MODULE DESCRIPTION FORM

Module Information					
Module Title	**Thermodynamics**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EME111**				
ECTS Credits	**9**				
SWL (hr/sem)	**225**				
Module Level	**1 1**		**Semester of Delivery**	**1**	
Administering Department	**EME**		**College**	**CENGS**	
Module Leader	**Name: Omar M. Ahmed**		**e-mail**	**E-mail: omar.alzayat@uosamarra.edu.iq**	
Module Leader's Acad. Title	**Lecturer**		**Module Leader's Qualification**	**M.Sc.**	
Module Tutor	**Shaymaa Husham AbdllMalek**		**e-mail**	**E-mail: shaymaa.h.ab@uosamarra.edu.iq**	
Peer Reviewer Name	**Reyad Azzawi Badr**		**e-mail**	**E-mail: reyadh.azawi@uosamarra.edu.iq**	
Scientific Committee Approval Date	**11/11/2023**		**Version Number**	**1.0**	

Relation with other Modules			
Prerequisite module	None	**Semester**	-
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. To explain the thermodynamic science through the application of techniques. 2. To understand the first law of thermodynamic, units and properties system. 3. To understand the zeroth law of thermodynamic, properties system (Temperature, Pressure and density act.). 4. To understand the pure substance, steam tables And charts 5. To explain the ideal gas equation and real gas, gas tables and charts. 6. To understand the first law of thermodynamic, entropy, heat pump,

	reversible process and irreversible process. 7. To explain the nozzle, the diffuser, the turbine, the compressor and the throttling valve. 8. The vapor power cycle (Carnot cycle, Rankin cycle, reheat Rankin cycle and regenerative Rankin cycle). 9. The gas power cycle (Carnot cycle, Otto cycle, Diesel cycle and starling cycle and Ericson Rankin cycle). 10. The refrigeration cycle.
Module Learning Outcomes	1. The student will know about the importance of thermodynamic science and its application areas. 2. Understanding the thermodynamic system and surroundings. 3. Explaining the difference between substance intensive and extensive properties. 4. Understanding the relationship between the zeroth law of thermodynamics and temperature measurement devices. 5. Identify the concept of energy and energy conservation law and explaining the energy forms. 6. Identify the steady flow energy equation and non-flow energy equation and their applications. 7. Learning about thermodynamic state and process and reversible and irreversible processes. 8. Define ideal gases and their relations and processes. 9. Learning how to use steam tables to get the precise properties of steam state. 10. Understanding the second law of thermodynamics and entropy. 11. Define the heat engine cycles and their applications. 12. Learning about gas mixture and their properties.
Indicative Contents	Indicative content includes the following: 1- Dimensions and units of physical quantities, primary dimensions and secondary dimensions. 2- International system units (Metric SI) and English system (British) units. 3- Thermodynamic system (closed and open system), boundary and surroundings. 4- System properties, intensive and extensive properties. 5- Thermodynamic equilibrium: thermal, mechanical, phase and chemical equilibriums. 6- Thermodynamic state, process and cycle. 7- Constant property processes: isothermal, isobaric, and isochoric processes. and their solutions. 8- Zeroth law of thermodynamics and temperature measurement. 9- Temperature scales: Celsius, Fahrenheit, Kelvin and Rankine. 10- Pressure measurement: absolute, gage and vacuum pressure. 11- Energy forms: microscopic and macroscopic energy forms 12- The first law of thermodynamics (the energy conservation law).

	13- Steady flow energy equation (SFEE), steam boiler, turbine, compressor and nozzle. 14- Non flow energy equation (NFEE). 15- Ideal gas: Boyle's law, Charles's law, Gay-Lussac's law, Combined Gas Law and ideal gas law. 16- Gas constant, specific heats (Cp and Cv) and adiabatic index ($\boldsymbol{\gamma}$) of ideal gas. 17- Reversible and irreversible process of ideal gas and P-V diagram. 18- Steam formation: saturated water, wet steam, saturated steam and superheated steam. 19- Steam properties: dry fraction, saturation temperature, enthalpy, specific volume, internal energy. 20- Steam tables and interpolation. 21- The second law of thermodynamics: Kelvin-Blank statement and Clausius statement. 22- Entropy and T-S diagram. 23- Heat engine cycles: Carnot, Brayton, Otto, Diesel and Dual combustion cycles. 24- Seam cycles: Rankine, Rankine with superheat, reheat steam cycles. 25- Vapor compression refrigeration system. 26- Gas mixing processes.

Learning and Teaching Strategies

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

Student Workload (SWL)

Structured SWL (h/sem)	135	**Structured SWL (h/w)**	9
Unstructured SWL (h/sem)	87	**Unstructured SWL (h/w)**	5.8
Total SWL (h/sem)	**225**		

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

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	-Introduction -Basic concept of thermodynamics. - Thermodynamic system. - Substance thermodynamic properties (intensive and extensive properties).
Week 2	-Energy and energy transfer.
Week 3	- First law of thermodynamics.
Week 4	- Ideal and real gas.
Week 5	- Reversible and irreversible processes of ideal gas.
Week 6	- Steam formation and steam properties.

Week 7	- Steam tables and interpolation, nozzle – diffuser – turbine – compressor – throttling valve.
Week 8	- Mid exam.
Week 9	- The second law of thermodynamics.
Week 10	- Entropy and T-S chart.
Week 11	- Heat engine cycles (work and efficiency). - Carnot cycle
Week 12	- Rankin cycle. - Reheat Rankin cycle. - Regernative Rankin cycle
Week 13	- Otto cycle - Diesel cycle.
Week 14	- Vapor compression refrigeration system.
Week 15	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1 & 2	Lab 1: Identify the types and uses of pressure devices, air flow meters and thermometers.
Week 3 & 4	Lab 2: Boyle's and Charles's experiments.
Week 5 & 6	Lab 3: Measuring the specific heats ratio (adiabatic index $\boldsymbol{\gamma}$) for ideal gas.
Week 7 & 8	Lab 4: Heat pump.
Week 9 & 10	Lab 5: Evaluating the performance of simple vapor compression refrigeration cycle.
Week 11 & 12	Lab 6: The relationship between Saturated pressure and temperature of steam.

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Thermodynamics: An engineering approach (9th edition), by Yunus A. Cengel Dr., Michael A. Boles, Mehmet Kanoglu, Published 2018	Yes
Recommended Texts	A Textbook of Thermal Engineering, by R. S. Khurmi & J. K Gupta, 2003.	No
Websites	https://www.youtube.com/watch?v=5rYEOOdRNLA	

Grading Scheme				
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

Module Information

Module Title	**Mathematics**		**Module Delivery**	
Module Type	**Supportive**		☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EME112**			
ECTS Credits	**9**			
SWL (hr/sem)	**225**			
Module Level	1	**Semester of Delivery**	1	
Administering Department	EME	**College**	CENGS	
Module Leader	Hadeel Abdulhadi Ibraheem	**e-mail**	hadeel.abddulhadi@uosamarra.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer	**Module Leader's Qualification**	M.Sc.	
Module Tutor	Ehsan Ali Mustafa	**e-mail**	E-mail: ehsan.ali@uosamarra.edu.iq	
Peer Reviewer Name	Muhammad Asmail Eleiwi	**e-mail**	E-mail: dr.muhammad@uosamarra.edu.iq	
Scientific Committee Approval Date	11/11/2023	**Version Number**	1.0	

Relation with other Modules

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

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives	1.To develop problem solving skills and understanding of mathematic theory through the application of techniques. 2.Students learn about inverse functions 3.The student will be familiar with logarithms 4.The student will be familiar with the trigonometric functions 5.Understanding the engineering application of the studied specialization
Module Learning	1. Developing the student's ability to solve and discuss

Outcomes	2. Linking information to engineering reality
Indicative Contents	The first years of all mathematics programmers are designed to give students a thorough grounding in a wide spectrum of mathematical ideas, techniques and tools in order to equip them for the later stages of their course. During first year, as well as consolidating, broadening and extending core material from pre-University study, we initiate a cultural transition to the rigorous development of mathematics which is characteristic at university. Students will develop both their knowledge of mathematics as a subject and their reasoning and communication skills, through lectures, tutorials, seminars, guided self-study, independent learning and project work. This development is addressed in all of our first-year modules, although different modules have a different emphasis. In addition to the above broad aims of the first year, this module focuses on ensuring that students have competence in a wide range of essential concepts, techniques and applications of differential and integral calculus, and differential equations.

Learning and Teaching Strategies	
Strategies	Participation in the classroom during the lecture by asking questions by the teacher, taking short sudden exams, and participating in students sometimes to explain information from the subject matter. Guiding students to some sources, examples and exercises to benefit from.

Student Workload (SWL)			
Structured SWL (h/sem)	123	**Structured SWL (h/w)**	8.2
Unstructured SWL (h/sem)	102	**Unstructured SWL (h/w)**	6.8
Total SWL (h/sem)	**225**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	5% (10)	3 and 4	LO #2 and #3
	Assignments	6	4% (24)	9, 10, 11, 12, and 13	LO #8, #9 , #10 #11, #12, and #13
	Projects / Lab.	-	-	-	-
	Report	1	6% (6)	14	All
Summative assessment	**Mid-term Exam**	2hr	10% (10)	7	LO #1 - #6
	Final Exam	3hr	50% (50)	-	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Functions and Trigonometric Functions.
Week 2	Limit , Continuity , and L' Hopital's Rule.
Week 3	Differentiation: Differentiation Rules , Implicit Differentiation , Chain Rule , and related rates.
Week 4	Applications of Derivatives : Extreme values of functions , Increasing and Decreasing functions , Concavity and curve Sketching , and Applied Optimization.
Week 5	Integration: Definite and Indefinite Integrals, and Area between Curves.
Week 6	Applications of Definite Integrals: Volumes of Revolution (Disk ,Washer and Cylindrical Shell Methods) , Arc Length , and Area of Surfaces of Revolution.
Week 7	**Mid-term Exam +** Transcendental Functions: Inverse Functions
Week 8	Transcendental Functions: Natural Logarithms ,and Exponential Functions .

