq0$, Two Useful Formulas, **Rational Functions and Partial Fractions:** General Description of the Method, The Substitution z=tan($x2/$). [24 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [2 hr.] **Plane Curves and Polar Coordinates**: Polar Coordinates, Definition of Polar Coordinates, Negative Values of r, Changing to Radian Measure, The Use of Radian Measure, Elementary Coordinate, Equations and Inequalities, Cartesian Versus Polar Coordinates, **Graphing in Polar Coordinates:** Symmetry and Slope, Faster Graphing, Finding the Points Where Curves Intersect. [6 hrs.] Revision problem and tutorial classes [2 hrs.] Quizzes [1 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1/5	20% (20)	2, 7, 8, 12, 14	LO #2, 6, 7, 8 and 9
	Assignments	7	20% (20)	2 to 15	LO # 2, 4, 6 7, 8, and 9
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	7	LO # 1-6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Calculus and Area:** Regions Bounded by Curves, Area under the Graph of a Nonnegative Continuous Function.
Week 2	**Definite Integrals:** Constant Functions, Area is Strictly a Special Case.
Week 3	**Indefinite Integrals:** The Indefinite Integral of a Function, Rules of Algebra, The Integrals of $sin2x$ and $cos2x$, Solving Initial Value Problems with Indefinite Integrals.
Week 4	**Integration by Substitution-Running the Chain Rule Backward:** The Generalized Power Rule in Integral Form, Sines and Cosines, The Substitution Method of Integration, Substitution in Definite Integrals.
Week 5	**Application of Definite Integrals: Areas between Curves**: The Basic Formula, Derived from Riemann Sums, Curves That Cross Boundaries with Changing Formulas, Integrating with Respect to y, Combining Integrals with Formulas from Geometry.

Week 6	**Volumes of Solids of Revolution:** Disc Method, Washer Method, Cylindrical Shells Method.
Week 7	**Lengths of Curves in the Plane:** The Basic Formula, Dealing with Discontinuities in dy/dx, The Short Differential Formula.
Week 8	**Area of Surfaces of Revolution:** The Basic Formula, Revolution about the y-axis, The Short Differential Form.
Week 9	**Techniques of Integration: Basic Integration Formulas**: Algebraic Procedures and Trigonometric Identities.
Week 10	**Integration by Parts:** The Formula, Repeated Use, Solving for the Unknown Integral, Tabular Integration.
Week 11	**Trigonometric Integrals:** Products of Sines and Cosines, Eliminating Square Roots, Integrals of Powers of tanx and secx, Integrals of Odd Functions, Definite Integrals of Even Functions.
Week 12	**Trigonometric Substitution:** Trigonometric Substitution for Combining Squares, Integrals involving $ax2+bx+c$,$a\neq0$, Two Useful Formulas.
Week 13	**Rational Functions and Partial Fractions:** General Description of the Method, The Substitution z=tan($x2/$).
Week 14	**Plane Curves and Polar Coordinates:** Polar Coordinates, Definition of Polar Coordinates, Negative Values of r, Changing to Radian Measure, The Use of Radian Measure, Elementary Coordinate, Equations and Inequalities, Cartesian Versus Polar Coordinates.
Week 15	**Graphing in Polar Coordinates:** Symmetry and Slope, Faster Graphing, Finding the Points Where Curves Intersect.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Calculus, Thirteenth Edition, by George B. Thomas,	Yes
Recommended Texts	Calculus, Mathematics for Engineers and Technologists, 2002, by Huw Fox and Bill Bolton.	No
Websites	Khan Academy math (https://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	**Computer programming**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EE110**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level		1	**Semester of Delivery**		2
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title		لقبه العلمي	**Module Leader's Qualification**		الشهادة
Module Tutor	Nagham Hikmat Aziz		**e-mail**	naghamhikmat@uomosul.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Introduction of MATLAB program (m file). 2. To understand Types of variables, numbers, Expressions, operation and function. 3. To understand Solving of Electrical circuit in MATLAB program. 4. To perform Solving equation by symbols. 5. To solve the Function and its application (pulse & ramp functions). 6. To perform Engineering graphics (two dimension and three dimensions) such as vector diagram mesh, bar plots). 7. To perform Matrix and its applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Proficiency in MATLAB: Students should develop a strong understanding of the MATLAB programming language, syntax, and functionality. They should be able to write, debug, and modify M-file programs effectively. 2. Problem-solving skills: MATLAB is often used for scientific and engineering applications, so students should learn how to apply MATLAB to solve complex problems in their respective fields. They should be able to analyze problems, develop algorithms, and implement them using MATLAB. 3. Data analysis and visualization: MATLAB offers powerful tools for data analysis and visualization. Students should learn how to import, manipulate, analyze, and visualize data using MATLAB functions and techniques. 4. computation: MATLAB is well-known for its mathematical computing capabilities. Students should become proficient in using MATLAB for performing mathematical computations, including linear algebra and differential equations. 5. Algorithm development: MATLAB allows students to develop algorithms and implement them in M-file programs. They should learn how to break down complex problems into smaller, manageable tasks, design algorithms to solve those tasks, and integrate them into a complete MATLAB program. 6. Code optimization: Students should develop skills in optimizing MATLAB code for improved performance and efficiency. 7. Debugging and troubleshooting: MATLAB programs may encounter errors or produce unexpected results. Students should learn how to effectively debug and troubleshoot their M-file programs, identify and resolve issues, and improve the overall reliability of their code. 8. Documentation and code organization: Writing clear and well-organized code is crucial for collaboration and future maintenance. Students should learn to document their MATLAB programs, including comments, variable naming conventions, and overall code structure.

	9. Project implementation: In some cases, students may be required to develop larger-scale projects using MATLAB. They should learn how to plan, manage, and implement MATLAB-based projects, ensuring that their programs meet the specified requirements and deliver the desired outcomes.
Indicative Contents المحتويات الإرشادية	**Part A - Circuit Components and values** Introduction to MATLAB, Types of variables, Numbers and Expressions, Operation, Functions, Solving set of linear equations, Function and its application (pulse & ramp functions). [14 hrs.] Lab. [14 hrs.] Revision problem and tutorial classes [4 hrs.] **Part B- Circuit reduction** Differentiation, Integration, Solving of Electrical circuit, Engineering graphics (two dimension and three dimensions) such as vector diagram mesh and bar plots, Solving of ordinary differential equation, Curve fitting and interpolation, Matrix and its applications [14 hrs.] Lab. [14 hrs.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1	10% (10)	4,8,12	LO #1, 5, 8 and 9
	Assignments	10	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects / Lab.	2	25% (25)	Continuous	All
	Report	0	0% (0)	----	----
Summative assessment	Midterm Exam	2 hr.	10% (10)	8	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	Introduction to MATLAB, Types of variables, numbers. Expressions
Week 2	Complex Numbers, Array Operations, Matrix Operations.
Week 3	Application of matrix, Solving set of linear equations.
Week 4	Control structures in MATLAB program.
Week 5	Plotting commands for 2-D Graphics.
Week 6	Polynomials analysis.
Week 7	Function Files, its application (pulse & ramp functions)
Week 8	Revision
Week 9	Solving equation by symbols.
Week 10	Numerical Integration.
Week 11	Transient Analysis.
Week 12	Frequency Response using MATLAB
Week 13	Partial fraction Expansion.
Week 14	Application on Battery Charging on circuit.
Week 15	Engineering graphics 3D.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to MATLAB, Types of variables, numbers. Expressions
Week 2	Applied Complex Numbers, Array Operations, Matrix Operations.
Week 3	Applied Application of matrix, Solving set of linear equations.
Week 4	Applied Control structures in MATLAB program.
Week 5	Applied Plotting commands for 2-D Graphics.
Week 6	Applied Polynomials analysis.
Week 7	Applied Function Files, its application (pulse & ramp functions)
Week 8	Revision
Week 9	Applied Solving equation by symbols.
Week 10	Applied Numerical Integration.
Week 11	Applied Transient Analysis.
Week 12	Applied Frequency Response using MATLAB
Week 13	Applied Partial fraction Expansion.
Week 14	Applied Application on Battery Charging on circuit.
Week 15	Applied Engineering graphics 3D.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Numerical Analysis Using MATLAB® and Excel® Third Edition, Steven T. Karris.	No
Recommended Texts	2- ELEMENTARY MATHEMATICAL and COMPUTATIONAL TOOLS for ELECTRICAL and COMPUTER ENGINEERS USING MATLAB, Jamal T. Manassah City College of New York,2011	No
Websites	3. ELECTRONICS and CIRCUIT ANALYSIS using MATLAB, JOHN O. ATTIA ,1999.	

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

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Computer programming**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EE110**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level		UGI	**Semester of Delivery**		2
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title		لقبه العلمي	**Module Leader's Qualification**		الشهادة
Module Tutor	Nagham Hikmat Aziz		**e-mail**	naghamhikmat@uomosul.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Introduction of MATLAB program (m file). 2. To understand Types of variables, numbers, Expressions, operation and function. 3. To understand Solving of Electrical circuit in MATLAB program. 4. To perform Solving equation by symbols. 5. To solve the Function and its application (pulse & ramp functions). 6. To perform Engineering graphics (two dimension and three dimensions) such as vector diagram mesh, bar plots). 7. To perform Matrix and its applications.
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
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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
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	Report	0	0% (0)	----	----
Summative assessment	Midterm Exam	2 hr.	10% (10)	8	LO # 1-5
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Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to MATLAB, Types of variables, numbers. Expressions
Week 2	Complex Numbers, Array Operations, Matrix Operations.
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Week 12	Frequency Response using MATLAB
Week 13	Partial fraction Expansion.
Week 14	Application on Battery Charging on circuit.
Week 15	Engineering graphics 3D.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to MATLAB, Types of variables, numbers. Expressions
Week 2	Applied Complex Numbers, Array Operations, Matrix Operations.
Week 3	Applied Application of matrix, Solving set of linear equations.
Week 4	Applied Control structures in MATLAB program.
Week 5	Applied Plotting commands for 2-D Graphics.
Week 6	Applied Polynomials analysis.
Week 7	Applied Function Files, its application (pulse & ramp functions)
Week 8	Revision
Week 9	Applied Solving equation by symbols.
Week 10	Applied Numerical Integration.
Week 11	Applied Transient Analysis.
Week 12	Applied Frequency Response using MATLAB
Week 13	Applied Partial fraction Expansion.
Week 14	Applied Application on Battery Charging on circuit.
Week 15	Applied Engineering graphics 3D.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Numerical Analysis Using MATLAB® and Excel® Third Edition, Steven T. Karris.	No
Recommended Texts	2- ELEMENTARY MATHEMATICAL and COMPUTATIONAL TOOLS for ELECTRICAL and COMPUTER ENGINEERS USING MATLAB, Jamal T. Manassah City College of New York,2011	No
Websites	3. ELECTRONICS and CIRCUIT ANALYSIS using MATLAB, JOHN O. ATTIA ,1999.	

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 Techniques**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EE111**				
ECTS Credits	**3**				
SWL (hr./sem)	**75**				
Module Level		1	**Semester of Delivery**		2
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title		لقبه العلمي	**Module Leader's Qualification**		الشهادة
Module Tutor	Mohammed Idrees dawod		**e-mail**	Mohammed.idrees@uomosul.edu.iq	
Peer Reviewer Name		اسم مُراجع الملف	**e-mail**	بريده الالكتروني	
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 Aims أهداف المادة الدراسية	1. To develop problem solving skills and understanding of Digital circuit theory through the application of techniques. 2. To understand Digital circuit, latches and Flip-flops, asynchronous binary counters, synchronous binary counters. 3. This course deals with the basic concept of latches and Flip-flops, asynchronous binary counters, synchronous binary counters. 4. To construct data storage units/shift registers using flip flops 5. To analyze sequential logic circuits using appropriate tools. 6. To design and analyze synchronous binary, up/down counters.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how combinational logic circuits works. 2. Design combinational logic circuits using combination logic design process. 3. Define and describe various latches and Flip-flops 4. Construct data storage units/shift registers using flip flops 5. Define asynchronous and synchronous Digital circuit 6. Identify how to design and analyze asynchronous binary counters. 7. Explain how to design and analyze BCD asynchronous counters 8. Explain the Synchronous counters Binary Counters 2: bit, 3-bit. 9. Explain the types of shift registers and Shift register counters Ring Counter.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A - Circuit Components and values** Introduction to Digital Technique, Basic Definitions, System of Numbers, General number formula: Binary, octal, decimal & hexadecimal numbers, Numbers Base Conversion (Arithmetic operation in different numbers complements, binary codes, BCD, Ex-3, gray codes). [9 hrs.] : Revision problem and tutorial classes [6 hrs.] : Quizzes [1 hr.] **Part B- Circuit reduction** Boolean algebra: (Basic definitions, basic theorem & properties, Boolean functions), Canonical & Standard Forms Digital Logic Gates. [12 hrs.]: Revision problem and tutorial classes [8 hrs.]: Quizzes [1 hr.] **Part C- Circuit Theory** Karnaugh Maps (AND & OR implementation, don't care condition), Adders Arithmetic Operation (Sub tractors, half & full adders & Subtractors, binary parallel adders), Code Conversion (Even and odd party logic, decoders, encoders comparator, multiplexers & demultiplexers), Sequential Logic (Flip Flops (RS, T, D, JK…) Master slave FF, Counters, Shift registers).. [24 hrs.]: Revision problem and tutorial classes [16 hrs.]:Quizzes [1 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	27	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	5% (5)	4,8,12	LO #1, 5, 8 and 9
	Assignments	10	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects /	1	20% (20)	Continuous	All
	Report	1	10% (10)	2 to 12	All
Summative assessment	**Midterm Exam**	2 hr.	10% (10)	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	Introduction to Digital Technique, General number formula
Week 2	Numbers Base Conversion, Boolean algebra
Week 3	Canonical & Standard Forms Digital Logic Gates, Karnaugh Maps
Week 4	Adders Arithmetic Operation, Code Conversion
Week 5	Introduction to sequential logic circuit design Latches, S-R Latch, gated RS Latch
Week 6	Edge-triggered Flip-Flops, JK-FF and D-FF Flip-Flop Operating Characteristics
Week 7	Shift Register operation
Week 8	Mid-term Exam
Week 9	Types of shift registers, Shift register counters: Ring Counter
Week 10	Models of State Machines
Week 11	Asynchronous Counters: Ripple counter
Week 12	Synchronous counters: Binary Counters 2: bit, 3-bit
Week 13	BCD Counter
Week 14	Up/down counter
Week 15	Synchronous counters design
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Digital Fundamental: By Thomas L. Floyd 11th Edition Pearson Education Limited (2015)	Yes
Recommended Texts	Contemporary Logic Design, Randy Katz Addison Wesley Publishing Company1993	No
Websites	Introduction to Boolean algebra and logic design by Gerhard and Melvin	

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	**Democracy and Human Rights**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UOM104**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level		1	**Semester of Delivery**		2
Administering Department			**College**		
Module Leader	Rashad Adhed Alsaigh		**e-mail**	rashad.alsaigh@uomosul.edu.iq	
Module Leader's Acad. Title		Assistant lecturer	**Module Leader's Qualification**		MSc
Module Tutor			**e-mail**		
Peer Reviewer Name		Zainab abd alellah abd alkareem	**e-mail**	lawyerzainabaa@uomosul.edu.iq	
Scientific Committee Approval Date		01/07/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The aim of studying the democracy and human rights topics is to: 1. **Understand** the concept of human rights and explore their sources, including international, regional, national, and religious sources. 2. **Define** administrative corruption, explore its types, and understand its detrimental effects on society. Study methods to combat administrative corruption and promote transparency, accountability, and good governance. 3. **Trace** the historical development and evolution of human rights, examining key milestones and movements that have shaped the modern understanding of human rights. 4. **Differentiate** between different categories of human rights, including civil and political rights, economic and social rights, and environmental, cultural, and developmental rights. 5. **Explore** legal, institutional, and societal guarantees to prevent human rights violations, including guarantees of human rights in Islam, national-level protections, and international safeguards. 6. **Comprehend** the concept of democracy, including its principles, values, and various forms of democratic governance such as direct, semi-direct, indirect, and digital democracy. Overall, studying these topics aims to develop a comprehensive understanding of human rights, democracy, and combating corruption, empowering individuals to actively promote and protect human rights and democratic values in society.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After these module aims, students should be able to: 1. Demonstrate a comprehensive understanding of the concept of human rights and their sources, including international, regional, national, and religious sources. 2. Identify and explain the fundamental characteristics of human rights, such as universality, indivisibility, interdependence, and inalienability. 3. Analyze the historical emergence and evolution of human rights, including key milestones and movements that have shaped their development. 4. Differentiate between different categories of human rights, including civil and political rights, economic and social rights, and environmental, cultural, and developmental rights. 5. Evaluate and apply legal, institutional, and societal guarantees to prevent human rights violations, considering guarantees in Islam, at the national level, and within the international framework. 6. Understand and discuss the concept of democracy, including its principles, values, and different forms of democratic governance. 7. Evaluate the Islamic stance on democracy and engage in critical analysis of the strengths and weaknesses of the democratic system. 8. Recognize and assess the impact of administrative corruption on society and propose methods to combat and prevent corruption in administrative systems. 9. Demonstrate critical thinking skills by analyzing and evaluating different perspectives on human rights, democracy, and corruption. 10. Apply acquired knowledge and skills to promote and protect human rights,

	democracy, and good governance in personal, professional, and civic contexts. Overall, students should have a solid understanding of democracy and human rights, democracy, and corruption issues, and be able to apply this knowledge to contribute to the advancement of human rights and democratic values in society.
Indicative Contents المحتويات الإرشادية	The indicative content includes: 1. Definition and sources of democracy and human rights (international, regional, national, religious). [3h] 2. Characteristics of democracy and human rights: universality, indivisibility, interdependence, inalienability. [3h] 3. Emergence and evolution of human rights: historical development, key milestones, influential movements. [3h] 4. Types of human rights: civil and political, economic and social, environmental, cultural, and developmental. [3h] 5. Guarantees to prevent human rights violations: legal, institutional, societal safeguards, Islamic guarantees, national and international levels. [3h] 6. Concept of democracy: principles, values, forms of governance (direct, semi-direct, indirect). [3h] 7. Islamic stance on democracy: compatibility, strengths, weaknesses. [3h] 8. Critique of the democratic system: analysis of strengths and weaknesses. [3h] 9. Administrative corruption: definition, types, societal impact. [3h] 10. Methods to combat administrative corruption. [3h]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	When it comes to learning and teaching strategies for a human rights module, there are several approaches can be taken to enhance understanding and engagement. Here are some effective strategies: 1. Interactive Discussions: Encourage students to actively participate in discussions, debates, and group activities. This promotes critical thinking, allows for different perspectives to be shared, and fosters a deeper understanding of human rights issues. 2. Case Studies: Present real-life case studies that highlight human rights violations or achievements. Analyzing these cases helps students apply theoretical concepts to practical situations and develops their problem-solving skills. 3. Research Projects: Assign research projects on specific human rights topics or issues. This encourages independent learning, critical analysis, and the development of research skills.

	4. Collaborative Learning: Foster collaboration among students through group projects or assignments. This encourages teamwork, peer learning, and the exchange of diverse perspectives. 5. Assessment Variety: Use a variety of assessment methods, including essays, presentations, debates, and quizzes, to assess students' understanding of human rights concepts and their ability to apply them to real-world situations.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.1
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 #2, 4, 6 and 8
	Assignments	2	10% (10)	3, 5, 8, 11, 13	LO # 1, 3, 7, 6, 9 and 10
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 2,4,5,7,9and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered

Week 1	Definition of human rights and sources of rights (international sources / regional sources / national sources / religious sources).
Week 2	Characteristics of human rights.
Week 3	The emergence and evolution of human rights.
Week 4	Types of human rights / civil and political rights. Economic and social rights. Environmental, cultural, and developmental rights.
Week 5	Guarantees to prevent human rights violations / guarantees of human rights in Islam.
Week 6	Guarantees for the protection of human rights at the national level.
Week 7	Guarantees of human rights at the international level.
Week 8	The concept of democracy.
Week 9	Characteristics of a democratic system.
Week 10	Forms of democratic governance (direct democracy / semi-direct democracy / indirect democracy).
Week 11	Digital democracy / definition and advantages and disadvantages of digital democracy / manifestations of digital democracy.
Week 12	The Islamic stance on democracy.
Week 13	Critique of the democratic system.
Week 14	Administrative corruption / definition and types.
Week 15	Methods to combat administrative corruption.
Week 16	**Preparatory week before the final Exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	ضمانات حقوق الانسان وحمايتها وفقا للقانون الدولي والتشريع الوطني / نبيل عبد الرحمن ناصر الدين	No
Recommended Texts	الديمقراطية وحقوق الانسان / د. امير عبد العزيز	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**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UoM221EE112**				
ECTS Credits	**2**				
SWL (hr./sem)	**50**				
Module Level	1		**Semester of Delivery**	2	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader			**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor			**e-mail**		
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
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 Aims أهداف المادة الدراسية	1. To develop Communications skills in the English language. 2. To let the students able to read and write in correct Grammer. 3. To develop the skills of writing professional writing 4. To develop the skills of writing emails for future Engineers
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Learning Parts of Speech in English 2. Learn different tenses of verbs. 3. Learn active and passive voice. 4. Learn adjectives and adverbs. 5. Learn the correct prepositions. 6. Learn the correct articles
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A – learn parts of speech** Nouns, verbs, adjectives, articles, pronouns. [9 hrs.] Revision problem and tutorial classes [5 hrs.] Quizzes [1 hr.] **Part B-different tenses** Present simple, present perfect, present continuous, past simple, past perfect, past continuous. [9 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [1 hr.] **Part C- active and passive voice** Active and passive voice, since and for [6 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [1 hr.]

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 communications skills. This will be achieved through classes, interactive involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
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**	3	10% (10)	4,8,12	LO #1, 5, 8 and 9
	Assignments	5	10% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects	1	20% (25)	Continuous	All
	Report	0	0% (0)	----	----
Summative assessment	**Midterm Exam**	2 hr	10% (10)	8	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	Introduction
Week 2	Part of speech: Verbs present
Week 3	Part of speech: Verbs past
Week 4	Part of speech: perfect tenses
Week 5	Part of speech: Noun
Week 6	Part of speech: preposition
Week 7	Part of speech: adVerbs
Week 8	Mid-term Exam
Week 9	Part of speech: passive and active
Week 10	Part of speech: since and for

Week 11	Part of speech: articles
Week 12	Part of speech: conjunctions
Week 13	Writing an email
Week 14	Writing an email exercises
Week 15	Technique to fix Grammers.
Week 16	**Preparing week before the Final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	NEW HEADWAY INTERMEDIATE	Yes
Recommended Texts	ENGLISH GRAMMAR IN USE	No
Websites	https://www.udemy.com/course/english-for-engineers/	

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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	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electrical Circuits Analysis**			**Module Delivery**	
Module Type	**Core / C**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC201**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level	2		**Semester of Delivery**	3	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor	Asst. Prof Dr. Omar Sharaf Al-Deen		**e-mail**	o.yehya@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Basics of Electrical Engineering I and Basics of Electrical Engineering II	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Ability to understand the AC Circuit Power Analysis and Poly-phase Circuits 2. Ability to determine the Transient Response of RL /RC Circuit and the Transient Response of RLC Circuit 3. Ability to analysis Magnetically Coupled Circuits and Ideal Transformers 4. Ability to solve the mathematical equations for Complex Frequency, Laplace Transform, Frequency Response and Fourier Circuit Analysis 5. Ability to synthesize the Circuit Analysis in the s-Domain and Two-Port Networks
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Use basic electrical DC concepts and theorems to analyze circuits 2. Build and simulate electrical DC circuits and perform measurements with electronic test equipment 3. Understand the fundamental concepts of electrical circuits, including voltage, current, resistance, and power. 4. Analyze and solve basic DC (direct current) circuits using Ohm's Law, Kirchhoff's Laws, and nodal/mesh analysis techniques. 5. Apply techniques to analyze and solve AC (alternating current) circuits, including complex impedance, phasor representation, and frequency response. 6. Demonstrate proficiency in analyzing circuits with passive elements such as resistors, capacitors, and inductors. 7. Use circuit simulation software and laboratory equipment to verify theoretical analysis and gain practical experience in circuit analysis. 8. Analyze and solve circuits with operational amplifiers (op-amps), including understanding their basic configurations and applications. 9. Understand the concepts of power in electrical circuits, including active power, reactive power, and power factor correction. 10. Develop critical thinking and problem-solving skills by applying circuit analysis techniques to real-world electrical engineering problems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A - Transient Circuits** The Transient Circuits: RC, RL, RLC circuit in series and parallel and their complete response in time and Frequency. [**16 hrs**.] Revision problem and tutorial classes [**8 hrs**.] Quizzes [**1 hr**.]

	Part B- Poly-phase Circuits Poly-phase Circuits: Single-phase and three phase wire system, 3-Phase balance and unbalance system star and delta connections, Power in 3-phase circuits. [**16 hrs**.] Revision problem and tutorial classes [**8 hrs**.] Quizzes [**1 hr**.] **Part C- Coupling** Coupling: Magnetic coupling, Coefficient of coupling, Linear and ideal transformers. [**12 hrs**.] Revision problem and tutorial classes [**6 hrs**.] **Part D- Two-Port Networks** Two-Port Networks: One-pot networks, y-z-h-g and ABCD parameters. Filters: Constant k-filters, Low pass and high pass modern filter design, Active filter. [**16 hrs**.] Revision problem and tutorial classes [**8 hrs**.] Quizzes [**1 hr**.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1	10% (10)	4,8,12	LO #1, 5, 8 and 9
	Assignments	10	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects / Lab.	0	0% (0)	----	----
	Report	0	0% (0)	----	----
Summative assessment	Midterm Exam	2 hr	25% (25)	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; syllabus; Advantages and Disadvantages of Electrical Networks as a different circuits .
Week 2	Transient Response of RL Circuit
Week 3	Transient Response of RC Circuit
Week 4	Transient Response of RLC Circuit / Parallel connection
Week 5	Transient Response of RLC Circuit / Series connection
Week 6	Poly-phase Circuits
Week 7	Mid-term Exam
Week 8	Three phase circuit analysis / Balance load
Week 9	Three phase circuit analysis / Un-Balance load
Week 10	Magnetically Coupled Circuits
Week 11	Linear and Ideal Transformers
Week 12	Frequency Response
Week 13	Circuit Analysis in the S-Domain
Week 14	Two-Port Networks
Week 15	Filters
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Engineering Circuit Analysis Eight Edition (William H. Hayt) 2012 Fundamentals of Electric Circuits (Charles K. Alexander)2009	Yes
Recommended Texts	Electric Circuits Tenth Edition (James W. Nilsson) 2015	Yes
Websites	https://www.pdfdrive.com/schaums-outline-of-electric-circuits-e185851170.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	**Engineering Mathematics I**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC202**				
ECTS Credits	**5**				
SWL (hr./sem)	**125**				
Module Level	2		**Semester of Delivery**	3	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor			**e-mail**		
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
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 Aims أهداف المادة الدراسية	1. Develop problem-solving skills and understand partial differentiation. 2. Understand the chain rule and the total derivative. 3. Understand vectors and units, space coordinates, and space vectors. 4. Understand gradient, divergence, and Curl in curved coordinates. 5. Solving linear differential equations of the first and second order with constant coefficients. 6. Understanding Fourier series.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the concept of partial derivatives for functions of two or more variables. 2. Understand the concept of the total derivative and its relationship to partial derivatives. 3. Determine whether a critical point is a maximum, minimum, or saddle point using the second derivative test or other methods. 4. Understand vector representation and components in Cartesian coordinates. 5. Understand the geometric interpretation of the vector product. 6. Express gradient, divergence, and curl in terms of curvilinear coordinates. 7. Solve first and second-order linear differential equations with constant coefficients. 8. Understand the need for Fourier series in representing periodic functions. 9. Understand double integrals and their properties.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **<u>Part A - Partial Differentiation and Vectors</u>** Partial Differentiation, function of two or more variables, partial derivatives, The Chain Rule and total Derivative, maxima, minima and saddle point, Vectors component and Units, Space coordinate and Space Vector, Scalar Product and Vector Product, Product of Three Vectors, Applications [20 hrs.] Revision problem and tutorial classes [5 hrs.] Quizzes [1 hr.] **<u>Part B- Vector Calculus and Differential Equations</u>** Vector Functions and Their Derivatives, Gradient of Scalar Field, Divergence of Vector Field, Curl of Vector Field, Directional Derivatives, Gradient, Divergence, and Curl in Curvilinear Coordinates, 1st and 2nd order linear differential equations. [20 hrs.] Revision problem and tutorial classes [5 hrs.] Quizzes [1 hr.] **<u>Part C- Fourier Series and Multiple Integrals</u>** Fourier series, Periodic functions and Fourier Series-Euler formulas, Double integrals, areas, and volumes [20 hrs.] Revision problem and tutorial classes [5 hrs.] Quizzes [1 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	5% (5)	4,8,12	All
	Assignments	10	5% (5)	2 to 12	All
	Project	2	15% (15)	Continuous	All
	Report	0	0% (0)	----	----
Summative assessment	**Midterm Exam**	2hr	25% (25)	8	All
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Partial Differentiation: Function of two or more variables, partial derivatives.
Week 2	The Chain Rule and Total Derivative, Maxima, minima, and saddle points.
Week 3	Vectors: Vector components and units, Space coordinates and space vectors.
Week 4	Scalar Product and Vector Product, Units and plane equations.
Week 5	Equations of lines and planes, Product of Three Vectors, Applications of vectors.
Week 6	Vector Functions and Their Derivatives, Gradient of Scalar Field.
Week 7	Divergence of Vector Field, Curl of Vector Field.
Week 8	Mid-term Exam
Week 9	Directional Derivatives, Gradient, Divergence, and Curl in Curvilinear Coordinates.
Week 10	Introduction to Differential Equations, 1st and 2nd order linear differential equations.
Week 11	Application of differential equations to electrical systems.
Week 12	Transformation of higher order linear differential equations onto coupled differential equations.
Week 13	Periodic functions and Fourier Series-Euler formulas.
Week 14	Application of Fourier series in Electrical Engineering.
Week 15	Double integrals, areas, and volumes
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts		No
Recommended Texts		No
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electronics Principles**			**Module Delivery**	
Module Type	**Core / C**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC203**				
ECTS Credits	**5**				
SWL (hr./sem)	**125**				
Module Level	2		**Semester of Delivery**	3	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	Dr. Mohammed Tariq Yaseen		**e-mail**	mtyaseen@uomosul.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	Doctor	
Module Tutor	Mr. Shamil Hamzah Hussein		**e-mail**	Shamil_alnajjar84@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To develop problem solving skills of electronic circuit through the understanding solid state for each electronic passive and active elements such as RLC, diodes, transistors, and integrated circuits. 2. To understand the Basic Transistor Construction through graphical analysis of transistors Connections and biasing. 3. This course deals with the basic concept of the small-signal analysis of the transistors such as D.C. and A.C. Equivalent Circuits. 4. To understand the Load Line Analysis, Operating Point Transistor Parameters, and Rating Amplification Stabilization. 5. To understand the H-parameters, Hybrid Equivalent Circuit. Z-parameters, R-parameters Equivalent Circuit. 6. To perform current-voltage characteristics, charge control description for all types of both the diode and transistors. 7. To Describe and operation of the Multistage Transistor Amplifiers
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize the regions of operation, graphical analysis of BJT, regions of operation stability. 2. List the various terms associated with bias configuration of the transistors. 3. Summarize what is meant of the practical circuit of transistor amplifier. 4. Describe the types of multistage amplifiers. 5. Discuss the various properties of transistors used as an amplifier 6. Explain the transistor construction and operation such as amplifier and switching. 7. Explain the operation of the linear amplifier through the a.c. load line and DC load line analysis.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A - Transistor Construction, Operation, and Stabilization** Transistor Construction. Transistor Symbols. Transistor Operation. Transistor Connections: Common Base CB Connection, Common Emitter CE Connection, Transistor Curves, Cutoff and Saturation. Transistor as a switch. Common Collector Connection. Transistor Load Line Analysis, Operating Point, Transistor Parameters and Rating Amplification. Stabilization, Stability Factor Methods of Transistor Biasing. [**15 hrs**.] Revision problem and tutorial classes [**5 hrs**.] Quizzes [**1 hr**.] **Part B- D.C and A.C Equivalent Circuits of the transistors** Practical Circuit of Transistor Amplifier, D.C. and A.C. Equivalent Circuits. Transistor ac Equivalent Circuits h-parameters, Hybrid Equivalent Circuit. r-parameters, r-parameters Equivalent Circuit. The Linear Amplifier. [**15 hrs**.] Revision problem and tutorial classes [**5 hrs**.] Quizzes [**1 hr**.]

	Part C- Transistor Bias Configuration and Multistage Transistor Amplifiers The a.c. Load Line, A.C. Analysis Using re Model for Transistor Common Emitter Fixed Bias Configuration, Common-Emitter Emitter Bias Configuration, Common – Emitter Collector Feedback Configuration, Common – Emitter Voltage Divider Configuration. The Common – Collector Amplifier, the Common – Base Amplifier. Multistage Transistor Amplifiers. [**15 hrs**.] Revision problem and tutorial classes [**5 hrs**.] Quizzes [**1 hr**.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/ Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	10% (5)	4,8,14	LO #1, 4, 6 and 7
	Assignments	10	5% (5)	2 to 13	LO #1, 2, 3, 4, 5 and 7
	Projects	0	0 (0)	----	-----
	Report	2	10% (10)	Continuous	All
Summative assessment	**Midterm Exam**	2 hr	15% (15)	7	LO # 4-7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Transistor Construction. Transistor Symbols. Transistor Operation.
Week 2	Transistor Connections: Common Base CB Connection, Common Emitter CE Connection.
Week 3	Transistor Curves, Cutoff and Saturation. Transistor as a switch. Common Collector Connection.
Week 4	Transistor Load Line Analysis, Operating Point, Transistor Parameters and Rating Amplification.
Week 5	Stabilization, Stability Factor Methods of Transistor Biasing.
Week 6	Practical Circuit of Transistor Amplifier.
Week 7	D.C. and A.C. Equivalent Circuits. Transistor ac Equivalent Circuits.
Week 8	Transistor ac Equivalent Circuits h-parameters, Hybrid Equivalent Circuit.
Week 9	Transistor ac Equivalent Circuits, r-parameters, r-parameters Equivalent Circuit.
Week 10	The Linear Amplifier.
Week 11	The a.c. Load Line, A.C. Analysis Using re Model for Transistor Common Emitter Fixed Bias Configuration.
Week 12	The a.c. Load Line, A.C. Analysis Using re Model for Transistor Common – Emitter Emitter – Bias Configuration, Common – Emitter Collector Feedback Configuration.
Week 13	The a.c. Load Line, A.C. Analysis Using re Model for Transistor Common – Emitter Voltage Divider Configuration.
Week 14	The Common – Collector Amplifier, the Common – Base Amplifier.
Week 15	Multistage Transistor Amplifiers.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Floyd, Thomas L. Electronics Fundamentals: Circuits, Devices and Applications (Floyd Electronics Fundamentals Series). Prentice-Hall, Inc., 2006.	Yes
Recommended Texts	Donald A. Neamen. (2003). "SEMICONDUCTOR PHYSICS AND DEVICES". 3rd Edition, ISBN 0-07-232107-05, USA. (can be downloaded from the Course web page/classroom).	Yes
Websites	Nashelsky, L., & Boylestad, R. L. (2021). Electronic Devices and Circuit Theory Eleventh Edition.	