Week 9	Transcendental Functions: Inverse Trigonometric Functions , Derivative and Integral of Inverse trigonometric functions , Hyperbolic Functions , and Inverse Hyperbolic Functions.
Week 10	Techniques of Integration: Integration by Parts , Tabular Integration , Trigonometric Integrals.
Week 11	Techniques of Integration: Trigonometric substitutions , Integration by Partial Fractions.
Week 12	Numerical Integration (Midpoint ,Trapezoidal and Simpson methods).
Week 13	Polar Coordinates.
Week 14	Matrix.
Week 15	**Preparatory week before the final Exam**

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	Calculus, George B. Thomas. 12th Edition	Yes
Recommended Texts	Calculus, Anton ,Bivens and Davis. 7th Edition	No
Websites	https://www.khanacademy.org/math/calculus-1	

Grading Scheme

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

Module Information					
Module Title	**Computer Science**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EME113**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	EME		**College**	CENGS	
Module Leader	Riyadh Meteab Mahmood		**e-mail**	E-mail: reyadh.m@uosamarra.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Eman Adel Mahmood		**e-mail**	E-mail: Eman.A.Mahmood00009@st.tu.edu.iq	
Peer Reviewer Name	Younes Saud Alwan		**e-mail**	E-mail: Younes.s.al@uosamarra.edu.iq	
Scientific Committee Approval Date	11/11/2023		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	-
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. This course deals with the basic computer 2. Learn the basic computer components 3-Learn the Windows operating system, installation requirements, new features, and desktop components 4. To develop computer skills and understand programs through computer applications. 5. Broad understanding of word, Excel, PowerPoint and its applications. 6.To understand Computer Safety & Software problems To understand the pure

	substance, steam tables And charts
Module Learning Outcomes	1. Recognize how computer components. 2. Identify the Windows operating system, installation requirements, new features, and desktop components. 3. General description of Excel, Word and PowerPoint programs. 4. Understand the basic features of the Word program 5. Identify the basic features of the Excel program. 6. Identify the basic features of the PowerPoint program 7. Summarize what is meant by Microsoft Office program 8. The practical application of the Word program 9. Excel practical application 10. PowerPoint practical application
Indicative Contents	Indicative content includes the following. Part A - Computer's components and Microsoft Word program (Theoretical and laboratory computer). Computer's components – The physical parts of a computer, software entities and Computer security, also Computer software licenses and it types, Intellectual property and electronic penetration. Definition of operating system, objectives, classification, Windows operating system, installation requirements, desktop components, Control panel, common settings in the computer, start menu, Taskbar. General introduction to Microsoft, Definition of Microsoft Word, Insert objects into Microsoft Word, Additional tasks in Microsoft Word. [60 hrs]. Part B - Excel and power point Microsoft program (Theoretical and laboratory) Definition of Excel Microsoft program, Basic functions of Microsoft Excel, Components of Excel Microsoft program, Explanation of the command bar in Excel, Creating mathematical formulas in Microsoft Excel, Additional tasks in 21- The second law of thermodynamics: Kelvin-Blank statement and Clauses statement. Microsoft Excel Definition of power point program, PowerPoint Components, Explanation of the components of the home bar, Explanation of insert bar components, Explanation of animation in power point, Definition of a design bar in power point program, explain each the Slide show, review and View power point . [60 hrs]. Exams and quizzes (3 hrs) Revision problem classes [27 hrs]

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

Student Workload (SWL)			
Structured SWL (h/sem)	63	**Structured SWL (h/w)**	4.2
Unstructured SWL (h/sem)	37	**Unstructured SWL (h/w)**	2.46
Total SWL (h/sem)	**100**		

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

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	-Introduction - Difference Computer's components
Week 2	-The physical parts of a computer
Week 3	- Software entities.

Week 4	- Computer software licenses and it types.
Week 5	- Definition of operating system objectives, classification, Windows operating system.
Week 6	- Definition of Microsoft Office Word and mid exam.
Week 7	- Additional tasks in Microsoft Office Word, Insert objects into Microsoft Word.
Week 8	- Definition of Microsoft Office Excel program, Basic functions of Microsoft Office Excel.
Week 9	- Components of Excel Microsoft Office program, Explanation of the main bar in Excel.
Week 10	- Creating mathematical formulas in Microsoft Office Excel, Additional tasks in Microsoft Office Excel.
Week 11	- Definition of Microsoft Office power point program, Microsoft Office PowerPoint Components.
Week 12	- Explanation of the components of the home bar.
Week 13	-Explanation of insert bar components, Explanation of animation in power point.
Week 14	- Definition of a design bar in Microsoft Office power point program
Week 15	- Explain each the Slide show, review and View power point.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Introduction to Computer's components.
Week 2	Recognize the physical parts of a computer.
Week 3	Recognize the operating system, Windows operating system.
Week 4	Historical development of computers
Week 5	Computer security and work ethics
Week 6	Definition of Microsoft Office Word & the components of Microsoft Office Word.
Week 7	Definition of Excel Microsoft program, Basic functions of Microsoft Excel.
Week 8	Recognize the Components of Microsoft Office Excel program.
Week 9	Explanation of the main bar in Microsoft Office Excel.
Week 10	Creating mathematical formulas in Microsoft Office Excel.
Week 11	Additional tasks in Microsoft Office Excel.
Week 12	Recognize the Microsoft Office power point program and Microsoft Office PowerPoint Components

Week 13	Recognize the components of the home bar, also animation in Microsoft Office power point.
Week 14	Application of insert bar components, design bar in Microsoft Office power point program.
Week 15	Recognize to the Slide show, review and View in the Microsoft Office power point.
Week 16	**Preparatory week before the final Exam.**

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Fundamentals of Computer and Their Office Applications	Yes
Recommended Texts		
Websites		

Grading Scheme

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

Module Information					
Module Title	Engineering Physics			**Module Delivery**	
Module Type	**Supportive**			☒ **Theory** ☒ **Lecture** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EME114				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	EME		**College**	CENGS	
Module Leader	Marwa Majeed Juma		**e-mail**	E-mail: Marwa.majeed@uosamarra.edu.iq	
Module Leader's Acad. Title	Assistant lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Ehsan Ali Mustafa		**e-mail**	E-mail: ehsan.ali@uosamarra.edu.iq	
Peer Reviewer Name	Reyad Azzawi Badr		**e-mail**	E-mail: reyadh.azawi@uosamarra.edu.iq	
Scientific Committee Approval Date	11/11/2023		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	-
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. Metallurgists develop different ways of processing metals and converting them into products which are useful for humans. They study the science of metals and also conduct various types of research in the respective field. They primarily work in the iron and steel industrial areas and research laboratories. 2. The task of the metallurgist is to achieve balance between material

	properties, such as cost, weight, strength, toughness, hardness, corrosion, fatigue resistance and performance in temperature extremes. To achieve this goal, the operating environment must be carefully considered. 3. Metallurgical engineers conduct testing to ensure the safety of materials, develop sustainable materials and processes for recycling existing materials, investigate material failures, and create testing
Module Learning Outcomes	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Atomic Structure: Atom, The Nucleus, The Protons, The Neutrons, The Electrons 2. The Bohr's Model 3. Periodic Table Element Groupings 4. Type of Bonding in Solids: Ionic Bonding, Covalent Bonding, Metallic Bonding, Hydrogen Bonding, Van Der Wall's Bonding 5. The Crystal Structure of Solids 6. Metallic Crystal Structures: Body-Centered Cubic (BCC), Face-Centered Cubic (FCC), Hexagonal Close-Packed (HCP) 7. Atomic Packing Factor 8. coordination number 9. Theoretical Density 10. ALLOYS 11. Structure of A Alloys : 12. Classification of Alloys Structure 13. Type of Alloys Structures (solid solution) : Substitutional alloy, Interstitial alloy, Substitutional / Interstitial alloy 14. Classification of Engineering Materials: Ferrous Metals, Non-Ferrous Metals: 15. Classification of Metals Alloys:

	16. Phase Equilibrium Diagrams 17. Types of Alloying Systems: 18. DEFORMATION: Elastic deformation, Plastic deformation 19. Recrystallization 20. Mechanical Properties: STRENGTH, HARDNESS, TOUGHNESS, BRITTLENESS, DUCTILITY, MALLEABILITY, ELASTICITY, PLASTICITY, RIGIDITY, MACHINABILITY, HARDENABILITY, FATIGUE, CREEP 21. Stress: Compressive strength, Tensile strength 22. Types of Stress: Tensile Stress, Compressive Stress 23. Strain: 24. Types of Strain: Tensile Strain, Compressive Strain 25. Modulus of elasticity, or Young's Modulus 26. Stress-Strain Curve: (i) Proportional Limit, (ii) Elastic Limit, (iii) Yield Point, (iv) Ultimate Stress Point, (v) Fracture or Breaking Point 27. Heat Treatments: Annealing, Normalizing, Hardening, Tampering, Curborization, Quenching 28. Ferrous Metals(Alloys) : Pig Iron (Iron Ore), Wrought Iron, Cast Iron, Steel, Stainless Steels, Super alloys 29. Iron Carbon phase Diagram 30. Structures In Fe-C-Diagram: Austenite, Ferrite, Cementite, Pearlite, Austenite 31. Transformation TTT Diagrams
Indicative Contents	Indicative content includes the following: 1. Occupational safety instructions for laboratories and factories 2. Instructions for chemical, biological, radiological and nuclear safety and Security

Learning and Teaching Strategies	
Strategies	Type something like:. Teaching and learning strategies can include a range of whole class, group and individual activities to accommodate different abilities, skills, learning rates and styles that allow every student to participate and to achieve some degree of success.

Student Workload (SWL)			
Structured SWL (h/sem)	78	**Structured SWL (h/w)**	5.2
Unstructured SWL (h/sem)	47	**Unstructured SWL (h/w)**	3.13
Total SWL (h/sem)	**125**		

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

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1-4	Internal Structure of Metals Atom structure, The crystalline structure of metals, Defects in metal casting.
Week 5-7	Equilibrium states of binary system and mid exam. Constitution of alloys: Alloy structure and classification of alloys Equilibrium states of binary system and mid exam.
Week 8-9	Phases in alloy system Properties of Metals and Alloy : -Mechanical deformation and recrystallization Hot and cold working Physical and mechanical properties.
Week 10-13	Ferrous Alloy (Iron - Carbon) : Fe - C equilibrium diagram Carbon steel classification and applications Cast iron.
Week 14-15	Heat treatment of steels: Austenite transformation TTT diagrams Case hardening of steel the concept hardenability.

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Materials Science and Engineering by William D.callister,jr.David G.Rethwisch	No
Recommended Texts	-	-
Websites		

Grading Scheme				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
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Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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

MODULE DESCRIPTION FORM

Module Information					
Module Title	Mechanical workshop			**Module Delivery**	
Module Type	Supportive			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐**Practical** ☐ **Seminar**	
Module Code	EME115				
ECTS Credits	3				
SWL (hr/sem)	**75**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	EME		**College**	CENGS	
Module Leader	Omar Mohammad Ahmed		**e-mail**	E-mail: omar.alzayat@uosamarra.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**		
Module Tutor	Ehsan Ali Mustafa		**e-mail**	E-mail: ehsan.ali@uosamarra.edu.iq	
Peer Reviewer Name	Reyad Azzawi Badr		**e-mail**	E-mail: reyadh.azawi@uosamarra.edu.iq	
Scientific Committee Approval Date	11/11/2023		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	-
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes and Indicative Contents	
Module Objective	The module objectives of a mechanical workshop can vary depending on the specific context and level of education or training. However, here are some common objectives that may be associated with a mechanical workshop: 1. Understanding Mechanical Systems: The objective is to provide participants with a comprehensive understanding of various mechanical systems, including their components, functions, and interactions.

	2. Developing Technical Skills: The workshop aims to enhance participants' technical skills related to mechanical engineering, such as operating tools and equipment, performing measurements, and tools. 3. Safety Awareness: Safety is a crucial aspect of any mechanical workshop. The objective is to educate participants about safety protocols, risk assessment, proper handling of tools and equipment, and the importance of following safety guidelines to prevent accidents or injuries. 4. Critical Thinking and Innovation: The objective is to encourage participants to think critically and foster innovation in mechanical design, problem-solving, or process improvement. This may involve challenging participants to develop creative solutions, optimize existing designs, or propose new approaches to mechanical systems. 5. Critical Thinking and Innovation: The objective is to encourage participants to think critically and foster innovation in mechanical design, problem-solving, or process improvement. This may involve challenging participants to develop creative solutions, optimize existing designs, or propose new approaches to mechanical systems. 6. Familiarity with Industry Standards and Practices: The workshop may focus on familiarizing participants with relevant industry standards, regulations, and best practices in mechanical engineering. This includes topics such as quality control, material selection, manufacturing processes, and sustainability considerations.
Module Learning Outcomes	The module learning outcomes of a mechanical workshop generally reflect the goals and objectives of the workshop. These outcomes describe the knowledge, skills, and abilities that participants are expected to acquire or demonstrate upon completing the workshop. Here are some possible learning outcomes for a mechanical workshop: 1. Knowledge of Mechanical Systems: Participants will acquire a comprehensive understanding of mechanical systems, including their components, functions, and interactions. 2. Knowledge of Mechanical Systems: Participants will acquire a comprehensive understanding of mechanical systems, including their components, functions, and interactions. 3. Teamwork and Collaboration: Participants will demonstrate the ability to work effectively in teams, communicate ideas, delegate tasks, and collaborate to achieve common goals within a mechanical workshop setting. 4. Problem Solving: Participants will develop the ability to analyze mechanical problems, identify possible solutions, and apply appropriate troubleshooting techniques to resolve issues effectively. 5. Professional Development: Participants will gain insights into career opportunities in the field of mechanical engineering, including industry trends, networking strategies, and further education pathways for continued professional growth. 6. Documentation and Reporting: Participants will develop skills in maintaining accurate records, creating technical reports, and effectively communicating findings or project outcomes related to mechanical engineering.
Indicative Contents	The indicative contents of a mechanical workshop can vary depending on the specific focus, duration, and level of the workshop. However, here are some common indicative contents that may be included in a mechanical workshop: 1. Introduction to Mechanical Engineering: a. Overview of mechanical engineering and its applications b. Introduction to basic mechanical concepts and principles c. Role of mechanical engineering in various industries 2. Tools and Equipment: a. Introduction to various hand tools and their uses in mechanical engineering b. Familiarity with power tools, such as drills, grinders, and saws c. Overview of specialized equipment, such as welding machines, CNC machines, etc. 3. Measurement and Metrology: a. Principles of measurement and metrology in mechanical engineering b. Use of measuring instruments, such as calipers, micrometers, and gauges c. Techniques for accurate measurement and calibration 4. Assembly and Disassembly:

	a. Techniques for assembling and disassembling mechanical components b. Proper handling and alignment of components during assembly c. Identification and troubleshooting of issues during disassembly 5. Project Work: a. Undertaking practical projects related to mechanical engineering b. Applying theoretical knowledge and skills to real-world problems c. Collaborating in teams to design, build, or improve mechanical systems or prototypes

Learning and Teaching Strategies	
Strategies	Learning and teaching strategies in a mechanical workshop are designed to engage participants actively, promote hands-on learning, and facilitate the acquisition of practical skills and knowledge. Here are some common strategies used in a mechanical workshop: 1. Demonstrations: The instructor or facilitator provides live demonstrations of mechanical concepts, techniques, or equipment operation. Participants observe and learn through visual and auditory stimuli. 2. Hands-on Practice: Participants are provided with opportunities for hands-on practice, allowing them to apply theoretical knowledge to real-world scenarios. They can engage in activities like assembling or disassembling mechanical components, operating tools and equipment, or conducting experiments. 3. Collaborative Learning: Participants work in teams or small groups to solve mechanical problems, complete projects, or perform tasks. This encourages collaboration, communication, and the sharing of knowledge and ideas among participants. Case Studies: Case studies present real or hypothetical mechanical engineering scenarios for participants to analyze and solve. They promote critical thinking and decision-making skills by applying knowledge to practical situations.

Student Workload (SWL)			
Structured SWL (h/sem)	48	**Structured SWL (h/w)**	3.2
Unstructured SWL (h/sem)	27	**Unstructured SWL (h/w)**	1.8
Total SWL (h/sem)	**75**		

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

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Welding
Week 2	
Week 3	Grinding
Week 4	Filings
Week 5	
Week 6	Polishing
Week 7	Measuring tools for mechanical systems
Week 8	
Week 9	Carpentry
Week 10	Lathing

Week 11	
Week 12	
Week 13	Milling
Week 14	Drilling
Week 15	

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	K. c. John, Mechanical Workshop Practice Paperback	No
Recommended Texts	Elements Of Workshop Technology Vol-1" by Choudhury H S K	No
Websites	-	

Grading Scheme				
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

Module Information

Module Title	**Fundamentals of Electrical Engineering**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EME121		
ECTS Credits	**9**		
SWL (hr/sem)	**225**		

Module Level	1	**Semester of Delivery**	2
Administering Department	EME	**College**	CENGS
Module Leader	Name: Baker Saed	**e-mail**	E-mail: bakrs1991@uosamarra.edu.iq
Module Leader's Acad. Title	Lec.	**Module Leader's Qualification**	M. Sc.
Module Tutor	Name (if available):	**e-mail**	E-mail:
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	1/03/2024	**Version Number**	1.0

Relation with other Modules

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

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives	1. Basics of electrical engineering. 2.System of units. 3. Electrical circuit elements. 4. Electrical circuit analyses. 5. Electrical circuit analysis methods. 6.Electrical circuit theories. 7. Power calculations. 8.Alternating and direct current circuits. 9. Resonance in alternating current circuits.

	10. Theories of alternating current circuits analysis. 11. Magnetic circuits.
Module Learning Outcomes	1.Recognize how electricity works in electrical circuits. 2.List the various terms associated with electrical circuits. 3. Summarize what is meant by a basic electric circuit. 4. Discuss the reaction and involvement of atoms in electric circuits. 5. Describe electrical power, charge, and current. 6. Define Ohm's law. 7. Identify the basic circuit elements and their applications. 8. Discuss the operations of sinusoid and phasors in an electric circuit. 9. Discuss the various properties of resistors, capacitors, and inductors. 10. Explain the two Kirchoff's laws used in circuit analysis. 11. Identify the capacitor and inductor phasor relationship with respect to voltage and current.
Indicative Contents	Indicative content includes the following: DC circuits Basic principles, basic concepts and ideas of electrical circuits ,Ohm's and Kirchhoff's laws and simplification of DC electrical circuits, Circuit analysis by the DC toroidal method[10 hrs] Circuit analysis by the direct current nodal method, Methods for analyzing electrical circuits: DC superposition grouping theory [10 hrs] Methods for analyzing electrical circuits: Thevenn's theory, Norton's direct current theory [10 hrs] Electrical Circuit Analysis Methods: Theory of Maximum DC Power Transfer[10 hrs] Methods of connecting Delta-Star resistors, review, monthly exam [10 hrs] AC circuits – Time dependent signals, average and RMS values. Capacitance and inductance, energy storage elements, simple AC steady-state sinusoidal analysis. [15 hrs] AC Circuits II - Phasor diagrams, definition of complex impedance, AC circuit analysis with complex numbers. [10 hrs] RL, RC and RLC circuits - Frequency response of RLC circuits, simple filter and band-pass circuits, resonance and Q-factor. [10 hrs] behavior of resistance, coil and capacitance in alternating current circuits Linking and analyzing electrical circuits of alternating current with the influence of resistance, inductance and capacitance. [10 hrs] To analyze circuits in both the toroidal and nodal ways of alternating current Superposition grouping theory, Thevenn and Norton grouping theory for alternating current. [10 hrs] Methods of analyzing electrical circuits: the theory of maximum transfer of power, resonant circuits of alternating current, analysis of magnetic circuits and the operation of electrical transformers. [10 hrs] Public discussions and review, monthly exam. [5 hrs]

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

	sampling activities that are interesting to the students.

Student Workload (SWL)			
Structured SWL (h/sem)	123	**Structured SWL (h/w)**	8.2
Unstructured SWL (h/sem)	102	**Unstructured SWL (h/w)**	6.8
Total SWL (h/sem)	**225**		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	5% (10)	5 and 12	LO 1#2#3#4#5, LO 6#7#8#9#10
	Assignments	3	3% (9)	Continuous	All
	Projects / Lab.	3	5% (15)	4,9, and 13	LO1#2#3#4,5#6#7#8,9#10#11#12
	Report	1	6% (6)	13	All
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)		All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introduction - Basic principles, basic concepts and ideas of electrical circuits.
Week 2	Basics of Ohm's and Kirchhoff's laws and simplification of DC electrical circuits.
Week 3	Circuit analysis by the DC toroidal method.
Week 4	Review of Kirchhoff's Laws, Circuit Analysis - Nodal and Mesh
Week 5	Linearity and Superposition, Source Transformations.