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	**Communication Principles**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC204**				
ECTS Credits	**5**				
SWL (hr./sem)	**125**				
Module Level	2		**Semester of Delivery**	3	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor	Dr. Omar Mustafa Ali		**e-mail**	omarmostafa@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
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 Aims أهداف المادة الدراسية	1. To develop problem solving skills and understanding of the propagation methods of electrical signals across transmission lines. 2. To understand the reflection in transmission line. 3. This course deals with the mathematical calculations for the propagation of signals through transmission lines. 4. This is the basic subject for all A.C. Steady state transmission line. 5. To understand crank method for the analysis of transmission lines. 6. To perform graphical solution of lossless transmission line using Smith chart. 7. To perform transmission line matching using Quarter Wave Transformer (λ/4).
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Know the propagation methods of electrical signals across transmission lines. 2. Conduct mathematical calculations for the propagation of signals through transmission lines. 3. Handling crank method in the analysis of transmission lines. 4. Use the Smith chart and its applications. 5. Identify types of electrical signals. 6. Analysis of electrical signals using Fourier series and Fourier transform.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A - Transmission Lines basics** Reflection in transmission line, Space-Time diagram (zig-zag), Discharge of transmission line. Transmission line equation, Propagation constant, Transmission line distortion, A.C. Steady state transmission line, Standing wave in transmission line. [16 hrs.] Revision problem and tutorial classes [4hrs.] Quizzes [1 hr.] **Part B- Transmission Lines analysis** Graphical solution of lossless transmission line using Crack diagram. Graphical solution of lossless transmission line using Smith chart. Graphical solution of lossy transmission line using Smith chart. Transmission line matching using Quarter Wave Transformer (λ/4). Transmission line matching using single stub. [16hrs.] Revision problem and tutorial classes [4 hrs.] Quizzes [1 hr.] **Part C- Signals and Systems** Signal classifications. Fourier series. Fourier Transform. Signals and linear systems. Power spectral density and Correlation. [16 hrs.] Revision problem and tutorial classes [4 hrs.] Quizzes [1 hr.]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy for delivering this module will be to encourage students to participate in the exercises while also refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving some sampling activities that students find interesting.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	5% (5)	4,8,12	All
	Assignments	10	5% (5)	2 to 12	All
	Projects	2	15% (15)	Continuous	All
	Report	0	0% (0)	----	----
Summative assessment	**Midterm Exam**	2 hr	25% (25)	10	All
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction, Transmission Line Analysis.
Week 2	Reflection in transmission line, Space-Time diagram (zig-zag).
Week 3	Discharge of transmission line.
Week 4	Transmission line equations
Week 5	Graphical solution of lossless transmission line using Crank diagram.
Week 6	Graphical solution of lossless transmission line using Smith chart.
Week 7	Graphical solution of lossy transmission line using Smith chart.
Week 8	Transmission line matching using Quarter Wave Transformer (λ/4).
Week 9	Transmission line matching using single stub.
Week 10	Mid-term Exam
Week 11	Signal classifications.
Week 12	Fourier Series.
Week 13	Fourier Transform.
Week 14	Signals and linear systems 1.
Week 15	Signals and linear systems 2.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	The fundamentals of signal transmission line by Lem Ibbotson, 1999. Modern digital and analog communication systems by Lathi, 1998. Communications Principles by Dr. Sami Mohamed, 1989. Transmission line and network by Johnson.	no
Recommended Texts	Transient signal on transmission lines by Peterson, 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	**Electromagnetic Fields**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC205**				
ECTS Credits	**4**				
SWL (hr./sem)	**100**				
Module Level	2		**Semester of Delivery**	3	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	Dr. Mohammed Tariq Yaseen		**e-mail**	mtyaseen@uomosul.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	Doctor	
Module Tutor	Mr. Shamil Hamzah Hussein		**e-mail**	Shamil_alnajjar84@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To develop problem solving skills of coordinate systems through the understanding the rectangular coordinate system, cylindrical coordinate system, spherical coordinate system. 2. To understand the vector analysis (scalars and vectors).

	3. This course deals with the basic concept of the Electric Field Intensity, Electric Flux Density, magnetic Field Intensity, and magnetic Flux Density. 4. To understand the Energy and Potential. 5. To understand the electric fields in material space. conductors, dielectrics, and capacitance. 6. To perform the electric fields due to continuous charge distributions. 7. To understand the magnetic field due to different current distributions. 8. To understand different laws such as Coulomb's Law, Gauss's Law, Biot-Savart's Law, Ampere's Law, and Faraday's Law.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize the electric field, electric field intensity, and charge distributions. 2. Recognize the magnetic Field Intensity, and magnetic Flux Density 3. List the various terms associated with continuous charge and different current distributions. 4. Summarize what is meant by a coordinate system, scalars and vectors analysis, conductors, dielectrics, capacitance, and inductance. 5. Describe the electric flux density and gauss's law. magnetic Flux Density and Ampere's Law. 6. Discuss the various charge and current distributions such as line, sheet, and volume. 7. Explain the work, potential & potential difference. 8. Explain the electric fields in material space. conductors, dielectrics, and capacitance.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **<u>Part A - Coordinate systems and Vector analysis</u>** coordinate systems: rectangular coordinate system, cylindrical coordinate system, spherical coordinate system. vector analysis: scalars and vectors, vector algebra, vector components and unit vectors, vector addition and subtraction, vector multiplication. coulomb's law and electric force: the experimental law of coulomb. Magneto-statics: the static magnetic fields, biot-savart law. Magneto-statics: magnetic field due to different current distributions, right-hand rule. Magneto-statics: solenoid, applications of solenoid, toroid. [**8 hrs**.] Revision problem and tutorial classes [**4 hrs**.] Quizzes [**1 hr**.] **<u>Part B- Electric field intensity and Charge distributions</u>** electric field intensity: electric field of a point charge, electric field of n point charges. electric fields due to continuous charge distributions: electric field of a line charge. electric fields due to continuous charge distributions: electric field of a sheet of charge. electric fields due to continuous charge distributions: electric field of a volume of charge. Magneto-statics: ampere's circuital law, applications of ampere's law: infinite line current, infinite sheet of current, infinitely long coaxial transmission line. Magneto-statics: magnetic flux and magnetic flux density. inductance: inductance of a conductor, inductance of toroid. [**8 hrs**.] Revision problem and tutorial classes [**4 hrs**.] Quizzes [**1 hr**.] **<u>Part C- Electric flux density and Gauss's law application</u>**

	Electric flux density and gauss's law: gauss's law application on a point charge, gauss's law application on a line charge. electric flux density and gauss's law: gauss's law application on a surface charge. electric flux density and gauss's law: gauss's law application on a volume charge. work, potential & potential difference: work done in moving a point charge. work, potential & potential difference: potential & potential difference. Force on a moving charge. magnetic forces, work & power: work. magnetic forces, work & power: power. time varying fields: faraday's law. time varying fields: induced electromotive force. [**6 hrs**.] Revision problem and tutorial classes [**3 hrs**.] **Part D- conductors, dielectrics, and capacitance** conductors, dielectrics, and capacitance: electric fields in material space. conductors, dielectrics, and capacitance: dielectric – dielectric boundary conditions, conductor – dielectric boundary conditions, conductor – free space boundary conditions. conductors, dielectrics, and capacitance: capacitance and capacitors. Maxwell's equations: the vector operator (del) and the divergence theorem. Maxwell's equations: derivation of Maxwell's equations and applications. Maxwell's equations: the uniform plane wave. Maxwell's equations: wave propagation in free space. [**8 hrs**.] Revision problem and tutorial classes [**4 hrs**.] Quizzes [**1 hr**.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
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	1	10% (10)	4,8,14	LO #1, 4, 6 and 7
	Assignments	10	5% (5)	2 to 13	LO #1, 2, 3, 4, 5 and 7
	Projects	0	0% (0)	----	-----
	Report	0	0% (0)	----	----
Summative assessment	Midterm Exam	2 hr	25% (25)	7	LO # 4-7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	coordinate systems: rectangular coordinate system, cylindrical coordinate system, spherical coordinate system. vector analysis: scalars and vectors.
Week 2	Vector analysis: vector algebra, vector components and unit vectors, vector addition and subtraction. vector multiplication. coulomb's law and electric force: the experimental law of coulomb.
Week 3	Electric field intensity: electric field of a point charge, electric field of n point charges. Electric fields due to continuous charge distributions: electric field of a line charge. electric field of a volume of charge.
Week 4	Electric flux density and gauss's law: gauss's law application on a point charge, gauss's law application on a line charge.
Week 5	Electric flux density and gauss's law: gauss's law application on a surface charge. electric flux density and gauss's law: gauss's law application on a volume charge.
Week 6	Work, potential & potential difference: work done in moving a point charge. work, potential & potential difference: potential & potential difference. Conductors, dielectrics, and capacitance: electric fields in material space. conductors, dielectrics, and capacitance.
Week 7	dielectric – dielectric boundary conditions, conductor – dielectric boundary conditions, conductor – free space boundary conditions. Conductors, dielectrics, and capacitance: capacitance and capacitors.
Week 8	Magneto-statics: the static magnetic fields, biot-savart law. magnetic field due to different current distributions. right-hand rule. solenoid, applications of solenoid, toroid. ampere's circuital law, applications of ampere's law. applications of ampere's law: infinite line current, infinite sheet of current. infinitely long coaxial transmission line.
Week 9	Magneto-statics: magnetic flux and magnetic flux density. inductance: inductance of a conductor, inductance of toroid.
Week 10	Magnetic forces, work & power: force on a moving charge. work and power.
Week 11	Magnetic forces, work & power: power. time varying fields: faraday's law. time varying fields: induced electromotive force.

Week 12	Maxwell’s equations: the vector operator (del) and the divergence theorem
Week 13	Maxwell’s equations: derivation of Maxwell's equations and applications.
Week 14	Maxwell’s equations: the uniform plane wave.
Week 15	Maxwell’s equations: wave propagation in free space.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Johnk, Carl Theodore Adolf. "Engineering electromagnetic fields and waves." New York (1975).	Yes
Recommended Texts	Rojansky, Vladimir Borisovich, and Vladimir Rojansky. Electromagnetic fields and Waves. Courier Corporation, 1979. (can be downloaded from the Course web page/classroom).	Yes
Websites	Nefyodov, Eugene I., and Sergey Smolskiy. Electromagnetic fields and waves. Springer, 2019.	

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 Engineering Lab. I**			**Module Delivery**	
Module Type	**Core**			☐ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC206**				
ECTS Credits	**3**				
SWL (hr./sem)	**75**				
Module Level	2		**Semester of Delivery**	3	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor			**e-mail**		
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
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 Aims أهداف المادة الدراسية	1. To handle laboratory equipment and electrical elements professionally and scientifically. 2. To analyze electrical circuits and comprehend their operational principles. 3. To cultivate a scientific mindset in the student by interpreting practical results based on theoretical concepts. 4. To enhance the student's capability to design basic electronic circuits in accordance with their scientific aptitude. 5. To analyze and simulate circuit processes using various software tools on electronic calculators and compare the analysis results with practical outcomes.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Dealing with laboratory equipment and electrical elements in a professional and scientific manner(i). 2. Ability to analyze electrical circuits and understand the nature of their work(ii). 3. Building a scientific mentality for the student through his ability to interpret the practical results according to theoretical concepts(iii). 4. Develop the student's ability to design simple electronic circuits in line with his scientific abilities(iv). 5. Analyze and simulate the process circuit using different software on the electronic calculator and match the results of the analysis with the practical results(v).
Indicative Contents المحتويات الإرشادية	Indicative content includes the following.

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	42	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**				
	Assignments				
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**				
	Final Exam				
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction & representation about first group of experiments
Week 2	Thevenin theory in AC circuits
Week 3	Measurement of power factor in electrical networks
Week 4	Study of I-V characteristics of normal diode & zener diode
Week 5	First quiz
Week 6	Introduction & representation about second group of experiment
Week 7	Diode application I: Rectifier filters
Week 8	Diode application II: Clipping & clamping circuits
Week 9	Transient condition for R-L & R-C circuits
Week 10	Second quiz + first term theoretical exam. for 1st &2nd group
Week 11	First term practical exam
Week 12	Introduction & representation about third group of experiment
Week 13	Transient condition for RLC circuits
Week 14	Transformer tests: open, short & load test
Week 15	Study of common emitter transistor characteristics

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• Electrical technology (twenty-third edition) BL.THERAJA, AK. THERAJA S. Chand and company Ltd. (2005), ISBN: 81-219-2440-5. • Electronics devices (Ninth edition) by Thomas L. Floyd (2012), Prentice Hall ISBN-13: 978-0-13-254986-8.	No
Recommended Texts		No
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound works 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	**Core / C**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**EEEC210**				
ECTS Credits	**5**				
SWL (hr./sem)	**125**				
Module Level	2		**Semester of Delivery**	4	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	Dr. Mohammed Tariq Yaseen		**e-mail**	mtyaseen@uomosul.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	Doctor	
Module Tutor	Mr. Shamil Hamzah Hussein		**e-mail**	Shamil_alnajjar84@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To develop problem solving skills of the Field Effect Transistors through the basic operation, Symbols, and current-voltage Characteristics. 2. To understand Basic Junction Field Effect Transistor (JFET) through graphical analysis, Connections, and biasing circuits. 3. This course deals with the basic concept of the Field Effect Transistors FET, Junction Field Effect Transistor JFET, Metal Oxide Semiconductor FET (MOSFET), and Tuned Amplifiers. 4. To understand the D.C. And A.C. Equivalent Circuits of the FET, JFET, MOSFET. 5. To understand the Silicon Controlled Rectifier, Diac, Thyristor, GTO and Triac. 6. To perform the Equations for Trans conductance Curve. 7. To Describe and operation of High Frequency Equivalent Circuit, Low – Frequency Equivalent Circuit.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize the classes of the Frequency Response of the Amplifiers. 2. List the various terms associated with transistor amplifiers. 3. Summarize what is meant by an active electronic device such as FET, JFET, and MOSFET. 4. Describe the types of MOSFET Biasing Circuits. 5. Discuss the various properties of Silicon Controlled Rectifier, Diac, Thyristor, GTO and Triac. 6. Explain the Small – Signal Model of FET, JFET, and MOSFET. 7. Explain the Types of MOSFET and operation modes.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **<u>Part A - Field Effect Transistors</u>** Types of Field Effect Transistors: Junction Field Effect Transistor JFET, Basic Structure, Basic Operation, JFET Symbols. Difference Between JFET and Bipolar Transistor JFET Characteristics Important Terms (IDSS, VP, VGS (off) Expression for Drain Current ID Advantages of JFET Parameters of JFET, Relation Among JFET Parameters, Variation of Trans conductance gm of JFET. JFET Biasing Circuit: JFET Biasing by Bias Battery, Self – Bias for JFET, JFET with Voltage – Divider Bias. JFET Connections: Common Source Connection, Common Gate Connection, Common Drain Connection. [**15 hrs**.] Revision problem and tutorial classes [**5 hrs**.] Quizzes [**1 hr**.] **<u>Part B- D.C. And A.C. Equivalent Circuits of JFET and Introduction of MOSFET</u>** Practical JFET Amplifier, D.C. And A.C. Equivalent Circuits of JFET. D.C. Load Line Analysis JFET Small – Signal Model JFET A.C. Equivalent Circuit Fixed – Bias Configuration Self – Bias Configuration Voltage – Divider Configuration Common – Gate Configuration Source – Follower (Common – Drain) Configuration JFET Applications. Metal Oxide Semiconductor FET (MOSFET): Types of MOSFET D – MOSFET, Circuit Operation of D – MOSFET. [**15 hrs**.] Revision problem and tutorial classes [**5 hrs**.] Quizzes [**1 hr**.]

	Part C- Depletion and Enhancement Mode MOSFET, and Frequency Equivalent Circuit Depletion Mode, Enhancement Mode D – MOSFET. Transfer Characteristic D – MOSFET. Biasing D – MOSFET Small – Signal Model E – MOSFET, Operation, Schematic Symbols, Equation for Trans conductance Curve. E – MOSFET Biasing Circuits E – MOSFET Small – Signal Model, E – MOSFET Drain – Feedback Configuration, E – MOSFET Voltage – Divider Configuration E – MOSFET Versus D – MOSFET Tuned Amplifiers, Single – Tuned Amplifiers, Double – Tuned Amplifiers Introduction to Four – Layer Devices Description and Operation of Silicon Controlled Rectifier, Diac, Thyristor, GTO and Triac. High Frequency Equivalent Circuit, Low – Frequency Equivalent Circuit. [**15 hrs**.] Revision problem and tutorial classes [**5 hrs**.] Quizzes [**1 hr**.]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

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

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

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	1	5% (5)	4,8,14	LO #1, 4, 6 and 7
	Assignments	10	5% (5)	2 to 13	LO #1, 2, 3, 4, 5 and 7
	Projects	0	0 (0)	----	-----
	Report	2	15% (15)	Continuous	All
Summative assessment	**Midterm Exam**	2 hr	15% (15)	7	LO # 4-7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Types of Field Effect Transistors: Junction Field Effect Transistor JFET, Basic Structure, Basic Operation, JFET Symbols
Week 2	Junction Field Effect Transistors: Difference Between JFET and Bipolar Transistor. JFET Characteristics Important Terms (IDSS, VP, VGS (off).
Week 3	Junction Field Effect Transistors: Expression for Drain Current ID Advantages of JFET Parameters of JFET, Relation Among JFET Parameters, Variation of Trans conductance gm of JFET.
Week 4	Junction Field Effect Transistors: JFET Biasing Circuit: JFET Biasing by Bias Battery, Self – Bias for JFET, JFET With Voltage – Divider Bias.
Week 5	Junction Field Effect Transistors: JFET Connections: Common Source Connection, Common Gate Connection, Common Drain Connection.
Week 6	Junction Field Effect Transistors: Practical JFET Amplifier, D.C. And A.C. Equivalent Circuits of JFET. D.C. Load Line Analysis.
Week 7	Junction Field Effect Transistors: JFET Small – Signal Model, JFET A.C. Equivalent Circuit Fixed – Bias Configuration Self – Bias Configuration Voltage – Divider Configuration
Week 8	Junction Field Effect Transistors: Common – Gate Configuration Source – Follower (Common – Drain) Configuration.
Week 9	Junction Field Effect Transistors: JFET Applications.
Week 10	Metal Oxide Semiconductor FET (MOSFET): Types of MOSFET D – MOSFET, Circuit Operation of D – MOSFET.
Week 11	Metal Oxide Semiconductor FET (MOSFET): Depletion Mode, Enhancement Mode D – MOSFET. Transfer Characteristic D – MOSFET. Biasing D – MOSFET Small – Signal Model E – MOSFET.
Week 12	Metal Oxide Semiconductor FET (MOSFET): Operation, Schematic Symbols, Equation for Trans conductance Curve. E – MOSFET Biasing Circuits E – MOSFET Small – Signal Model, E – MOSFET Drain – Feedback Configuration.
Week 13	Metal Oxide Semiconductor FET (MOSFET): E – MOSFET Voltage – Divider Configuration, E – MOSFET Versus D – MOSFET Tuned Amplifiers, Single – Tuned Amplifiers.
Week 14	Metal Oxide Semiconductor FET (MOSFET): Double – Tuned Amplifiers Introduction to Four – Layer Devices.
Week 15	Description and Operation of Silicon Controlled Rectifier, Diac, Thyristor, GTO and Triac. High Frequency Equivalent Circuit, Low – Frequency Equivalent Circuit.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Floyd, Thomas L. Electronics Fundamentals: Circuits, Devices and Applications (Floyd Electronics Fundamentals Series). Prentice-Hall, Inc., 2006.	Yes
Recommended Texts	Donald A. Neamen. (2003). "SEMICONDUCTOR PHYSICS AND DEVICES". 3rd Edition, ISBN 0-07-232107-05, USA. (can be downloaded from the Course web page/classroom).	Yes
Websites	Nashelsky, L., & Boylestad, R. L. (2021). Electronic Devices and Circuit Theory Eleventh Edition.	

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 II**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC214**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	2		**Semester of Delivery**	4	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	Dr. Mohammed Tariq Yaseen		**e-mail**	mtyaseen@uomosul.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	Doctor	
Module Tutor	Mr. Shamil Hamzah Hussein		**e-mail**	Shamil_alnajjar84@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims and Learning Outcomes	Students will be able to: 1. Distinguish between dependent, Independent, and Integrated essays. 2. Find the topic and the thesis statement of short essays. 3. Identify the main ideas from the introduction paragraph. 4. Identify the main ideas from the body paragraph. 5. Find the supporting details from the introduction paragraph. 6. Find the supporting details from the body paragraph. 7. Draw an outline to link the ideas, supporting details, and essay topic. 8. Make notes in response to an essay question to create main ideas, supporting details, and thesis statement. 9. Write the introduction paragraph on basis of the thesis statement and main ideas. 10. Build the body paragraphs based on main ideas and supporting details. 11. Write the introduction paragraph based on the main ideas. 12. Enhance the smoothness and fluency of an essay by employing transition words and sentence starters.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Classification of Essays:** [2 hrs] - Independent essays based on personal thoughts. - Dependent essays based on data, figures, diagrams. - Integrated essays **Structure of academic essays:** [6 hrs] - Analyzing academic essays according to the standard structure of academic essays. **Idea Maps:** [3 hrs] - Filling the idea maps from the major information extracted while reading an essay. **Responding to an essay question:** [4 hrs] - Building an outline using personal ideas in response to an essay question. **Writing Paragraphs:** [6 hrs] - Writing thesis statement. - The Introduction Paragraph. - The Body Paragraphs. **Essay Conclusion:** [3 hrs] - Writing the conclusion paragraph considering the main ideas stated in the introduction and body paragraphs **Transition words and connection phrases:** [3 hrs] **Dependent essays:** [3hrs] - Introduction to essays based on figures, tables, diagrams, and processes

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The approach to be followed here is to motivate students to analyze previously written model essays to understand the standard structure of academic essays then implement the same procedures to build their own essays.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.13
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, 3, 8 and 10
	Assignments	2	10% (10)	3, 12	LO # 5, 6,11 and 12
	Projects / Lab.				
	Report	1	20% (20)	14	LO # 1-10
Summative assessment	**Midterm Exam**				
	Final Exam	3hr	60% (60)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Overview of Academic Essays Independent, Dependent, and Integrated essays Structure of academic essays
Week 2	Structure of academic essays
Week 3	Topic sentence and thesis statement Identifying topic sentence and thesis statement of academic essays.
Week 4	Main Ideas: Identifying the main Ideas of academic essays.
Week 5	Supporting Details: Identifying the supporting details
Week 6	Essay outlines: Building Essay outlines using idea maps

Week 7	Essay Questions: Responding to essay questions by making personal notes
Week 8	Topic Sentence ：Writing a thesis statement or topic sentence using personal thoughts.
Week 9	Personal Thoughts: Using personal thoughts to express main ideas and supporting details in response to an essay question.
Week 10	Idea Map Creation: Building an idea map of an essay question.
Week 11	Transition words and sentence starters Increasing the fluency, coherence, and smooth transition of thoughts using sentence starters and transition words.
Week 12	Writing the Introduction: Combining the thesis statement and main ideas together to build the introduction paragraph.
Week 13	Writing the Conclusion
Week 14	Introduction to dependent writing tasks
Week 15	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: There are no laboratory experiments.
Week 2	Lab 2: There are no laboratory experiments.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	➢ No Textbook is required for this course. Supplemental materials will be provided by provided by the instructor.	
Recommended Texts	➢ *Sharpe, P. J. (2009). Barron's TOEFL iBT. Barron's Educational Series.* ➢ *Lougheed, L. (2016). Barron's Ielts with Mp3 Cd. Barron's.*	No
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance.
	B - Very Good	جيد جدا	80 - 89	Above average with some errors.
	C - Good	جيد	70 - 79	Sound work with notable errors.
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings.
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is 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 Circuits Analysis I**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEPM201**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level	2		**Semester of Delivery**	3	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor	Asst. Prof Dr. Omar Sharaf Al-Deen		**e-mail**	o.yehya@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Basics of Electrical Engineering I and Basics of Electrical Engineering II	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Ability to understand the AC Circuit Power Analysis and Poly-phase Circuits 2. Ability to determine the Transient Response of RL /RC Circuit and the Transient Response of RLC Circuit 3. Ability to analysis Magnetically Coupled Circuits and Ideal Transformers 4. Ability to solve the mathematical equations for Complex Frequency, Laplace Transform, Frequency Response and Fourier Circuit Analysis 5. Ability to synthesize the Circuit Analysis in the s-Domain and Two-Port Networks
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Use basic electrical DC concepts and theorems to analyze circuits 2. Build and simulate electrical DC circuits and perform measurements with electronic test equipment 3. Understand the fundamental concepts of electrical circuits, including voltage, current, resistance, and power. 4. Analyze and solve basic DC (direct current) circuits using Ohm's Law, Kirchhoff's Laws, and nodal/mesh analysis techniques. 5. Apply techniques to analyze and solve AC (alternating current) circuits, including complex impedance, phasor representation, and frequency response. 6. Demonstrate proficiency in analyzing circuits with passive elements such as resistors, capacitors, and inductors. 7. Use circuit simulation software and laboratory equipment to verify theoretical analysis and gain practical experience in circuit analysis. 8. Analyze and solve circuits with operational amplifiers (op-amps), including understanding their basic configurations and applications. 9. Understand the concepts of power in electrical circuits, including active power, reactive power, and power factor correction. 10. Develop critical thinking and problem-solving skills by applying circuit analysis techniques to real-world electrical engineering problems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A - Transient Circuits** The Transient Circuits: RC, RL, RLC circuit in series and parallel and their complete response in time and Frequency. [15 hrs.] Revision problem and tutorial classes [8 hrs.] Quizzes [1 hr.]

	Part B- Poly-phase Circuits Poly-phase Circuits: Single-phase and three phase wire system, 3-Phase balance and unbalance system [12 hrs.], star and delta connections [9 hrs.], Power in 3-phase circuits. [12 hrs.] Revision problem and tutorial classes [8 hrs.] Quizzes [1 hr.] **Part C- Magnetic coupling circuit** Magnetic coupling circuit: Coefficient of coupling, Linear and ideal transformers. [15 hrs.] Revision problem and tutorial classes [8 hrs.] Quizzes [1 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.2
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	150		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1	10% (10)	4,8,12	LO #1, 5, 8 and 9
	Assignments	10	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects / Lab.	0	0% (0)	Continuous	All
	Report	0	0% (0)	----	----
Summative assessment	Midterm Exam	2 hr	25% (25)	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; syllabus; Advantages and Disadvantages of Electrical Networks as a different circuits .
Week 2	Transient Response of RL Circuit
Week 3	Transient Response of RC Circuit
Week 4	Unit step functions
Week 5	Complete response of RL and RC Circuits
Week 6	Transient Response of RLC Circuit / Parallel connection
Week 7	Transient Response of RLC Circuit / Series connection
Week 8	Complete response of RLC Circuit / Parallel and Series connections
Week 9	Mid-term Exam
Week 10	Poly-phase Circuits
Week 11	Three phase circuit analysis / Balance load
Week 12	Three phase circuit analysis / Un-Balance load
Week 13	Three phase wattmeter's
Week 14	Magnetically Coupled Circuits
Week 15	Linear and Ideal Transformers
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Engineering Circuit Analysis Eight Edition (William H. Hayt) 2012 Fundamentals of Electric Circuits (Charles K. Alexander)2009	Yes
Recommended Texts	Electric Circuits Tenth Edition (James W. Nilsson) 2015	Yes
Websites	https://www.pdfdrive.com/schaums-outline-of-electric-circuits-e185851170.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	**Engineering Mathematics I**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEPM202**				
ECTS Credits	**5**				
SWL (hr./sem)	**125**				
Module Level	2		**Semester of Delivery**	3	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor	Dr. Omar Muwafaq Mahmood		**e-mail**	omer_alyousif@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
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 Aims أهداف المادة الدراسية	1. To understand differential equations and Partial Differentiation. 2. To understand Vectors components. 3. To understand Fourier series: 4. To perform Applications in Electrical Eng. 5. To perform Multiple Integrals and Double integral.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize differential equations and Partial Differentiation. 2. Summarize the Vectors components. 3. Identify the Multiple Integrals and Double integral and their applications. 4. Identify the Fourier series and their applications. 5. Identify the application in Electrical Circuits.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Differential Equations: Introduction to Differential Equations, 1st and 2nd order linear differential equations with constant coefficients, solution via the auxiliary equation, nonhomogeneous equations, application to electrical systems. Coupled 1st order linear differential equations; transformation of higher order linear differential equations on to coupled differential equations. Homogenous differential of higher order. Vectors: Vectors component and Units, Space coordinate and Space Vector, Scalar Product and Vector Product, Units and plane equation, equations of lines and planes, Product of Three Vectors, Applications. Vector Functions and Their Derivatives Gradient of Scalar Reid; Divergence of Vector Field; Curl of Vector Field; Directional Derivatives; Gradient, Divergence and Curl in Curvilinear Coordinates. Fourier series: The need for Fourier series, Periodic functions, Fourier Series-Euler formulas. Even and odd functions, Half-Range expansions, Application in Electrical Eng.

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	10% (10)	3,6,11,14	LO #1, 5, 8 and 9
	Assignments	8	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
Summative assessment	**Midterm Exam**	2 hr	25% (25)	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 to Differential Equations, 1st and 2nd order linear differential equations with constant coefficients, homogeneous equations
Week 2	solution via the auxiliary equation, nonhomogeneous equations,
Week 3	application to electrical systems. Coupled 1st order linear differential equations;
Week 4	transformation of higher order linear differential equations on to coupled differential equations. Homogenous differential of higher
Week 5	Multiple Integrals and Double integral.
Week 6	The Chain Rule and total Derivative, maxima, minima and saddle point.
Week 7	Vectors component and Units, Space coordinate and Space Vector, Scalar Product and Vector Product,
Week 8	Mid-term Exam
Week 9	Units and plane equation, equations of lines and planes,
Week 10	Product of Three Vectors, Applications, dot and cross product
Week 11	Vector Functions and Their Derivatives Gradient of Scalar Reid;
Week 12	Divergence of Vector Field; Curl of Vector Field; Directional Derivatives;
Week 13	Gradient, Divergence and Curl in Curvilinear Coordinates
Week 14	Fourier series: The need for Fourier series, Periodic functions, Fourier Series-Euler formulas
Week 15	Even and odd functions, Half-Range expansions, Application in Electrical Eng. Multiple Integrals: Double integral, Areas and volume, Double integral polar coordinates.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to lab. components
Week 2	Lab 2: Introduction to AVO meter (analog and digital)
Week 3	Lab 3: Introduction to resistance measurements (practical and color code)
Week 4	Lab 4: resistance temperature affect, internal resistance of a source, open circuit & short circuit
Week 5	Lab 5: ohm’s Law
Week 6	Lab 6: series and parallel resistance
Week 7	Lab 7: resistance delta and star transformation
Week 8	Lab 8: Kirchhoff's Voltage Law

Week 9	Lab 9: Kirchhoff's Current Law
Week 10	Lab 10: implementation of Maxwell's circulating currents (mesh analysis)
Week 11	Lab 11: implementation of Nodal analysis
Week 12	Lab 12: implementation of Superposition theorem
Week 13	Lab 13: implementation of Thevenin's / Norton's Theorem
Week 14	Lab 14: implementation of maximum power transfer theorem
Week 15	Lab 15: DC power measurements (methods and instrumentations)

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Engineering Circuit Analysis 7th Edition by William Hayt , Jack Kemmerly , Steven Durbin	Yes
Recommended Texts	Schaum's Outline of Basic Circuit Analysis, Second Edition (Schaum's Outlines) 2nd Edition, by John O'Malley	No
Websites	DC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2017.	

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	**Electromagnetic Fields**			**Module Delivery**	
Module Type	**Core / C**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEPM203**				
ECTS Credits	**5**				
SWL (hr./sem)	**125**				
Module Level	2		**Semester of Delivery**	3	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	Dr. Mohammed Tariq Yaseen		**e-mail**	mtyaseen@uomosul.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	Doctor	
Module Tutor			**e-mail**		
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To develop problem solving skills of coordinate systems through the understanding the rectangular coordinate system, cylindrical coordinate system, spherical coordinate system. 2. To understand the vector analysis (scalars and vectors). 3. This course deals with the basic concept of the Electric Field Intensity, Electric Flux Density, magnetic Field Intensity, and magnetic Flux Density.