Week 6	Methods for analyzing electrical circuits: Thevenn's theory, Norton's direct current theory
Week 7	Electrical Circuit Analysis Methods: Theory of Maximum DC Power Transfer and mid exam.
Week 8	Methods of connecting Delta-Star resistors, review.
Week 9	Approved and unapproved sources, review of complex numbers and their mathematical operations To analyze circuits in both the toroidal and nodal ways of alternating current.
Week 10	Behavior of resistance, coil and capacitance in alternating current circuits.
Week 11	Basic ideas of alternating current. Linking and analyzing electrical circuits of alternating current with the influence of resistance, inductance and capacitance.
Week 12	Superposition grouping theory, Thevenin and Norton grouping theory for alternating current.
Week 13	Methods of analyzing electrical circuits: the theory of maximum transfer of power, resonant circuits of alternating current.
Week 14	Frequency Response of Series/Parallel Resonances, High-Q Circuits.
Week 15	Analysis of magnetic circuits and the operation of electrical transformers.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Introduction of electrical device, DC sources and metering .
Week 2	Calculation of resistor by resistor color code.
Week 3	Ohm’s law.
Week 4	Series DC Circuit.
Week 5	Parallel DC Circuit.
Week 6	Series-Parallel DC Circuit.
Week 7	Potentiometer and Rheostats.
Week 8	Kirchhoff’s laws

Grading Scheme

Week 9	Mid Exam.
Week 10	Superposition theorem's .
Week 11	Mesh and Nodal theorem's.
Week 12	Norton's theorem's.
Week 13	Thevenin's theorem.
Week 14	Maximum Power transfer.
Week 15	Final Exam.

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	1- Boylestad, Robert L. "Introductory circuit analysis", 11th ed.	Yes
Recommended Texts	2- Allan H. Robbins and Wilhelm C. Miller, "Circuit Analysis: Theory and Practice", Fifth Edition. 3- Nilsson, James William." Electric circuits", Tenth edition.	No
Websites	-	

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

Module Information					
Module Title	**Engineering Mechanics**			Module Delivery	
Module Type	**Core**			**☒Theory** **☐ Lecture** **☒Lab** **☒Tutorial** **☐ Practical** **☐Seminar**	
Module Code	**EME122**				
ECTS Credits	**8**				
SWL (hr/sem)	**200**				
Module Level	1		Semester of Delivery	2	
Administering Department	EME		College	CENGS	
Module Leader	**Name: Ihsan Ali Mustafa**		e-mail	E-mail ehsan.ali@uosamarra.edu.iq	
Module Leader's Acad. Title	Lecturer		Module Leader's Qualification	PhD	
Module Tutor	**Mohammed O. Attea**		e-mail	E-mail: mohammedatteaa@uosamarra.edu.iq	
Peer Reviewer Name	Name		e-mail	E-mail	
Scientific Committee Approval Date	1/03/2024		Version Number	1.0	

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1.To provide definitions of engineering mechanics, units , introduction of force and moment 2.To explain the concept of equilibrium of particles and rigid bodies in 2D space 3.To give information about support types and to give ability to calculate support reactions 4.To explain the equilibrium of structures and internal forces in trusses

	5.To provide information on moment of inertia in 2D space 6.To provide friction in 2D space 7.Introducing the basic analysis methods of the particle dynamics. 8.Analyzing the patterns and relationships of the given problems with practical examples 9.Strengthen the basic mechanical sense of the student
Module Learning Outcomes	1.Use both conceptual and numerical techniques to solve engineering problems 2.Understand and use the general ideas of force system resultants 3.Determine the moment of a force about an arbitrary point and/or axes 4.Analyze and develop free-body diagrams for any system of forces in two dimension 5.Understand and use the general idea of equilibrium of a particle 6.Analyze trusses and friction in two dimensional space 7.Introduce the concept of truss structure 8.Prepare and understand engineering mechanics – particle dynamics 9.Master various problem solving for rectilinear and curvilinear motion 10.Practice the problem solving of kinetics of particle. 11.Analyze and develop free-body diagrams for a particle in non-equilibrium in two dimensional space 12. The ability to apply Newton's second Law for many Engineering applications
Indicative Contents	Indicative content includes the following: • Force system (7 hrs) • Moments of forces (7 hrs) • Force Couples (7 hrs) • Resultant of force-couple systems (7 hrs) • Equilibrium of rigid bodied (7 hrs) • Trusses (7 hrs) • Friction (7 hrs) • Introduction to dynamics & Mid-term exam (7 hrs) • Kinematics of particle (Rectilinear motion) (7 hrs) • Kinematics of particle (Curvilinear motion) (7 hrs) • Normal-tangential coordinates (Kinematics) (7 hrs) • Polar coordinates (Kinematics) (7 hrs) • Kinetics of particles (Rectilinear motion) (7 hrs) • Kinetics of particles (Curvilinear motion) (14 hrs) • Final exam (3hrs)
Course Description	The course covers the following topics; • statics of particles: In this course, the students will master; forces in plane moments, equilibrium, moment of a force, moment of a couple, equivalent systems of forces on rigid bodies, equilibrium in two dimensions. Also analysis of structures: trusses, friction will be introduced. • Dynamics of particles: In this course, the students will be introduced to the fundamentals of Dynamics of Engineering Mechanics. The topics will cover a wide range of applications that, collectively, form building blocks of the dynamics world for an everyday mechanical engineer. Typically, the course starts with the behavior and properties of particles and the fundamental relationships of distance, velocity, and acceleration. There is a broad spectrum to cover to accommodate most of the applications in more than one coordinate system.

Learning and Teaching Strategies	
Strategies	The learning and teaching strategy is designed to: Carefully cover in lectures the necessary fundamental material and analytical techniques, and demonstrate concepts with appropriate (and where possible practical) examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems.

Student Workload (SWL)			
Structured SWL (h/sem)	108	Structured SWL (h/w)	7.2
Unstructured SWL (h/sem)	92	Unstructured SWL (h/w)	6.13
Total SWL (h/sem)	200		

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

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	force systems
Week 2	definition of moment,
Week 3	moment of a couple
Week 4	Resultant of force couple systems
Week 5	Equilibrium in 2-D, free body diagrams, equations of equilibrium
Week 6	Structure trusses
Week 7	Friction (dry friction)
Week 8	Mid-term exam , Introduction to dynamics(Rectilinear motion)
Week 9	Kinematic of particle – Curvilinear motion(Projectile)
Week 10	Kinematic of particle – Normal and tangential coordinate system
Week 11	Kinematic of particle – Polar coordinate system
Week 12	Kinetics of particles – Newton's second law(Rectilinear motion)
Week 13	Kinetics of particles – Curvilinear motion (Normal and tangential coordinate system)
Week 14	Kinetics of particles –Curvilinear motion (Polar coordinate system)
Week 15	final Exam

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1,2	force resultant experiment
Week 3,4	moments experiment
Week 5,6	equilibrium experiment

Week 7,8	friction experiment
Week 9,10	Instantaneous and average velocity experiment
Week 11,12	Velocity of rolling body over inclined surface experiment
Week 13,14,15	Newton 2nd law experiment & conservation of energy experiment

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	1. Engineering Mechanics-Statics, J.L.Meriam, L.G.Kraige, Wiley, 7th Edition, 2012, ISBN: 978-0-470-61473-0 2. Engineering Mechanics: Dynamics 7th edition, by Meriam, J. L., Kraige, L. G. (2012)	Yes Yes
Recommended Texts	1. Engineering Mechanics-Statics, Hibbeler, R.C.13th Edition, Pearson Prentice Hall, 2016, ISBN 978-0-13-31892-2." 2. Engineering Mechanics: Dynamics, by R. C. Hibbeler 2004.	Yes No
Websites	N/A	

Grading Scheme

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

Module Information					
Module Title	**Engineering Drawing and Auto CAD**			**Module Delivery**	
Module Type	**Supportive**			☒**Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐**Practical** ☐ **Seminar**	
Module Code	EME123				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		1	**Semester of Delivery**		2
Administering Department		EME	**College**	CENGS	
Module Leader	Mohammed Fadil Hasan		**e-mail**	Albadry.mohamad55@uosamarra.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		M.S.C
Module Tutor	Name (if available):		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		1/03/2024	**Version Number**		1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1- Understanding Engineering Drawings: The module should provide students with a comprehensive understanding of engineering drawings, including different types of views (orthographic, isometric, etc.), dimensioning, to learning, sectioning, and symbols commonly used in mechanical engineering 2- Drafting Standards and Conventions: Students should be familiarized with industry-standard drafting practices, including dimensioning standards, drawing scales, line types, and layer management. They should learn how to create drawings that adhere to these standards. 3- Familiarity with AutoCAD: The module should introduce students to AutoCAD, a widely used computer-aided design (CAD) software. Students should learn how to navigate the software interface, create and modify 2D drawings, and apply appropriate annotations.
Module Learning	Upon completion of the module on Engineering Drawing and AutoCAD, learners

Outcomes	should be able to achieve the following learning outcomes: 1. Interpret Engineering Drawings: Students should be able to interpret various types of engineering drawings, including orthographic projections, isometric views, section views, and assembly drawings. They should be able to understand the information conveyed in the drawings and extract relevant dimensions and specifications. 2. Create Accurate Engineering Drawings: Students should be able to create accurate engineering drawings using AutoCAD. They should demonstrate proficiency in using the software to create 2D drawings, apply appropriate annotations and symbols, and adhere to industry-standard drafting practices and conventions. 3. Apply Dimensioning and Tolerancing: 4. Utilize AutoCAD for 3D Modeling: Learners should demonstrate the ability to create basic 3D models using AutoCAD. They should be able to build 3D representations of mechanical components and assemblies, apply materials and textures, and generate visualizations and renderings. 5. Apply Design Standards and Conventions: Students should be able to apply design standards and conventions consistently throughout their drawings. They should understand industry-specific standards and practices related to line types, layer management, drawing scales, and documentation 6. Apply Design Standards and Conventions: Students should be able to apply design standards and conventions consistently throughout their drawings. They should understand industry-specific standards and practices related to line types, layer management, drawing scales, and documentation.
Indicative Contents	The indicative contents of a module on Engineering Drawing and AutoCAD here are some common topics and areas that such a module may cover 1. Introduction to Engineering Drawing: a. Importance and purpose of engineering drawings b. Types of engineering drawings: orthographic, isometric, section, assembly, etc. c. Drawing scales and sheet layouts d. Introduction to drawing tools and instruments 2. AutoCAD Fundamentals: a. Introduction to AutoCAD software and its user interface b. Basic commands and operations in AutoCAD c. Drawing setup and units d. Navigating and viewing drawings e. Introduction to layers and linetypes 3. Geometric Construction: a. Basic geometric constructions (lines, arcs, circles, etc.) b. Constructing polygons and ellipses c. Tangents and intersections d. Construction of common geometric features in engineering drawings 4. Introduction to 3D Modeling in AutoCAD: • Creating 3D models using basic solid modeling techniques Creating primitive shapes (box, cylinder, sphere, etc.) Modifying 3D objects (extruding, revolving, sweeping, etc.) • Applying materials and textures to 3D models Generating basic 3D renderings 5. Single simple and complex geometric objects

Learning and Teaching Strategies	
Strategies	Planning a unit or lesson involves a number of instructional decisions. The teacher must identify the following: the content and processes to be addressed, the strengths, needs, and interests of students, the Common Essential Learnings that could be incorporated, and the most effective instructional approaches. Such decisions are critical and must be made consciously and purposefully. It begins with the student's interest in engineering tools and the drawing board. To reach the highest level of understanding in the application of all theoretical and laboratory lesson processes.

Student Workload (SWL)			
Structured SWL (h/sem)	93	**Structured SWL (h/w)**	6.2
Unstructured SWL (h/sem)	57	**Unstructured SWL (h/w)**	3.8
Total SWL (h/sem)	**150**		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	5%(10)	5 and 12	All
	Home work	3	3% (9)	3,6, and 11	All
	Class work	3	5% (15)	3,8 and 11	All
	Projects/ Lab.	1	6%(6)	12	All
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1-#6
	Final Exam	3hr	50% (50)		All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introduction - Graphic Instruments and Their Use - Lettering - Graphic Geometry
Week 2	Intro to AutoCAD - Precision Drawing & Drawing Aids.
Week 3	Engineering Operations
Week 4	Basic Printing , Editing Tools by AutoCAD
Week 5	Graphic Geometry
Week 6	Geometric Shapes in AutoCAD
Week 7	Views and Mid exam.
Week 8	Annotating in AutoCAD with Text & Hatching
Week 9	Complex views
Week 10	Third View
Week 11	Layers
Week 12	Dimensions
Week 13	Dimensions by AutoCAD
Week 14	Section of Isometric Drawing Sectional View.
Week 15	Blocks, Drafting symbols, Attributes, Extracting data
Week 16	**Exam**

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Engineering Drawing , by Abdul-Rasool Abdul-Hussein AL-Khafaf Published by the Iraqi House of Books and Documents (1) 1990 Mastering AutoCAD and AutoCAD LT / Omura / Sybex	Yes
Recommended Texts	Engineering Drawing, by A.W. Boundy, 3rd edition, 1987 McGraw-Hill book company Sydney.	No
Websites	https://www.youtube.com/watch?v=yhRDjplrl1U, https://www.youtube.com/watch?v=fQNwVo2hWU4 https://www.youtube.com/watch?v=K8fQsse68Sc https://www.youtube.com/watch?v=BjROtC8rJkY&list=RDCMUCXtNlHrXwJSlsT6hRy9OUIg&start_radio=1&rv=BjROtC8rJkY&t=19	

Grading Scheme				
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

Module Information					
Module Title	**Electric Workshop**			**Module Delivery**	
Module Type	**Supportive**			☒**Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EME124				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	1		**Semester of Delivery**	2	
Administering Department	EME		**College**	CENGS	
Module Leader	Name: Riyadh Alsaleem		**e-mail**	E-mail: reyadh.m@uosamarra.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Name (if available):Baker Saed		**e-mail**	E-mail: bakrs1991@uosamarra.edu.iq	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	1/03/2024		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1.To learn the residential wiring and various types of wiring. 2.To measure the various electrical quantities. 3.To gain knowledge about the fundamentals of various electrical gadgets and their working and trouble shooting of them 4.Acquire teamwork skills for working effectively in groups
Module Learning Outcomes	1. Demonstrate safety measures against electric shocks 2. Identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols 3. Develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings . 4. Identify and test various electronic components. 5. Assemble and test electronic circuits on boards. 6. Work in a team with good interpersonal skills.

	7. The Student ability to develop and conduct appropriate design, analyze and interpret data, and use engineering judgment to draw conclusions.
Indicative Contents	Indicative content includes the following. Safety: (3 h) Introduction to Electrical Safety, Home Safety, Outdoor Safety, Lab & Workshop Safety, Safety and Accident Prevention Signs, Identify and name the following safety equipment. Electrical Tools: (3 h) Introduction of tools, electrical materials, symbols and devices, etc. Cables and switching: (9 h) Exposure to different types of electrical accessories like types of switches, types of lamps, wires and cables Fuses, Circuit Breaker, and Neutral: (3 h) Types of fuses, Types of circuit breaker, Importance of Neutral and structure Grounding and exposure to various earthing schemes. Series, Parallel Electrical Circuit: (3 h) Types of fuses, Types of circuit breaker, Importance of Neutral and structure Grounding and exposure to various earthing schemes. Active and Passive Components: (3 h) Identify Active and passive components, Determining capacitor values, inductor values, Resistance Measurement. Batteries: (3 h) Identify different types of batteries with their specifications. Testing the Semiconductor Component: (3 h) Test the semiconductor diodes using digital multi-meter, Test the LEDs display using multi-meter, BJT transistor, FET Transistor. Soldering Practice (12 h) Build simple circuits using resistors, diode, switch and LED, Study circuit of a Simple power supply with regulation & filters, Soldering Practice and fabrication of Have Wave/ Full Wave rectifiers circuits on General Purpose PCB/bread board.

Learning and Teaching Strategies

Strategies	Classroom management strategies Summative assessment Formative assessment Active learning Differentiated instruction

Student Workload (SWL)

Structured SWL (h/sem)	63	**Structured SWL (h/w)**	4.2
Unstructured SWL (h/sem)	37	**Unstructured SWL (h/w)**	2.46
Total SWL (h/sem)	**100**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	5% (10)	3 and 7	LO1#2#3#4, LO#5#6#7#8#9
	Assignments	2	5% (10)	3 and 8	All
	Projects / Lab.	3	5% (15)	3,5, and 8	All
	Report	1	5% (5)	11	All
Summative assessment	**Midterm Exam**	2hr	10% (10)	8	LO #1 - #7
	Final Exam	3hr	50% (50)	-	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	-Classroom management strategies -Summative assessment -Formative assessment -Active learning Differentiated instruction -Safe systems of working
Week 2	Basic electrotechnical units and theory
Week 3	Basic electrical circuits and cables
Week 4	-Tools and equipment used for electrotechnical applications
Week 5	-Alternating current theory and electrical machines
Week 6	-Cables and Cable Accessories
Week 7	-General Rules and Design Requirements for Electrical Installations
Week 8	-Electrical Circuit + Mid-term exam
Week 9	-Electrical installations and wiring systems
Week 10	-General Rules for Electrical Installations

Week 11	-General Rules and Design Requirements
Week 12	-Identify different types of batteries with their specifications
Week 13	- Electricity breakers, working methods, types
Week 14	-Light bulbs, power and light intensity
Week 15	-Using technical information
Week 16	Preparatory week before the final Exam.

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Basic Electrical Installation Work Senior Lecturer ELECTRONIC WORKSHOP & PCB LAB MANUAL DEPARTMENT OF ELECTRONICS &COMMUNICATION ENGINEERING	Yes
Recommended Texts	Uppal, S.L., "Electrical Wiring, Estimating and Costing"	No
Websites	http://home.howstuffworks.com/electrical-tools.htm http://www.kpsec.freeuk.com/components/switch.htm http://en.wikipedia.org/wiki/Electrical_wiring	

Grading Scheme

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

Module Information					
Module Title	**English Language I**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**EME125**				
ECTS Credits	**3**				
SWL (h/sem)	**75**				
Module Level	**1**		**Semester of Delivery**	**2**	
Administering Department	EME		**College**	CENG	
Module Leader	**Hadeel A. Ibraheem**		**e-mail**	hadeel.abdulhadi@uosamarra.edu.iq	
Module Leader's Acad. Title	**Assistant Lecturer**		**Module Leader's Qualification**	**M.Sc.**	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	None		**e-mail**	None	
Scientific Committee Approval Date	**1/03/2024**		**Version Number**	**1.0**	

Relation with other Modules			
Prerequisite module	None	**Semester**	-
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	**1.** Improve the ability of the students to understand, speak, read and write English as a second language with some technical texts. **2.** Intended to teach them, how to use technical English effectively as a language of instruction, Lab. Experiments and Exercises, examples **3.** Using Technical Terminologies as close as possible to the lectures they receive during their study. In addition to teach them how to give academic presentation, and how to write academically. **4.** Engineering is the biggest field of study in the world. English is a tool that notably affect engineering students in academic life. While most of the assumptions in engineering are taught in English, it requires to have good English communication skill.

	5. In academic life, engineering students have to deal with the countless lectures, tutorials, labs, project reports and papers in English. Generally engineering professors in various universities are also conducting lectures in English.
Module Learning Outcomes	**1**. Teaching the students how to characterize the different parts of speech. **2**. Assisting the students to distinguish between verb tenses and relating forms of actions to the time of happening. **3**. Teaching the student how to use questions words(what, where, which, how, who, when, whose) . **4**. Learning the students the most commonly confusing words. **5**. Improving pronunciation and spelling. **6**. Teaching the students various phrases (not individual words only) to use it in many situations. **7.** Increasing the student outcome of vocabulary especially engineering vocabulary. **8**. Developing the student's skills in reading, speaking, listening and writing .
Indicative Contents	1.Introduction: Pronunciation and Phonetic Symbols (**4.5hr**) 2.Grammar: Tenses, Articles, Question forms, Part of Speech, Reflexive Pronouns, Contrasting Ideas and Intensifiers, Infinitive of Purpose, Relative Clauses, and Sentence Structure (**25hr**) 3.Vocabulary: Commonly used Words, Synonyms, Phrases, and Idioms (2**hr**) 4.Reading Skill: Improving Student Reading in Engineering Topics (**2hr**) 5.Writing Skill: Rules to write a comprehensive paragraphs (**5hr**) 6.Listening Skill: Listening to Audios and Answering questions about it (2**hr**) 7.Speaking and Communication: Pronunciation, Fluency, and Conversation (**2.5hr**) 8.Assessments: Quizzes, Onsite Assignment, and Report (**2hr**)

Learning and Teaching Strategies	
Strategies	The strategy focuses on the four key language skills: reading, writing, listening, and speaking. A balanced approach is adopted to develop these skills through a variety of engaging activities and authentic materials. Reading and writing activities include comprehension exercises, vocabulary expansion and guided writing tasks, while listening and speaking activities involve interactive discussions, and presentations.