	4. To understand the Energy and Potential. 5. To understand the electric fields in material space. conductors, dielectrics, and capacitance. 6. To perform the electric fields due to continuous charge distributions. 7. To understand the magnetic field due to different current distributions. 8. To understand different laws such as Coulomb's Law, Gauss's Law, Biot-Savart's Law, Ampere's Law, and Faraday's Law.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize the electric field, electric field intensity, and charge distributions. 2. Recognize the magnetic Field Intensity, and magnetic Flux Density 3. List the various terms associated with continuous charge and different current distributions. 4. Summarize what is meant by a coordinate system, scalars and vectors analysis, conductors, dielectrics, capacitance, and inductance. 5. Describe the electric flux density and gauss's law. magnetic Flux Density and Ampere's Law. 6. Discuss the various charge and current distributions such as line, sheet, and volume. 7. Explain the work, potential & potential difference. 8. Explain the electric fields in material space. conductors, dielectrics, and capacitance.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A - Coordinate systems and Vector analysis** coordinate systems: rectangular coordinate system, cylindrical coordinate system, spherical coordinate system. vector analysis: scalars and vectors, vector algebra, vector components and unit vectors, vector addition and subtraction, vector multiplication. coulomb's law and electric force: the experimental law of coulomb. Magneto-statics: the static magnetic fields, biot-savart law. Magneto-statics: magnetic field due to different current distributions, right-hand rule. Magneto-statics: solenoid, applications of solenoid, toroid. [**12 hrs**.] Revision problem and tutorial classes [**4 hrs**.] Quizzes [**1 hr**.] **Part B- Electric field intensity and Charge distributions** electric field intensity: electric field of a point charge, electric field of n point charges. electric fields due to continuous charge distributions: electric field of a line charge. electric fields due to continuous charge distributions: electric field of a sheet of charge. electric fields due to continuous charge distributions: electric field of a volume of charge. Magneto-statics: ampere's circuital law, applications of ampere's law: infinite line current, infinite sheet of current, infinitely long coaxial transmission line. Magneto-statics: magnetic flux and magnetic flux density. inductance: inductance of a conductor, inductance of toroid. [**12 hrs**.] Revision problem and tutorial classes [**4 hrs**.] Quizzes [**1 hr**.] **Part C- Electric flux density and Gauss's law application** Electric flux density and gauss's law: gauss's law application on a point charge, gauss's law application on a line charge. electric flux density and gauss's law: gauss's law application on a

	surface charge. electric flux density and gauss's law: gauss's law application on a volume charge. work, potential & potential difference: work done in moving a point charge. work, potential & potential difference: potential & potential difference. Force on a moving charge. magnetic forces, work & power: work. magnetic forces, work & power: power. time varying fields: faraday's law. time varying fields: induced electromotive force. [**9 hrs**.] Revision problem and tutorial classes [**3 hrs**.] **Part D- conductors, dielectrics, and capacitance** conductors, dielectrics, and capacitance: electric fields in material space. conductors, dielectrics, and capacitance: dielectric – dielectric boundary conditions, conductor – dielectric boundary conditions, conductor – free space boundary conditions. conductors, dielectrics, and capacitance: capacitance and capacitors. Maxwell's equations: the vector operator (del) and the divergence theorem. Maxwell's equations: derivation of Maxwell's equations and applications. Maxwell's equations: the uniform plane wave. Maxwell's equations: wave propagation in free space. [**12 hrs**.] Revision problem and tutorial classes [**4 hrs**.] Quizzes [**1 hr**.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1	10% (10)	4,8,14	LO #1, 4, 6 and 7
	Assignments	10	5% (5)	2 to 13	LO #1, 2, 3, 4, 5 and 7
	Projects	0	0% (0)	----	-----
	Report	0	0% (0)	----	----
Summative assessment	Midterm Exam	2 hr	25% (25)	7	LO # 4-7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	coordinate systems: rectangular coordinate system, cylindrical coordinate system, spherical coordinate system. vector analysis: scalars and vectors.
Week 2	Vector analysis: vector algebra, vector components and unit vectors, vector addition and subtraction. vector multiplication. coulomb's law and electric force: the experimental law of coulomb.
Week 3	Electric field intensity: electric field of a point charge, electric field of n point charges. Electric fields due to continuous charge distributions: electric field of a line charge. electric field of a volume of charge.
Week 4	Electric flux density and gauss's law: gauss's law application on a point charge, gauss's law application on a line charge.
Week 5	Electric flux density and gauss's law: gauss's law application on a surface charge. electric flux density and gauss's law: gauss's law application on a volume charge.
Week 6	Work, potential & potential difference: work done in moving a point charge. work, potential & potential difference: potential & potential difference. Conductors, dielectrics, and capacitance: electric fields in material space. conductors, dielectrics, and capacitance.
Week 7	dielectric – dielectric boundary conditions, conductor – dielectric boundary conditions, conductor – free space boundary conditions. Conductors, dielectrics, and capacitance: capacitance and capacitors.
Week 8	Magneto-statics: the static magnetic fields, biot-savart law. magnetic field due to different current distributions. right-hand rule. solenoid, applications of solenoid, toroid. ampere's circuital law, applications of ampere's law. applications of ampere's law: infinite line current, infinite sheet of current. infinitely long coaxial transmission line.
Week 9	Magneto-statics: magnetic flux and magnetic flux density. inductance: inductance of a conductor, inductance of toroid.
Week 10	Magnetic forces, work & power: force on a moving charge. work and power.
Week 11	Magnetic forces, work & power: power. time varying fields: faraday's law. time varying fields: induced electromotive force.
Week 12	Maxwell's equations: the vector operator (del) and the divergence theorem

Week 13	Maxwell’s equations: derivation of Maxwell's equations and applications.
Week 14	Maxwell’s equations: the uniform plane wave.
Week 15	Maxwell’s equations: wave propagation in free space.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Johnk, Carl Theodore Adolf. "Engineering electromagnetic fields and waves." New York (1975).	Yes
Recommended Texts	Rojansky, Vladimir Borisovich, and Vladimir Rojansky. Electromagnetic fields and Waves. Courier Corporation, 1979. (can be downloaded from the Course web page/classroom).	Yes
Websites	Nefyodov, Eugene I., and Sergey Smolskiy. Electromagnetic fields and waves. Springer, 2019.	

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 Transformers**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEPM204**				
ECTS Credits	**5**				
SWL (hr./sem)	**120**				
Module Level	2		**Semester of Delivery**	3	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor	Dr.		**e-mail**	@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date	09/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To understand the principle of transformers, E.M.F and transformer construction. 2. To understand and study transformer on no load and on load. 3. To understand the transformer equivalent circuit and Separation of core losses. 4. To study the Regulation of transformer, Losses and efficiency. 5. To study the Parallel operation of transformer, Three-phase transformer, connections and cooling of transformers.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Identify the principle of transformers. 2. Identify the transformer on no load and on load. 3. Identify the Regulation of transformer, Losses and efficiency. 4. Summarize the Parallel operation of transformer, Three-phase transformer.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Transformers working, principle of transformers. Transformer construction, E.M.F equation. Transformer on no load and on load. Transformer equivalent circuit. Open and short circuit test. Separation of core losses. Regulation of transformer. Losses and efficiency. All-Day efficiency. Auto transformer. Parallel operation. Three-phase transformer, connections. Open-Delta Scoot connection, cooling of transformers.

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	10% (10)	3,6,11,14	LO #1, 5, 8 and 9
	Assignments	8	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
Summative assessment	**Midterm Exam**	2 hr	25% (25)	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	Transformers working, principle of transformers.
Week 2	Transformer construction, E.M.F equation.
Week 3	Transformer on no load and on load (R load, RL load, RC load).
Week 4	equivalent circuit and phasor diagram of Transformers.
Week 5	Open and short circuit test.
Week 6	Separation of core losses

Week 7	Regulation of transformer.
Week 8	Mid-term Exam
Week 9	Losses and efficiency.
Week 10	All-Day efficiency.
Week 11	Auto transformer.
Week 12	Parallel operation.
Week 13	Three-phase transformer, connections.
Week 14	Open-Delta Scoot connection
Week 15	cooling of transformers.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to lab. components
Week 2	Lab 2: Introduction to AVO meter (analog and digital)
Week 3	Lab 3: Introduction to resistance measurements (practical and color code)
Week 4	Lab 4: resistance temperature affect, internal resistance of a source, open circuit & short circuit
Week 5	Lab 5: ohm's Law
Week 6	Lab 6: series and parallel resistance
Week 7	Lab 7: resistance delta and star transformation
Week 8	Lab 8: Kirchhoff's Voltage Law
Week 9	Lab 9: Kirchhoff's Current Law
Week 10	Lab 10: implementation of Maxwell's circulating currents (mesh analysis)
Week 11	Lab 11: implementation of Nodal analysis
Week 12	Lab 12: implementation of Superposition theorem
Week 13	Lab 13: implementation of Thevenin's / Norton's Theorem
Week 14	Lab 14: implementation of maximum power transfer theorem
Week 15	Lab 15: DC power measurements (methods and instrumentations)

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Engineering Circuit Analysis 7th Edition by William Hayt , Jack Kemmerly , Steven Durbin	Yes
Recommended Texts	Schaum's Outline of Basic Circuit Analysis, Second Edition (Schaum's Outlines) 2nd Edition, by John O'Malley	No
Websites	DC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2017.	

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	**Electronics Principles**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEPM205**				
ECTS Credits	**4**				
SWL (hr./sem)	**100**				
Module Level	2		**Semester of Delivery**	3	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	Dr. Mohammed Tariq Yaseen		**e-mail**	mtyaseen@uomosul.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	Doctor	
Module Tutor	Mr. Shamil Hamzah Hussein		**e-mail**	Shamil_alnajjar84@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To develop problem solving skills of electronic circuit through the understanding solid state for each electronic passive and active elements such as RLC, diodes, transistors, and integrated circuits. 2. To understand the Basic Transistor Construction through graphical analysis of transistors Connections and biasing. 3. This course deals with the basic concept of the small-signal analysis of the transistors such as D.C. and A.C. Equivalent Circuits. 4. To understand the Load Line Analysis, Operating Point Transistor Parameters, and Rating Amplification Stabilization. 5. To understand the H-parameters, Hybrid Equivalent Circuit. Z-parameters, R-parameters Equivalent Circuit. 6. To perform current-voltage characteristics, charge control description for all types of both the diode and transistors. 7. To Describe and operation of the Multistage Transistor Amplifiers
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize the regions of operation, graphical analysis of BJT, regions of operation stability. 2. List the various terms associated with bias configuration of the transistors. 3. Summarize what is meant of the practical circuit of transistor amplifier. 4. Describe the types of multistage amplifiers. 5. Discuss the various properties of transistors used as an amplifier 6. Explain the transistor construction and operation such as amplifier and switching. 7. Explain the operation of the linear amplifier through the a.c. load line and DC load line analysis.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A - Transistor Construction, Operation, and Stabilization** Transistor Construction. Transistor Symbols. Transistor Operation. Transistor Connections: Common Base CB Connection, Common Emitter CE Connection, Transistor Curves, Cutoff and Saturation. Transistor as a switch. Common Collector Connection. Transistor Load Line Analysis, Operating Point, Transistor Parameters and Rating Amplification. [**15 hrs**.] Revision problem and tutorial classes [**5 hrs**.] Quizzes [**1 hr**.] **Part B- D.C and A.C Equivalent Circuits of the transistors** Practical Circuit of Transistor Amplifier, D.C. and A.C. Equivalent Circuits. Transistor ac Equivalent Circuits h-parameters, Hybrid Equivalent Circuit. The Linear Amplifier. [**15 hrs**.] Revision problem and tutorial classes [**5 hrs**.] Quizzes [**1 hr**.] **Part C- Transistor Bias Configuration and Multistage Transistor Amplifiers**

	The a.c. Load Line, A.C. Analysis Using re Model for Transistor Common Emitter Fixed Bias Configuration, Common-Emitter Emitter Bias Configuration, Common – Emitter Collector Feedback Configuration, Common – Emitter Voltage Divider Configuration. The Common – Collector Amplifier, the Common – Base Amplifier. Multistage Transistor Amplifiers. [**15 hrs**.] Revision problem and tutorial classes [**5 hrs**.] Quizzes [**1 hr**.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/ Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	10% (10)	4,8,14	LO #1, 4, 6 and 7
	Assignments	10	5% (5)	2 to 13	LO #1, 2, 3, 4, 5 and 7
	Projects	0	0 (0)	----	-----
	Report	2	10% (10)	Continuous	All
Summative assessment	**Midterm Exam**	2 hr	15% (15)	7	LO # 4-7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Transistor Construction. Transistor Symbols. Transistor Operation.
Week 2	Transistor Connections: Common Base CB Connection, Common Emitter CE Connection.
Week 3	Transistor Curves, Cutoff and Saturation. Transistor as a switch. Common Collector Connection.
Week 4	Transistor Load Line Analysis, Operating Point.
Week 5	Transistor Parameters and Rating Amplification.
Week 6	Practical Circuit of Transistor Amplifier.
Week 7	D.C. and A.C. Equivalent Circuits. Transistor ac Equivalent Circuits.
Week 8	Transistor ac Equivalent Circuits h-parameters, Hybrid Equivalent Circuit.
Week 9	Transistor ac Equivalent Circuits.
Week 10	The Linear Amplifier.
Week 11	The a.c. Load Line, A.C. Analysis Using re Model for Transistor Common Emitter Fixed Bias Configuration.
Week 12	The a.c. Load Line, A.C. Analysis Using re Model for Transistor Common – Emitter Emitter – Bias Configuration, Common – Emitter Collector Feedback Configuration.
Week 13	The a.c. Load Line, A.C. Analysis Using re Model for Transistor Common – Emitter Voltage Divider Configuration.
Week 14	The Common – Collector Amplifier, the Common – Base Amplifier.
Week 15	Multistage Transistor Amplifiers.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Floyd, Thomas L. Electronics Fundamentals: Circuits, Devices and Applications (Floyd Electronics Fundamentals Series). Prentice-Hall, Inc., 2006.	Yes
Recommended Texts	Donald A. Neamen. (2003). "SEMICONDUCTOR PHYSICS AND DEVICES". 3rd Edition, ISBN 0-07-232107-05, USA. (can be downloaded from the Course web page/classroom).	Yes
Websites	Nashelsky, L., & Boylestad, R. L. (2021). Electronic Devices and Circuit Theory Eleventh Edition.	

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 Engineering Lab. I**			**Module Delivery**	
Module Type	**Core**			☐ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEPM206**				
ECTS Credits	3				
SWL (hr./sem)	**75**				
Module Level		2	**Semester of Delivery**		3
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title		لقبه العلمي	**Module Leader's Qualification**		الشهادة
Module Tutor			**e-mail**		
Peer Reviewer Name		اسم مُراجع الملف	**e-mail**	بريده الالكتروني	
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 Aims أهداف المادة الدراسية	This course deals with general and different topics in the fields of electronic and power within the framework of the student's curriculum and includes practical experiences in studying the characteristics of the diode and its applications and the types of connection of the transistor and its advantages. This course also covers the study of transient conditions in electrical circuits and transformer tests and DC machines
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	This course designed to develop the students' abilities about using the different measurement equipment's that necessary to execute the practical experiments. Also this course covered the need of students to investigate the theoretical subjects according to practical method that's will improve the scientific level of students through this course By the end of this course, student should be able to: • Dealing with laboratory equipment and electrical elements in a professional and scientific manner(i). • Ability to analyze electrical circuits and understand the nature of their work(ii). • Building a scientific mentality for the student through his ability to interpret the practical results according to theoretical concepts(iii). • Develop the student's ability to design simple electronic circuits in line with his scientific abilities(iv). • Analyze and simulate the process circuit using different software on the electronic calculator and match the results of the analysis with the practical results(v).
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A - Circuit Components and values** DC circuits, Current and voltage definitions, Passive sign convention and circuit elements, Resistive networks, real and ideal elements, voltage and current sources. [9 hrs.] Lab. [6 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [1 hr.] **Part B- Circuit reduction** combining sources, Combining resistive elements in series and parallel, delta and star transformation. [12 hrs.] Revision problem and tutorial classes [8 hrs.] Lab. [8 hrs.] Quizzes [1 hr.] **Part C- Circuit Theory** Kirchhoff's laws and Ohm's law. Introduction to mesh and nodal analysis, Introduction to thevenin and Norton theory, maximum power transfer, introduction to superposition theory. [24 hrs.] Revision problem and tutorial classes [16 hrs.] Lab. [16 hrs.]

	Quizzes [1 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	42	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	5% (5)	4,8,12	LO #1, 5, 8 and 9
	Assignments	0	0% (0)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects / Lab.	2	25% (25)	Continuous	All
	Report	10	10% (5)	----	----
Summative assessment	**Midterm Exam**	2 hr	15% (15)	7	LO # 1-5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to lab. components
Week 2	Lab 2: Study of I-V characteristics of normal diode & zener diode
Week 3	Lab 3: Diode application I: Rectifier filters
Week 4	Lab 4: Diode application II: Clipping circuits
Week 5	Lab 5: Diode application III: clamping circuits
Week 6	Lab 6: Transient condition for R-L
Week 7	Lab 7: Transient condition for R-C
Week 8	Lab 8: Transient condition for R-L-C
Week 9	Lab 9: Mid-term exam
Week 10	Lab 10: Thevenin theory in AC circuits
Week 11	Lab 11: Thevenin theory in DC circuits
Week 12	Lab 12: Measurement of power factor in electrical networks
Week 13	Lab 13: Transient condition for RLC circuits
Week 14	Lab 14: Transformer tests : open, short & load test
Week 15	Lab 15: preparatory week before the Final exam and review
Week 16	Lab 16 : Final exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	•Electrical technology (twenty-third edition) BL.THERAJA ,AK.THERAJA S.Chand and company Ltd. (2005), ISBN: 81-219-2440-5	Yes
Recommended Texts	Electronics devices (Ninth edition) by Thomas L. Floyd (2012),Prentice Hall ISBN-13: 978-0-13-254986-8	Yes
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electrical Circuits Analysis II**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEPM208**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level	2		**Semester of Delivery**	3	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor	Asst. Prof Dr. Omar Sharaf Al-Deen		**e-mail**	o.yehya@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Basics of Electrical Engineering I and Basics of Electrical Engineering II	**Semester**	
Co-requisites module	Electrical Circuits Analysis I	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Ability to understand the AC Circuit Power Analysis and Poly-phase Circuits 2. Ability to determine the Transient Response of RL /RC Circuit and the Transient Response of RLC Circuit 3. Ability to analysis Magnetically Coupled Circuits and Ideal Transformers 4. Ability to solve the mathematical equations for Complex Frequency, Laplace Transform, Frequency Response and Fourier Circuit Analysis 5. Ability to synthesize the Circuit Analysis in the s-Domain and Two-Port Networks
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Use basic electrical DC concepts and theorems to analyze circuits 2. Build and simulate electrical DC circuits and perform measurements with electronic test equipment 3. Understand the fundamental concepts of electrical circuits, including voltage, current, resistance, and power. 4. Analyze and solve basic DC (direct current) circuits using Ohm's Law, Kirchhoff's Laws, and nodal/mesh analysis techniques. 5. Apply techniques to analyze and solve AC (alternating current) circuits, including complex impedance, phasor representation, and frequency response. 6. Demonstrate proficiency in analyzing circuits with passive elements such as resistors, capacitors, and inductors. 7. Use circuit simulation software and laboratory equipment to verify theoretical analysis and gain practical experience in circuit analysis. 8. Analyze and solve circuits with operational amplifiers (op-amps), including understanding their basic configurations and applications. 9. Understand the concepts of power in electrical circuits, including active power, reactive power, and power factor correction. 10. Develop critical thinking and problem-solving skills by applying circuit analysis techniques to real-world electrical engineering problems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A - Two-Port Networks** Two-Port Networks: One-pot networks, y-z-h-g and ABCD parameters, [15 hrs.] Revision problem and tutorial classes [8 hrs.] Quizzes [1 hr.]

	Part B- Frequency Response Complex Frequency and Circuit Analysis in the s-Domain [12 hrs.] Frequency Response [12 hrs.] Revision problem and tutorial classes [8 hrs.] Quizzes [1 hr.] **Part C- Filters** Filters: Constant k-filters, Low pass and high pass modern filter design, Butterworth and filters, Network transformations, and all pass filter, Active filter. [15 hrs.] Fourier circuit analysis [9 hrs.] Revision problem and tutorial classes [8 hrs.] Quizzes [1 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.2
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	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
	Quizzes	1	10% (10)	4,8,12	LO #1, 5, 8 and 9

Formative assessment	**Assignments**	10	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects / Lab.	0	0% (0)	Continuous	All
	Report	0	0% (0)	----	----
Summative assessment	**Midterm Exam**	2 hr	25% (25)	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; syllabus; Advantages and Disadvantages of Electrical Networks as a different circuits .
Week 2	Two-Port Networks : One-pot networks
Week 3	Two-Port Networks : y-z-h-g parameters
Week 4	Two-Port Networks : ABCD parameters
Week 5	Complex Frequency
Week 6	Circuit Analysis in the S-Domain
Week 7	Frequency Response
Week 8	Bode Diagrams
Week 9	Mid-term Exam
Week 10	Filters: Constant k-filters, Low pass and high pass
Week 11	Filters: modern filter design, Butterworth and filters
Week 12	Filters: Network transformations
Week 13	All pass filter
Week 14	Active filter
Week 15	Fourier circuit analysis
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Engineering Circuit Analysis Eight Edition (William H. Hayt) 2012	Yes

	Fundamentals of Electric Circuits (Charles K. Alexander)2009	
Recommended Texts	Electric Circuits Tenth Edition (James W. Nilsson) 2015	Yes
Websites	https://www.pdfdrive.com/schaums-outline-of-electric-circuits-e185851170.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	**Engineering Mathematics II**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEPM209**				
ECTS Credits	**5**				
SWL (hr./sem)	**125**				
Module Level	2		**Semester of Delivery**	4	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor	Dr. Omar Muwafaq Mahmood		**e-mail**	omer_alyousif@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
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 Aims أهداف المادة الدراسية	1. To develop problem solving of Eigenvalues and eigenvectors 2. To understand Laplace Transforms. 3. This course deals with the basic concept of DC electrical circuits. 4. To understand the application of Laplace Transforms in the electronic circuits. 5. To understand Fourier, transform and their applications in electrical engineering.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize Eigenvalues and eigenvectors. 2. Summarize series and series geometric. 3. Identify the Laplace Transforms. 4. Identify the Fourier transform their applications. 5. Identify the application in Electrical Circuits.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Eigenvalues and eigenvectors; diagonalization. Sequence and series, sequence convergence, series geometric series, nth partial sum, test of convergence, Laplace Transforms: Introduction to transforms and operators, Laplace transforms of basic functions; unit step function, transforms of 1st and 2nd derivatives, Application to electric circuits; Transforms of piecewise continuous functions Inverse Laplace transforms, derivation using partial fractions. Direct (s-domain) analysis of electrical circuits, Interpretation of s-domain functions Initial & final value theorems. Fourier transform for different functions (unit step function, unit impulse function, singularity function, applications in electrical engineering. Fourier transform for different functions (unit step function, unit impulse function, singularity function, applications in electrical engineering.

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	10% (10)	3,6,11,14	LO #1, 5, 8 and 9
	Assignments	8	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
Summative assessment	**Midterm Exam**	2 hr	25% (25)	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	Sequence and series, sequence convergence,
Week 2	series geometric series, nth partial sum, test of convergence,
Week 3	Taylor and Mandarin series,
Week 4	Eigenvalues and eigenvectors; diagonalization.
Week 5	Introduction to transforms and operators, Laplace Transforms
Week 6	Laplace transforms of basic functions
Week 7	unit step function, transforms of 1st and 2nd derivatives
Week 8	Mid-term Exam
Week 9	Inverse Laplace transforms,
Week 10	Application to electric circuits;

Week 11	Direct (s-domain) analysis of electrical circuits, Interpretation of s-domain functions Initial & final value theorems.
Week 12	derivation using partial fractions
Week 13	Transforms of piecewise continuous functions.
Week 14	Fourier transform: Introduction, Fourier transform equation, properties,
Week 15	Fourier transform for different functions (unit step function, unit impulse function, singularity function, applications in electrical engineering.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to lab. components
Week 2	Lab 2: Introduction to AVO meter (analog and digital)
Week 3	Lab 3: Introduction to resistance measurements (practical and color code)
Week 4	Lab 4: resistance temperature affect, internal resistance of a source, open circuit & short circuit
Week 5	Lab 5: ohm's Law
Week 6	Lab 6: series and parallel resistance
Week 7	Lab 7: resistance delta and star transformation
Week 8	Lab 8: Kirchhoff's Voltage Law
Week 9	Lab 9: Kirchhoff's Current Law
Week 10	Lab 10: implementation of Maxwell's circulating currents (mesh analysis)
Week 11	Lab 11: implementation of Nodal analysis
Week 12	Lab 12: implementation of Superposition theorem
Week 13	Lab 13: implementation of Thevenin's / Norton's Theorem
Week 14	Lab 14: implementation of maximum power transfer theorem
Week 15	Lab 15: DC power measurements (methods and instrumentations)

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

Required Texts	Engineering Circuit Analysis 7th Edition by William Hayt , Jack Kemmerly , Steven Durbin	Yes
Recommended Texts	Schaum's Outline of Basic Circuit Analysis, Second Edition (Schaum's Outlines) 2nd Edition, by John O'Malley	No
Websites	DC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2017.	

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	**DC Machines**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEPM210**				
ECTS Credits	**5**				
SWL (hr./sem)	**125**				
Module Level	2		**Semester of Delivery**	4	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor	Dr.		**e-mail**	@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date	09/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To understand the principle of Electro-Mechanical Energy Conversion of DC Machine. 2. To understand Armature. Reaction and communication. 3. To understand the D.C generator. General principle 4. To study the Regulation of DC generator, Losses and efficiency. 5. To study Motors principle. Voltage equation of motor, torque, types of motors. Motor characteristics
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Identify the principle of DC machine. 2. Identify the Armature. Reaction and communication. 3. Identify the Regulation of DC generator, Losses and efficiency. 4. Summarize the testing of DC machines and Speed control of D.C motors.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Principles of Electro-Mechanical Energy Conversion. Classification of Electrical machines. D.C generator. General principle. Construction and working, E.M.F equation. Armature Winding Armature. Reaction and communication, types of generation. Losses in generator. The efficiency, generation characteristics. Parallel operation of D.C generator. D.C Motors principle. Voltage equation of motor, torque, types of motors. Motor characteristics, power stages, losses and efficiency. Speed control of D.C motors, breaking. Starters, testing of D.C Machines Permeant D.C Machines.

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	10% (10)	3,6,11,14	LO #1, 5, 8 and 9
	Assignments	8	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
Summative assessment	**Midterm Exam**	2 hr	25% (25)	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	Principles of Electro-Mechanical Energy Conversion. Classification of Electrical machines.
Week 2	D.C generator. General principle
Week 3	Construction and working, E.M.F equation.
Week 4	Armature Winding Armature. Reaction and communication, types of generation.
Week 5	Losses in generator. The efficiency, generation characteristics.
Week 6	Parallel operation of D.C generator.
Week 7	D.C Motors principle.
Week 8	Mid-term Exam
Week 9	Voltage equation of motor, torque
Week 10	Types of motors. Motor characteristics,
Week 11	power stages, losses and efficiency
Week 12	Speed control of D.C motors
Week 13	Breaking of D.C motors
Week 14	Starters of D.C motors
Week 15	testing of D.C Machines Permeant D.C Machines.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to lab. components
Week 2	Lab 2: Introduction to AVO meter (analog and digital)
Week 3	Lab 3: Introduction to resistance measurements (practical and color code)
Week 4	Lab 4: resistance temperature affect, internal resistance of a source, open circuit & short circuit
Week 5	Lab 5: ohm’s Law
Week 6	Lab 6: series and parallel resistance
Week 7	Lab 7: resistance delta and star transformation
Week 8	Lab 8: Kirchhoff's Voltage Law

Week 9	Lab 9: Kirchhoff's Current Law
Week 10	Lab 10: implementation of Maxwell's circulating currents (mesh analysis)
Week 11	Lab 11: implementation of Nodal analysis
Week 12	Lab 12: implementation of Superposition theorem
Week 13	Lab 13: implementation of Thevenin's / Norton's Theorem
Week 14	Lab 14: implementation of maximum power transfer theorem
Week 15	Lab 15: DC power measurements (methods and instrumentations)

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Engineering Circuit Analysis 7th Edition by William Hayt , Jack Kemmerly , Steven Durbin	Yes
Recommended Texts	Schaum's Outline of Basic Circuit Analysis, Second Edition (Schaum's Outlines) 2nd Edition, by John O'Malley	No
Websites	DC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2017.	

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	**Renewable Energy Sources**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEPM212**				
ECTS Credits	**4**				
SWL (hr./sem)	**100**				
Module Level	2		**Semester of Delivery**	4	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	Dr. Mohammed Tariq Yaseen		**e-mail**	mtyaseen@uomosul.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	Doctor	
Module Tutor			**e-mail**		
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date	14/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	· To explain the concepts of Non-renewable and renewable energy systems · To outline utilization of renewable energy sources for both domestic and industrial applications · To analyze the environmental and cost economics of renewable energy sources in comparison with fossil fuels.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Students will be able to understand selected renewable energy sources. 2. Students will be able to design photovoltaic energy system. 3. Students will be able to design wind energy system. 4. Students will be able to understand the use of energy storage devices. 5. Students will be able to understand integration of renewable energy sources into utility grid. 6. Students will be able to explain application of renewable energy for distributed generation.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A - Non-renewable and renewable energy** The concepts of Non-renewable and renewable energy systems. Renewable energy sources for both domestic and industrial applications. [12 hrs.] Revision problem and tutorial classes [4 hrs.] Quizzes [1 hr.] **Part B - Renewable energy sources** The environmental and cost economics of renewable energy sources in comparison with fossil fuels. [12 hrs.] Revision problem and tutorial classes [4 hrs.] Quizzes [1 hr.] **Part C – Design energy system** Design photovoltaic energy system. design wind energy system [9 hrs.] Revision problem and tutorial classes [3 hrs.] **Part D - Application of renewable energy** energy storage devices. integration of renewable energy sources into utility grid. application of renewable energy for distributed generation. [12 hrs.] Revision problem and tutorial classes [4 hrs.] Quizzes [1 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/ Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	10% (10)	4,8,14	LO #1, 4, 6 and 7
	Assignments	10	5% (5)	2 to 13	LO #1, 2, 3, 4, 5 and 7
	Projects	0	0% (0)	----	-----
	Report	0	0% (0)	----	----
Summative assessment	**Midterm Exam**	2 hr	25% (25)	7	LO # 4-7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Traditional power plants**
Week 2	**Introduction to Renewable Energy**
Week 3	**Solar Energy and Physics of Energy Conversion in Solar Cell (Current and Voltage)**
Week 4	**Understanding basic terminologies of a PV cell (1-V Curve, Efficiency, FF)**
Week 5	**Wind Energy**
Week 6	**Biogas Energy and Ocean Energy**
Week 7	**Small hydro Power Plant**
Week 8	**Geothermal Energy**
Week 9	**Mid Exam**
Week 10	**Photovoltaic Energy Systems**
Week 11	**Energy Storage devices**
Week 12	**Integration of Renewable Energy Resources**
Week 13	**Distributed Generation**
Week 14	**Economics of Renewable Energy**
Week 15	**Future Trends and Challenges**
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Goswami, D. Yogi, and Frank Kreith, eds. Energy efficiency and renewable energy handbook. CRC press, 2015.	Yes
Recommended Texts	John Twidell and Tony Weir, “Renewable Energy Resources”, 3st Edition, CRC Press, USA, 2015	Yes
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electrical Engineering Lab. I I**			**Module Delivery**	
Module Type	**Core**			☐ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UoM221EE211**				
ECTS Credits	3				
SWL (hr./sem)	75				
Module Level	2		**Semester of Delivery**	4	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor			**e-mail**		
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
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 Aims أهداف المادة الدراسية	This course deals with general and different topics in the fields of electronic and power within the framework of the student's curriculum and includes practical experiences in studying the characteristics of the diode and its applications and the types of connection of the transistor and its advantages. This course also covers the study of transient conditions in electrical circuits and transformer tests and DC machines
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	This course designed to develop the students' abilities about using the different measurement equipment's that necessary to execute the practical experiments. Also this course covered the need of students to investigate the theoretical subjects according to practical method that's will improve the scientific level of students through this course By the end of this course, student should be able to: • Dealing with laboratory equipment and electrical elements in a professional and scientific manner(i). • Ability to analyze electrical circuits and understand the nature of their work(ii). • Building a scientific mentality for the student through his ability to interpret the practical results according to theoretical concepts(iii). • Develop the student's ability to design simple electronic circuits in line with his scientific abilities(iv). • Analyze and simulate the process circuit using different software on the electronic calculator and match the results of the analysis with the practical results(v).
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A - Circuit Components and values** DC circuits, Current and voltage definitions, Passive sign convention and circuit elements, Resistive networks, real and ideal elements, voltage and current sources. [9 hrs.] Lab. [6 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [1 hr.] **Part B- Circuit reduction** combining sources, Combining resistive elements in series and parallel, delta and star transformation. [12 hrs.] Revision problem and tutorial classes [8 hrs.] Lab. [8 hrs.] Quizzes [1 hr.] **Part C- Circuit Theory** Kirchhoff's laws and Ohm's law. Introduction to mesh and nodal analysis, Introduction to thevenin and Norton theory, maximum power transfer, introduction to superposition theory. [24 hrs.] Revision problem and tutorial classes [16 hrs.] Lab. [16 hrs.]