Student Workload (SWL)			
Structured SWL (h/sem)	**48**	**Structured SWL (h/w)**	**3.2**
Unstructured SWL (h/sem)	**27**	**Unstructured SWL (h/w)**	**1.8**
Total SWL (h/sem)	**75**		

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

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	**Pronunciation and Phonetic Symbols + Listening**
Week 2	**Pronunciation and Phonetic Symbols + Useful Vocabulary and Phrases + Reading + Listening**
Week 3	**Articles + Question forms + Reading + Listening**

Week 4	**Part of Speech + Reading**
Week 5	**Part of Speech + Reading**
Week 6	**Tenses + Useful Vocabulary and Idioms + Reflexive Pronouns**
Week 7	**Mid-Exam + Contrasting Ideas + Intensifiers + Listening**
Week 8	**Tenses + Useful Vocabulary and Phrases + Infinitive of Purpose**
Week 9	**Relative Clauses + Reading**
Week 10	**Tenses + Useful Vocabulary and Synonyms + Sentence Structure**
Week 11	**Rules of Writing + Listening**
Week 12	**Rules of Writing + Useful Vocabulary and Idioms**
Week 13	**Report Discussion**
Week 14	**Confusing Words + Listening**
Week 15	**Preparatory Week before the Final Exam**

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Head way Plus by John Liz Soars for Beginners	Yes
Recommended Texts	English Grammar in Use by Raymond Murphy	Yes
Websites	https://dictionary.cambridge.org	

Grading Scheme				
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

Module Information

Module Title	**Electronics**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒**Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EME211		
ECTS Credits	8		
SWL (hr/sem)	200		
Module Level	2	**Semester of Delivery**	3
Administering Department	EME	**College**	CENG
Module Leader	Ahmed M. Sana	**e-mail**	ahmed.sana@uosamarra.edu.iq
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor	N/A	**e-mail**	N/A
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	12/08/2024	**Version Number**	1.0

Relation with other Modules

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

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives	To Study and analyze the architecture, operation, and characteristics of the analog electronic components (Semiconductor Diodes, BJT transistors, FET transistors, and Operational amplifiers) and use the gained knowledge to design electronic circuits that meets the requirements of various applications. this module also aims to study and analyze the digital electronic components (logic gates, combinational logic circuits, flip-flops) and use them to design and implement various digital circuits such as arithmetic logic circuits, comparators, counters, and shift registers.
Module Learning Outcomes	1. The ability to analyze the characteristics of general-purpose semiconductor diodes and use it design diode circuits necessary for various applications like rectification. 2. The ability to analyze the characteristics of Zener diodes and use it

	design Zener diode circuits necessary for various applications like voltage regulation. 3. The ability to study the characteristics and modes of operation for Bipolar Junction Transistors (BJTs) and perform the DC, and AC on different BJT configurations in order to meet the requirements of different applications like signal amplification, and switching. 4. The ability to study the characteristics and modes of operation for Field Effect Transistors (FETs) and perform the DC, and AC analysis on different FET configurations in order to meet the requirements of different applications like signal amplification, and switching. 5. The ability to study and analyze the operational amplifier characteristics, and operation in order to use it in various application that needs some certain properties like high input impedance, low output impedance, enhanced frequency response, and high open loop gain. 6. The ability to use the operational amplifier to design and implement various applications like amplifiers, summers, comparators, integrators, differentiators, and oscillators. 7. Understanding the binary numbers system, how to perform conversion and arithmetic operations on binary numbers and study the binary codes such as binary coded decimal (BCD) and gray codes. 8. Understanding the basic logic gates and their types, symbols, expressions, and truth tables. 9. The ability to use the logic gates in combinational logic circuits and use them in various applications such as arithmetic logic circuits, comparators, encoders, decoders. 10. Understanding the flip-flops and their types, symbols, architecture, and truth tables and the ability to use them to implement various sequential logic circuits such as counters and shift registers.
Indicative Contents	**Indicative content includes the following:** **<u>Part A – Semiconductor Diodes</u>** **Semiconductor Diodes –** characteristics equation and curve for semiconductor diodes, semiconductor diodes DC circuits, and semiconductor diode as half wave and full wave rectifier. **[3 hrs]** **Zener Diodes –** characterstics of Zener Diodes, Zener Diodes as voltage regulator in fixed load circuits, variable load circuits, and variable input voltage circuits. **[2 hrs]** **<u>Part B – BJT transistors</u>** **BJT DC Analysis –** BJT architecture and operation principle, DC analysis of common emitter fixed bias, emitter bias, and voltage divider configurations. **[4 hrs]** **BJT AC Analysis –** re model of BJT, AC analysis of common emitter fixed bias, emitter bias, and voltage divider BJT amplifiers. **[4 hrs]** **BJT As Switch –** Introduction to BJT switching circuits, BJT as NOT logic gate, BJT as NOR, and NAND logic gates. **[1 hrs]** **<u>Part B – FET transistors</u>** **FET DC Analysis –** FET types, architecture and operation principle, DC analysis of Common source Fixed bias, self-bias, and voltage divider

	configurations. **[5 hrs]** **FET AC Analysis –** AC model of FET transistor, AC analysis of common source fixed bias, self-bias, and voltage divider FET amplifiers. **[4 hrs]** **FET As Switch –** Introduction to FET switching circuits, FET as inverting logic circuit. **[1 hrs]** **Part C – Operational Amplifiers and Oscillators** AC model and characteristics of operational amplifier, and operational amplifier applications circuits (inverting & non-inverting gain amplifiers, adders, comparators, integrators, differentiators, and oscillators. **[11 hrs]** **Part D – Binary Number Systems and Logic Gates** **Binary Number System** – Introduction to binary number systems, conversion and arithmetic operations on binary numbers, Binary codes (Binary coded decimal and Gray code). **[5 hrs]** **Logic Gates** – Introduction to the basic logic gates and their symbols, expressions, and truth tables. **[5 hrs]** **Part E – Boolean Algebra and Logic Simplification** Introduction to Boolean algebra and its laws and rules, expression and simplification of logic circuits using Boolean algebra. **[5 hrs]** **Logic Gates** – Introduction to the basic logic gates and their symbols, expressions, and truth tables. **[5 hrs]** **Part F – Combinational logic analysis and its functions** Analysis of combinational logic circuits and their applications as arithmetic logic circuits, comparators, encoders, and decoders. **[10 hrs]** **Part G – Latches, Flip-Flops, and Flip-Flops Applications** Introduction to latches & flip flops and their types, symbols, truth tables, and applications **[10 hrs]**

Learning and Teaching Strategies	
Strategies	The main strategies that will be adopted in delivering this module is summarized as follows: 1- Encourage the students' participation in the lecture explanation and solving exercises by rewarding those who answer correctly by bonus marks. 2- Encourage the students to pay high attention to the lecture explanation provided via the lecturer by making intentional simple mistakes during the lecture and reward those who find those mistakes and correct them quickly by bonus marks. 3- Acquiring feedback from students by stopping the explanation every 15 minutes to ask if there is any question or obscure parts in the explanation. Then, ask a random sample of the students to ensure that the explanation is understood and well received.

	4- Instilling the spirit of competition among students by giving them extra assignments and ask them to complete those assignments in a given time. Those who complete the assignments before the deadline will be discussed to ensure there is no cheating. If no cheating is spotted, the students will be rewarded handsomely by extra marks.

Student Workload (SWL)

Structured SWL (h/sem)	108	**Structured SWL (h/w)**	7.2
Unstructured SWL (h/sem)	92	**Unstructured SWL (h/w)**	6.13
Total SWL (h/sem)	**200**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (20)	4 and 12	LO#1-#3 and LO#7- #9
	Assignments	1	5% (5)	Continuous	All
	Lab. Reports	1	5% (5)	Continuous	All
	Lab. Exam	1	10% (10)	Continuous	All
Summative assessment	**Midterm Exam**	2hr	10% (10)	8	LO #1 - #7
	Final Exam	3hr	50% (50)		All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Semiconductor Diodes, Diode Approximate Equivalent Circuits, Diodes Applications, Zener Diodes, Zener Diodes Applications.
Week 2	Introduction to Bipolar Junction Transistors, DC Biasing of BJTs, DC analysis of Common Emitter Configurations, BJT AC Analysis, re Transistor equivalent Model.
Week 3	AC analysis for common emitter BJT configurations, BJT as Switch, Introduction to Field Effect

	transistors (FETs).
Week 4	DC Biasing of E-MOSFETs, DC Analysis of Common Source E-MOSFET Configurations, FET AC Analysis, FET AC Equivalent Circuit
Week 5	AC Analysis of Common Source E-MOSFET Configurations, E-MOSFET as Switch, Introduction to Operation Amplifiers (Op-Amps).
Week 6	Op-Amp applications
Week 7	Relaxation Oscillators, feedback oscillators
Week 8	Mid-term Exam
Week 9	Binary Number System, Binary Operations, Binary Codes
Week 10	Logic Gates
Week 11	Boolean Algebra & Logic Simplification
Week 12	Combinational Logic Analysis
Week 13	Functions of Combinational Logic
Week 14	Latches & Flip Flops
Week 15	Flip Flops Applications (Counters and Shift Registers)
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Lab 1: Introductory lecture on the electronics training board and the other Lab. Tools
Week 2	Lab 2: Diode rectifiers
Week 3	Lab 3: Zener diode as voltage regulator
Week 4	Lab 4: Common Emitter – Voltage Divider BJT Amplifier
Week 5	Lab 5: Enhancement MOSFET Characteristics.

Week 6	Lab 6: Common Source – Voltage Divider E-MOSFET Amplifier
Week 7	Lab 7: Operational Amplifier Application Circuits
Week 8	Lab 8: Relaxation Oscillators – 555 Timer Based Square Wave Generator
Week 9	Lab 9: Feedback Oscillators: Wien Bridge RC Oscillator
Week 10	Lab 10: Logic Gates and Combinational Logic Circuits
Week 11	Lab 11: Encoders and Decoders
Week 12	Lab 12: Flip Flops
Week 13	Lab 13: Digital Counters
Week 14	Lab 14: Shift Registers

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Electronic Devices and Circuit Theory 12th Edition, Robert L. Boylestad, Louis Nashelsky	Yes
Recommended Texts	Electronic Devices 10th Edition, Thomas L. Floyd	No
Websites	https://www.coursera.org/learn/electronics	

Grading Scheme				
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

Module Information					
Module Title	**Fluid Mechanics**			**Module Delivery**	
Module Type	Core			☒**Theory** ☐**Lecture** ☒**Lab** ☒**Tutorial** ☐**Practical** ☐ **Seminar**	
Module Code	EME212				
ECTS Credits	8				
SWL (h/sem)	200				
Module Level	2		**Semester of Delivery**	3	
Administering Department	EME		**College**	CENG	
Module Leader	Prof. Dr. Muhammad A. Eleiwi		**e-mail**	dr.muhammad@uosamarra.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	None		**e-mail**	None	
Scientific Committee Approval Date	**12 /08/2024**		**Version Number**	**1.0**	

Relation with other Modules			
Prerequisite module	None	**Semester**	-
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	This course aims to provide students with the physical and analytical foundations of fluid mechanics through an understanding of the principles of conservation of mass, energy and momentum. Students are expected to gain a deep and comprehensive understanding of the subject, enabling them to apply course content to new situations and evaluate industrial applications of fluid theory using physical analysis and mathematical calculations. This inductive and analytical approach will be taught through practical examples and homework assignments, and will be tested in exams. The course will also explain the importance of studying fluids in practical life by extracting the mathematical formulas that govern their movement. Through this study, students can consolidate and deeply understand the scientific material, which contributes to activating their active role in learning instead of just seeking

	grades. Thus, students can effectively invest their knowledge of fluid mechanics in their daily lives and in various fields.
Module Learning Outcomes	Upon successful completion of this course, students should be able to: 1- Learning about the terms associated with fluid mechanics. 2- Using fluid properties correctly to solve problems. 3- Explaining how fluids resist forces such as gravity, momentum, and shear stresses. 4- Understanding the principles of flow rates and velocity measurement. 5- Interpreting experimental results and present them in an appropriate engineering report format. 6- Collaborating with others in a team project environment to conduct engineering investigations and produce reports. 7- Understanding and applying basic concepts of statics and fluid dynamics, including calculation of fluid forces on submerged and floating surfaces, and applications of fluid flow. 8- Understanding the concept of Mach number, and how it relates to the compressibility effect, typical flow properties, and wave propagation 9- Formulating and solving problems in one-dimensional steady compressible flow. 10- Determining the type of flow, whether it is stable or unstable, regular or irregular, laminar or turbulent for incompressible flow, and subsonic, sonic, and supersonic for compressible flow.
Indicative Contents	• Introduction of Fluid Mechanics Principles. • Units and Scales of Pressure Measurement Fluid Properties. • Pressure Variation in Static Fluid. • Hydrostatic Forces on Plane Surfaces and Curved Surface. • Buoyancy Force. • Continuity, Momentum e, Energy, and Bernoulli equation • Similarity Principles and Dynamic Simulated. • The steady flow between parallel plate • Minor and Major Losses. • Equation of steady one-Dimensional compressible flow • Mach number and type flow • One Dimensional Isentropic flow • Governing Equations of the Stationary Normal Shock Waves • Governing Equations of Oblique Shock Waves
Course Description	The course begins with a study of the physical properties of fluids and then moves on to fluid statics including pressure measurement, hydrostatics, and buoyancy. The study also includes principles of fluid motion such as conservation of mass (continuity equation) and conservation of energy (Bernoulli's equation), in addition to the basic principles of fluid dynamics, introductory concepts to compressible fluid, isentropic flow, normal and oblique shock waves. The course description then provides a summary of its most important features and the learning outcomes the student is expected to achieve, which helps in assessing the extent to which he or she has benefited from the learning opportunities available. Course content is linked to the program description and presented to engineering students with basic skills in fluid mechanics. The course provides a comprehensive presentation of the theory and application of hydrodynamics, and aerodynamic equations, and includes key

	concepts such as pressure, velocity, fluid flow, laminar or turbulent for incompressible flow, and subsonic, sonic, supersonic for compressible flow.

Learning and Teaching Strategies	
Strategies	The model will rely on a variety of learning and teaching strategies, including: **Lectures**: Aiming to provide a comprehensive overview of the basic concepts and principles in fluid mechanics, through classroom lessons, reading from methodological and reference books, and using electronic resources for self-learning, as well as in-class discussions. **Laboratory activities**: Providing students with the opportunity to gain practical experience in fluid mechanics applications through practical experiments and testing of devices related to this field. **Assignments and Quizzes**: Aiming to enable students to apply what they have learned to real-life problems, and to ensure the extent of their understanding by conducting monthly and final tests, in addition to short tests, active participation in class, submitting scientific and theoretical reports, and evaluating students' performance in laboratory activities.

Student Workload (SWL)			
Structured SWL (h/sem)	108	**Structured SWL (h/w)**	7.2
Unstructured SWL (h/sem)	92	**Unstructured SWL (h/w)**	6.13
Total SWL (h/sem)	**200**		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	5% (10)	5 and 10	LO #1, 3, 5 and 6
	Assignments	2	5% (10)	2 and 12	LO # 2, 4, 7,8 and 9
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	12	All

Summative assessment	**Midterm Exam**	2hr	10% (10)	8	LO # 1-7
	Final Exam	3hr	50% (50)	-	All
Total assessment			**100% (100 Marks)**		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introduction of Fluid Mechanics Principles
Week 2	Units and Scales of Pressure Measurement Fluid Properties
Week 3	Pressure Variation in Static Fluid
Week 4	Hydrostatic Forces on Plane Surfaces and Curved Surface
Week 5	Buoyancy Force
Week 6	Continuity, Momentum e, Energy, and Bernoulli equation
Week 7	**Mid-term Exam**
Week 8	Similarity Principles and Dynamic Simulated
Week 9	The steady flow between parallel plate
Week 10	Minor and Major Losses
Week 11	Equation of steady one-Dimensional compressible flow
Week 12	Mach number and type flow
Week 13	One Dimensional Isentropic flow
Week 14	Governing Equations of the Stationary Normal Shock Waves
Week 15	Governing Equations of Oblique Shock Waves

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Center of Pressure
Week 2	Center of Pressure
Week 3	Center of Pressure
Week 4	Center of Pressure
Week 5	Center of Pressure
Week 6	Determine the drag and lift coefficient of an aircraft wing for different values of impact angles
Week 7	Determine the drag and lift coefficient of an aircraft wing for different values of impact angles
Week 8	Determine the drag and lift coefficient of an aircraft wing for different values of impact angles
Week9	Determine the drag and lift coefficient of an aircraft wing for different values of impact angles
Week10	**Final Exam of Lab tests**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Fluid Mechanics Fundamentals and Applications, Yunus A. Cengel, John M. Cimbala.	No
Recommended Texts	1-Fluid Mechanics-Victor Lyle Streeter 2-FLUID MECHANICS WITH ENGINEERING APPLICATIONS BY ROBERT L DAUGHERTY	-
Websites	1.Fundamentals of Fluid Mechanics, Munson,Young, Okiishi. 2. Introduction to Fluid Mechanics, Fox, and McDonald. 3.https://www.youtube.com/watch?v=fa0zHI6nLUo&list=PLbMVogVj5nJTZJHsH6uLCO00I-ffGyBEm	

Grading Scheme				
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

Module Information					
Module Title	**Strength of Materials**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EME213**				
ECTS Credits	**5**				
SWL (h/sem)	**125**				
Module Level	2		**Semester of Delivery**		**3**
Administering Department	EME		**College**	CENG	
Module Leader	**Dr. Ihsan Ali**		**e-mail**	Ehsan.ali@uosamarra.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**		**PhD**
Module Tutor	**Mohammed F. Hasan**		**e-mail**	**M.Sc.**	
Peer Reviewer Name	None		**e-mail**	albadry_mohamad55@uosamarra.edu.iq	
Scientific Committee Approval Date	**12/08/2024**		**Version Number**	**1.0**	

Relation with other Modules			
Prerequisite module	None	**Semester**	-
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	Mechanics of materials is a basic engineering subject that, along with statics, must be understood by anyone concerned with the strength and physical performance of structures, whether those structures are man-made or natural. At the college level, statics is usually taught during the sophomore or junior year and is a prerequisite for the follow-on course in mechanics of materials. Both courses are required for most students majoring in mechanical, structural, civil, biomedical, petroleum, nuclear, aeronautical, and aerospace engineering. Furthermore, many students from such diverse fields as materials science, industrial engineering, architecture, and agricultural engineering also find it useful to study mechanics of materials.
Module Learning Outcomes	• **Statics review**—A new section entitled Statics Review has been added to Chapter 1. New Section 1.2 includes four example problems which illustrate calculation of support reactions and internal stress resultants for truss, beam,

	circular shaft and plane frame structures. Twenty six end-of-chapter problems on statics provide the student with two and three dimensional structures to be used as practice, review or homework assignment problems of varying difficulty. • **Expanded** Chapter Overview and also Chapter Summary & Review sections–The Chapter Overview and Chapter Summary sections have been expanded and now include key equations presented in that chapter. These summary sections will serve as a convenient review for the student of key topics and equations presented in each chapter. • **Increased emphasis** on equilibrium, constitutive, and strain-displacement/ compatibility equations in problem solutions–Example problem and end-of chapter problem solutions have been updated to emphasize an orderly process of explicitly writing out the equilibrium, constitutive and strain-displacement/ compatibility equations before attempting a solution. • New/**expanded topic coverage—**The following topics have been added or have received expanded coverage: stress concentrations in axially loads bars (Sec. 2.10); torsion of noncircular shafts (Sec. 3.10); stress concentrations in bending (Sec. 5.13); and transformed section analysis for composite beams (Sec. 6.3). • **New example and end-of-chapter problems**—Forty-eight new example problems have been added to the eighth edition. In addition, close to 800 of the end-of chapter.

Learning and Teaching Strategies	
Strategies	Planning a unit or lesson involves a number of instructional decisions. The teacher must identify the following: the content and processes to be addressed, the strengths, needs, and interests of students, the Common Essential Learning that could be incorporated, and the most effective instructional approaches. Such decisions are critical and must be made consciously and purposefully. It begins with the student's interest in engineering tools and the drawing board. To reach the highest level of understanding in the application of all theoretical and laboratory lesson processes.