	Quizzes [1 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	42	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	5% (5)	4,8,12	LO #1, 5, 8 and 9
	Assignments	0	0% (0)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects / Lab.	2	25% (25)	Continuous	All
	Report	10	10% (5)	----	----
Summative assessment	**Midterm Exam**	2 hr	15% (15)	7	LO # 1-5
	Final Exam	3hr	50% (50)	16	All

Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to lab. components
Week 2	Lab 2: Study of common base transistor characteristic
Week 3	Lab 3: Common emitter transistor as an amplifier
Week 4	Lab 4: Common Collector transistor as an amplifier
Week 5	Lab 5: Low bass filter
Week 6	Lab 6: band bass filter
Week 7	Lab 7: high bass filter
Week 8	Lab 8: Transistor as a switch & device drive
Week 9	Lab 9: Mid-term exam
Week 10	Lab 10: Digital logics
Week 11	Lab 11: Digital Circuits
Week 12	Lab 12: Study of JFET Transistor characteristics
Week 13	Lab 13: Negative feedback connection
Week 14	Lab 14: Speed control for DC motor
Week 15	Lab 15: preparatory week before the Final exam and review
Week 16	Lab 16 : Final exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	•Electrical technology (twenty-third edition) BL.THERAJA ,AK.THERAJA S.Chand and company Ltd. (2005), ISBN: 81-219-2440-5	Yes
Recommended Texts	Electronics devices (Ninth edition) by Thomas L. Floyd (2012),Prentice Hall ISBN-13: 978-0-13-254986-8	Yes
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**English Language II**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEPM214**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	2		**Semester of Delivery**	4	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	Dr. Mohammed Tariq Yaseen		**e-mail**	mtyaseen@uomosul.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	Doctor	
Module Tutor	Mr. Shamil Hamzah Hussein		**e-mail**	Shamil_alnajjar84@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims and Learning Outcomes	Students will be able to: 1. Distinguish between dependent, Independent, and Integrated essays. 2. Find the topic and the thesis statement of short essays. 3. Identify the main ideas from the introduction paragraph. 4. Identify the main ideas from the body paragraph. 5. Find the supporting details from the introduction paragraph. 6. Find the supporting details from the body paragraph. 7. Draw an outline to link the ideas, supporting details, and essay topic. 8. Make notes in response to an essay question to create main ideas, supporting details, and thesis statement. 9. Write the introduction paragraph on basis of the thesis statement and main ideas. 10. Build the body paragraphs based on main ideas and supporting details. 11. Write the introduction paragraph based on the main ideas. 12. Enhance the smoothness and fluency of an essay by employing transition words and sentence starters.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Classification of Essays:** [2 hrs] - Independent essays based on personal thoughts. - Dependent essays based on data, figures, diagrams. - Integrated essays **Structure of academic essays:** [6 hrs] - Analyzing academic essays according to the standard structure of academic essays. **Idea Maps:** [3 hrs] - Filling the idea maps from the major information extracted while reading an essay. **Responding to an essay question:** [4 hrs] - Building an outline using personal ideas in response to an essay question. **Writing Paragraphs:** [6 hrs] - Writing thesis statement. - The Introduction Paragraph. - The Body Paragraphs. **Essay Conclusion:** [3 hrs] - Writing the conclusion paragraph considering the main ideas stated in the introduction and body paragraphs **Transition words and connection phrases:** [3 hrs] **Dependent essays:** [3hrs] - Introduction to essays based on figures, tables, diagrams, and processes

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The approach to be followed here is to motivate students to analyze previously written model essays to understand the standard structure of academic essays then implement the same procedures to build their own essays.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.13
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, 3, 8 and 10
	Assignments	2	10% (10)	3, 12	LO # 5, 6,11 and 12
	Projects / Lab.				
	Report	1	20% (20)	14	LO # 1-10
Summative assessment	**Midterm Exam**				
	Final Exam	3hr	60% (60)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Overview of Academic Essays Independent, Dependent, and Integrated essays Structure of academic essays
Week 2	Structure of academic essays
Week 3	Topic sentence and thesis statement Identifying topic sentence and thesis statement of academic essays.
Week 4	Main Ideas: Identifying the main Ideas of academic essays.
Week 5	Supporting Details: Identifying the supporting details
Week 6	Essay outlines: Building Essay outlines using idea maps

Week 7	Essay Questions: Responding to essay questions by making personal notes
Week 8	Topic Sentence ：Writing a thesis statement or topic sentence using personal thoughts.
Week 9	Personal Thoughts: Using personal thoughts to express main ideas and supporting details in response to an essay question.
Week 10	Idea Map Creation: Building an idea map of an essay question.
Week 11	Transition words and sentence starters Increasing the fluency, coherence, and smooth transition of thoughts using sentence starters and transition words.
Week 12	Writing the Introduction: Combining the thesis statement and main ideas together to build the introduction paragraph.
Week 13	Writing the Conclusion
Week 14	Introduction to dependent writing tasks
Week 15	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: There are no laboratory experiments.
Week 2	Lab 2: There are no laboratory experiments.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	➢ No Textbook is required for this course. Supplemental materials will be provided by provided by the instructor.	
Recommended Texts	➢ *Sharpe, P. J. (2009). Barron's TOEFL iBT. Barron's Educational Series.* ➢ *Lougheed, L. (2016). Barron's Ielts with Mp3 Cd. Barron's.*	No
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Analysis I**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ ☐ **Lecture** **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC301**				
ECTS Credits	**4**				
SWL (hr./sem)	**100**				
Module Level	3		**Semester of Delivery**	5	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor	Dr. Riyadh Zaki Sabry		**e-mail**	riyadhzaki@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Engineering Mathmatics I	**Semester**	1
Co-requisites module	Engineering Mathmatics II	**Semester**	2

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	On successful completion of this subject, students must be able:

	• To understand the concepts of z transform and to solve the difference equations. • Teaching student, the basic principles of function of complex variables.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Discrete time system analysis Z-transforms Inverse Z-transform Difference equations Series solution of differential equation. Power series Frobenious method Bessel differential equation Solutions of Bessel's Equation Applications of Bessel's Equation, functions of complex variables, ; Analytic functions integrations.
Indicative Contents المحتويات الإرشادية	

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.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	10% (5)	4,8,12	LO #1, 5, 8 and 9
	Assignments	10	10% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9

	Projects / Lab.	0	0% (25)	Continuous	All
	Report	0	0% (0)	----	----
Summative assessment	**Midterm Exam**	2 hr	20% (10)	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	Discrete time system analysis , Z transform; sampling
Week 2	Region of convergence
Week 3	properties of z transform
Week 4	properties of z transform
Week 5	Inverse Z transform
Week 6	Convolution
Week 7	Difference equations
Week 8	Mid-term Exam
Week 9	Inverse Z transform
Week 10	Series solution of differential equation
Week 11	Power series Frobenious method
Week 12	Bessel differential equation
Week 13	Solutions of Bessel's Equation Applications of Bessel's Equation
Week 14	Functions of complex variables.
Week 15	functions of complex variables, ; Analytic functions integrations
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, Inc; 10th Ed.; 2011.	Yes

Recommended Texts	Advanced Engineering Mathematics – Cengage Learning, Seventh Edition., 2007.	Yes
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electronics I**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**EEEC302**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level	3		**Semester of Delivery**	5	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	Dr. Mohammed Tariq Yaseen		**e-mail**	mtyaseen@uomosul.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	Doctor	
Module Tutor	Mr. Shamil Hamzah Hussein		**e-mail**	Shamil_alnajjar84@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To develop problem solving skills of electronic circuit through the understanding solid state for each electronic passive and active elements such as operational amplifiers and its types. 2. To understand Basic Differential Amplifier and its applications. 3. This course deals with the basic concept of the Frequency Response of the amplifier as a single stage and multistage Amplifiers. 4. To understand the application of the amplifiers such as integrator, summer. 5. To understand the A/D convertor and D/A convertor circuits. 6. To perform frequency Response of the Amplifiers using BJT and FET transistor. 7. To Describe and operation of Logarithmic amplifier Analog computer circuit.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize the types of the operational amplifiers and frequency response of the amplifiers. 2. List the various terms associated with all active electronics devices. 3. Summarize what is meant by an active electronic device such as operational amplifiers, Differential Amplifier, and Logarithmic amplifier. 4. Describe the types of the Amplifier (integrator, summer, differentiator, …). 5. Discuss the various properties of Differential Amplifier and its applications. 6. Explain the analog computer circuits. 7. Explain the operation of the A/D convertor and D/A convertor circuits.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A - Frequency Response of the Amplifiers** Frequency Response of single stage and Multistage Amplifiers used as a BJT transistors and FET. Differential Amplifier, and Differential Amplifier Applications. [**15 hrs**.] Revision problem and tutorial classes [**5 hrs**.] Quizzes [**1 hr**.] **Part B- Operational amplifiers and its types** Operational amplifiers and its types, Operation amplifier internal circuits, Inverting amplifiers non-inverting amplifiers, Differentiator and integrator circuits. [**15 hrs**.] Revision problem and tutorial classes [**5 hrs**.] Quizzes [**1 hr**.] **Part C- A/D and D/A convertor circuit and active filter design** A/D convertor and D/A convertor. Logarithmic amplifier. Analog computer circuit. Passive filter design. Active filter design and its applications. [**15 hrs**.] Revision problem and tutorial classes [**5 hrs**.] Quizzes [**1 hr**.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/ Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	5% (5)	4,8,14	LO #1, 4, 6 and 7
	Assignments	10	5% (5)	2 to 13	LO #1, 2, 3, 4, 5 and 7
	Projects	0	0 (0)	----	-----
	Report	2	15% (25)	Continuous	All
Summative assessment	**Midterm Exam**	2 hr	15% (15)	7	LO # 4-7
	Final Exam	3hr	50% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Frequency Response of the single stage amplifier using BJT transistors.
Week 2	Frequency Response of the single stage amplifier using FET transistors.
Week 3	Frequency Response of Multistage Amplifiers using BJT transistors.
Week 4	Frequency Response of Multistage Amplifiers using FET transistors.
Week 5	Basics of Operational amplifiers.
Week 6	Operational amplifiers and its types.
Week 7	Operational amplifiers and its applications.
Week 8	Characteristics of the Operational amplifiers.
Week 9	Basics of the Differential Amplifier.
Week 10	Differential Amplifier Applications.
Week 11	A/D convertor circuit and its types and applications.
Week 12	D/A convertor circuit and its types and applications.
Week 13	Passive filter and active filter design.
Week 14	Logarithmic amplifiers.
Week 15	Analog computer circuits.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Floyd, Thomas L. Electronics Fundamentals: Circuits, Devices and Applications (Floyd Electronics Fundamentals Series). Prentice-Hall, Inc., 2006.	Yes
Recommended Texts	Donald A. Neamen. (2003). “SEMICONDUCTOR PHYSICS AND DEVICES". 3rd Edition, ISBN 0-07-232107-05, USA. (can be downloaded from the Course web page/classroom).	Yes
Websites	Nashelsky, L., & Boylestad, R. L. (2021). Electronic Devices and Circuit Theory Eleventh Edition.	

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	**Microprocessor**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC303**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level		3	**Semester of Delivery**		5
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title		لقبه العلمي	**Module Leader's Qualification**		الشهادة
Module Tutor	Marwan Abdulkhaleq Al-Yoonus		**e-mail**	marwanathy1972@uomosul.edu.iq	
Peer Reviewer Name		اسم مُراجع الملف	**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date		10/06/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To develop problem solving skills and understanding of microprocessor technology. 2. To understand computer architecture. 3. Understanding the basic of programing and data processing. 4. Understanding the basic of algorithms and flow charts. 5. Understanding the process timing diagram. 6. Digital circuit design and timing analysis.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Binary numbers manipulation. 2. Interface Microprocessor and peripheral devices. 3. Having the basics of Hardware description language (HDL). 4. Having the skills of Hardware design and software programing. 5. Microcontroller Programing.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A – combinational, sequential digital circuit and microprocessor** Sequential and combinational circuits which are the most widely used ones in the arena of digital electronics [8 hr.]. Central Processing Unit, memory and input/output interfacing. Memory Classification Volatile and non-volatile memory, Primary and secondary memory, Static and Dynamic memory, Logical, Virtual and Physical memory [12 hrs.]. problem and tutorial classes [8 hr.]. Quizzes [1 hr.] **Part B- Architecture of INTEL 8086** (Bus Interface Unit, Execution unit), register organization, memory addressing, memory segmentation, Operating Modes [12 hrs.] problem and tutorial classes [8 hr.]. Quizzes [1 hr.] **Part C- 8086 microprocessor instruction Set** Instruction Set of 8086: Addressing Modes: Instruction format: Discussion on instruction Set: Groups: data transfer, arithmetic, logic string, branch control transfer, processor control. Interrupts: Hardware and software interrupts, responses, and types. [12 hrs.] Revision problem and tutorial classes [16 hrs.] Quizzes [1 hr.]

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, video animation, and reports that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	10% (10)	4,8,12	LO #1, 5, 8 and 9
	Assignments	3	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects	1	5% (5)	Continuous	All
	Report	0	0% (0)	----	----
Summative assessment	**Midterm Exam**	2 hr	30% (30)	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	Understanding combinational and sequential digital circuit Design of simple security system
Week 2	Compare the RISC processor with the CISC processor.
Week 3	Distinguish between the 32-bit processor and the 64-bit processor.

Week 4	Architecture of INTEL 8086 (Bus Interface Unit, Execution unit), register organization, memory addressing, memory segmentation, Operating Modes
Week 5	8086 Microprocessor Instruction format
Week 6	8086 microprocessor instruction Set
Week 7	Explain the instruction execution steps. Show advantage of the instruction pipelining.
Week 8	Shift-and-Add Multiplication algorithm
Week 9	Distinguish different types of the microcomputer buses. Explain operation of the USB bus.
Week 10	Types of memory
Week 11	THE MEMORY UNIT
Week 12	Learn architecture of multicore processor. List the components of CPU.
Week 13	Next step in assembly language programming (timing)
Week 14	Flow charts and algorithms
Week 15	Logical circuit design using Vivado IDE software
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1- Ahmet Bindal "Fundamentals of Computer Architecture and Design" 2nd edition: © Springer Nature Switzerland AG 2019 2- Ata Elahi "Computer Systems Digital Design, Fundamentals of Computer Architecture and Assembly Language", © Springer International Publishing AG 2018 3- K M Bhurchandi "Advanced microprocessors and peripherals" © McGraw hill 2013	Yes
Recommended Texts	• K M Bhurchandi "Advanced microprocessors and peripherals" © McGraw hill 2013	Yes

	• Ahmet Bindal “Fundamentals of Computer Architecture and Design” 2nd edition: © Springer Nature Switzerland AG 2019	
Websites	https://youtu.be/gsb2QTESSFo	

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 Communication**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC304**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level	3		**Semester of Delivery**	5	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	Dr. Firas S. Alsharbaty		**e-mail**	alsharbaty@uomosul.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	PH.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
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 Aims أهداف المادة الدراسية	1. To overcome the basic concepts of Probability theory. 2. To handle the principles of Random variables and Random process.

	3. To understand the Information theory and the capacity of the systems. 4. To introduce the Sampling theory and Matching filter. 5. To capture the main concepts of Digital modulations.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Overcoming the random and deterministic of the digital communication systems. 2. Analysis the relationship between the randomization and communication systems capacity. 3. Understanding the benefit of the sampling theory. 4. Design the match filter. 5. Handling the probability of error. 6. Identify the main types of digital modulations. 7. Design the appropriate digital communication systems in term of digital modulations.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A – Probability, Random Processes, and Information Theory** Probability theory, Random variables, CDF, PDF, Random process, Correlation, Information, Capacity. [21 hrs.] Revision problem and tutorial classes [7 hrs.] Quizzes [1 hr.] **Part C- Sampling Theory and Digital Modulations** Sampling theory, PAM, PCM, DM, Matched filter, ASK, FSK, PSK, and QAM. [21 hrs.] Revision problem and tutorial classes [7 hrs.] Quizzes [2 hr.]

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, virtual Labs, projects, seminars and by considering type of simple explanations and examples involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem)	87	**Unstructured SWL (h/w)**	6

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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**	1	5% (5)	4,6,11,15	LO #3, 4, 6 and 7
	Assignments	10	5% (5)	2 to 12	LO #1-7
	Projects and/or Seminars	2	25% (25)	Continuous	All
	Report	0	0% (0)	----	----
Summative assessment	**Midterm Exam**	2 hr	15% (15)	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	Introduction to probability and the basic types of the probability
Week 2	Random variables, CDF, and PDF
Week 3	Distributions
Week 4	Random process
Week 5	Correlation
Week 6	Information theory
Week 7	System capacity
Week 8	Mid-term Exam
Week 9	Sampling theory and PAM
Week 10	Pulse code modulation
Week 11	Quantization noise
Week 12	Matched filter

Week 13	Probability of error
Week 14	ASK and FSK
Week 15	PSK, and QAM
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Introduction to Analog and Digital Communications 2nd edition, by Simon Haykin and Michael Moher Copyright © 2007 John Wiley & Sons, Inc.	Yes
Recommended Texts	Introduction to communication systems, 3rd edition, by Ferrel Stremler	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	**Digital Electronics**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC305**				
ECTS Credits	**4**				
SWL (hr./sem)	**100**				
Module Level	3		**Semester of Delivery**	5	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor	Mr. Ahmed Idrees Alghannam		**e-mail**	ahmed_edrees@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
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 Aims أهداف المادة الدراسية	Student introduces to latches, the various flip-flop types and common applications and sequential logic circuits including: basic concepts, variations, applications and the differences between synchronous and asynchronous sequential circuits and learns how Sequential Logic Circuits are organised, how they are different from combinational logic circuits, how they are constructed using a mixture of gates and flip-flop to form sequential logic circuits, and also learn the methods for the design of sequential circuits (state diagram, state table, state assignment and circuit synthesis).
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Having successfully completed the module, students should be able to: - Analyze Combinational and sequential circuits. - Apply methods of solution to Combinational and sequential circuits - Design various sequential circuits. - Implement logic gates using various technologies
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Flipflops - SR, JK, T, D, Master/Slave FF, Triggering of FF, Analysis of clocked sequential circuits and their design, , Synchronous and asynchronous sequential circuits state assignment, State minimization Circuit implementation, Registers-Shift registers, Ripple counters, Synchronous counters, Timing signal, RAM, Semiconductor memories, Fundamental Mode Sequential Circuits, Memory decoding.

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.4

Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	1	5% (5)	3,7,10	LO #1, 5, 8 and 9
	Assignments	10	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects / Lab.	0	0% (0)	---------	--------
	Report	2	25% (25)	----	----
Summative assessment	**Midterm Exam**	2 hr	15% (15)	10	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	Introduction to Digital Circuits ; Latches ; Gated S-R latch and Gated D latch
Week 2	Flip Flop ; The edge triggering S-R , D , T and J k flip flop ; Master slave S-R flip flop ; Asynchronous Preset and Clear Inputs
Week 3	Asynchronous counter ; 2-bit , 3-bit and 4-bit Asynchronous binary counter ; Asynchronous decade counters.
Week 4	74lS93 4-BIT ASYNCHRONOUS BINARY COUNTER ; Synchronous counter ; 2-bit , 3-bit and 4-bit Synchronous counter.
Week 5	Synchronous Decade Counter ; 74HC163 4-BIT SYNCHRONOUS BINARY COUNTER ; 74F162 SYNCHRONOUS BCD DECADE COUNTER ;
Week 6	UP/DOWN SYNCHRONOUS COUNTERS ; 74HC190 UP/DOWN DECADE COUNTER ; CASCADED COUNTERS ; COUNTER DECODING
Week 7	Shift registers ; Basic data movement in shift registers ; Parallel in serial out shift registers ,parallel in parallel out registers ; Serial in parallel out shift registers , serial in serial out registers
Week 8	74HC164 8-BIT SERIAL IN/PARALLEL OUT SHIFT REGISTER ; 74HC165 8-BIT PARALLEL LOAD SHIFT REGISTER ; 74HC195 4-BIT PARALLEL-ACCESS SHIFT REGISTER ; 74HC194 4-BIT BIDIRECTIONAL UNIVERSAL SHIFT REGISTER
Week 9	SHIFT REGISTER COUNTERS ; The Johnson Counter ; The Ring Counter
Week 10	Semiconductor Memory ; types of memory ; memory extension
Week 11	Implementation of combinational logic circuits ; PLA ; PAL
Week 12	Synchronous sequential circuit models mealy model ; examples

Week 13	Synchronous sequential circuit models Moore model ; examples
Week 14	Integrate circuit technologies ; BJT ; MOSFET
Week 15	Logic gates using BJT and MOSFET
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1- Digital Fundamentals, 10th Ed., by: Thomas L. Floyd. Prentice Hall. 2009. 2- Digital Electronics, Principles, Devices and Applications, By: Anil K. Maini, John Wiley and SoNs 2007.	Yes
Recommended Texts	Digital Logic Circuit Analysis and Design, Victor P. Nelson	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	**Electronics and Communications Lab. I**			**Module Delivery**	
Module Type	**Support**			☐ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC306**				
ECTS Credits	**4**				
SWL (hr./sem)	**100**				
Module Level	3		**Semester of Delivery**	5	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor			**e-mail**		
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
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 Aims أهداف المادة الدراسية	1. To handle laboratory equipment and electrical elements professionally and scientifically. 2. To analyze electrical circuits and comprehend their operational principles. 3. To cultivate a scientific mindset in the student by interpreting practical results based on theoretical concepts. 4. To enhance the student's capability to design basic electronic circuits in accordance with their scientific aptitude. 5. To analyze and simulate circuit processes using various software tools on electronic calculators and compare the analysis results with practical outcomes.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Dealing with laboratory equipment and electrical elements in a professional and scientific manner(i). 2. Ability to analyze electrical circuits and understand the nature of their work(ii). 3. Building a scientific mentality for the student through his ability to interpret the practical results according to theoretical concepts(iii). 4. Develop the student's ability to design simple electronic circuits in line with his scientific abilities(iv). 5. Analyze and simulate the process circuit using different software on the electronic calculator and match the results of the analysis with the practical results(v).
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A - Circuit Components and values** Operational amplifier, Operational amplifier application, Active Filter, Frequency Modulation Single Phase Transformer Open and Short Circuit Tests and and Three Phase Power Measurements and No load test of D.C. shunt generator. [21 hrs.] Revision problem and tutorial classes [10hrs.] Quizzes [1 hr.] **Part B- Circuit reduction** Class A Power Amplifier and Phase Splitter, Push-Pull & Complementary Power Amplifiers (Class AB power amplifier), Transmission line characteristics (Coaxial Cable), Three Phase Power Measurements, Speed and Direction Control of D.C shunt Motor using voltage control method and Encoder& Decoder. [20 hrs.] Revision problem and tutorial classes [10hrs.] Quizzes [1 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
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**	1	10% (10)	4,8,12	All
	Report	2	10% (10)	1 to 15	All
	Practical Exam	1	20%(20)	8,15	
Summative assessment	**Theoretical Exam**	1	10% (10)	7	All
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Operational amplifier
Week 2	Operational amplifier application

Week 3	Digital Logic
Week 4	Signal analysis
Week 5	Active Filter
Week 6	Frequency Modulation
Week 7	Single Phase Transformer Open and Short Circuit Tests
Week 8	Class A Power Amplifier and Phase Splitter.
Week 9	Push-Pull & Complementary Power Amplifiers (Class AB power amplifier).
Week 10	Transmission line characteristics (Coaxial Cable).
Week 11	Three Phase Power Measurements
Week 12	Speed and Direction Control of D.C shunt Motor using voltage control method
Week 13	No load test of D.C. shunt generator
Week 14	Speed Control of D.C shunt Motor using field control method
Week 15	Encoder& Decoder

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts		No
Recommended Texts		No
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Analysis II**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ **Lecture** **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC307**				
ECTS Credits	**4**				
SWL (hr./sem)	**100**				
Module Level	3		**Semester of Delivery**	6	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor	Dr. Riyadh Zaki Sabry		**e-mail**	riyadhzaki @uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Engineering Mathmatics I	**Semester**	1
Co-requisites module	Engineering Mathmatics II	**Semester**	2

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Solving the 2nd order differential equation and Bessel differential equations by series solutions. 2. Students learn the principals of the wave equation for one and two dimensions. 3. To introduce the fundamentals of numerical methods used for the solution of engineering problems and to improve the computer skills of the students.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Partial Differential Equations. One dimensional wave equation Separation of variables, Vibrating string, two-dimensional wave equation, transmission line, Introduction to Complex Variables Complex number system and its operations, Limits and sequences Continuous functions and their properties, Derivatives complex integration and Cauchy integral theorems. Concepts and role for the numerical method in engineering, Numerical Solution of Nonlinear Algebraic Equations, Open Methods, Numerical Solution of linear algebraic equations, Curve Fitting
Indicative Contents المحتويات الإرشادية	

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.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem)	37	**Unstructured SWL (h/w)**	2.4

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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**	1	10% (5)	4,8,12	LO #1, 5, 8 and 9
	Assignments	10	10% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects / Lab.	0	0	0	0
	Report	0	0	----	----
Summative assessment	**Midterm Exam**	2 hr	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	Partial Differential Equations. One dimensional wave equation Laplace equation Derivatives
Week 2	Separation of variables
Week 3	vibrating string, two-dimensional wave equation, transmission line
Week 4	Introduction to Complex Variables
Week 5	Complex number system and its operations
Week 6	Limits and sequences Continuous functions and their properties
Week 7	complex integration and Cauchy integral theorems
Week 8	Mid-term Exam
Week 9	Concepts and role for the numerical method in engineering, approximations, and errors, the definition of Round-off error and truncation error, absolute and rel ative true/approximation error.
Week 10	Numerical Solution of Nonlinear Algebraic Equations (Roots of Equations): Bracketing Methods (Bisection, and False-Position method)
Week 11	Open Methods (Newton-Raphson and secant method).

Week 12	Numerical Solution of linear algebraic equations (system): the difference between the direct and indirect methods, Singular and ill/wel1-conditioned system, Parlial and complete Pivoting, Convergence Criteria, Jacobi iterative method.
Week 13	The gauss-Seidel iterative method, Gauss-Seidel iterative with the relaxation factor method. Tri-diagonal systems and its solution.
Week 14	Curve Fitting: Classification of Curve Fitting (Regression and Interpolation), the concepts of regression, and Least Square Criterion, Linear Regression.
Week 15	Introduction another to another methods (finite difference, finite volume, finite element method
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, Inc; 10th Ed.; 2011. Applied Numerical Methods with MATLAB for Engineers and Scientists ,Steven C. Chapra,2018	Yes
Recommended Texts	1- Numerical Analysis Using Matlab and Excel, Steven T. Karris, Third Edition, 2007.	YES
Websites		

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electronics II**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**EEEC308**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level		3	**Semester of Delivery**		6
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	Dr. Mohammed Tariq Yaseen		**e-mail**	mtyaseen@uomosul.edu.iq	
Module Leader's Acad. Title		Assist. Prof.	**Module Leader's Qualification**		Doctor
Module Tutor	Mr. Shamil Hamzah Hussein		**e-mail**	Shamil_alnajjar84@uomosul.edu.iq	
Peer Reviewer Name		اسم مُراجع الملف	**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date		10/06/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To develop problem solving skills of electronic circuit through the understanding solid state for each electronic passive and active elements such as amplifiers, oscillators, and integrated circuits. 2. To understand Basic power amplifiers through graphical analysis and Frequency Response. 3. This course deals with the basic concept of Power Amplifier and its Classes. 4. To understand the Feedback Amplifier circuits. 5. To understand the RF amplifiers circuits. 6. To Describe the oscillators circuits types. 7. To Describe and operation of several integrated circuit such as timer IC555, VCO IC566, and PLL IC655.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize the classes of the Power Amplifiers and Frequency Response of Multistage Amplifiers. 2. List the various terms associated with all active electronics devices. 3. Summarize what is meant by an active electronic device such as operational amplifiers, IC555, VCO, and PLL integrated circuit. 4. Describe the types of Oscillator (Radio Frequency) and filters. 5. Discuss the various properties of Differential Amplifier and its applications. 6. Explain the Power Supply Circuits and voltage regulators. 7. Explain the operation of timer integrated circuits.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A - Classes of the Operational amplifiers** Power Amplifier Class (A), Power Amplifier Class (B, AB), Power Amplifier Class (C). Power Amplifier Class (D). [**15 hrs**.] Revision problem and tutorial classes [**5 hrs**.] Quizzes [**1 hr**.] **Part B- - Amplifiers Circuit and timer integrated circuit** Negative and Positive Amplifier Circuit. Oscillator (Radio Frequency) and its types. Timer integrated circuit design IC555. [**15 hrs**.] Revision problem and tutorial classes [**5 hrs**.] Quizzes [**1 hr**.] **Part C- Integrated circuit design and power supply** The voltage controlled oscillators VCO IC566. The phase locked loop PLL IC655. Frequency Synthesizer. Power Supply Circuit. Types of Voltage Regulator Power Supply Circuit. [**15 hrs**.] Revision problem and tutorial classes [**5 hrs**.] Quizzes [**1 hr**.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/ Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	5% (5)	4,8,14	LO #1, 4, 6 and 7
	Assignments	10	5% (5)	2 to 13	LO #1, 2, 3, 4, 5 and 7
	Projects	0	0 (0)	----	-----
	Report	2	15% (25)	Continuous	All
Summative assessment	**Midterm Exam**	2 hr	15% (15)	7	LO # 4-7
	Final Exam	3hr	50% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Basics of the power amplifiers and its classes with applications.
Week 2	Power Amplifier Class (A).
Week 3	Power Amplifier Class (B).
Week 4	Power Amplifier Class (AB).
Week 5	Power Amplifier Class (C, D).
Week 6	Negative Amplifier Circuit.
Week 7	Positive Amplifier Circuit.
Week 8	Oscillator (Radio Frequency) circuit and its types 1.
Week 9	Oscillator (Radio Frequency) circuit and its types 2.
Week 10	Timer integrated circuits IC555.
Week 11	The voltage controlled oscillators VCO IC566.
Week 12	The phase locked loop PLL IC655.
Week 13	Frequency Synthesizer.
Week 14	Power Supply Circuit.
Week 15	Types of Voltage Regulator.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Floyd, Thomas L. Electronics Fundamentals: Circuits, Devices and Applications (Floyd Electronics Fundamentals Series). Prentice-Hall, Inc., 2006.	Yes
Recommended Texts	Donald A. Neamen. (2003). “SEMICONDUCTOR PHYSICS AND DEVICES". 3rd Edition, ISBN 0-07-232107-05, USA. (can be downloaded from the Course web page/classroom).	Yes
Websites	Nashelsky, L., & Boylestad, R. L. (2021). Electronic Devices and Circuit Theory Eleventh Edition.	

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	**Antennas and Wave Propagation**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC309**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level	3		**Semester of Delivery**	6	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	Dr. Mohammed T. Yaseen		**e-mail**	mtyaseen@uomosul.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	PH.D.	
Module Tutor	Mr. Ali Ghanim Saber		**e-mail**	ali-alanaz@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date	11/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	In this course a fundamental parameters of antennas are studied. The characteristics of different types of antennas are described. Array antenna theory and its analysis is explained. Radio wave propagation (ground, troposphere, and ionosphere) are studied. In this course, the student will acquire the following skills: ✓ Define the fundamental parameters of antennas (radiation pattern, radiation power density, radiation intensity, beam width, directivity, efficiency, gain, and effective aperture). ✓ Derive expressions of radiated electric and magnetic fields using magnetic vector potentials. ✓ Develop expressions for the radiated fields of infinitesimal and finite length dipoles.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	In this course, the student will acquire the following skills: • Define the fundamental parameters of antennas (radiation pattern, radiation power density, radiation intensity, beam width, directivity, efficiency, gain, and effective aperture) . • Derive expressions of radiated electric and magnetic fields using magnetic vector potentials. • Develop expressions for the radiated fields of infinitesimal and finite length dipoles. • Discuss the effect of increasing dipole length on radiation pattern and input impedance. • Derive expressions for the radiation pattern of a linear array of identical isotropicp elements. • Discuss the principles of pattern multiplication. • Know various types of broadband antennas. • Identify plane wave in both normal and oblique incidences. • Know various types of radio wave propagation (ground wave propagation, tropospheric wave propagation, ionospheric wave propagation).
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **<u>Part A – Probability, Random Processes, and Information Theory</u>** Define the fundamental parameters of antennas (radiation pattern, radiation power density, radiation intensity, beam width, directivity, efficiency, gain, and effective aperture). Derive expressions of radiated electric and magnetic fields using magnetic vector potentials. [21 hrs.] Revision problem and tutorial classes [7 hrs.] Quizzes [1 hr.] **<u>Part B- Sampling Theory and Digital Modulations</u>** Develop expressions for the radiated fields of infinitesimal and finite length dipoles. Discuss the effect of increasing dipole length on radiation pattern and input impedance. Derive expressions for the radiation pattern of a linear array of identical isotropic elements. [7 hrs.] Quizzes [2 hr.]

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, virtual Labs, projects, seminars and by considering type of simple explanations and examples involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	10% (5)	4,6,11,15	LO #3, 4, 6 and 7
	Assignments	10	5% (5)	2 to 12	LO #1-7
	Projects and/or Seminars	2	10% (25)	Continuous	All
	Report	0	0% (0)	----	----
Summative assessment	**Midterm Exam**	2 hr	15% (15)	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	**Fundamental parameters of antenna:** radiation patterns, field region, radiation power density, radiation intensity.
Week 2	**Fundamental parameters of antenna:** directivity, gain, HPBW, bandwidth.
Week 3	**Linear wire antenna:** infinitesimal dipole.
Week 4	**Linear wire antenna:** finite length dipole.
Week 5	**Array antenna:** array theory, two element array.
Week 6	**Array antenna:** broadside array, end-fire array.
Week 7	**Array antenna**: N- element array (uniform amplitude & uniform spacing).
Week 8	**Array antenna**: N- element array (scanning array).
Week 9	**Array antenna**: multiplication of patterns, non- uniform amplitude array.
Week 10	**Broadband antennas:** broadband dipole, folded dipole, microstrip antenna
Week 11	**Broadband antennas:** microstrip antenna
Week 12	Maxwell equations
Week 13	Rectangular waveguide
Week 14	Rectangular waveguide
Week 15	Scattering matrix(S-parameters)
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Introduction to Analog and Digital Communications 2nd edition, by Simon Haykin and Michael Moher Copyright © 2007 John Wiley & Sons, Inc.	Yes
Recommended Texts	Introduction to communication systems, 3rd edition, by Ferrel Stremler	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	**Control Systems**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC310**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level	3		**Semester of Delivery**	6	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	استاذ مساعد		**Module Leader's Qualification**	الشهادة	
Module Tutor	Dr. Mohammed Obaid Mustafa		**e-mail**	mohammed.obaid1975@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date	08/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To understand the fundamental concepts of Control systems and mathematical modeling of the system. 2. To understand and differentiate the basics of linear time-invariant control system. 3. To understand and analyze feedback characteristics of linear control system. 4. To understand and analyze, transfer function, Mathematical model. 5. This course deals with State space representation of control system, 6. To understand and analyze time response of first and second order control systems for different standard test signals. 7. To understand the stability analysis of the linear control systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize and identify the concept of State space analysis of the control system. 2. Ability to identify the concept of time response of the control system. 3. Ability to identify the concept of the transfer function. 4. Ability to identify the Mathematical modeling of different systems. 5. Ability to apply the stability concept to control systems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction to control system, Basic Components of a Control System, Open loop and closed loop control system , Block diagram and block diagram reduction, Signal flow graph; Masson gain formula, transfer function, Mathematical model, State space representation of control system, State Space representation: State equation, output equation, state transition Matrix, state transition equation, Characteristic Equations , state diagram, Controllability Canonical Form (CCF), Observability Canonical Form (OCF), Diagonal Canonical Form (DCF) , Jordan Canonical Form (JCF), controllability, observability of control system, Time domain analysis of control system, Stability of control system, Rowth Hurwitz criterion.

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	10% (10)	3,6,11,14	LO #1, 5, 8 and 9
	Assignments	8	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
Summative assessment	**Midterm Exam**	2 hr	25% (25)	8	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 to control system, Basic Components of a Control System, Open loop and closed loop control system
Week 2	Block diagram and block diagram reduction
Week 3	Signal flow graph; Masson gain formula
Week 4	Mathematical model
Week 5	State space representation: State equation, output equation
Week 6	state transition Matrix, state transition equation,
Week 7	From Differential Equations to State Diagrams, From State Diagrams to Transfer Function,
Week 8	Mid-term Exam
Week 9	From State Diagrams to State and Output Equations, Characteristic Equations, state diagram

Week 10	Controllability Canonical Form (CCF), Observability Canonical Form (OCF), Diagonal Canonical Form (DCF) , Jordan Canonical Form (JCF),
Week 11	Controllability and observability of control system
Week 12	Time domain analysis of control system: Typical Test Signals for the Time Response of Control Systems, The Unit-Step Response and Time-Domain Specifications, Steady-State Error steady-state error
Week 13	transient response of Transient Response of a Second-Order control system
Week 14	Stability of control system,
Week 15	Rowth Hurwitz criterion
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	
Week 8	
Week 9	
Week 10	
Week 11	
Week 12	
Week 13	
Week 14	
Week 15	

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

Required Texts	Automatic Control Systems 9th Edition by Farid Golnaraghi , Benjamin C. Kuo	Yes
Recommended Texts	Modern Control Engineering, 5th Edition by Katsuhiko Ogata	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	**Electronics and Communications Lab. II**			**Module Delivery**	
Module Type	**Core**			☐ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC312**				
ECTS Credits	**4**				
SWL (hr./sem)	**100**				
Module Level	3		**Semester of Delivery**	6	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor			**e-mail**		
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
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 Aims أهداف المادة الدراسية	1. To handle laboratory equipment and electrical elements professionally and scientifically. 2. To analyze electrical circuits and comprehend their operational principles. 3. To cultivate a scientific mindset in the student by interpreting practical results based on theoretical concepts. 4. To enhance the student's capability to design basic electronic circuits in accordance with their scientific aptitude. 5. To analyze and simulate circuit processes using various software tools on electronic calculators and compare the analysis results with practical outcomes.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Dealing with laboratory equipment and electrical elements in a professional and scientific manner(i). 2. Ability to analyze electrical circuits and understand the nature of their work(ii). 3. Building a scientific mentality for the student through his ability to interpret the practical results according to theoretical concepts(iii). 4. Develop the student's ability to design simple electronic circuits in line with his scientific abilities(iv). 5. Analyze and simulate the process circuit using different software on the electronic calculator and match the results of the analysis with the practical results(v).
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A - Circuit Components and values Digital Counter, Amplitude Modulation and Demodulation , Analysis of FM , 8086 Study of Finite Length Dipole Antenna , PCM , Design of a timer using the IC-555 , No load test of D.C. shunt generator , Digital –To- Analog Converters , Voltage regulators No load test of D.C. shunt generator and Speed and Direction Control of D.C shunt Motor using voltage control [10hrs.] Quizzes [1 hr.] Part B- Circuit reduction Class A Power Amplifier and Phase Splitter, Push-Pull & Complementary Power Amplifiers (Class AB power amplifier), Transmission line characteristics (Coaxial Cable), Three Phase Power Measurements, Speed and Direction Control of D.C shunt Motor using voltage control method and Encoder& Decoder. [20 hrs.] Revision problem and tutorial classes [10hrs.] Quizzes [1 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
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**	1	10% (10)	4,8,12	All
	Report	2	10% (10)	1 to 15	All
	Practical Exam	1	20%(20)	8,15	
Summative assessment	**Theoretical Exam**	1	10% (10)	7	All
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Operational amplifier
Week 2	Operational amplifier application

Week 3	Digital Counter
Week 4	Amplitude Modulation and Demodulation
Week 5	Analysis of FM.
Week 6	8086
Week 7	**Study of Finite Length Dipole Antenna**
Week 8	**PCM**
Week 9	**Design of a timer using the IC-555**
Week 10	**No load test of D.C. shunt generator**
Week 11	**Digital –To- Analog Converters**
Week 12	**Voltage regulators**
Week 13	**No load test of D.C. shunt generator**
Week 14	**Speed and Direction Control of D.C shunt Motor using voltage control**
Week 15	8086 application

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts		No
Recommended Texts		No
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**English Language**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**EEEC313**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level		3	**Semester of Delivery**		6
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	Dr. Mohammed Tariq Yaseen		**e-mail**	mtyaseen@uomosul.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		Doctor
Module Tutor			**e-mail**		
Peer Reviewer Name		اسم مُراجع الملف	**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date		10/06/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The aims of the module are to 1. Foster the development of problem-solving skills, with a particular emphasis on speaking, reading, writing, and listening, while also gaining a comprehensive understanding of the English language as a foreign language through the utilization of various techniques. 2. Comprehend the fundamental principles of the English language. 3. Explore the foundational concepts essential for learning the key principles of English grammar and expanding English vocabulary. 4. Establish a solid foundation for proficient English writing and speaking. 5. Gain a comprehensive understanding of constructing grammatically accurate English sentences.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completing the course, students will be able to: 1. Demonstrate proficiency in utilizing main and auxiliary verbs, as well as possessive pronouns. 2. Compile a comprehensive list of words associated with questions and various subject pronouns. 3. Engage in conversations concerning social expressions and personal information, particularly regarding jobs, using affirmative, negative, and interrogative sentences. 4. Discuss the usage of adjectives and their placement within sentences. 5. Construct simple present sentences using "I," "we," "you," and "they," and accurately define the usage of articles. 6. Describe the present simple tense utilizing "he" and "she," and explore adverbs of frequency. 7. Identify basic question words and demonstrative pronouns, and effectively apply them in different contexts. 8. Examine the usage of "there is/are" and various prepositions. 9. Analyze the structure of simple past sentences and irregular verbs. 10. Explain the negative and interrogative structures of simple past tense sentences, along with adverbs associated with the past tense. 11. Recognize the usage of multiple adverbs and the use of "can/can't" in sentences, while explaining requests and offers. 12. Elaborate on the usage of "like" and "would you like," as well as the application of "some" and "any" in various expressions. 13. Discuss the application of the present continuous tense and distinguish it from the present simple tense. 14. Explain the structures employed to refer to future plans.
Indicative Contents المحتويات الإرشادية	The indicative content of the course comprises the following: 1. Introduction to the significance of English language acquisition and its role in social communication.

	2. Application and practice of various tenses, such as present and past tenses. 3. Comprehensive exploration of key concepts, including offers, requests, future, personal expressions, and different tenses. 4. Utilization of a range of skills to facilitate English language learning, including listening, reading, writing, and speaking. Additionally, providing diverse examples to enhance understanding of concepts and structures.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategies adopted in delivering this module include: • Encouraging active participation and fostering critical thinking skills through engaging students in discussions. • Applying the communicative approach to enhance students' English language learning skills and enable effective communication. • Incorporating authentic materials in the classroom to create a realistic and immersive learning experience. • Emphasizing student motivation and promoting their engagement in the learning process. • Enhancing interaction and communication skills to achieve greater success in English language proficiency.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Develops further knowledge of the grammar and of essential vocabulary in order to lead the students to an advanced level of proficiency.
Week 2	Emphasis is placed on developing listening
Week 3	Emphasis is placed on developing speaking,
Week 4	Emphasis is placed on developing reading
Week 5	Emphasis is placed on developing writing
Week 6	grammar and fundamental writing skills
Week 7	**Midterm Exam**
Week 8	Understand the main ideas of a variety of written and spoken texts
Week 9	Participate effectively in a short conversation using appropriate language.
Week 10	Select appropriate vocabulary to talk about feelings and experiences.
Week 11	Select appropriate vocabulary to talk about opinions and experiences.
Week 12	Recognize, understand and use a number of phrasal verbs and collocations.
Week 13	Effective organizational strategies that include introductions, and paragraphs.
Week 14	Effective organizational strategies that include transitions, and conclusion.
Week 15	**Revision**
Week 16	**Preparatory week before the final Exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	John and liz Soar. (New Headway Beginner) 4th edition. Oxford: Oxford University Press.	Yes
Recommended Texts		No
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Analysis I**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ ☐ **Lecture** **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEPM301**				
ECTS Credits	**4**				
SWL (hr./sem)	**100**				
Module Level	3		**Semester of Delivery**	5	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor	Dr. Riyadh Zaki Sabry		**e-mail**	riyadhzaki@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Engineering Mathmatics I	**Semester**	1
Co-requisites module	Engineering Mathmatics II	**Semester**	2

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	On successful completion of this subject, students must be able: • To understand the concepts of z transform and to solve the difference equations. • Teaching student, the basic principles of function of complex variables.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Discrete time system analysis Z-transforms Inverse Z-transform Difference equations Series solution of differential equation. Power series Frobenious method Bessel differential equation Solutions of Bessel's Equation Applications of Bessel's Equation, functions of complex variables, ; Analytic functions integrations.
Indicative Contents المحتويات الإرشادية	

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.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	10% (5)	4,8,12	LO #1, 5, 8 and 9
	Assignments	10	10% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects / Lab.	0	0% (25)	Continuous	All
	Report	0	0% (0)	----	----
Summative assessment	**Midterm Exam**	2 hr	20% (10)	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	Discrete time system analysis , Z transform; sampling
Week 2	Region of convergence
Week 3	properties of z transform
Week 4	properties of z transform
Week 5	Inverse Z transform
Week 6	Convolution
Week 7	Difference equations
Week 8	Mid-term Exam
Week 9	Inverse Z transform
Week 10	Series solution of differential equation
Week 11	Power series Frobenious method
Week 12	Bessel differential equation
Week 13	Solutions of Bessel's Equation Applications of Bessel's Equation
Week 14	Functions of complex variables.
Week 15	functions of complex variables, ; Analytic functions integrations

Week 16	Preparatory week before the final Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, Inc; 10th Ed.; 2011.	Yes
Recommended Texts	Advanced Engineering Mathematics – Cengage Learning, Seventh Edition., 2007.	Yes
Websites		

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Transmission Systems**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEPM302**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level	3		**Semester of Delivery**	5	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor	Dr. Saad Enad Mohammed		**e-mail**	saadmohamed@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
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 Aims أهداف المادة الدراسية	1. Introduction to power transmission systems: The module aims to provide an overview of power transmission systems, including their importance in electrical power distribution networks. Students learn about the role of power transmission in delivering electricity from power plants to distribution substations. 2. Study of transmission system components: The module aims to familiarize students with the various components of a power transmission system. This may include topics such as transformers, circuit breakers, transmission lines, insulators, and protective devices. Students learn about the functions, characteristics, and operational considerations of these components. 3. Understanding transmission line parameters: The module aims to provide an understanding of transmission line parameters such as resistance, inductance, capacitance, and conductance. Students learn how these parameters affect the performance and efficiency of power transmission systems. 4. Safety and environmental considerations: The module aims to emphasize safety practices and environmental considerations associated with power transmission systems. Students learn about safety protocols, grounding techniques, electromagnetic fields, and environmental impacts of transmission line construction and operation. 5. Practical application and problem-solving: The module aims to develop practical skills in students for designing, analyzing, and troubleshooting power transmission systems. This may involve laboratory experiments, simulation exercises, case studies, and projects to reinforce theoretical concepts.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completion of the course, the student will be able to: 1. Demonstrate knowledge and understanding of the principles, theories, and concepts related to power transmission systems. 2. Explain the role and importance of power transmission systems in electrical power distribution networks. 3. Identify and describe the components of power transmission systems, such as transformers, circuit breakers, transmission lines, and protective devices. 4. Understand the parameters and characteristics of transmission lines, including resistance, inductance, capacitance, and conductance. 5. Apply problem-solving skills to troubleshoot and resolve issues related to power transmission system operation and performance. 6. Apply knowledge of power system reliability and maintenance techniques to ensure the proper functioning of transmission systems. 7. Utilize appropriate tools and techniques to analyze and improve the efficiency and reliability of power transmission systems.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Introduction of Transmission Systems:** Choice of Transmission Voltage, Overhead Transmission Lines (OHTL), Electrical Calculations of OHTL, Mechanical calculations of OHTL, Insulators of OHTL, Corona. [24 hrs.] Revision problem and tutorial classes [4 hrs.] Quizzes [2 hr.] **Representation of Overhead Transmission Lines:** Short and Medium Transmission Lines, Long Transmission Lines, Incident and reflected voltage, General Circuit Constant. [24 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [2 hr.] **Electrical Power Cables (EPC)**: Capacitance of EPC, Current Rating of Cables. [12 hrs.] Revision problem and tutorial classes [3 hrs.] Quizzes [1 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1/5	20% (20)	2, 7, 8, 12, 14	LO #2, 3, 4, 5 and 8
	Assignments	5	20% (20)	2 to 15	LO # 2, 4, 5, 7, and 8
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	7	LO # 1-6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction Transmission Systems
Week 2	Choice of Transmission Voltage.
Week 3	Overhead Transmission Lines (OHTL).
Week 4	Electrical Calculations of OHTL.
Week 5	Mechanical calculations of OHTL.
Week 6	Insulators of OHTL.
Week 7	Corona
Week 8	Representation of OHTL.
Week 9	Short and Medium Transmission Lines (TL).
Week 10	Long TL.
Week 11	Incident and reflected voltage.
Week 12	General Circuit Constant.
Week 13	Electrical Power Cables (EPC).
Week 14	Capacitance of EPC.
Week 15	Current rating of Cables.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. A course in Electrical Power by J. B. Gupta.	Yes
Recommended Texts	2. Principles of Power Systems by V. K. Mehta.	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	**AC Machines**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEPM303**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level		3	**Semester of Delivery**		5
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title		لقبه العلمي	**Module Leader's Qualification**		الشهادة
Module Tutor	Dr. Yasir M.Y. Ameen		**e-mail**	Yasir_752000@uomosul.edu.iq	
Peer Reviewer Name		اسم مُراجع الملف	**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Basics of Electrical Engineering II	**Semester**	2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Understand the concept of rotating magnetic field and understand the principles of the rotating AC machines (induction machines and synchronous machines). 2. Understand and know how to use the equivalent circuit of the induction machine and the synchronous machine. 3. Understand power flows and the power flow diagram. 4. Understand the torque-speed characteristic curve. 5. Understand the philosophy and benefits of speed control methods, starting methods and braking methods. 6. Understand the induction machine used as a generator. 7. Understand the phasor diagrams for a synchronous machine. Understand the equations for power and torque in a synchronous machine, understand how terminal voltage varies with load in a synchronous generator operating alone. 8. Understand the conditions required to parallel two or more synchronous generators, and understand the operation of synchronous generators in parallel with infinite bus. 9. Understand the static stability limit of a synchronous generator. Understand synchronous machine ratings, and what condition limits each rating value. 10. Understand the effect of governor set point changing, load changing and field current changing on the synchronous machine variables. 11. Understand how and why power factor varies as synchronous motor field current varies -the "V" curve.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of this module, students will be able to: 1- Explain the concept of a rotating magnetic field and its significance in AC machines. 2- Demonstrate a comprehensive understanding of the principles underlying the operation of induction machines and synchronous machines. 3- Apply equivalent circuit models to analyze and predict the behavior of induction machines and synchronous machines. 4- Analyze power flows and power flow diagrams in AC machines, considering factors affecting power transfer and distribution. 5- Interpret and analyze torque-speed characteristic curves, enabling the prediction of machine performance under different operating conditions. 6- Evaluate and understand the operation of induction machines as generators, including considerations for efficient generator mode operation. 7- Construct and interpret phasor diagrams for synchronous machines, and use them to analyze and predict machine behavior.

	8- Formulate equations for power and torque in synchronous machines and demonstrate an understanding of how terminal voltage varies with load in a synchronous generator operating independently. 9- Identify and comprehend the conditions required for parallel operation of synchronous generators, and evaluate the operation of synchronous generators in parallel with an infinite bus. 10- Assess the static stability limit of synchronous generators and understand synchronous machine ratings, recognizing the factors that limit each rating value. 11- Analyze the effect of changing governor set points, loads, and field currents on synchronous machine variables, and predict the impact of these changes on machine performance. 12- Analyze the relationship between synchronous motor field current and power factor variations using the "V" curve, explaining how and why power factor varies in synchronous motors.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A: Overview [10hr]** 1- Introduction to AC Machines. - Overview of AC machines and their importance in electrical engineering . - Historical background and development of AC machines 2- Rotating Magnetic Field -Concept of a rotating magnetic field -Generation and properties of a rotating magnetic field **Part B: Induction Machines [25 hr]** -Construction and working principles of induction machines -Induction machine equivalent circuit. -Power and torque equations in induction motor -Torque-speed characteristics of induction machines. -speed control methods of induction motor. -Finding equivalent circuit parameters. -Induction machine as a generator. **Part C: Synchronous Machines [40 hrs]** -Construction and working principles of synchronous machines -Synchronous machine equivalent circuit -Phasor diagrams for synchronous machines -Power and torque equations in synchronous machines and Power Flow Diagrams -Variation of terminal voltage with load in synchronous generators -Synchronous Generators operating alone. -Parallel Operation of Synchronous Generators and Conditions required for parallel operation of synchronous generators -Operation of synchronous generators in parallel with an infinite bus -Stability and Ratings of Synchronous Generators

	-Effect of governor set point changes and filed current changes on synchronous generator variables -Impact of load changes and filed current changes on synchronous motor performance. Synchronous machine "V" Curves.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lectures: Conduct regular lectures to deliver theoretical concepts and foundational knowledge. Use multimedia presentations, diagrams, and examples to enhance understanding. Encourage student participation through discussions and questions. Practical Laboratory Sessions in cooperation with the Course of the Power and Machine Lab to provide students with practical experience in operating AC machines. Case Studies and Problem-Solving Exercises: Assign case studies and problem-solving exercises that simulate real-world scenarios related to AC machines. Encourage students to apply their theoretical knowledge to analyze and solve these problems, fostering critical thinking and problem-solving skills. Group Discussions and Peer Learning: Organize group discussions and collaborative learning activities where students can discuss and share their understanding of AC machines. Encourage peer-to-peer teaching and learning, promoting active engagement and the exchange of ideas. Simulations and Virtual Labs: Utilize computer-based simulations and virtual labs to supplement practical learning. These tools can provide interactive experiences and allow students to experiment with different AC machine configurations and operating conditions. Guest Lectures and Industry Visits: Invite industry experts or guest lecturers to share their practical experiences and insights related to AC machines. Arrange visits to relevant industrial facilities to provide students with exposure to real-world applications and challenges. Online Resources and Learning Management Systems: Provide access to online resources, including lecture notes, reference materials, and interactive tutorials. Utilize a learning management system to facilitate communication, assignment submissions, and online discussions. Assessments: Design a variety of assessments, including quizzes, assignments, and examinations, to evaluate students' understanding of the course material. Incorporate practical assessments, such as simulation-based projects, to assess hands-on skills.

	Feedback and Progress Monitoring: Provide timely and constructive feedback to students on their assignments and assessments. Monitor students' progress throughout the course and offer additional support or clarification when needed. Industry-Engaged Projects: Assign project work that requires students to apply their knowledge of AC machines to real-world problems or industry-related challenges. This could involve designing a motor control system, optimizing power flows, or analyzing the performance of a synchronous generator. By employing a combination of these learning and teaching strategies, students can develop a solid theoretical understanding of AC machines while also gaining practical skills and the ability to apply their knowledge in real-world scenarios.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

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

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	15% (15)	2,7,14	LO #1, 2-6, 7-11
	Assignments	2	10% (10)	2 to 14	LO # 2-6, 7,8,10,11
	Projects / Lab.	0	0% (0)	----	----
	Report	1	5% (05)	14	All
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	7	LO # 1-6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introducing to rotating electrical machines and their classifications, Introducing to Rotating MMF Theorem.
Week 2	Construction and characteristics of 3-phase induction motors, Equivalent circuit of three-phase induction machines.
Week 3	Power and torques in three-phase induction machines, Maximum torque and Torque-Speed characteristics.
Week 4	NEMA Design classes of induction motor rotors, Tests to obtain equivalent circuit parameters.
Week 5	Speed control, starting and braking methods of three-phase induction motors.
Week 6	Introduction to Induction generators, Induction generators operating.
Week 7	Construction and characteristics of 3-phase synchronous machines, Derive the equivalent circuit of the synchronous machines, and understand power and torques equations
Week 8	Phasor diagram of synchronous machines for different conditions
Week 9	Operating synchronous generator alone (P-F and Q-V characteristics), Conditions and advantages of parallel operation of S.G, operating with another generator.
Week 10	Parallel operation of S.G with infinite busbar, Understand the effect of Changing governor set point and changing of the field current
Week 11	Rating Limitations of Synchronous generator.
Week 12	Synchronous motors, equivalent circuit, PF control, effect of load changing and field current changing on the motor variables.
Week 13	Phasor diagrams of synchronous machine and V-curves for different cases, Starting methods of Synchronous motors
Week 14	Open and short circuit tests and obtain equivalent circuit parameters, Voltage regulation of synchronous generator
Week 15	General review.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Stephan J. Chapman., Electric Machinery Fundamentals, (5th Edition), McGraw-Hill, New York,2012.	AS PDF

Recommended Texts	J. Hindmarsh, *Electrical Machines and their applications*, *(4th Edition)*, Pergamon Press, Oxford. New York. 1977. V.K Mehta and Rohit Mehta, *principles of electrical machines*, 2nd edition 2008, S.Chand &company LTD د باسل محمد سعيد و د ضياء علي النعمة." *مكائن التيار المتناوب"* مطبعة جامعة الموصل 1989	AS PDF
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
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Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electrical Measurements**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEPM304**				
ECTS Credits	**4**				
SWL (hr./sem)	**100**				
Module Level		3	**Semester of Delivery**		5
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title		لقبه العلمي	**Module Leader's Qualification**		الشهادة
Module Tutor	Dr. Wael Hashem Hamdon		**e-mail**	Waelhashem_67@uomosul.edu.iq	
Peer Reviewer Name		اسم مُراجع الملف	**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Basics of Electrical Engineering I	**Semester**	One
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To understand what is the electrical measurements. 2. To learn what is instrumentation system. 3. To know what are the sources of errors in electrical measurements and how to fix them. 4. To familiarize the students to various types of measuring instruments and their performance characteristics. 5. To design the multi-range ammeters, voltmeters and ohmmeters for both AC and DC circuits. 6. To learn the bridges and their types and how to use them in electrical measurements. 7. To know the oscilloscopes and their applications 8. To explain what are the transducers and their types and their usage in measurements.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Student is able to understand the basic principles of measuring instruments related to Electrical Engineering and choose a proper measuring instrument suitable for any given application taking into consideration the operating conditions
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **<u>Part A – Electrical Measurement Principle</u>** Basics, instruments classifications, linearity, Errors. Units [12 hrs.] Revision problem and tutorial classes [3 hrs.] Quizz [1 hr.] **<u>Part B- Electromechanical instruments</u>** Principle work, Torques types, PMMC, multi-range voltmeters, ammeters, ohmmeters, rectifier type voltmeter. [10 hrs.] Revision problem and tutorial classes [3 hrs.] Quizz [1 hr.] Mid-term exam [2 hr.] **<u>Part C- Oscilloscope and bridges</u>** Oscilloscopes and their applications, DC and AC bridges. [12 hrs.] Revision problem and tutorial classes [3 hrs.] Quizz [1 hr.] **<u>Part D- Transducers</u>** Transducers, types applications. [8 hrs.] Revision problem and tutorial classes [3 hrs.] Quizz [1 hr.] Final exam [3 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	20% (20)	3,6,11and13	LO #1, 5, 8 and 9
	Assignments	10	20% (20)	3 to 12	LO #1, 2, 4, 6 7, 8,9,10 and 12
	Projects / Lab.			----	----
	Report	0	0% (0)	----	----
Summative assessment	**Midterm Exam**	2 hr	10% (10)	9	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	Basic Concept of electrical measurements, what are the Instrument, Resolution. Accuracy, Precision, etc. What are the instrumentation system with some example
Week 2	Classification of measurements instruments, the linearity of measurements instruments.
Week 3	Units and system of units, SI units, fundamental and derived units
Week 4	Errors in electrical measurements, How to reduce them.
Week 5	Electromechanical instrument, How it is work, the torque types, Examples
Week 6	Permanent magnet moving coil PMMC, Multi-range Voltmeter and Ammeter design. Examples.
Week 7	Series and shunt ohmmeter design, voltmeter-ammeter method to resistance measurement. Examples.
Week 8	Rectifier type voltmeter. Examples.
Week 9	Mid-term exam
Week 10	Oscilloscope
Week 11	Oscilloscope applications
Week 12	Direct current bridges
Week 13	Alternative current bridges
Week 14	Transducers, their types, how to classify them.
Week 15	Resistance, inductive, capacitive change transducers
Week 16	**Final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Electronic Instrumentation And Measurements Techniques by William David copper.	Yes
Recommended Texts	Electrical and Electronic Measurements by Dr. Ahmed A. Montaser	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	**Power Electronics II**			**Module Delivery**	
Module Type	**Core**			☐ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**EEPM305**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level	3		**Semester of Delivery**	5	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor	1-Dr. Mohamad N. Abdul Kadir		**e-mail**	makadr@uomosul.edu.iq	
Peer Reviewer Name	Dr Yasir Muhammed Yonus		**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	1-Power Electronics I	**Semester**	five
Co-requisites module	Power and Machines Lab. II	**Semester**	six

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

أهداف المادة الدراسية	1. Introduce the undergraduate students to the principle of semiconductor switch-based conversion in power electronics. 2. The analysis of power components and important factors when dealing with nonsinusoidal quantities. 3. Focus on the features and benefits of power electronics circuits and apricate its importance in modern electrical engineering systems such as energy processing and conditioning. 4. To introduce the features and characteristics the common power switching devices. 5. To introduce the single-phase and three-phase phase-controlled power converter circuits. 6. To relate the steady state and transient analysis of phase-controlled power converter circuits to the converter performance and design.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the completion of the course, the students should be able to: 1. Define the scope, tools types and applications of power converters. 2. Calculate the assess the figures of merits used to describe the quality of non-ideal waveforms in power electronics converters. 3. Describe the behavioral characteristics and ratings of power switching semiconductor devices such as diodes, Thyristors, MOSFETs and IGBTs. 4. Analyze single-phase and three-phase power diode circuits, evaluate input-output performance parameters with idealized load models. 5. Analyze single-phase and three-phase power SCR controlled rectifier circuits with various load models. 6. Describe and Analyze the single-phase and three-phase SCR-AC controller circuits with R and RL loads.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **<u>Part A – Introduction, definitions and tools</u>** Power Electronics: definitions, approach and applications. [2 hrs.] Figures of Merits: Ripple factor, Total harmonic distortion, Form factor, Power factor (non-sinusoidal waveform), conversion efficiency. [4 hrs.] Review of circuit analysis tools [6 hrs.] Quizzes [1 hr.] **<u>Part B- Semiconductor Switching Devices</u>** combining sources, Combining resistive elements in series and parallel, delta and star transformation. [12 hrs.] Revision problem and tutorial classes [8 hrs.] Lab. [8 hrs.] Quizzes [1 hr.] **<u>Part C- Phase-controlled AC-DC converters</u>**

	Kirchhoff's laws and Ohm's law. Introduction to mesh and nodal analysis, Introduction to Thevenin and Norton theory, maximum power transfer, introduction to superposition theory. [24 hrs.] Revision problem and tutorial classes [16 hrs.] Lab. [16 hrs.] Quizzes [1 hr.] **Part D- Phase-controlled AC-AC controllers**

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 some activities through a simple project to guide the students to self-learning, report writing and scientific debate skills.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	15% (15)	4,8,12	2, 3, 4, 5
	Assignments	2	10% (10)	5,13	2, 3, 4, 6
	Projects / Lab.	0	0 (0)	-----	----

	Report	1	5% (5)	11	3,5
Summative assessment	**Midterm Exam**	1	20% (20)	9	1-4
	Final Exam	3hr	50% (50)	16	1-6
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction: Definitions, Power and Energy, Types of Conversion, Power Electronics Approach. The role of switch in power converter, Energy recovery.
Week 2	Power Computations: Mean, RMS, Figures of Merits
Week 3	Methods of Analysis of switching circuits: closed form solution, discrete analysis, Fourier-based analysis
Week 4	Power Diodes: Steady-state characteristics, basic parameters and ratings, transient characteristics, Special Diodes.
Week 5	SCRs: Steady-state characteristics, basic parameters and ratings, controlling SCR by gate pulses.
Week 6	Half-wave diode rectifiers: R-load, RL-Load, freewheeling diode and capacitor filter.
Week 7	Full-Wave diode rectifier R, RL load and freewheeling diode.
Week 8	Controlled Full-Wave rectifier R, RL load and freewheeling diode.
Week 9	Three-phase three-pulse rectifier
Week 10	Six-pulse diode rectifier with R and highly inductive load
Week 11	Analysis of six-pulse diode rectifier with RLE load
Week 12	Diodes and SCR sizing / voltage and current selection.
Week 13	AC –Controller: Single phase with R/RL-Load
Week 14	AC –Controller: Three - phase with R-Load
Week 15	AC controller: integral cycle control.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Power Electronics by Daniel W. Hart, ISBN 978-0-07-338067-4. McGraw Hill (2010)	No
Recommended Texts	-Power electronics Devices, circuits, and Applications (Fourth Edition) by Muhammad H. Rashid, ISBN 978-0-13-312590-0 , Pearson 2014 -Power Electronics Basics, by Yuriy Rozanov, Sergey Ryvkin, Evgeny Chaplygin and Pavel Voronin. ISBN 978-1-4822-9880-2, CRC Press 2016 -POWER CONVERTER CIRCUITS By Shepherd and Zhang ISBN: 0-8247-5054-3, Marcel Dekker 2004	No
Websites	https://classroom.google.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	**Power and Machine Lab. I**			**Module Delivery**	
Module Type	**Support**			☐ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEPM306**				
ECTS Credits	**4**				
SWL (hr./sem)	**100**				
Module Level	3		**Semester of Delivery**	5	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor	م. عمر تراث+كادر المختبر		**e-mail**		
Peer Reviewer Name	ا.م.د. ياسر محمد يونس		**e-mail**	Yasir_752000@uomosul.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 Aims أهداف المادة الدراسية	1- Measure and analyze transformer circuit model parameters and Identify and comprehend the different connection types of three-phase transformers. 2- Gain a basic understanding of the operation characteristics of DC generators. 3- Control the speed of DC motors and understand the underlying principles. 4- Apply triggering and gate drive approaches to power semiconductor devices and gain an understanding of rectifier, chopper, and inverter circuits. Additionally, explore the fundamentals of electrical machine drive systems. 5- Gain a basic understanding of Programmable Logic Controllers (PLCs) and their applications. 6- Develop foundational knowledge of electronic circuits, including decoders, encoders, and the 555IC.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of the Power and Machine Lab I course, students will be able to: 1- Measure and analyze the circuit model parameters of transformers, gaining a comprehensive understanding of their characteristics and performance. Identify and differentiate between various connection types of three-phase transformers, understanding their applications and operational considerations. 2- Apply control methods to regulate the speed of DC motors, considering the underlying principles and techniques involved. 3- Measure, analyze and Identify the operation of dc and ac generator 4- Utilize triggering and gate drive approaches for power semiconductor devices, while comprehending the basic principles and practical applications of rectifier, chopper, and inverter circuits. Additionally, develop a fundamental understanding of electrical machine drive systems. 5- Demonstrate a basic understanding of Programmable Logic Controllers (PLCs), including their functionality, programming concepts, and application in automation and control systems. 6- Acquire foundational knowledge in electronic circuits, specifically decoders, encoders, and the 555IC, comprehending their principles, applications, and integration into electronic systems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A – power and machine** 0pen and short circuit test for single-phase Transformer. Speed and direction control of D.C. shunt motor using voltage control method Three-phase Power measurement. Speed Control of D.C shunt Motor using field control method. Speed Control of DC Shunt Motor

	Using Armature Voltage Control Method. No load test of D.C. shunt generator. shunt generator load test. Single phase transformer load test. [32 hrs.] Revision problem and tutorial classes [10hrs.] Quizzes [1 hr.] **Part B- Power Electronics** Thyristor Controllable Rectification Circuit. Three phase full wave Rectifier. The triac light dimmer control circuit. DC-DC Converters. [12 hrs.] Revision problem and tutorial classes [6hrs.] Quizzes [1 hr.] **Part c- Electronics** The operation Amplifier. Decoder, Encoder circuit. Integrating and differentiating circuit. Digital counter [12 hrs.] Revision problem and tutorial classes [6hrs.] Quizzes [1 hr.]

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. Through hands-on experiments, projects, and laboratory work, students will gain practical skills and knowledge in the areas of power applications, electrical machines, power electronics, and electronic circuits. This course aims to provide students with a comprehensive understanding of measurement techniques, control methods, and practical applications in the field of electrical engineering.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
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	1	5% (5)	8	All
	Report	10	15% (15)	1 to 15	All
	Practical Exam	1	20%(20)	8,15	All
Summative assessment	Theoretical Exam	1	10% (10)	7	All
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Speed and direction control of D.C. shunt motor using voltage control method.
Week 2	No-load test of D.C. shunt generator.
Week 3	0pen and short circuit test for single-phase Transformer.
Week 4	Three-phase Power measurement.
Week 5	Thyristor Controllable Rectification Circuit & The triac light dimmer control circuit.
Week 6	Three phase full wave Rectifier.
Week 7	Decoder and Encoder and 555IC .
Week 8	Speed Control of D.C shunt Motor using field control method.
Week 9	DC shunt generator load test.
Week 10	Single phase transformer load test.
Week 11	Three Phase Transformer connection.
Week 12	DC-DC Converters (boost).
Week 13	Triggering of SCR using OP-AMP 741and Buck DC–DC Converter.
Week 14	The Operational Amplifier and Digital counter.
Week 15	Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	ELECTRICAL MACHINES-I LABORATORY MANUAL, BY Lab . staff	YES
Recommended Texts	1- P. C. Sen, "Principles of Electrical machines and power electronics", 2nd edition, John Wiley & Sons. 2- M H Rashid, "Power Electronics – circuits, devices and applications", 3rd edition, Pearson Education. 3- Robert L. Boylestad , Louis Nashelsky Electronic Devices and Circuit Theory 10th Edition	No
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Analysis II**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ **Lecture** **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEPM307**				
ECTS Credits	**4**				
SWL (hr./sem)	**100**				
Module Level	3		**Semester of Delivery**	6	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor	Dr. Riyadh Zaki Sabry		**e-mail**	riyadhzaki @uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Engineering Mathmatics I	**Semester**	1
Co-requisites module	Engineering Mathmatics II	**Semester**	2

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Solving the 2nd order differential equation and Bessel differential equations by series solutions. 2. Students learn the principals of the wave equation for one and two dimensions. 3. To introduce the fundamentals of numerical methods used for the solution of engineering problems and to improve the computer skills of the students.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Partial Differential Equations. One dimensional wave equation Separation of variables, Vibrating string, two-dimensional wave equation, transmission line, Introduction to Complex Variables Complex number system and its operations, Limits and sequences Continuous functions and their properties, Derivatives complex integration and Cauchy integral theorems. Concepts and role for the numerical method in engineering, Numerical Solution of Nonlinear Algebraic Equations, Open Methods, Numerical Solution of linear algebraic equations, Curve Fitting
Indicative Contents المحتويات الإرشادية	

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.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem)	37	**Unstructured SWL (h/w)**	2.4

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	1	10% (5)	4,8,12	LO #1, 5, 8 and 9
	Assignments	10	10% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects / Lab.	0	0	0	0
	Report	0	0	----	----
Summative assessment	**Midterm Exam**	2 hr	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	Partial Differential Equations. One dimensional wave equation Laplace equation Derivatives
Week 2	Separation of variables
Week 3	vibrating string, two-dimensional wave equation, transmission line
Week 4	Introduction to Complex Variables
Week 5	Complex number system and its operations
Week 6	Limits and sequences Continuous functions and their properties
Week 7	complex integration and Cauchy integral theorems
Week 8	Mid-term Exam
Week 9	Concepts and role for the numerical method in engineering, approximations, and errors, the definition of Round-off error and truncation error, absolute and rel ative true/approximation error.
Week 10	Numerical Solution of Nonlinear Algebraic Equations (Roots of Equations): Bracketing Methods (Bisection, and False-Position method)
Week 11	Open Methods (Newton-Raphson and secant method).

Week 12	Numerical Solution of linear algebraic equations (system): the difference between the direct and indirect methods, Singular and ill/wel1-conditioned system, Parlial and complete Pivoting, Convergence Criteria, Jacobi iterative method.
Week 13	The gauss-Seidel iterative method, Gauss-Seidel iterative with the relaxation factor method. Tri-diagonal systems and its solution.
Week 14	Curve Fitting: Classification of Curve Fitting (Regression and Interpolation), the concepts of regression, and Least Square Criterion, Linear Regression.
Week 15	Introduction another to another methods (finite difference, finite volume, finite element method
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, Inc; 10th Ed.; 2011. Applied Numerical Methods with MATLAB for Engineers and Scientists ,Steven C. Chapra,2018	Yes
Recommended Texts	1- Numerical Analysis Using Matlab and Excel, Steven T. Karris, Third Edition, 2007.	YES
Websites		

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Generation Systems**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEPM308**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level		3	**Semester of Delivery**		6
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title		لقبه العلمي	**Module Leader's Qualification**		الشهادة
Module Tutor	Dr. Saad Enad Mohammed		**e-mail**	saadmohamed@uomosul.edu.iq	
Peer Reviewer Name		اسم مُراجع الملف	**e-mail**	بريده الالكتروني	
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 Aims أهداف المادة الدراسية	1. Power Generation Technologies: The module aims to introduce students to different power generation technologies, such as thermal power plants, hydroelectric power plants, nuclear power plants, renewable energy sources (solar, wind, biomass, etc.), and their characteristics. It covers the principles of operation, components, efficiency, and environmental impacts of these power generation technologies. 2. Power Distribution Systems: The module aims to familiarize students with the distribution of electrical power from the transmission grid to end-users. It covers distribution network design, components, and operation, including substations, distribution transformers, switchgear, and protection systems. Students learn about the challenges associated with distribution system operation, such as voltage regulation, power quality, and reliability.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completion of the course, the student will be able to: 1. Knowledge of Power Generation Technologies: Students will acquire a comprehensive understanding of various power generation technologies, including thermal, hydroelectric, nuclear, and renewable energy sources. They will grasp the principles of operation, components, efficiency, and environmental impacts associated with each technology. 2. Familiarity with Power Distribution Systems: Students will gain a solid understanding of power distribution systems, including network design, components, and operation. They will become knowledgeable about substations, distribution transformers, switchgear, and protection systems. They will understand the challenges associated with voltage regulation, power quality, and system reliability in distribution networks. 3. Students will be able to apply engineering principles and concepts to solve practical problems related to power generation and distribution systems. They will develop problem-solving skills and apply their knowledge to design efficient and reliable power systems, address system vulnerabilities, and optimize system performance.
Indicative Contents	

المحتويات الإرشادية	Indicative content includes the following. **Generation Systems:** Introduction and Definitions of Primary and secondary energy, commercial and noncommercial Energy, renewable and non-renewable energy, Definitions: Load factor, utilization factor, capacity factor, diversity factor, demand factor, availability. Energy Generation in Power Plants: Hydro power plants, Thermal Power Plants, Steam Power Plant, Gas Power Plant, Combined Cycle Gas Power Plant, Nuclear Power Plant, Diesel Power Plants. Renewable Energy Systems: Solar energy system, Solar Thermal Power Plants, Wing energy systems, Geothermal systems, Biomass systems, Fuel Cell. [24 hrs.] Revision problem and tutorial classes [4 hrs.] Quizzes [2 hr.] **Distribution Systems:** Introduction, Classification of Distribution System, Methods of Connection, Comparison among Distribution Systems, Type of D.C Distributions: D.C Distributor fed at One End-Concentrated Loading, D.C Distributor fed at Both End- Concentrated Loading, D.C Distributor fed at One End with Uniformly Distributed Load, D.C Distributor fed at Both Ends with Uniformly Distributor Load, D.C Ring Distributor, Ring Distributor with Inter-Connector, Stepped Distributor, Classification of A. C. Distribution Systems. Methods of Connection, Single Phase Distribution Systems, Three Phase Distribution Systems. Types of A. C. Distribution Systems. A. C. Radial Systems: A. C. Distributor fed at one end. A. C. Distributor fed at both ends. A. C. Ring Systems Protection of Distribution Systems, Distribution Transformers, Types of Sub-Stations, Sub-Stations Measurements Devices. [24 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [3 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1/6	20% (20)	3, 5, 6, 8, 11, 14	LO # 1, 2, and 3
	Assignments	6	20% (20)	2 to 15	LO # 1, 2, and 3
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	7	LO # 1-6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction and Definitions of Primary and secondary energy.
Week 2	commercial and noncommercial Energy.
Week 3	renewable and non-renewable energy.
Week 4	Definitions: Load factor, utilization factor, capacity factor, diversity factor, demand factor, availability.
Week 5	Energy Generation in Power Plants: Hydro power plants, Thermal Power Plants, Steam Power Plant, Gas Power Plant, Combined Cycle Gas Power Plant, Nuclear Power Plant, Diesel Power Plants.
Week 6	Renewable Energy Systems: Solar energy system, Solar Thermal Power Plants, Wing energy systems, Geothermal systems, Biomass systems. Fuel Cell.
Week 7	Introduction to Distribution Systems.
Week 8	Classification of DC Distribution Systems.
Week 9	Comparison among Distribution Systems.
Week 10	Classification of AC Distribution Systems.
Week 11	Single Phase Distribution Systems.
Week 12	three Phase Distribution Systems.
Week 13	Distribution Transformers.
Week 14	Types of Sub-Stations.
Week 15	Sub-Stations Measurements Devices.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Power Distribution Planning Reference Book by H. Lee willis, 2014. 2. Electrical Distribution Systems by Dale R. Patrick and Stephen W. Fardo, 2009.	Yes
Recommended Texts	3. Electrical Engineering Fundamentals by S. Bobby Rauf, 2020.	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	**Electrical Machines Drives**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEPM309**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level	3		**Semester of Delivery**	6	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor	Dr. Yasir M.Y. Ameen		**e-mail**	Yasir_752000@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Basics of Electrical Engineering II	**Semester**	2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1- To introduce students to the fundamental concepts, theories, and principles of electrical machine drives. 2- To introduce students to the types of mechanical loads and understand steady state stability points in different operation quadrants. 3- To develop students' understanding of the different types of electrical machines and their operating characteristics. 4- To equip students with knowledge of power electronic converters used in electrical machine drives. 5- To familiarize students with control strategies for efficient and reliable operation of electrical machine drives. 6- To enable students to analyze and evaluate the performance of electrical machine drive systems. 7- To encourage critical thinking and problem-solving skills through real-world case studies in the field of speed control, starting and braking of the electrical machines such as DC, induction and synchronous motors. 8- To promote awareness of emerging trends and technologies in the field of electrical machine drives, such as the field of electrical vehicles.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of this module, students will be able to: 1- Demonstrate a clear understanding of the fundamental concepts, theories, and principles underlying electrical machine drives. 2- Identify and classify different types of mechanical loads and comprehend the steady-state stability points associated with various operation quadrants. 3- Differentiate between different types of electrical machines, including DC, induction, and synchronous motors, and evaluate their operating characteristics. 4- Explain the functioning and operation of power electronic converters used in electrical machine drives. 5- Apply control strategies to ensure efficient and reliable operation of electrical machine drives. 6- Analyze and evaluate the performance of electrical machine drive systems. 7- Utilize critical thinking and problem-solving skills through real-world case studies focused on speed control, starting, and braking of electrical machines, such as DC, induction, and synchronous motors. 8- Demonstrate awareness of emerging trends and technologies in the field of electrical machine drives, particularly in areas like electric vehicles, and discuss their potential impact and applications.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Introduction to Electrical Machine Drives • Overview of electrical machine drives and their importance in various industries

	• Introduction to fundamental concepts, theories, and principles of electrical machine drives • Introduction to mechanical loads and steady-state stability points in different operation quadrants • Types of Electrical Machines • Classification and characteristics of electrical machines, including DC, induction, and synchronous motors • Operating principles, construction, and key features of each type of electrical machine • Analysis of the operating characteristics, performance parameters, and limitations of electrical machines • Power Electronic Converters • Introduction to power electronic converters and their role in electrical machine drives • Detailed study of converter topologies and their applications in different types of electrical machines • Understanding the functioning and control of power electronic converters in electrical machine drive systems • Control Strategies for Electrical Machine Drives • Overview of control strategies for efficient and reliable operation of electrical machine drives • Study of speed control techniques, starting methods, and braking mechanisms for DC, induction, and synchronous motors • Application of control strategies to optimize the performance of electrical machine drives • Performance Analysis of Electrical Machine Drives • Analysis and evaluation of the performance parameters of electrical machine drive systems • Examination of efficiency, power factor, and torque production, of electrical machine drives • Techniques for assessing and improving the overall performance and reliability of electrical machine drive systems • Emerging Trends and Technologies • Exploration of emerging trends and technologies in the field of electrical machine drives • Investigation of advancements in electric vehicles and their impact on electrical machine drives • Discussion of cutting-edge research, innovations, and future directions in electrical machine drives

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lectures: Conduct regular lectures to deliver theoretical concepts and foundational knowledge. Use multimedia presentations, diagrams, and examples to enhance understanding. Encourage student participation through discussions and questions. Practical Laboratory Sessions in cooperation with the Course of the Power and Machine Lab to provide students with practical experience in operating Electrical machines drives . Case Studies and Problem-Solving Exercises: Assign case studies and problem-solving exercises that simulate real-world scenarios related to Electrical machines drives . Encourage students to apply their theoretical knowledge to analyze and solve these problems, fostering critical thinking and problem-solving skills. Group Discussions and Peer Learning: Organize group discussions and collaborative learning activities where students can discuss and share their understanding of AC machines. Encourage peer-to-peer teaching and learning, promoting active engagement and the exchange of ideas. Simulations and Virtual Labs: Utilize computer-based simulations and virtual labs to supplement practical learning. These tools can provide interactive experiences and allow students to experiment with different AC machine configurations and operating conditions. Guest Lectures and Industry Visits: Invite industry experts or guest lecturers to share their practical experiences and insights related to Electrical machines drives . Arrange visits to relevant industrial facilities to provide students with exposure to real-world applications and challenges. Online Resources and Learning Management Systems: Provide access to online resources, including lecture notes, reference materials, and interactive tutorials. Utilize a learning management system to facilitate communication, assignment submissions, and online discussions. Assessments: Design a variety of assessments, including quizzes, assignments, and examinations, to evaluate students' understanding of the course material. Incorporate practical assessments, such as simulation-based projects, to assess hands-on skills. Feedback and Progress Monitoring: Provide timely and constructive feedback to students on their assignments and assessments. Monitor students' progress throughout the course and offer additional support or clarification when needed. Industry-Engaged Projects: Assign project work that requires students to apply their knowledge of AC machines to real-world problems or industry-related challenges. This

	could involve designing a motor control system, optimizing power flows, or analyzing the performance of a synchronous generator. By employing a combination of these learning and teaching strategies, students can develop a solid theoretical understanding of Electrical machines drives while also gaining practical skills and the ability to apply their knowledge in real-world scenarios.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	7,11	LO #1-7
	Assignments	1	5% (5)	2 to 14	All
	Projects / Lab.	1	10% (10)	----	----
	Report	1	5% (05)	12	All
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	8	LO # 1-6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Overview for electrical drives, concept, classification, parts and advantages of electrical dives, applications of electrical drives in electrical vehicles
Week 2	Dynamic of the motor load system, components of load toques, electrical braking, steady state stability, ratings of converters and motors, speed control and multi quadrant operation, drive specifications
Week 3	Characteristics of dc motors, types of dc motors, steady-state speed torque relations, methods of speed control, starting, braking, multi quadrant operation of separately excited dc motor
Week 4	Power electronics drives classification, overview of semiconductor switching devices, single-phase dc drive(half-wave converter, semi converter, full-converter, dual converter)
Week 5	Three-phase dc drives (half-wave converter, semi converter, full-converter)
Week 6	Chopper drives (principle of power control, principle of regenerative control, principle of rheostatic brake control,
Week 7	Chopper drives, two and four quadrant drives, and General review of dc drives and evaluation the dc part
Week 8	AC drives (classifications, induction motor drives, speed control methods, stator voltage control
Week 9	Induction motor drives speed control using frequency control, V/f control,
Week 10	Speed control and starting methods of synchronous motors
Week 11	Course projects about Synchronous Motor Drives (speed control and introductions to types of SM, cylindrical rotor, salient-pole, reluctance, permanent-magnet , switched reluctance , brushless dc and ac motors), stepper motor drives, and scaler and vector control of IM
Week 12	Modern drives of EV (Reports)
Week 13	Projects discussion
Week 14	Projects discussion
Week 15	AC drive review.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1- "Fundamentals of Electric Drives", Gopal K Dubey, Narosa	AS PDF

	2- "Power Electronics", P.S. Bimbhra	
Recommended Texts	1- "Power Electronics", M. H. Rashid 2- "Electric Motor Drives – Modeling, Analysis and Control," R. Krishnan, Prentice-Hall of India. 3- "Electric Drives – Concepts and Applications", Vedam Subrahmanyam, Tata McGraw Hill	AS PDF
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Power Electronics II**			**Module Delivery**	
Module Type	**Core**			☐ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**EEPM310**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level		3	**Semester of Delivery**		6
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title		لقبه العلمي	**Module Leader's Qualification**		الشهادة
Module Tutor	1-Dr. Mohamad N. Abdul Kadir		**e-mail**	makadr@uomosul.edu.iq	
Peer Reviewer Name		Dr Yasir Muhammed Yonus	**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	1-Power Electronics I	**Semester**	five
Co-requisites module	Power and Machines Lab. II	**Semester**	six

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	This course is designed as the second part of Power Electronics I (EE305) course. In EE305 the students introduced to power switching devices and phase-controlled converters. This course focuses on PWM control applied to dc-dc and dc-ac converters with emphasis on design part. 1- DC-DC and DC-AC power conversion. The operating principles, design, characteristics and application of these electronic power converter circuits are treated, with the goal of equipping the students with capability to analyze and design such power supplies. 2- Various important topologies of power converter circuits for specific types of applications are covered and analyzed. These include DC-DC converters and inverters. 3- The course also analyze the qualities of waveforms at input and output ends of these converters. The quality of these waveforms is of major concern to users of modern power converter circuits. 4- The course covers some aspects of the design and application.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the completion of the course, the students should be able to: 1. Perform analysis of single- and multi-quadrant DC-DC chopper, and identify the fundamental control methods (current mode/voltage mode). 2. Analyze non-isolated DC-supply circuits: Buck, Boost, Buck-Boost and Cuk converters. 3. Perform a basic design (topology and components selection) of dc-supply circuit for a given application. 4. Describe the role of the transformer isolation and analyze the basic transformer-isolated dc-dc converters. 5. Present single-phase VSI half and full-bridges implementations. 6. Analyze the single-phase inverter operation in square-wave, quasi-square wave and PWM modes. 7. Define three-phase VSI, switching variables and operations as six step inverter. 8. Present carrier comparison control of three phase inverter.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **<u>Chapter 1: DC Choppers: (3 weeks)</u>** First quadrant, second quadrant, first and second quadrants, first and fourth quadrants and four quadrants choppers. Bridge Circuit switching function **<u>Chapter 2: non-isolated D.C power supply circuits: (4 weeks)</u>** Buck, boost, buck-boost, and Cuk regulators. **<u>Chapter 3: Transformer-Isolated DC supplies (2 weeks):</u>** Feedforward and flyback.

	Chapter 4: Single-phase and three-phase inverters. (6weeks) Square wave mode (half and full bridge circuits), quasi square wave operation and PWM of single-phase inverter Three phase inverter and its switching variables Pulse width modulation (PWM) strategies of three-phase inverter.

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 some activities through a simple project to guide the students to self-learning, software use, report writing and scientific debate skills.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	20% (20)	4,8,12	2, 3, 4, 5
	Assignments	2	5% (5)	5,13	2, 3, 4, 6
	Projects / Lab.	0	0 (0)	---	----
	Report	1	5% (5)	----	----
	Midterm Exam	1	20% (20)	10	1-4

Summative assessment	**Final Exam**	3hr	50% (50)	16	1-6
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction: PWM control explanation through an idealized converter.
Week 2	One and two dc quadrant choppers: topology and analysis.
Week 3	Four-quadrant chopper: analysis; voltage and current control.
Week 4	**Non-isolated DC Power supply circuits** Buck Converter, Boost Converter
Week 5	Buck-Boost, Cuk converter
Week 6	DC power supply circuits: discontinuous mode analysis
Week 7	DC power supply circuits comparison and design aspects
Week 8	Transformer Isolated DC supply circuit. The operation and analysis of transformer in power converters
Week 9	Fly-back Converter Forward Converter
Week 10	**(Mid-term exam)** **Chapter 6: AC Inverters** Single –Phase half-bridge inverter Square wave mode
Week 11	Single –Phase full-bridge Inverter Square wave mode Single –Phase Quasi square wave mode
Week 12	Single-Phase Inverter: PWM control Implementation and analysis using Fourier series analysis
Week 13	Three –Phase VSI: Square Wave Mode (six-step inverter)
Week 14	**Session 1:** Three –Phase VSI: Sinusoidal PWM **Session 2:** Three-Phase VSI: Carrier Comparison methods
Week 15	Analysis and design of three-phase inverter.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	INTRODUCTION TO MODERN POWER ELECTRONICS (third edition) by Andrzej M. Trzynadlowski; Wiley (2016)	No
Recommended Texts	-- Power Electronics: Converters, Applications and Design; by Mohan, Undeland and Robbins 3rd Edition (Wiley) -Fundamentals of Power Electronics, by Robert W. Erickson and Dragan Maksimovi´c, Third Edition, Springer (2020).	No
Websites	https://classroom.google.com/c/NDA5MDI4MDc5MzQz	

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 and Machine Lab. II**			**Module Delivery**	
Module Type	**Core**			☐ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEPM312**				
ECTS Credits	**4**				
SWL (hr./sem)	**100**				
Module Level	3		**Semester of Delivery**	6	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor	م. عمر تراث+كادر المختبر		**e-mail**		
Peer Reviewer Name	ا.م.د. ياسر محمد يونس		**e-mail**	Yasir_752000@uomosul.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 Aims أهداف المادة الدراسية	1- Understand parallel operation and zig-zeg connection of transformer. 2- Understand how the speed of dc motors can be controlled. 3- Understand the load test of dc motors. 4- Understand how to find Induction motor parameters. 5- Understand the triggering approaches of MOSFET transistor and learning the basic of the chopper and inverter circuits. 6- Apply the principles of electrical drives to real-world applications in industrial and commercial settings 7- Understand the basic of: Integrating and differentiating circuit., Shift Registers. Op-Amp and PLC.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completion of Lab 2, students will be able to: 1- Demonstrate a comprehensive understanding of the parallel operation and zig-zag connection of transformers, including their benefits, challenges, and practical applications. 2- Apply load test to the DC machines. 3- Conduct load tests on DC machine, analyze the performance characteristics, and interpret the results. 4- Determine the parameters of induction motors through practical experiments, including measurements and calculations, allowing for a thorough understanding of their operating characteristics. 5- Utilize triggering approaches for MOSFET transistors, applying the principles to design and analyze basic chopper and inverter circuits. Understand the advantages, limitations, and applications of these circuits. 6- Apply the principles of electrical drives to real-world applications in industrial and commercial settings, considering factors such as motor selection, control strategies, and energy efficiency. 7- Gain a basic understanding of integrating and differentiating circuits, shift registers, operational amplifiers (Op-Amp), and Programmable Logic Controllers (PLCs), including their principles, functionalities, and applications in electronic systems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A – power and machine** Determination of regulation of an alternator by Synchronous Impedance Method Three-phase induction motor (No-load & Locked rotor test) parallel Operation of Two Single-phase Transformers. Load test of D.C. series generator Three-phase induction motor. (Directional control and star -delta starting) Three-phase Synchronous generator (Load test) [32 hrs.] Revision problem and tutorial classes [10hrs.] Quizzes [1 hr.] **Part B- Power Electronics**

	PWM signal generation to control a D.C. chopper using Arduino Motor drive [12 hrs.] Revision problem and tutorial classes . full Bridge Inverter Automatic Control of Motor Drive ACH555 [12hrs.] Revision problem and tutorial classes [6hrs.] Quizzes [1 hr.] **Part c- Electronics** Design of a timer using the IC-555 Shift Registers . The concept of Analog to digital converter (ADC) using Arduino Introduction to PLC and Ladder Logic Programming [12 hrs.] Revision problem and tutorial classes [6hrs.] Quizzes [1 hr.]

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. Through hands-on experiments, projects, and laboratory work, students will gain practical skills and knowledge in the areas of power applications, electrical machines, power electronics, and electronic circuits. This course aims to provide students with a comprehensive understanding of measurement techniques, control methods, and practical applications in the field of electrical engineering.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
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**	1	5% (5)	8	All
	Report	10	15% (15)	1 to 15	All
	Practical Exam	1	20%(20)	8,15	All
Summative assessment	**Theoretical Exam**	1	10% (10)	7	All
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Determination of regulation of an alternator by Synchronous Impedance Method
Week 2	Three-phase induction motor (No-load & Locked rotor test)
Week 3	parallel Operation of Two Single-phase Transformers
Week 4	PWM signal generation to control a D.C. chopper using Arduino
Week 5	Motor drive
Week 6	Design of a timer using the IC-555 Or PLC applications
Week 7	(starting of synchronous motor
Week 8	Mid-term Exam
Week 9	Load test of D.C. series generator
Week 10	Three-phase induction motor. (Directional control and star -delta starting)
Week 11	Three-phase Synchronous generator (Load test)
Week 12	full Bridge Inverter
Week 13	Automatic Control of Motor Drive ACH555
Week 14	The concept of Analog to digital converter (ADC) using Arduino
Week 15	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**

Required Texts	ELECTRICAL MACHINES -II LABORATORY MANUAL, BY Lab . staff	YES
Recommended Texts	- P. C. Sen, "Principles of Electrical machines and power electronics", 2nd edition, John Wiley & Sons. - M H Rashid, "Power Electronics – circuits, devices and applications", 3rd edition, Pearson Education. - Robert L. Boylestad , Louis Nashelsky Electronic Devices and Circuit Theory 10th Edition	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**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**EEPM313**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level		3	**Semester of Delivery**		6
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	Dr. Mohammed Tariq Yaseen		**e-mail**	mtyaseen@uomosul.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		Doctor
Module Tutor			**e-mail**		
Peer Reviewer Name		اسم مُراجع الملف	**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date		10/06/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The aims of the module are to 1. Foster the development of problem-solving skills, with a particular emphasis on speaking, reading, writing, and listening, while also gaining a comprehensive understanding of the English language as a foreign language through the utilization of various techniques. 2. Comprehend the fundamental principles of the English language. 3. Explore the foundational concepts essential for learning the key principles of English grammar and expanding English vocabulary. 4. Establish a solid foundation for proficient English writing and speaking. 5. Gain a comprehensive understanding of constructing grammatically accurate English sentences.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completing the course, students will be able to: 1. Demonstrate proficiency in utilizing main and auxiliary verbs, as well as possessive pronouns. 2. Compile a comprehensive list of words associated with questions and various subject pronouns. 3. Engage in conversations concerning social expressions and personal information, particularly regarding jobs, using affirmative, negative, and interrogative sentences. 4. Discuss the usage of adjectives and their placement within sentences. 5. Construct simple present sentences using "I," "we," "you," and "they," and accurately define the usage of articles. 6. Describe the present simple tense utilizing "he" and "she," and explore adverbs of frequency. 7. Identify basic question words and demonstrative pronouns, and effectively apply them in different contexts. 8. Examine the usage of "there is/are" and various prepositions. 9. Analyze the structure of simple past sentences and irregular verbs. 10. Explain the negative and interrogative structures of simple past tense sentences, along with adverbs associated with the past tense. 11. Recognize the usage of multiple adverbs and the use of "can/can't" in sentences, while explaining requests and offers. 12. Elaborate on the usage of "like" and "would you like," as well as the application of "some" and "any" in various expressions. 13. Discuss the application of the present continuous tense and distinguish it from the present simple tense. 14. Explain the structures employed to refer to future plans.
Indicative Contents المحتويات الإرشادية	The indicative content of the course comprises the following: 1. Introduction to the significance of English language acquisition and its role in social communication.

	2. Application and practice of various tenses, such as present and past tenses. 3. Comprehensive exploration of key concepts, including offers, requests, future, personal expressions, and different tenses. 4. Utilization of a range of skills to facilitate English language learning, including listening, reading, writing, and speaking. Additionally, providing diverse examples to enhance understanding of concepts and structures.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategies adopted in delivering this module include: • Encouraging active participation and fostering critical thinking skills through engaging students in discussions. • Applying the communicative approach to enhance students' English language learning skills and enable effective communication. • Incorporating authentic materials in the classroom to create a realistic and immersive learning experience. • Emphasizing student motivation and promoting their engagement in the learning process. • Enhancing interaction and communication skills to achieve greater success in English language proficiency.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Develops further knowledge of the grammar and of essential vocabulary in order to lead the students to an advanced level of proficiency.
Week 2	Emphasis is placed on developing listening
Week 3	Emphasis is placed on developing speaking,
Week 4	Emphasis is placed on developing reading
Week 5	Emphasis is placed on developing writing
Week 6	grammar and fundamental writing skills
Week 7	**Midterm Exam**
Week 8	Understand the main ideas of a variety of written and spoken texts
Week 9	Participate effectively in a short conversation using appropriate language.
Week 10	Select appropriate vocabulary to talk about feelings and experiences.
Week 11	Select appropriate vocabulary to talk about opinions and experiences.
Week 12	Recognize, understand and use a number of phrasal verbs and collocations.
Week 13	Effective organizational strategies that include introductions, and paragraphs.
Week 14	Effective organizational strategies that include transitions, and conclusion.
Week 15	**Revision**
Week 16	**Preparatory week before the final Exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	John and liz Soar. (New Headway Beginner) 4th edition. Oxford: Oxford University Press.	Yes
Recommended Texts		No
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Satellite Communications**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC401**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level	4		**Semester of Delivery**	7	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor	Dr. Saad Ahmed Ayoob		**e-mail**	sa_ah_ay@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
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 Aims أهداف المادة الدراسية	1. To provide an understanding of the principles and technologies behind satellite communications.

	2. To teach the basics of satellite orbits and link budgets for satellite communications systems. 3. To provide an awareness of the various segments of a satellite communications system, including transponders and tracking, telemetry, command, and monitoring (TT&C). 4. To develop an understanding of signal propagation through the atmosphere, including ionospheric effects and rain attenuation. 5. To teach the different types of satellite access technologies, such as FDMA, TDMA, CDMA, and SDMA. 6. To provide knowledge of international standards and regulations governing satellite communications. 7. To develop an awareness of the various applications of satellite communications, including direct broadcast satellite (DBS) systems. 8. To teach students to perform link budget calculations and assess the feasibility of a satellite communications system.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding the evolution of satellite communications and its various applications. 2. Ability to calculate elevation and azimuth angles to the satellite. 3. Knowledge of frequency allocation for satellite communications. 4. Understanding the types of satellites and their respective orbits, as well as examples such as INTELSAT and U.S DOMSATS. 5. Knowledge of Kepler's laws and their application to satellite communications. 6. Understanding the various segments of satellite communications systems, including radio wave propagation and ionospheric effects. 7. Ability to calculate satellite link parameters, including EIRP, transmission losses, and noise temperature. 8. Knowledge of different satellite access technologies such as FDMA, TDMA, CDMA, and SDMA. 9. Understanding of international standards such as the T-carrier telephony system and compressor/expander technology. 10. Knowledge of centralized and decentralized control systems, including the SPADE system.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Project** is a phrase that can refer to a variety of tasks, activities, or deliverables in different contexts. Generally, a project involves a set of planned activities with a defined objective or goal [30 hrs.]. **A report** is a document that presents information about a specific topic, usually including findings, analysis, and recommendations. Projects often require reports as part of the deliverables or outcomes. [40 hrs.] Revision problem and tutorial classes [15 hrs.] Quizzes [4 hr.]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary 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 reports involving some interesting sampling activities for the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	5% (5)	4,8,12	LO #1, 5, 8 and 9
	Assignments	10	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects /	1	10% (25)	Continuous	All
	Report	1	5% (5)	----	----
Summative assessment	**Midterm Exam**	1.30 hr	15% (15)	8	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 to Satellite Communications, Evolution of Satellite Communication, Elevation Angle to Satellite, Azimuth Angle to Satellite, Applications of Satellites, Frequency allocation for satellite
Week 2	Type of Satellites (Based on Orbits): (GEO, LEO, MEO, HEO, Polar Orbit),
Week 3	Satellite Examples (INTELSAT, U.S DOMSATS), Direct Broadcast Satellite System DBS.
Week 4	Kepler's Laws (First and Second).
Week 5	Satellite Communications Segments, Radio Wave propagation.
Week 6	Ionospheric Effects, Rain Attenuation, Other Propagation Impairments, Angle of Elevation and propagation impairments, Propagation delay.
Week 7	Satellite Construction, Satellite Transponder, Tracking, Telemetry, Command, and Monitoring.
Week 8	Mid-term Exam
Week 9	Satellite Link Parameters, Equivalent Isotropic Radiated Power (EIRP), Transmission Losses.
Week 10	Bad weather loss, Noise Temperature.
Week 11	Uplink and down signal budget calculations, Microwave Interference.
Week 12	Satellite Access (FDMA, TDMA, CDMA, SDMA).
Week 13	International Standards (The T-carrier TDM/PCM telephony system), Compressor and expander (Compander).
Week 14	Centralized and Decentralized Control, SPADE system.
Week 15	Discussions repots
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	[1] Louis J. Ippolito, Jr, "Satellite Communications Systems Engineering", 2008. [2] G. Maral & M. Bousquet," Satellite Communications Systems", 5th Edition, 2009.	Yes
Recommended Texts	Bruce R. Elbert, "Introduction to Satellite Communication", 3rd Edition, 2008.	Yes
Websites	https://www.tutorialspoint.com/satellite_communication/satellite_communication_introduction.htm	

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	**Digital Signal processing**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC402**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level	4		**Semester of Delivery**	7	
Administering Department	2 - **(Electrical Engineering)**		**College**	UoM2 - (Engineering)	
Module Leader	Dr. Mohammad Tariq Yaseen		**e-mail**	mtyaseen@uomosul.edu.iq	
Module Leader's Acad. Title	Asst. Prof		**Module Leader's Qualification**	Phd.	
Module Tutor	Fawaz Yaseen Abdullah		**e-mail**	fawaazyasen@uomosul.edu.iq	
Peer Reviewer Name	Dr. saad		**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date	11/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Math.	**Semester**	
Co-requisites module	Signal and system	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Demonstrate an understanding of basic discrete-time systems, linearity, time-invariance, stability, impulse response and discrete convolution.

	2. Implement discrete time systems, recursive and non-recursive realizations. 3. Perform Z transform and finding the inverse Z transform including its properties. 4. Demonstrate an understanding of frequency analysis of both continuous and discrete signals. 5. Demonstrate an understanding of frequency response of linear time invariant systems. 6. Demonstrate an understanding of discrete Fourier transform, its properties and applications. 7. Design FIR and IIR digital filters.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Discrete time signals. 2. Discrete Convolution and Correlation. 3. Z-transform. 4. Fourier Series, Fourier Transform. 5. Frequency Response of LTI Systems. 6. Sampling and Reconstruction of Signals. 7. Discrete and Fast Fourier Transform. 8. Design of FIR and IIR Digital Filters.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **<u>Part A - introduction to the theory of digital signal processing (DSP)</u>** . Introduction to discrete linear systems Digital Signals and Systems: Classification of Systems, Linear System, Time-Invariant System, Causal System, Stability [6 hrs.] Digital Convolution: Graphical Method, Table Lookup Method, Matrix by Vector Method, Linear Convolution and Circular Convolution, Deconvolution [6 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [1 hr.] **<u>Part B- Fourier transforms AND Z- transforms</u>** Discrete-Time Fourier Transform and Linear Time Invariant Systems[6 hrs.] The Z transform, Regions of convergence and Z-transform properties and Inverse Z-transform[6 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [1 hr.] **<u>Part C- The discrete Fourier transform and fast Fourier transform</u>** The discrete Fourier transform[6 hrs.] The fast Fourier transform [6 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [1 hr.] **<u>Part D- Digital filter design</u>** Digital filter design (Finite impulse response (FIR) filters) [6 hrs.] Infinite impulse response (IIR) filters) [6 hrs.] Structures and properties of FIR and IIR filters and review[6 hrs.] Revision problem and tutorial classes [9 hrs.] Quizzes [1 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	5% (5)	4,8,12	LO #1, 5, 8 and 9
	Assignments	10	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects	2	15% (25)	Continuous	All
	Report	2	10% (0)	5,10	LO# 3,7
Summative assessment	**Midterm Exam**	2 hr	15% (15)	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	Introduction to discrete linear systems Digital Signals and Systems: Classification of Systems, Linear System, Time-Invariant System, Causal System, Stability
Week 2	Digital Convolution: Graphical Method, Table Lookup Method, Matrix by Vector Method, Linear Convolution and Circular Convolution, Deconvolution

Week 3	Fourier transforms review
Week 4	Discrete-Time Fourier Transform and Linear Time Invariant Systems [1] Transform definitions. [2] Theorems. [3] Frequency response of linear time invariant systems. [4] Phase and group delays
Week 5	The Z transform, Regions of convergence and Z-transform properties. Inverse Z-transform
Week 6	Sampling [1] Sampling continuous-time signals: the sampling theorem. [2] Aliasing. [3] Re-sampling digital signals.
Week 7	Midterm review.
Week 8	Mid-term Exam
Week 9	The discrete Fourier transform [1] Definition of DFT and relation to Z-transform. [2] Properties of the DFT. [3] Linear and periodic convolution using the DFT. [4] Zero padding, spectral leakage, resolution and windowing in the DFT
Week 10	The fast Fourier transform [1] Decimation in time FFT. [2] Decimation in frequency FFT.
Week 11	Digital filter design (Finite impulse response (FIR) filters) [1] Window design techniques. [2] Kaiser window design technique. [3] Equiripple approximations.
Week 12	Digital filter design (Infinite impulse response (IIR) filters) [1] Bilinear transform method. [2] Examples of bilinear transform method
Week 13	Structures and properties of FIR and IIR filters and review [1] IIR - Direct, parallel and cascaded realizations. [2] FIR – Direct and cascaded realizations [3] Coefficient quantization effects in digital filters
Week 14	Final review
Week 15	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1) "Digital Signal Processing Principles, Algorithms, and applications", John G. Proakis, Dimitris G. Manolakis, Third Edition (1996). 2) "Applied Digital Signal Processing Theory and Practice", Dimitris G. Manolakis, Vinay K. Ingle, First Edition (2011).	no
Recommended Texts	Schaum's Outline of Digital Signal Processing, M. Hays, McGraw-Hill, 1999: This complements Mitra with lots of worked examples and summaries of each topic as well as a large number of additional problems.	No
Websites	https://www.softwaretestinghelp.com/digital-signal-processing-tutorial/	

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	**Microelectronics I**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC403**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level	4		**Semester of Delivery**	7	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**	دكتوراه	
Module Tutor	Dr. abdalem A. Rasheed		**e-mail**	Alem12@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
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 Aims أهداف المادة الدراسية	1. To develop problem solving skills and understanding of microelectronics concepts with the microwave devices.

	2. To understand microelectronics with electronics devices. 3. To include the microelectronics with available software such as CST simulation, ADS simulation, and COMSOL simulation.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how microelectronics connected with the electronics devices. 2. List the various terms associated with microelectronics. 3. Summarize what is meant by a microelectronics. 4. Identify microelectronics applications.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A – microwave devices** Microwave devices: Energy and band theory, Diode, PN, IMPAD, gun diode, IGBT, Tyristor, Triac, DIAC, TTL,RTL, ECL, LED, MS, . [35 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [1 hr.] **Part B- Digital circuit analyses** DTL , MOS, CMOS, DMOS, NMOS, [12 hrs.] Revision problem and tutorial classes [8 hrs.] Quizzes [1 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1	5% (5)	4,8,12	LO #1, 5, 8 and 9
	Assignments	10	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects / Lab.	2	25% (25)	Continuous	All
	Report	1	5% (0)	----	----
Summative assessment	Midterm Exam	2 hr	10% (10)	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	Energy and band theory,
Week 2	, PN diode
Week 3	IMPAD diode
Week 4	Gun diode
Week 5	IGBT transistor
Week 6	Thyristor
Week 7	Triac,
Week 8	TTL, RTL, DTL
Week 9	Metal semiconductor device
Week 10	DIAC device
Week 11	Fabrication of circuits
Week 12	Fabrication of circuits
Week 13	LASER light concept + LASER diode
Week 14	Solar cell
Week 15	Solar cell
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	ELECTRONIC DEVICES Floyd	Yes
Recommended Texts	Microelectronics: Circuit Analysis and Design by Neaman	No
Websites	Microelectronics for Microwave devices	

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 Networks			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC404**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level	4		**Semester of Delivery**	7	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor	Dr. Mohammed Younis Thanoun		**e-mail**	myounisth@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Understand basics of computer network communications. 2. Understand and identify network devices and their role/functions within a given network. 3. Identify the different types of network topologies and protocols. 4. Explain the layers of the OSI model and TCP/IP. Explicitly explain the functions for each layer. 5. Understand and building the skills of sub-netting. 6. Be able to administer a network regardless its size 7. Familiarity with the basic protocols of computer networks, and the way they can be used to assist in network design and implementation
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The student will learn: - the fundamentals of the computer networks; - main technologies and communication protocols, including the TCP/IP suite for Internet and packet-based communication; - the Internet architecture, the way Internet operates, inter-process communication and the design and development of inter-process communication protocols, including the principles and technologies for Wireless communications.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A - OSI and TCP/IP models** OSI and TCP/IP models and their associated protocols to explain how data flows in a network **Part B- Wired LANs: Ethernet** Networks of networks and inter-networking. Forwarding and routing IP (local and ISP-based - interdomain). Router. Multicasting. **Part C- Application layer** Examples of protocols and services at the application layer. SMTP (email), http (WWW), DNS, streaming video, gaming, P2P, VoIP.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lessons with electronic slides' projection, live demos and training on emulation and network tools and connected devices. In relation to the kind of activities and didactical methods adopted, the attendance to this class will require the preliminary participation of all the students to the Modules 1 and 2 of the Safety rules on study places

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	5% (5)	4,8,12	All
	Assignments	10	5% (5)	2 to 12	All
	Projects / Lab.	0	0% (0)	Continuous	----
	Report	1	15% (15)	----	All
Summative assessment	**Midterm Exam**	2 hr	25% (25)	7	All
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	definitions, history and development of computer networks. Topologies, network resources, and logical channels. Computer Network performances: indexes and their meaning in different application contexts.
Week 2	Circuit-switched and packet-switched networks. Network communication protocols. Network architectures: HW and SW. Network Service architectures: Client/server, Peer to peer, hybrid.

Week 3	ISO OSI Reference Model. Physical layer. Data Link layer, Medium Access Control techniques, MAC addressing, Error detection and correction.
Week 4	Local Area Network technologies: hub, repeater, bridge, switch. LAN connectivity. LAN topologies and links.
Week 5	Network Layer: IPv4 protocol and addressing. IPv4 network classes, CIDR, IP configuration. Network Address Translation (NAT). SDN e OpenFlow. ICMP. ARP e RARP. DHCP.
Week 6	Subnetting and super netting, Design of network and subnetworks in IP domains.
Week 7	IPv6. Domains and hierarchical addressing.
Week 8	Management and configuration of LANs (SNMP).
Week 9	Networks of networks and inter-networking. Forwarding and routing IP (local and ISP-based - interdomain). Router. Multicasting.
Week 10	Transport layer: Transmission Control Protocol (TCP), performance of end-to-end communications, Congestion control.
Week 11	Flow control.
Week 12	Sockets and socket programming (examples) with UDP/TCP.
Week 13	Session and Presentation layers.
Week 14	Application layer: examples of protocols and services at the application layer. SMTP (email), http (WWW), DNS, streaming video, gaming, P2P, VoIP.
Week 15	Quality of service. Real Time communication.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Behrouz A. Forouzan: DATA COMMUNICATIONS AND NETWORKING Fourth Edition. Behrouz A. Forouzan: TCP/IP PROTOCOL SUITE, FOURTH EDITION	Yes
Recommended Texts	- J.F. Kurose, K.W. Ross, Computer Networking: A Top-Down Approach, last edition	No
Websites	https://classroom.google.com/u/0/c/NTk1MTM0ODM4MzE3	

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	**Electronics and Communications Lab. III**			**Module Delivery**	
Module Type	**Core**			☐ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC405**				
ECTS Credits	**4**				
SWL (hr./sem)	**100**				
Module Level	4		**Semester of Delivery**	7	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor	Marwan Abdulkhaleq Al-yoonus		**e-mail**	Marwanathy1972@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
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 Aims أهداف المادة الدراسية	The lab course tries to present practical experiments based on several hardware devices like microcontroller digital circuits boards also simulation environments like MATLAB, ORCAD, Arduino IDE, and Opnet software.

	After completing this course, students should have the knowledge about: 1. Microcontroller programming. 2. Digital electronics circuit and application. 3. Various types of Computer networks and its configurations. 4. Microcontrollers and its application. 5. Understanding control circuits theory. 6. Solar cell characteristics and its connection methods. 7. Digital communication techniques. 8. Signal analysis using MATLAB and microcontroller.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Dealing with laboratory equipment and electrical elements in a professional and scientific manner. 2. Ability to analyze digital circuit in time domain. 3. Building a scientific mentality for the student through his ability to interpret the practical results according to theoretical concepts. 4. Develop the student's ability to simulate electronic circuits in line with his scientific abilities. 5. Students will be able to understand practically digital carrier modulation system and the differences between different techniques. 6. Learn programing in C-language for important basic algorithms. 7. Students will be able to introduce the world of digital controller of digital circuit using microcontroller. 8. Gain the ability to build signal analysis device in frequency domain using Arduino and MATLAB.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A Pam and PCM systems, sampling, quantization, and the encoding. PCM Transmission Bandwidth, PCM Signal-to-Quantization-Noise Ratio. Learn Arduino programing using C-language. [10hrs.] Quizzes [1 hr.] Part B Binary line coding, extract the differences between the NRZ and RZ. Digital carrier modulation On-Off Keying (OOK) and Amplitude Shift Keying (ASK). Network connection topologies. Data acquisition concept. System transfer function characteristics in MATLAB [20 hrs.] Revision problem and tutorial classes [10hrs.] Quizzes [1 hr.]

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 labs, interactive experiments and software simulation in laptops/PC.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
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**	1	10% (10)	4,8,12	All
	Report	2	10% (10)	1 to 15	All
	Practical Exam	1	20%(20)	8,15	
Summative assessment	**Theoretical Exam**	1	10% (10)	7	All
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	**1. Pulse Amplitude Modulation (PAM) & Pulse Code Modulation (PCM)**
Week 2	**2. Introduction to OPNET Modeler**
Week 3	**3. Time Division Multiplexing (TDM)**
Week 4	**4. Introduction to Digital Carrier Modulation**

Week 5	**5. Root locus Design in MATLAB**
Week 6	**6. QAM Modulation and Demodulation**
Week 7	**7. Network Protocols Capturer and Analyzer**
Week 8	**8. Ethernet and Bus Topology**
Week 9	**9. Ethernet and Star Topology**
Week 10	**10. Serial Data Communication and Flow Control Using PC COM Port With Matlab**
Week 11	**11. Understanding ADC concept using Arduino microcontroller**
Week 12	**12. Understanding system transfer function using MATLAB**
Week 13	**13. PISO/SIPO digital data transmission concept**
Week 14	**14. Understanding the concept of Data acquisition using ARDUINO**
Week 15	**15. Using Arduino microcontroller to drive a stepper motor driver circuit**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	-Jerry Luecke “Analog and Digital Circuits for Electronic Control System Applications” Elsevier. -Forouzan, B.A. "Data Communications and Networking". 4th Edition, McGraw Hill Higher Education, New York. -Gary Dunning, “Introduction to Programmable Logic Controllers”, Thomson, 2nd Edition -Proakis, J. G., and M. Salehi. "Digital communications 5th Edition McGraw-Hill." New York (2008). -Farid Golnaraghi and KUO “Automatic Control Systems” Simon Frase, Ninth Edition -Simon Monk “**Programming Arduino® Next Steps”** Going Further with Sketches Second Edition, Copyright © 2019 by McGraw-Hill Education	Yes (electronic books)
Recommended Texts		No
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mobile Communications**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC407**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level	4		**Semester of Delivery**	8	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor	Dr. Saad Ahmed Ayoob		**e-mail**	sa_ah_ay@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
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 Aims أهداف المادة الدراسية	1. Introducing the different types of mobile communication systems and their characteristics. 2. Exploring the cellular concept and its fundamental system design principles.

	3. Investigating frequency reuse techniques and channel assignment strategies. 4. Examining handoff strategies and practical considerations for successful handoff. 5. Analyzing interference and its impact on system capacity, specifically co-channel and adjacent channel interference. 6. Demonstrating the effectiveness of power control techniques in reducing interference. 7. Discussing trunking and grade of service concepts, including Erlang B and C blocked call models. 8. Understanding methods for improving coverage and capacity in cellular systems. 9. Evaluating the evolution of cellular systems across generations, including 1G, 2G, 3G, and 4G. 10. Comparing different cellular systems, such as AMPS, ETACS, N-AMPS, USDC(D-AMPS), GSM, CDMA, and LTE. 11. Introducing large-scale propagation models and their practical link budget design using path loss models. 12. Exploring outdoor propagation models, such as Okumura model, Hata model, and Walfisch-Bestoni models. 13. Understanding indoor propagation, small-scale fading, and multipath, including their associated properties such as Doppler shift, shadowing, and multipath propagation. 14. Analyzing parameters of mobile multipath channels and types of small-scale fading, such as Rayleigh and Rician distributions.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding the fundamentals and types of mobile communication systems. 2. Understanding the concept of cellular systems, system design fundamentals, and frequency reuse. 3. Understanding channel assignment and handoff strategies, as well as practical handoff considerations. 4. Understanding interference and system capacity, co-channel interference, adjacent channel interference, and power control for reducing interference. 5. Understanding trunking, grade of service, and blocked call analysis (Erlang B and Erlang C models). 6. Understanding techniques for improving coverage and capacity in cellular systems. 7. Understanding the architecture, frequency hopping, direct sequence spread spectrum, and comparison of 1G (AMPS, ETACS, N-AMPS, USDC), 2G (GSM, IS-95, IS-54), 3G (UMTS), and 4G (WiMAX, LTE) mobile communication systems. 8. Understanding large scale propagation models, outdoor propagation models such as Okumura, Hata, and Walfisch-Bestoni, and indoor propagation, small scale fading, and multipath. 9. Understanding the properties of small-scale multipath propagation, Doppler shift, shadowing, and parameters of mobile multipath channels. 10. Understanding types of small-scale fading and their distributions, such as Rayleigh and Rician distributions, and their impact on mobile communication systems.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Practical Workshops** is a phrase that can refer to a variety of tasks, activities, or deliverables in different contexts. Generally, a project involves a set of planned activities with a defined objective or goal [12 hrs.]. **Guest Lectures:** Case studies can be used to illustrate how a particular technology was adopted and practiced by a country [4 hrs.]. **Visits to a Mobile Communications Company:** Students can get a hands-on experience by visiting a mobile communication company for observation. They can see how mobile communication technology is used and to encourage inquiry into areas that they desire to explore [12 hrs.]. **A report** is a document that presents information about a specific topic, usually including findings, analysis, and recommendations. Projects often require reports as part of the deliverables or outcomes. [40 hrs.]. **Online Resources:** Utilizing online resources like video tutorials, discussion forums, online articles are a significant way to supplement the learning experience. Providing students with online resources guarantees their access to the latest technology trends and expands their knowledge beyond the scope of the classroom lectures [20 hrs.]. Revision problem and tutorial classes [15 hrs.]. Quizzes [4 hr.]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Learning and teaching strategies for a module on mobile communication may include: - Lectures: Traditional classroom lectures are often used in teaching technical subjects like mobile communication. Lectures can be used to introduce theoretical concepts and provide background context, and frameworks on which the rest of the subject matter can be structured. - Practical Workshops: Mobile communications are best learned by doing. Practical workshops such as wireless communication system training, laboratory experiments with simulation software, or implementation projects are all excellent ways to help students get hands-on experience with the subject matter. - Case Studies: In the teaching of mobile communications, students learn from examples. Case studies can be used to illustrate how a particular technology was adopted and practiced by a country and its economic impact on the community. - Group Discussion: Encouraging group discussion among students can help to foster a deeper understanding of the subject matter. Group discussions can be used to

	encourage students to exchange different points of view and collaborate to find solutions. - Guest Lectures: Inviting industry professionals to speak to students can be an educational and insightful experience. Guest lectures enhance the credibility of the module, give students access to real-world technology funding and provide insights into the relevant industry. - Visits to a Mobile Communications Company: Students can get a hands-on experience by visiting a mobile communication company for observation. They can see how mobile communication technology is used and to encourage inquiry into areas that they desire to explore. - Online Resources: Utilizing online resources like video tutorials, discussion forums, online articles is a significant way to supplement the learning experience. Providing students with online resources guarantees their access to the latest technology trends and expands their knowledge beyond the scope of the classroom lectures. These strategies, when utilized effectively, ensure that students gain a comprehensive understanding of the subject matter and are prepared for their academic, industrial, and social engagements in the future.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.2
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	150		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	1	5% (5)	4,8,12	LO #1, 5, 8 and 9
	Assignments	10	10% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9

	H.W /	1	10% (25)	Continuous	All
	Report	1	15% (15)	----	----
Summative assessment	**Midterm Exam**	1.30 hr	10% (10)	8	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	Wireless Communication Systems. Types of Mobile Communication Systems. The Cellular Concept - System Design Fundamentals.
Week 2	Frequency Reuse. Channel Assignment Strategies. Handoff Strategies. Practical Handoff Considerations.
Week 3	Interference and System Capacity. Co-channel Interference, Adjacent Channel Interference. Power Control for Reducing Interference.
Week 4	Trunking and Grade of Service. Blocked Calls Cleared (Erlang B). Blocked Calls Delayed (Erlang C). Improving coverage and capacity in cellular systems.
Week 5	Cellular Systems. 1G: AMPS, ETACS, N-AMPS, USDC(D-AMPS). 2G: Global System for Mobile GSM. GSM System Architecture.
Week 6	Spread spectrum (frequency hopping direct sequence). Frequency Hopping Spread Spectrum (FH-SS). Direct Sequence Spread Spectrum (DS-SS).
Week 7	2G, Code Division Multiple Access (CDMA). Comparison of the IS-95, IS-54, and GSM systems.
Week 8	4G: Long-Term Evolution (LTE).
Week 9	Large Scale Propagation Models. Practical Link Budget Design Using Path Loss Models. Outdoor Propagation Models. Okumura Model, Hata Model, Walfisch-Bestoni Model
Week 10	Indoor Propagation, Small Scale Fading and Multipath. Properties of Small-Scale Multipath Propagation. Doppler Shift, Shadowing, Multipath Propagation. Parameters of Mobile Multipath channels. Types of Small-Scale Fading, Rayleigh and Ricean Distributions
Week 11	Plane wave: normal incidence.
Week 12	Plane wave: oblique incidence
Week 13	Radio wave propagation. ground wave propagation.
Week 14	Radio wave propagation. troposphere wave propagation.
Week 15	Radio wave propagation. ionosphere wave propagation.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	[1] T. S. Rappaport," Wireless Communications", 2nd edition, 2002. [2] J. H. Schiller," Mobile Communications", 2nd edition, 2003.	Yes

Recommended Texts	Bruce R. Elbert, "Introduction to Satellite Communication", 3rd Edition, 2008.	Yes
Websites	https://www.tutorialspoint.com/satellite_communication/satellite_communication_introduction.htm	

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	**Microelectronics II**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC408**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level	4		**Semester of Delivery**	8	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader			**e-mail**		
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor	Dr. Abdalem A. Rasheed		**e-mail**	Alem12@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date	1/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To develop problem solving skills and understanding of microelectronics concepts with the microwave devices. 2. To understand microelectronics with electronics devices.

	3. To include the microelectronics with available software such as CST simulation, ADS simulation, and COMSOL simulation.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how microelectronics connected with the electronics devices. 2. List the various terms associated with microelectronics. 3. Summarize what is meant by a microelectronics. 4. Identify microelectronics applications.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A - Semiconductor Materials and Diodes + The Bipolar Junction Transistor + The Field-Effect Transistor+ Basic FET Amplifiers + Integrated Circuit Biasing and Active Loads + Basic BJT Amplifiers** [75 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [3 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1	5% (5)	4,8,12	LO #1, 5, 8 and 9
	Assignments	10	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects / Lab.	2	25% (25)	Continuous	All
	Report	1	5% (5)	----	----
Summative assessment	Midterm Exam	2 hr	10% (10)	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	Semiconductor Materials and Diodes
Week 2	Semiconductor Materials and Diodes
Week 3	The Bipolar Junction Transistor
Week 4	The Bipolar Junction Transistor
Week 5	The Field-Effect Transistor
Week 6	The Field-Effect Transistor
Week 7	Basic FET Amplifiers
Week 8	Basic FET Amplifiers
Week 9	introduction to network theorems, types of source: independent and dependent voltage and current sources and their transformation
Week 10	Integrated Circuit Biasing and Active load
Week 11	Integrated Circuit Biasing and Active load
Week 12	Basic BJT Amplifiers
Week 13	Basic BJT Amplifiers
Week 14	Differential Amplifier
Week 15	Differential Amplifier
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts		Yes
Recommended Texts	Microelectronics: Circuit Analysis and Design by Neaman ELECTRONIC DEVICES Floyd	yes
Websites	**Microelectronics for Microwave devices**	

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 Networks Security			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC409**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level		4	**Semester of Delivery**		8
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title		لقبه العلمي	**Module Leader's Qualification**		الشهادة
Module Tutor	Dr. Mohammed Younis Thanoun		**e-mail**	myounisth@uomosul.edu.iq	
Peer Reviewer Name		اسم مُراجع الملف	**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date		13/06/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Understand Basic concepts of network security. 2. History of encryption techniques. 3. AES symmetric encryption technique. 4. public-key encryption and RSA. 5. Message Authentication and Hash Functions. 6. Authentication Protocols. 7. Cryptographic Systems. 8. Network Security Tools.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	This course provides students with basic knowledge in: Basic concepts of network security; History of encryption techniques; AES symmetric encryption technique; public-key encryption and RSA; Message Authentication and Hash Functions; Authentication Protocols; Cryptographic Systems: Secure Socket Layer (SSL), Virtual Private Network (VPN), and Kerberos; Access Control of Computer Resources; Computer Viruses, Malicious and Antivirus Software; Network Security Tools: Firewall, Intrusion Detection System (IDS) and Intrusion Prevision System (IPS); Web Security, Email Security and Password Management; and Security of Wireless Networks.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lessons with electronic slides' projection, live demos and training on emulation and network tools and connected devices. In relation to the kind of activities and didactical methods adopted, the attendance to

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	5% (5)	4,8,12	All
	Assignments	10	5% (5)	2 to 12	All
	Projects / Lab.	0	0% (0)	Continuous	----
	Report	1	15% (15)	----	All
Summative assessment	**Midterm Exam**	2 hr	25% (25)	7	All
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Basic Concepts of Network Security.
Week 2	History of Encryption Techniques.
Week 3	Symmetric Encryption Technique and AES.
Week 4	Public-Key Encryption Techniques and RSA.
Week 5	Message Authentication and Hash Functions.
Week 6	Authentication Protocols & Cryptographic Systems: Secure Socket Layer (SSL).

Week 7	Virtual Private Network (VPN).
Week 8	Kerberos.
Week 9	Computer Viruses, Malicious. Antivirus Software.
Week 10	Antivirus Software.
Week 11	Firewall Architecture and Administration.
Week 12	Intrusion Detection System (IDS) and Intrusion Prevision System (IPS).
Week 13	Web Security, Email Security and Password Management.
Week 14	Security of Wireless Networks
Week 15	Access Control Techniques of Computer Resources
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	1- Cryptography and network Security Principles and Practice Sixth edition William Stallings. 2- Network Security eSSeNtialS: Applications and Standards Sixth edition Global edition.	Yes
Recommended Texts	Computer Security Principles and Practice Fourth Edition Global Edition William Stallings Lawrie Brown.	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	**Electronics and Communications Lab. IV**			**Module Delivery**	
Module Type	**Core**			☐ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC411**				
ECTS Credits	**4**				
SWL (hr./sem)	**100**				
Module Level	4		**Semester of Delivery**	8	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor	Marwan Abdulkhaleq Al-yoonus		**e-mail**	Marwanathy1972@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
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 Aims أهداف المادة الدراسية	The lab course tries to present practical experiments based on several hardware devices like microcontroller digital circuits boards also simulation environments like MATLAB, ORCAD, Arduino IDE, and Opnet software. After completing this course, students should have the knowledge about: 1. Microcontroller programming. 2. Digital electronics circuit and application. 3. Various types of Computer networks and its configurations. 4. Microcontrollers and its application. 5. Understanding control circuits theory. 6. Solar cell characteristics and its connection methods. 7. Digital communication techniques. 8. Signal analysis using MATLAB and microcontroller.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Dealing with laboratory equipment and electrical elements in a professional and scientific manner(i). 2. Ability to analyze electrical circuits and understand the nature of their work(ii). 3. Building a scientific mentality for the student through his ability to interpret the practical results according to theoretical concepts(iii). 4. Develop the student's ability to design simple electronic circuits in line with his scientific abilities(iv). 5. Students will be able to understand practically the most of digital carrier modulation system and the differences between the QAM and types of PSK. 6. Students will be able to mitigate the Intersymbol Interference in the baseband systems by satisfying the conditions for zero ISI, get indications of the BER during the monitoring of the eye pattern (eye diagram), also can deal with the additive noise channel and get the transmitted data at the receiver using the sampling receiver.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A Pam and PCM systems, sampling, quantization, and the encoding. PCM Transmission Bandwidth, PCM Signal-to-Quantization-Noise Ratio. Learn Arduino programing using C-language. Understanding Control theory using Matlab [10hrs.] Quizzes [1 hr.] Part B Binary line coding, extract the differences between the NRZ and RZ. Digital carrier modulation On-Off Keying (OOK) and Amplitude Shift Keying (ASK). Network connection topologies. Data acquisition concept. System transfer function characteristics in MATLAB. Inter symbol interference [20 hrs.] Revision problem and tutorial classes [10hrs.] Quizzes [1 hr.]

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 labs, interactive experiments and software simulation in laptops/PC.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
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**	1	10% (10)	4,8,12	All
	Report	2	10% (10)	1 to 15	All
	Practical Exam	1	20%(20)	8,15	
Summative assessment	**Theoretical Exam**	1	10% (10)	7	All
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	**1. Intersymbol Interference, Pulse Shaping and Sampling Receiver (part I)**
Week 2	**2. Intersymbol Interference, Pulse Shaping and Sampling Receiver (part II)**
Week 3	**3. Design a Digital clock using IC7490**
Week 4	**4. Digital Carrier Modulation part II**

Week 5	**5. Introduction to PLC and ladder logic programming**
Week 6	**6. Industrial wireless network**
Week 7	**7. Reading a matrix of photo sensors using microcontroller and MATLAB**
Week 8	**8. Solar cell characteristics and its connection methods**
Week 9	**9. Principle of DSP using Matlab and micro-controller**
Week 10	**10. State space module in MATLAB**
Week 11	**11. State variable feedback design**
Week 12	**12. Block diagram reduction**
Week 13	**13. Frequency response**
Week 14	**14. ADHOC Wireless Technology**
Week 15	**15. Infrastructure Wireless Technology**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	-Jerry Luecke “Analog and Digital Circuits for Electronic Control System Applications” Elsevier. -Forouzan, B.A. "Data Communications and Networking". 4th Edition, McGraw Hill Higher Education, New York. -Gary Dunning, “Introduction to Programmable Logic Controllers”, Thomson, 2nd Edition -Proakis, J. G., and M. Salehi. "Digital communications 5th Edition McGraw-Hill." New York (2008). -Farid Golnaraghi and KUO “Automatic Control Systems” Simon Frase, Ninth Edition	Yes (electronic books)
Recommended Texts		No
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Control Systems I**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEPM401**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level	4		**Semester of Delivery**	7	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	استاذ مساعد		**Module Leader's Qualification**	الشهادة	
Module Tutor	Dr. Mohammed Obaid Mustafa		**e-mail**	mohammed.obaid1975@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date	08/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To understand the fundamental concepts of Control systems and mathematical modeling of the system.

	2. To understand and differentiate the basics of linear time-invariant control system. 3. To understand and analyze feedback characteristics of linear control system. 4. To understand and analyze, transfer function, Mathematical model. 5. This course deals with State space representation of control system, 6. To understand and analyze time response of first and second order control systems for different standard test signals. 7. To understand the stability analysis of the linear control systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize and identify the concept of State space analysis of the control system. 2. Ability to identify the concept of time response of the control system. 3. Ability to identify the concept of the transfer function. 4. Ability to identify the Mathematical modeling of different systems. 5. Ability to apply the stability concept to control systems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction to control system, Basic Components of a Control System, Open loop and closed loop control system , Block diagram and block diagram reduction, Signal flow graph; Masson gain formula, transfer function, Mathematical model, State space representation of control system, State Space representation: State equation, output equation, state transition Matrix, state transition equation, Characteristic Equations , state diagram, Controllability Canonical Form (CCF), Observability Canonical Form (OCF), Diagonal Canonical Form (DCF) , Jordan Canonical Form (JCF), controllability, observability of control system, Time domain analysis of control system, Stability of control system, Rowth Hurwitz criterion.

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	10% (10)	3,6,11,14	LO #1, 5, 8 and 9
	Assignments	8	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
Summative assessment	**Midterm Exam**	2 hr	25% (25)	8	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 to control system, Basic Components of a Control System, Open loop and closed loop control system
Week 2	Block diagram and block diagram reduction
Week 3	Signal flow graph; Masson gain formula
Week 4	Mathematical model
Week 5	State space representation: State equation, output equation
Week 6	state transition Matrix, state transition equation,
Week 7	From Differential Equations to State Diagrams, From State Diagrams to Transfer Function,

Week 8	Mid-term Exam
Week 9	From State Diagrams to State and Output Equations, Characteristic Equations, state diagram
Week 10	Controllability Canonical Form (CCF), Observability Canonical Form (OCF), Diagonal Canonical Form (DCF) , Jordan Canonical Form (JCF),
Week 11	Controllability and observability of control system
Week 12	Time domain analysis of control system: Typical Test Signals for the Time Response of Control Systems, The Unit-Step Response and Time-Domain Specifications, Steady-State Error steady-state error
Week 13	transient response of Transient Response of a Second-Order control system
Week 14	Stability of control system,
Week 15	Rowth Hurwitz criterion
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	
Week 8	
Week 9	
Week 10	
Week 11	
Week 12	
Week 13	
Week 14	
Week 15	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Automatic Control Systems 9th Edition by Farid Golnaraghi , Benjamin C. Kuo	Yes
Recommended Texts	Modern Control Engineering, 5th Edition by Katsuhiko Ogata	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	**Power System Analysis**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEPM402**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level	4		**Semester of Delivery**	7	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor	Dr. Shaker Mahmood Khudher		**e-mail**	shakeralhyane@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
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 Aims أهداف المادة الدراسية	The objective of Power system analysis is for designing entire power systems consisting of generators, transformers, capacitor banks, shunt elements, transmission lines and

	so on. Power system analysis makes sure the equipment works together so that the required power is delivered to the load centers at the prescribed voltage and frequency, and no component in the network is overloaded and no-fault condition jeopardizes the system.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Acquiring knowledge of modern techniques that support the development of electrical power stations. 2. Understanding the basic concepts of troubleshooting in electrical power stations and transmission lines. 3. Understanding the fundamentals of electrical power transmission and distribution. 4. Understanding the basics of dealing with electrical power systems. 5. Building the scientific foundation for students in the field of designing and constructing power systems and transmission lines. 6. Training students on modern techniques in electrical fault diagnosis and repair. 7. Studying the fundamental concepts of building high-quality power systems. 8. Equipping students with scientific and practical skills to diagnose and repair faults in electrical power systems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A -** Introduction; Syllabus; basic components of a power system, single line diagram, per unit analysis, generator, transformer, transmission line and load representation for different power system, Construction of Y-bus and Z-bus, Power-flow problem and equations [12 hrs.] Revision problem and tutorial classes [3 hrs.] Quizzes [1 hr.] **Part B-** Gauss-Seidel method for solving power-flow equations, Newton-Raphson method for solving power-flow equations, balanced three-phase fault, short-circuit capacity, Bus impedance matrix, Fault analysis using bus impedance matrix, Symmetrical components and unbalanced faults (Review), Economical Operation of Power System neglecting generator limits and line losses [15 hrs.] Revision problem and tutorial classes [4 hrs.] Quizzes [1 hr.] **Part C-** Economical Operation of Power System with generator limits and line losses. Introduction, Classification of Power System Stability. Dynamic Equation of Synchronous Machine, Stability Analysis Swing equation, Multi machine system, Machines swinging in unison or coherently Power flow under steady state, Steady-state Stability, Transient Stability-Equal area criterion Transient Stability Applications of sudden change in power input, Critical clearing angle and critical clearing time, Application of equal area criterion 1- Sudden loss of one parallel line 2- sudden short circuit on one of parallel lines a) Short circuit at one end of line b) Short circuit at the middle of a line. [15 hrs.] Revision problem and tutorial classes [4 hrs.] Quizzes [1 hr.]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Electronic illustration tools, such as presentations, slides, images, videos, and others, can be used to clarify concepts and scientific information to students. These tools can be used to illustrate examples and practical applications, present graphs and charts to clarify relationships and processes, and demonstrate results and statistical data. 2- Surprise daily tests can be conducted without prior notice to students to motivate them to regularly review the materials and prepare well for any test. These daily tests can be sudden and short-term, aiming to test students' immediate understanding of the study materials and concepts. As for weekly tests, they can be announced in advance to students, giving them sufficient time to prepare. The purpose of weekly tests is to assess the overall progress of students and their understanding of the study materials over a longer period. 3- Students can be given the opportunity to participate in open discussion sessions on the study topics. These sessions can be organized to allow students to discuss scientific materials, exchange ideas and opinions, ask questions, and clarify any doubts. These discussion sessions can be organized as part of the lessons or as independent activities. Additionally, students can be assigned research tasks to explore the latest applications of the scientific subject matter.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	10% (10)	4,8,12	LO #1, 5, 8 and 9
	Assignments	5	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9

	Projects / Lab.	1	5% (5)	Continuous	All
	Report	0	0% (0)	----	----
Summative assessment	**Midterm Exam**	1.5hr	20% (20)	8	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; Syllabus; basic components of a power system, single line diagram,
Week 2	Per unit analysis, generator, transformer, transmission line and load representation for different power system
Week 3	Construction of Y-bus and Z-bus
Week 4	Power-flow problem and equations
Week 5	Gauss-Seidel method for solving power-flow equations
Week 6	Newton-Raphson method for solving power-flow equations
Week 7	Balanced three-phase fault- Short-circuit capacity- Bus impedance matrix- Fault analysis using bus impedance matrix
Week 8	EXAM
Week 9	Symmetrical components and unbalanced faults (Review)
Week 10	Economical Operation of Power System neglecting generator limits and line losses
Week 11	Economical Operation of Power System with generator limits and line losses.
Week 12	Introduction, Classification of Power System Stability. Dynamic Equation of Synchronous Machine
Week 13	Stability Analysis Swing equation, Multi machine system, Machines swinging in unison or coherently
Week 14	Power flow under steady state, Steady-state Stability, Transient Stability-Equal area criterion
Week 15	Transient Stability Applications of sudden change in power input, Critical clearing angle and critical clearing time, Application of equal area criterion 1- Sudden loss of one parallel line 2- sudden short circuit on one of parallel lines a) Short circuit at one end of line b) Short circuit at the middle of a line
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**

Required Texts	Power system analysis by Hadi Saadat http://powerunit-ju.com/wp-content/uploads/2016/11/Power-System-Analysis-by-Hadi-Saadat-Electrical-Engineering-libre.pdf	NO
Recommended Texts	Power System Analysis By Emeritus John J. Grainger and William D. Stevenson	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 works 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	**High Voltage Engineering**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEPM403**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level	4		**Semester of Delivery**	7	
Administering Department	2 - (Electrical Engineering)		**College**		
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor	Dr. Dawood Najem Saleh		**e-mail**	dnsaij@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date			**Version Number**		

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

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

	1. Introduction to High Voltage Engineering: This aim focuses on providing students with a broad understanding of high voltage engineering principles, concepts, and applications. 2. Electrical Insulation Systems: This aim focuses on studying various insulation materials, their properties, and their application in high voltage systems. It covers topics such as insulation coordination, breakdown mechanisms, and insulation testing techniques. 3. Generation and Measurement of High Voltages: This aim involves studying different methods of generating high voltages, including AC, Dc and impulse generation techniques. It also covers measurement techniques for high voltage parameters, such as voltage, current, and power. 4. High Voltage Equipment: This aim focuses on familiarizing students with different types of high voltage equipment used in power systems, such as transformers, circuit breakers, surge arresters, and capacitors. It includes studying their design, operation, and maintenance. 5. Overvoltage Phenomena and Protection: This aim involves studying overvoltage phenomena, such as lightning surges and switching surges, and their effects on power systems. It also covers protective measures and equipment used to mitigate the impact of overvoltages. 6. High Voltage Transmission and Distribution: This aim focuses on the transmission and distribution of high voltage electrical power. It includes studying power transmission lines, substations, insulation coordination, and safety considerations. 7. High Voltage Testing and Diagnostics: This aim involves learning about various testing techniques and diagnostic methods used in high voltage engineering. It covers topics such as partial discharge testing, dielectric response analysis, and condition monitoring of high voltage equipment. 8. Safety and Environmental Aspects: This aim emphasizes the importance of safety practices and environmental considerations in high voltage engineering. It covers earthing principles, safety regulations, protective measures, risk assessment, and the impact of high voltage systems on the environment.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Demonstrate a comprehensive understanding of the fundamental principles and concepts of high voltage engineering, including insulation coordination, breakdown mechanisms, and high voltage equipment. 2. Apply knowledge of different methods of generating high voltages, AC, DC and impulse, and demonstrate the ability to analyze and interpret high voltage measurements accurately. 3. Evaluate and select appropriate insulation materials for high voltage applications based on their properties and characteristics. 4. Describe the design, operation, and maintenance of high voltage equipment, such as transformers, circuit breakers, surge arresters, and capacitors. 5. Analyze and mitigate overvoltage phenomena, such as lightning surges and switching surges, and apply protective measures to ensure the reliability and safety of high voltage systems.

	6. Apply testing techniques and diagnostic methods to assess the condition of high voltage equipment, including partial discharge testing, dielectric response analysis, and condition monitoring. 7. Demonstrate knowledge of safety regulations and practices related to high voltage engineering, and apply appropriate safety measures in high voltage systems to ensure the protection of personnel and equipment. 8. Assess and address environmental considerations associated with high voltage engineering, such as minimizing environmental impact and promoting sustainable practices.
Indicative Contents المحتويات الإرشادية	**1. <u>Introduction to High Voltage Engineering</u>** • Historical overview of high voltage engineering • Importance and applications of high voltage systems • Basic concepts and terminology in high voltage engineering **2. <u>Electrical Insulation Systems</u>** • Insulating materials: properties, classification, and selection • Insulation coordination and insulation strength • Insulation testing techniques: breakdown voltage measurement, dielectric spectroscopy, etc. • Insulation aging and degradation mechanisms **3. <u>Generation and Measurement of High Voltages</u>** • AC high voltage generation: transformers, resonant circuits, and voltage multipliers • DC high voltage generation: rectifiers, voltage multipliers, and voltage doublers • Impulse high voltage generation: Lightning and Switching impulse, multi stage impulse generator. • High voltage measurement techniques: voltage dividers, capacitive voltage dividers, Rogowski coils, etc. **4. <u>High Voltage Equipment</u>** • Transformers: construction, design considerations, and insulation systems • Circuit breakers: types, principles of operation, and arc interruption techniques • Surge arresters: characteristics, types, and application in protecting against overvoltages • Capacitors: types, applications, and dielectric breakdown considerations **5. <u>Overvoltage Phenomena and Protection</u>** • Lightning surges: characteristics, protection against lightning, and lightning impulse testing • Switching surges: causes, effects, and mitigation techniques • Insulation coordination: voltage stresses, clearance and creepage distances, coordination of insulation levels **6. <u>High Voltage Transmission and Distribution</u>** • High voltage transmission lines: types, construction, and design considerations • Substations: configuration, equipment layout, and insulation coordination • High voltage safety: safety practices, grounding, personal protective equipment (PPE) **7. <u>High Voltage Testing and Diagnostics</u>**

	• Partial discharge (PD) testing: principles, detection methods, and interpretation of PD measurements • Dielectric response analysis: polarization and depolarization current measurements, interpretation of results • Condition monitoring techniques: thermal imaging, acoustic monitoring, oil analysis, etc. **8. Safety and Environmental Aspects** • Safety regulations and standards in high voltage engineering • Risk assessment and hazard mitigation in high voltage systems • Environmental impact assessment and sustainable practices **9. Case Studies and Practical Applications** • Analysis of real-world high voltage engineering problems and case studies • Practical demonstrations and experiments in high voltage laboratories • Simulation and modeling of high voltage systems using software tools

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: Traditional lectures can be used to deliver theoretical concepts, principles, and foundational knowledge of high voltage engineering. Instructors can present information using visual aids, multimedia presentations, and demonstrations to enhance understanding. 2. Laboratory Work: Practical laboratory sessions allow students to apply theoretical knowledge to real-world scenarios. Hands-on experiments involving high voltage equipment, measurement techniques, and diagnostic tools can help students gain practical skills and reinforce theoretical concepts. 3. Case Studies: Engaging students in case studies and real-world examples can provide a deeper understanding of high voltage engineering principles. Analyzing and solving problems encountered in actual high voltage systems can develop critical thinking and problem-solving skills. 4. Group Discussions and Brainstorming: Encouraging students to participate in group discussions and brainstorming sessions fosters active learning. It promotes collaboration, idea sharing, and the exploration of different perspectives on high voltage engineering topics. 5. Simulations and Virtual Laboratories: Utilizing computer-based simulations and virtual laboratories can provide a safe and interactive learning environment. Students can simulate high voltage systems, perform experiments, and observe the outcomes, allowing for experimentation and exploration of different scenarios. 6. Guest Lectures and Industry Experts: Inviting guest lecturers from industry or research institutions can provide valuable insights into practical applications, current trends, and emerging technologies in high voltage engineering. It offers students exposure to real-world experiences and industry perspectives.

	7. Problem-Solving Exercises: Assigning problem sets and exercises related to high voltage engineering challenges students to apply their knowledge and skills to solve specific problems. These exercises can range from calculations and design tasks to analyzing system failures and proposing solutions. 8. Field Trips and Site Visits: Organizing field trips or site visits to high voltage substations, power plants, or testing facilities allows students to observe high voltage equipment in operation and gain a practical understanding of the engineering practices in real-world settings. 9. Multimedia Resources and Online Platforms: Utilizing multimedia resources, such as video lectures, online tutorials, and interactive learning platforms, can supplement classroom teaching and provide students with additional resources for self-study and revision. 10. Assessment and Feedback: Regular assessments, including quizzes, exams, and projects, help gauge students' understanding and progress. Providing constructive feedback on their performance enables them to identify areas for improvement and reinforce their learning.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

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

Total assessment			

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to High Voltage Engineering: Historical overview, importance, and applications. Basic concepts and terminology in high voltage engineering.
Week 2	Electrostatic Fields and Dielectrics
Week 3	Gas Insulation: Properties and applications of gases used as insulation in high voltage systems
Week 4	Liquid Insulation: Properties and applications of liquid insulating materials (such as oils and synthetic liquids)
Week 5	Solid Insulation: Properties, types, and applications of solid insulating materials (such as ceramics, polymers, and composites)
Week 6	AC Voltage Generation: Principles and methods of AC high voltage generation (such as transformers, resonance, and cascade methods)
Week 7	DC Voltage Generation: Principles and methods of DC high voltage generation (such as rectifiers, voltage multipliers, and voltage doublers)
Week 8	Impulse Voltage Generation: Principles and methods of generating impulse voltages (such as Marx generators, sphere gaps, and impulse generators)
Week 9	HV Testing & Measurements
Week 10	Overvoltages & Insulation Coordination
Week 11	High Voltage Equipment: Surge Arresters: characteristics, types, and application in protecting against overvoltages
Week 12	High Voltage Equipment: Circuit Breakers: types, principles of operation, and arc interruption techniques
Week 13	Earthing System Design Principles: Earthing fundamentals, equipment grounding, and safety considerations
Week 14	Condition monitoring of cables: Partial Discharge (PD) Testing: principles, detection methods, and interpretation of PD measurements
Week 15	Condition monitoring of transformers: Degradation of oil-paper insulation, diagnostic methods
Week 16	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Andreas Küchler, High voltage Engineering, Springer-Verlag GmbH Germany, 2018.	Yes

	2. C.L. Wadhwa, High Voltage Engineering, 2nd ed., New Age International, 2007	
Recommended Texts	E. Kuffel, W.S. Zaengl, and J. Kuffel, High Voltage Engineering: Fundamentals, 2nd edition, Butterworth Heinemann, 2000.	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	**Special Electrical Machines I**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEPM404**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level	4		**Semester of Delivery**	7	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	Dr.Mohammad T. Yaseen		**e-mail**	mtyaseen@uomosul.edu.iq	
Module Leader's Acad. Title	Ass. Prof.		**Module Leader's Qualification**	PhD	
Module Tutor	Dr. Ahmed Nasser B. Alsammak Mr. Omar Turath Tawfeeq		**e-mail**	Ahmed_alsammak@uomosul.edu.iq omartawfeeq_1981@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
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 Aims أهداف المادة الدراسية	

	1. To develop skills and understanding of principles of operation single phase machines. 2. To develop skills and knowledge of the construction of single-phase machines. 3. To perform equivalent circuit analysis of Single Phase Induction Motor (SPIM). 4. To perform cross-field and double-field revolving theory of SPIM. 5. To understand starting problem of SPIM. 6. This course deals with all operating conditions of SPIM. 7. To improve the starting condition of SPIM.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**At the end of this course, students can:** 1. Explain electro-mechanical energy conversion concepts and their application in electrical machines. 2. Categorize various types of electrical machines and it is starting. 3. Analyze electrical machines individually. 4. Recognize SPIM and its applications. 5. Discuss the various operating conditions of SPIM. 6. Explain the two field theories that were used to start SPIM. 7. Explain the Analysis equivalent circuit of the SPIM in different cases. 8. Explain the starting torque of the SPIM.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A – Starting Problems and distributed field** Introduction, Single phase induction motors (SPIM): Principal of operations, Types of SPIM, Motors with main winding only, Cross field theory, Rotating field theory (Double-field revolving theory), Transformer voltage, Rotational voltage, Torque speed characteristic, Fields in SPIM. [14 hrs.] Revision problem and tutorial classes [5 hrs.] Quizzes [1 hr.] **Part B- Equivalent Circuit and Modeling Cases** Equivalent circuit, Power diagram, Two phase induction motor, Symmetrical two-phase motor supplied from two-phase balance system, Symmetrical two-phase motor supplied from two phase unbalance system, Unsymmetrical two-phase motor supplied from two phase unbalance system. [16 hrs.] Revision problem and tutorial classes [12 hrs.] Quizzes [1 hr.] **Part C- Special cases and starting Torque** Special cases, SPIM with main and auxiliary windings, Improvement of torque production in SPIM, starting torque, adding resistance with auxiliary winding, adding capacitor with auxiliary winding, and performance improvement. [6 hrs.] Revision problem and tutorial classes [4 hrs.] Quizzes [1 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	15% (15)	3, 10, 12	LO #3,5, and 8
	Assignments	3	15% (15)	2 to 12	LO #1, 2, 6, 7 and 8
	Projects / Lab.	0	0% (0)	----	----
	Report	1	10% (10)	----	----
Summative assessment	**Midterm Exam**	2 hr	10% (10)	8	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	Introduction, Single phase induction motors (SPIM): Principal of operations
Week 2	Types of SPIM, Motors with main winding only,
Week 3	Cross-field theory, Rotating field theory (Double-field revolving theory)
Week 4	Transformer voltage, Rotational voltage, Torque speed characteristic,
Week 5	Fields in SPIM.
Week 6	Equivalent circuit in SPIM
Week 7	Power diagram in SPIM
Week 8	Symmetrical two-phase motor supplied from two-phase balance system
Week 9	Symmetrical two-phase motor supplied from two phase unbalance system
Week 10	Unsymmetrical two-phase motor supplied from two phase unbalance system.
Week 11	Improvement of torque production in SPIM, starting torque,
Week 12	Effect of adding resistance with auxiliary winding on the starting torque of SPIM
Week 13	Special cases of SPIM with main and auxiliary windings,
Week 14	Effect of adding capacitor with auxiliary winding on the starting torque of SPIM
Week 15	Performance improvement of SPIM
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	1- Rotating electrical machine, S.K. Sen, 1975 2- Alternating current machines, M.G. Say, 1984 3- Electric Machinery and their Application, J.Hindmarsh 3rd, 1979 4-1989 مكائن التيار المتناوب ، د.باسل محمد و د.ضياء علي،	Yes
Recommended Texts	1- Electrical Machinery, A. E. Fitzgerald, Charles Kingsley, Jr., Stephen D. Umans, 2003. 2- Electric Machinery Fundamentals, Stephen J. Chapman, 2005 3- Electric Motors and Drives, Austin Hughes, 3rd, 2006	No
Websites	Electromechanical Motion Devices, Second Edition, Paul Krause, Oleg Wasynczuk, Steven Pekarek, Wiley-IEEE Press, Year: 2012	

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 and Machines Lab. III			**Module Delivery**	
Module Type	**Core**			☐ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**EEPM405**				
ECTS Credits	**4**				
SWL (hr./sem)	**100**				
Module Level	4		**Semester of Delivery**	7	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	Mohammed Tariq Yasin		**e-mail**	mtyaseen@uomosul.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph. D	
Module Tutor	Dr. Hasan Adnan Mohammed		**e-mail**	Hasan82adnan@uomosul.edu.iq	
Peer Reviewer Name	Dr. Ahmae Nasser B. Alsammak		**e-mail**	ahmed_alsammak@uomosul.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 Aims أهداف المادة الدراسية	1. Provide the student with the basic skills and proficiency of implementing the wiring diagrams required to conduct the testing procedures of transformers, AC and DC generators and motors. 2. Provide the student with the basic skills of conducting different testing procedures of the different types of electrical machines. 3. Allow the student to benefit from the testing results of the testing procedures to calculate the parameters of the tested machine equivalent circuit. 4. Provide the student with the proficiency of constructing the experimental performance characteristics of the different types of machines and correlate practical and theoretical results
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Proficiently deal with the measuring instruments usually involved in electrical machines testing procedures such as voltmeters, ammeters, ohmmeters, wattmeter's, power factor meters, torque, and speed meters 2. Recognize and differentiate between the different types of electrical machine. 3. Understand and construct the wiring diagram of the different testing procedures of power transformers and electric generators and motors 4. Perform the different test procedures of the different types of electrical machines safely. 5. Use the testing data to calculate the equivalent circuit parameters of the tested machines. 6. Construct and understand the different performance characteristics of electrical machines. 7. Corollate practical and theoretical results of the testing machines
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Power and Machines lab consist of sum of laboratories can be listed below: - **1- Machines Laboratory.** In this lab. student can perform sum of experiments that related with different types of machines. **2- Control Laboratory.** Demonstrate his/her understanding of the basics of control system laboratory including: Basics of transfer function of any control system and represented in MATLAB software, realization, and implementation of control system in time domain and frequency domain response such step response, bode plot response, Nichols. PID controller. State space model represent for transfer function of control system. Implement some controller such state variable feedback design and root locus design for speed control of dc servo motor. Principle of Arduino microcontroller with many applications. **3- Transmission Line Laboratory.** To study the behavior of transmission line under open and short circuit tests and show the Ferranti effect of Long Transmission Line model in order to calculate the transmission line parameters for PI representation also to understand the principles of compensation and voltage regulation along with load flow analysis and fault study. **4- Renewable Energy Laboratory.** Recently, renewable energy has been more popular in the household and rerial locations application due to reduction of the conventional energy sources. This laboratory helps the student to understand, test

	and design different types of renewable energy such as photovoltaic energy system, wind energy system etc. **5- High Voltage Laboratory.** The first course provides principal knowledge associated with high voltage engineering methods, techniques, and equipment. It is divided into two sections. The first section presents fundamentals of the failure mechanisms gaseous insulation at high voltages. It also discusses consequent design principles for high-voltage equipment; of the generation of high direct, alternating, and impulse voltages for testing high-voltage equipment.

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Attendance is required and highly encouraged. To that end, attendance will be taken every lecture. All exams (including the final exam) should be considered cumulative. Exams are closed book. No scratch paper is allowed. You will be held responsible for all reading material assigned, even if it is not explicitly covered in lecture notes.

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

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to lab. Components
Week 2	Lab 2: Dividing and organizing the students into sum of groups and teams.
Week 3	Lab 3: No load and blocked rotor tests of single-phase induction motor
Week 4	Lab 4: Variable load variable capacitor tests of single-phase induction motor
Week 5	Lab 5: Study the transfer function in control system.
Week 6	Lab 6: Block diagram reduction of control system in MATLAB.
Week 7	Lab 7: The power station and transmission system model short circuit and no-load test on a logic line
Week 8	Lab 8: Possibility of compensation and voltage regulation of T.L
Week 9	Lab 9: Study of photovoltaic energy system
Week 10	Lab 10: Breakdown of air in uniform & non-uniform AC Field
Week 11	Lab 11: No load and short circuit teste three phase synchronous generator
Week 12	Lab 12: Determine the zero and negative sequence impedance of three phase synchronous generator
Week 13	Lab 13: State space model of control system in MATLAB.
Week 14	Lab 14: Root locus design in MATLAB.
Week 15	Lab 15: Load flow analysis of power system

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1- B.M. Weedy, Electric Power System, 5th edition, John Wiley, and Sons, 2012.	Yes
Recommended Texts	1- Induction Machines Handbook Transients, Control Principles, Design and Testing, ION BOLDEA. 2- SYNCHRONOUS GENERATORS, ION BOLDEA. 3- Feedback Group Company. www.feedback.group.com. 4- Roland S. Burns, " Advanced Control Engineering", University of Plymouth. UK., 2001.	No
Websites	https://www.su.edu.om/doc/fe/Labs%20facilities-Electrical%20&%20Computer%20Engineering.pdf	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
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	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 II**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEPM407**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level	4		**Semester of Delivery**	8	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	استاذ مساعد		**Module Leader's Qualification**	الشهادة	
Module Tutor	Dr. Mohammed Obaid Mustafa		**e-mail**	mohammed.obaid1975@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date	08/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To understand the fundamental concepts of Control systems Design. 2. To understand and analyze state feedback characteristics of linear control system. 3. To understand the frequency-domain analysis. 4. To understand and analyze the design of control systems: PID controller, design with Lead and Lag Controller.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize and identify the concept of Control systems Design. 2. Ability to identify the concept of frequency-domain analysis of the control system. 3. Ability to identify the design of control systems: PID controller, design with Lead and Lag Controller.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. State-Feedback Control, Root Locus Analysis, structure and design using root locus, Frequency-Domain Analysis, Nyquist Stability Criterion, Relation between the Root Loci and the Nyquist Plot, Stability Analysis with the Bode Plot, The Nichols Chart, Design of Control Systems, PID controller, Design with Lead and Lag Controller.

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	10% (10)	3,6,11,14	LO #1, 5, 8 and 9
	Assignments	8	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
Summative assessment	**Midterm Exam**	2 hr	25% (25)	8	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	Pole-placement design with state feedback
Week 2	Root Locus Analysis: Properties of the Root Loci
Week 3	Structure and design using root locus
Week 4	Frequency-Domain Analysis: Frequency Response of Closed-Loop Systems
Week 5	Nyquist Stability Criterion, Fundamentals, Stability Problem, Definition of Encircled and Enclosed
Week 6	Relation between the Root Loci and the Nyquist Plot, Relative Stabillty: Gain Margin and Phase Margin
Week 7	Stability Analysis with the Bode Plot, Conditionally Stable System
Week 8	Mid-term Exam
Week 9	Stability Analysis with the Magnitude-Phase plot, The Nichols Chart

Week 10	Fundamental Principles of Design
Week 11	Design with the PD Controller, Frequency and Time-Domain Interpretation of PD Control
Week 12	Design with the PI Controller, Frequency and Time-Domain Interpretation of PI Control
Week 13	Design with the PID Controller, Frequency and Time-Domain Interpretation of PID Control
Week 14	Design with Phase-Lead Controller
Week 15	Design with Phase-Lag Controller
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	
Week 8	
Week 9	
Week 10	
Week 11	
Week 12	
Week 13	
Week 14	
Week 15	

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

Required Texts	Automatic Control Systems 9th Edition by Farid Golnaraghi , Benjamin C. Kuo	Yes
Recommended Texts	Modern Control Engineering, 5th Edition by Katsuhiko Ogata	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	**Power System Protection**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab 7** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEPM408**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level	4		**Semester of Delivery**	8	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title	لقبه العلمي		**Module Leader's Qualification**	الشهادة	
Module Tutor	Dr. Shaker Mahmood Khudher		**e-mail**	shakeralhyane@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
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 Aims أهداف المادة الدراسية	Power system protection is an integral part of every power system. All power equipment including power generators, step-up transformers, step-down transformers, transmission lines, power capacitors and electric motors and other loads etc. need protection. The necessity for protection is incurred by all kinds of contingencies such as equipment failure due to insulation deterioration, lightning strike, short-circuit by nature force or creature-made happenings, inappropriate operation of power system and other inadvertent incidences. Some power equipment is very expensive such as MW generators which could cost millions of dollars. Furthermore, outage due to failure of power system causes severe damage to economy and inconvenience to people's daily life. A properly designed protection can ensure power supply cut to minimum users yet continue supply power to other end users in case that a fault occurs in the system. It is a sophisticated art which needs a systematic study in order to master. All these call for a new module for undergraduate students to learn in the field of power system protection. The course is aimed at students who have been introduced with fundamental knowledge of power system.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After successful completion of this course, the students should be able to grasp: 1. Calculation of both symmetrical and un-symmetrical fault currents 2. Understanding the fundamentals of electromechanical relays and digital protective relaying 3. The methods to choose suitable current transformer, voltage transformer and circuit breakers etc. for fulfilling power system protection 4. Design of overcurrent protection and its coordination 5. Design of directional overcurrent protection 6. Design of differential protection 7. Design of distance protection
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A -** Introduction to power system protection, Fundamental of power system protection Review on fault analysis, Fundamentals of electromechanical relays and digital protective relaying. [16 hrs.] Revision problem and tutorial classes [3 hrs.] Quizzes [1 hr.] **Part B-** Fuse, circuit breakers, and Instrument transformers, Overcurrent protection and coordination Directional overcurrent protection, Differential protection. [20 hrs.] Revision problem and tutorial classes [4 hrs.] Quizzes [1 hr.] **Part C-** Protection of busbar, Transformer protection, Generator protection, Motors protection, Distance protection Summarization on course [20 hrs.] Revision problem and tutorial classes [4 hrs.] Quizzes [1 hr.]

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 1. Formal face-to-face lectures, which provide you with a focus on the core analytical material in the course, together with qualitative, alternative explanations to aid your understanding. 2. Tutorials, which allow for exercises in problem solving and allow time for you to resolve problems in understanding of lecture material.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	10% (10)	4,8,12	LO #1, 5, 8 and 9
	Assignments	5	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects / Lab.	1	5% (5)	Continuous	All
	Report	0	0% (0)	----	----
Summative assessment	**Midterm Exam**	1.5 hr	20% (20)	8	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 to power system protection, Fundamental of power system protection

Week 2	Review on fault analysis
Week 3	Fundamentals of electromechanical relays and digital protective relaying
Week 4	Fundamentals of electromechanical relays and digital protective relaying
Week 5	Fuse, circuit breakers, and Instrument transformers
Week 6	Fuse, circuit breakers, and Instrument transformers
Week 7	Overcurrent protection and coordination
Week 8	Mid-Semester Exam
Week 9	Directional overcurrent protection
Week 10	Differential protection
Week 11	Protection of busbar
Week 12	Transformer protection
Week 13	Generator protection
Week 14	Motors protection, introduction to Distance protection
Week 15	Distance protection; Summarization on course
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	حماية نظم القدرة /د عبدالغني عبدالرزاق	Yes
Recommended Texts	1- FUNDAMENTALS OF POWER SYSTEM PROTECTION by Y.G. Paithankar and S.R. Bhide ,2003. 2- TRANSMISSION NETWORK PROTECTION: THEORY AND PRACTICE by Yeshwant G. Paithankar.	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	**Special Electrical Machines II**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEPM409**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level	4		**Semester of Delivery**	8	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	Dr.Mohammad T. Yaseen		**e-mail**	mtyaseen@uomosul.edu.iq	
Module Leader's Acad. Title	Ass. Prof.		**Module Leader's Qualification**	PhD	
Module Tutor	Dr. Ahmed Nasser B. Alsammak Mr. Omar Turath Tawfeeq		**e-mail**	Ahmed_alsammak@uomosul.edu.iq omartawfeeq_1981@uomosul.edu.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
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 Aims أهداف المادة الدراسية	1. To develop skills and understanding of principles of operation of the different types of Special Electrical Machines. 2. To develop skills and knowledge of the construction of Special Electrical Machines. 3. To perform equivalent circuit analysis of the Special Electrical Machines. 4. To portray the torque-speed characteristics of the Special Electrical Machines. 5. To understand the applications of the Special Electrical Machines. 6. This course deals with all operating conditions of the Special Electrical Machines. 7. To explain the advantages and disadvantages of the Special Electrical Machines.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**At the end of this course, students can:** 1. Categorize various types of the Special Electrical Machines, and it is applications. 2. Explain the construction, operation and analysis of the Reluctance motor. 3. Explain the construction, operation and analysis of the Hysteresis motor. 4. Explain the construction, operation and analysis of the Universal motor. 5. Explain the construction, operation and analysis of the Repulsion motor. 6. Explain the construction, operation and analysis of the Stepper motor. 7. Explain the construction, operation and analysis of the Linear induction motor. 8. Explain the construction, operation and analysis of the Schrage motor. 9. Explain the Permanent Magnet Synchronous Motor's (PMSM) construction, operation and analysis. 10. Explain the Pilot excitor synchronous generator with Generator excitation and voltage control systems' types, construction, operation and analysis.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: **Part A – Starting Problems and distributed field** Introduction about Special Electrical Machines, Single phase synchronous motors: Variable Reluctance type motors, Switched Reluctance motors, Hysteresis motor. [16 hrs.] Revision problem and tutorial classes [8 hrs.] Quizzes [1 hr.] **Part B- Equivalent Circuit and Modeling Cases** Single phase AC series commutator motor. The Universal motor. The Repulsion motor. Stepper motors: Types, construction, characteristics, equivalent circuit, applications, advantages and disadvantages. Linear induction motors: Types and features and applications. [16 hrs.] Revision problem and tutorial classes [8 hrs.] Quizzes [1 hr.]

	Part C- Special cases and starting Torque Three-phase ac commutator machines. Schrage motor. Permanent Magnet Synchronous Motor (PMSM). Pilot excitor synchronous generator, Generator excitation and voltage control systems. [16 hrs.] Revision problem and tutorial classes [8 hrs.] Quizzes [1 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	15% (15)	3, 10, 12	LO #3,5, and 8
	Assignments	3	15% (15)	2 to 12	LO #1, 2, 6, 7 and 8
	Projects / Lab.	0	0% (0)	----	----

	Report	1	10% (10)	----	----
Summative assessment	**Midterm Exam**	2 hr	10% (10)	8	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	Introduction about Special Electrical Machines
Week 2	Single phase synchronous motors: Variable reluctance type motors
Week 3	Switched reluctance motors_1, Types, construction, characteristics, equivalent circuit, applications, advantages and disadvantages.
Week 4	Switched reluctance motors_2, Types, construction, characteristics, equivalent circuit, applications, advantages and disadvantages.
Week 5	Hysteresis motor
Week 6	Single phase AC series commutator motor
Week 7	The Universal motor-1, Types, construction, characteristics, equivalent circuit, applications, advantages and disadvantages.
Week 8	The Universal motor-2, Types, construction, characteristics, equivalent circuit, applications, advantages and disadvantages.
Week 9	The Repulsion motor.
Week 10	Stepper motors: Types, construction, characteristics, equivalent circuit, applications, advantages and disadvantages.
Week 11	Linear induction motors-1: Types and characteristics and applications.
Week 12	Linear induction motors-2: Types and characteristics and applications.
Week 13	Three-phase ac commutator machines: Schrage motor.
Week 14	Pilot excitor synchronous generator
Week 15	Generator excitation and voltage control systems
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1- Rotating electrical machine, S.K. Sen, 1975 2- Alternating current machines, M.G. Say, 1984 3- Electric Machinery and their Application, J.Hindmarsh 3rd, 1979 4-1989 مكائن التيار المتناوب ، د.باسل محمد و د.ضياء علي،	Yes
Recommended Texts	1- Electrical Machinery, A. E. Fitzgerald, Charles Kingsley, Jr., Stephen D. Umans, 2003. 2- Electric Machinery Fundamentals, Stephen J. Chapman, 2005 3- Electric Motors and Drives, Austin Hughes, 3rd, 2006	No
Websites	1- Electromechanical Motion Devices, Second Edition, Paul Krause, Oleg Wasynczuk, Steven Pekarek, Wiley-IEEE Press, Year: 2012	

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 and Machines Lab. IV			**Module Delivery**	
Module Type	**Core**			☐ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**EEPM411**				
ECTS Credits	**4**				
SWL (hr./sem)	**100**				
Module Level	4		**Semester of Delivery**	8	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	Mohammed Tariq Yasin		**e-mail**	mtyaseen@uomosul.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph. D	
Module Tutor	Dr. Hasan Adnan Mohammed		**e-mail**	Hasan82adnan@uomosul.edu.iq	
Peer Reviewer Name	Dr. Ahmae Nasser B. Alsammak		**e-mail**	ahmed_alsammak@uomosul.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 Aims أهداف المادة الدراسية	1. Provide the student with the basic skills and proficiency of implementing the wiring diagrams required to conduct the testing procedures of transformers, AC and DC generators and motors. 2. Provide the student with the basic skills of conducting different testing procedures of the different types of electrical machines. 3. Allow the student to benefit from the testing results of the testing procedures to calculate the parameters of the tested machine equivalent circuit. 4. Provide the student with the proficiency of constructing the experimental performance characteristics of the different types of machines and correlate practical and theoretical results
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Proficiently deal with the measuring instruments usually involved in electrical machines testing procedures such as voltmeters, ammeters, ohmmeters, wattmeter's, power factor meters, torque, and speed meters 2. Recognize and differentiate between the different types of electrical machine. 3. Understand and construct the wiring diagram of the different testing procedures of power transformers and electric generators and motors 4. Perform the different test procedures of the different types of electrical machines safely. 5. Use the testing data to calculate the equivalent circuit parameters of the tested machines. 6. Construct and understand the different performance characteristics of electrical machines. 7. Corollate practical and theoretical results of the testing machines
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Power and Machines lab consist of sum of laboratories can be listed below: - **1. Machines Laboratory.** In this lab. student can perform sum of experiments that related with different types of machines. **2. Control Laboratory.** Demonstrate his/her understanding of the basics of control system laboratory including: Basics of transfer function of any control system and represented in MATLAB software, realization, and implementation of control system in time domain and frequency domain response such step response, bode plot response, Nichols. PID controller. State space model represent for transfer function of control system. Implement some controller such state variable feedback design and root locus design for speed control of dc servo motor. Principle of Arduino microcontroller with many applications. **3. High Voltage Laboratory.** The first course provides principal knowledge associated with high voltage engineering methods, techniques, and equipment. It is divided into two sections. The first section presents fundamentals of the failure mechanisms gaseous insulation at high voltages. It also discusses consequent design principles for high-voltage equipment; of the generation of high direct, alternating, and impulse voltages for testing high-voltage equipment. **4. AC Motor Drives.** To study the methods of controlling the three-phase induction motor, as well as the use of modern methods to start the induction motor and the use of modern methods of dynamic braking of the motor.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Attendance is required and highly encouraged. To that end, attendance will be taken every lecture. All exams (including the final exam) should be considered cumulative. Exams are closed book. No scratch paper is allowed. You will be held responsible for all reading material assigned, even if it is not explicitly covered in lecture notes.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

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

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to lab. Components
Week 2	Lab 2: State Variable Feedback design
Week 3	Lab 3: Breakdown voltage for DC Field

Week 4	Lab 4: Universal motor
Week 5	Lab 5: Modern Methods to Control the Starting and Braking of a Three Phase
Week 6	Lab 6: Induction Motor / part 1
Week 7	Lab 7: Soil resistivity test
Week 8	Lab 8: PID Controller Design
Week 9	Lab 9: Stepper motor
Week 10	Lab 10: Modern Methods to Control the Starting and Braking of a Three Phase
Week 11	Lab 11: Induction Motor / part 2
Week 12	Lab 12: State Space Model In Matlab
Week 13	Lab 13: Servo motor
Week 14	Lab 14: polarity effects on breakdown voltage
Week 15	Lab 15: Root Locus Design In Matlab

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1- B.M. Weedy, Electric Power System, 5th edition, John Wiley, and Sons, 2012.	Yes
Recommended Texts	1- Induction Machines Handbook Transients, Control Principles, Design and Testing, ION BOLDEA. 2- SYNCHRONOUS GENERATORS, ION BOLDEA. 3- Feedback Group Company. www.feedback.group.com. 4- Roland S. Burns, " Advanced Control Engineering", University of Plymouth. UK., 2001.	No
Websites	https://www.su.edu.om/doc/fe/Labs%20facilities-Electrical%20&%20Computer%20Engineering.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.