Student Workload (SWL)			
Structured SWL (h/sem)	**78**	**Structured SWL (h/w)**	**5.2**
Unstructured SWL (h/sem)	**47**	**Unstructured SWL (h/w)**	**3.13**
Total SWL (h/sem)	**125**		

Module Evaluation

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

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	**Tension, compression and shear**
Week 2	**Axially loaded members**
Week 3	**Torsion**
Week 4	**Shear forces**
Week 5	**bending moments**
Week 6	**Stresses in beams**
Week 7	**Stresses in beams (advanced)**
Week 8	**Exam**
Week 9	**Analysis of stresses**
Week 10	**Analysis of strains**

Week 11	**Deflections of beams**
Week 12	**Combined loadings**
Week 13	**Pressure vessels**
Week 14	**Deflections**
Week 15	**Exams**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Tensile test
Week 2	Tensile test
Week 3	Tensile test
Week 4	Torsion test
Week 5	Torsion test
Week 6	Torsion test
Week 7	Exam
Week 8	Impact test
Week 9	Impact test
Week 10	Impact test
Week 11	Bending test
Week 12	Bending test
Week13	Deflection test
Week 14	Deflection test
Week 15	Exam

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Mechanics of materials , James M. Gere, 8TH edition Mechanics of Materials 10th Edition c2017	Yes
Recommended Texts		
Websites		

Grading Scheme				
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

Module Information					
Module Title	C++ Language			**Module Delivery**	
Module Type	**Supportive**			☒**Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EME214**				
ECTS Credits	4				
SWL (h/sem)	100				
Module Level	**2**		**Semester of Delivery**	**3**	
Administering Department	EME		**College**	CENG	
Module Leader	**ORAS FADHIL KHALAF**		**e-mail**	oras.fadil@uosamarra.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	**M.Sc.**	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	None		**e-mail**	None	
Scientific Committee Approval Date	**12/08/2023**		**Version Number**	**1.0**	

Relation with other Modules			
Prerequisite module	None	**Semester**	-
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	• The student will gain an understanding of the basic principles, structure, grammar, and uses of the C++ programming language. • Develop the ability and skill to write and compile C++ programs, including an understanding of the use of variables, data types, and operators. • Learn how to use control structures, including if-else statements, loops (while, for, and do-while), and switch statements to control program flow.
Module Learning Outcomes	After completing the course, students will be able to: 1. Be fully familiar with the basic concepts and features of C++. 2. Write programs that solve problems they encounter. 3. Effective use of the C++ standard template library.

	Effective use of control structures.
Indicative Contents	1. Introduction to computer programming 2. Introduction to C++ Programming 3. C++ Standard Library 4. Control flow in C++ 5. Memory Management in C++ 6. C++ Application Development

Learning and Teaching Strategies	
Strategies	Conceptual Understanding: Practical Practice Code Review and Feedback Problem Solving Exercises

Student Workload (SWL)			
Structured SWL (h/sem)	**48**	**Structured SWL (h/w)**	**3.2**
Unstructured SWL (h/sem)	**52**	**Unstructured SWL (h/w)**	**3.46**
Total SWL (h/sem)	**100**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	**2**	5% (10)	**5and10**	**LO #1 - #10**
	Assignments	**2**	5% (10)	**2and12**	**LO #1 - #12**
	Projects / Lab.	**1**	10% (10)	**Continuous**	**All**
	Report	**1**	10% (10)	**13**	**All**
Summative assessment	**Midterm Exam**	**2 hr**	10% (10)	**7**	**LO #1 - #6**
	Final Exam	**3 hr**	**50 % (50)**	**-**	**All**
Total assessment			**100% (100 Marks)**		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Introduction to computer programming
Week 2	Introduction to programming languages and C++
Week 3	Variables
Week 4	C++ Libraries
Week 5	C++ User Input and Output
Week 6	C++ Operators (Arithmetic operators, Bitwise operators, logical operators, and Relational operators)
Week 7	Mid-term Exam
Week 8	C++ Strings & C++ Math
Week 9	C++ Booleans
Week 10	C++ conditions
Week 11	Switch statement

Week 12	While loop
Week 13	For loop
Week 14	Break and Continue statements
Week 15	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	C++ Libraries.
Week 2	C++ User Input.
Week 3	C++ Operators.
Week 4	If condition.
Week 5	Switch condition.
Week 6	Break and Continue.
Week 7	For loop.
Week 8	While loop C++.
Week 9	Do-while loop.
Week 10	Break and Continue statements.
Week 11	Solving exercises related to electromechanics
Week 12	Solving exercises related to electromechanics
Week13	Solving exercises related to electromechanics
Week 14	Solving exercises related to electromechanics
Week 15	Solving exercises related to electromechanics

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	The C++ Programming Language (4th Edition) by Bjarne Stroustrup	
Recommended Texts		
Websites	https://www.learncpp.com https://www.w3schools.com/CPP/default.asp	

Grading Scheme				
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

Module Information					
Module Title	**English Language II**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**EME 215**				
ECTS Credits	**3**				
SWL (h/sem)	**75**				
Module Level	**2**		**Semester of Delivery**	**3**	
Administering Department	EME		**College**	CENG	
Module Leader	**Hadeel A. Ibraheem**		**e-mail**	hadeel.abdulhadi@uosamarra.edu.iq	
Module Leader's Acad. Title	**Assistant Lecturer**		**Module Leader's Qualification**	**M.Sc.**	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	None		**e-mail**	None	
Scientific Committee Approval Date	**12/08/2024**		**Version Number**	**1.0**	

Relation with other Modules			
Prerequisite module	None	**Semester**	-
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	**1.**Improve the ability of the students to understand, speak, read and write English as a second language with some technical texts. **2**.Intended to teach them, how to use technical English effectively as a language of instruction, Lab. Experiments and Exercises, examples **3**.Using Technical Terminologies as close as possible to the lectures they receive during their study. In addition to teach them how to give academic presentation, and how to write academically. **4.**Engineering is the biggest field of study in the world. English is a tool that notably affect engineering students in academic life. While most of the assumptions in engineering are taught in English, it requires to have good English communication skill.

	5.In academic life, engineering students have to deal with the countless lectures, tutorials, labs, project reports and papers in English. Generally engineering professors in various universities are also conducting lectures in English.
Module Learning Outcomes	**1**. Teaching the students how to report what other people said. **2**. Teaching the students how to form and use passive voice. **3**. Students will be able to identify and use multi-word verbs (Phrasal verbs) in context instead of the single verbs. **4**. Familiarize students with the purpose and usage of different punctuation marks. **5**. Improving pronunciation and spelling. **6**. Teaching the students various phrases (not single words only) to use it in many situations. **7.** Increasing the student outcome of vocabulary especially engineering vocabulary. **8**. Developing the student's skills in reading, speaking, listening and writing .
Indicative Contents	1.**Introduction:** Review 2.**Grammar:** Passive, Reported speech, Phrasal verbs, Quantifiers, Superlatives, Either and Neither, Exclamation and Punctuation, Negation , Numbers. 3.**Vocabulary:** Commonly confused words, synonyms, phrases, and idioms. 4.**Reading Skill:** Improving student reading in engineering topics. 5.**Writing Skill:** writing a comprehensive paragraphs. 6.**Listening Skill:** Listening to audios and answering questions about it. 7.**Speaking and Communication:** Pronunciation, Fluency, and Conversation. 8.**Assessments:** Mid- term exam, Quizzes, Assignments, and Report.
Learning and Teaching Strategies	
Strategies	The strategy focuses on the four key language skills: reading, writing, listening, and speaking. A balanced approach is adopted to develop these skills through a variety of engaging activities and authentic materials. Reading and writing activities include comprehension exercises, vocabulary expansion and guided writing tasks, while listening and speaking activities involve interactive discussions, and presentations.

Student Workload (SWL)			
Structured SWL (h/sem)	**48**	**Structured SWL (h/w)**	**3.2**

Unstructured SWL (h/sem)	**27**	**Unstructured SWL (h/w)**	**1.8**
Total SWL (h/sem)	**75**		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	**Introduction + Useful Vocabulary and Synonyms**
Week 2	**Reported speech + Useful Vocabulary and Idioms**
Week 3	**Phrasal verbs + Useful Vocabulary and Phrases**
Week 4	**Passive voice+ Reading**
Week 5	**Quantifiers + Superlatives + Listening**
Week 6	**Exclamation + Punctuation + Reading**
Week 7	**Mid -Term Exam + Either-or and Neither-nor**
Week 8	**Writing**
Week 9	**Writing**
Week 10	**Report Discussion**
Week 11	**Frequently Confused Words and Expressions+ Listening + Reading**
Week 12	**Negation + Numbers + Listening + Useful Vocabulary and Antonyms**
Week 13	**Pronunciation and speaking + Reading**
Week 14	**Pronunciation and Speaking + Listening**
Week 15	**Preparatory Week before the Final Exam**

Module Evaluation

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

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Head way Plus for pre-intermediate by John Liz Soars	Yes
Recommended Texts	English Grammar in Use by Raymond Murphy	Yes
Websites	https://dictionary.cambridge.org https://learnenglish.britishcouncil.org	

Grading Scheme				
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

Module Information					
Module Title	Crimes of Al Ba'ath Regime in Iraq			**Module Delivery**	
Module Type	Basic			☒**Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EME216				
ECTS Credits	**2**				
SWL (h/sem)	**50**				
Module Level	**2**		**Semester of Delivery**	**3**	
Administering Department	EME		**College**	CENG	
Module Leader	**Suhaib Kadhim**		**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	None		**e-mail**	None	
Scientific Committee Approval Date	**12/08/2024**		**Version Number**	**1.0**	

Relation with other Modules			
Prerequisite module	None	**Semester**	-
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	This course aims to introduce students to the crimes committed by the Baath regime in Iraq.
Module Learning Outcomes	The student will learn the following: - Crimes of the Baath regime according to the Iraqi Supreme Criminal Court Law of 2005 -Definition of the crime and its divisions. 3Psychological and social crimes and their effects, and the most prominent violations of the Baath regime in Iraq. -Environmental crimes of the Baath regime in Iraq. - Mass grave crimes. -Violations of Iraqi laws.

Indicative Contents	-Crimes of the Baath regime according to the Iraqi Supreme Criminal Court Law of 2005. Crimes of the Baath regime according to the Iraqi Supreme Criminal Court Law of 2005. The concept of crimes and their types. Definition of crime in language and terminology. Types of crimes, crimes of the Baath regime according to the documentation of the Iraqi Supreme Criminal Court Law of 2005.. Types of international crimes., Decisions issued by the Supreme Criminal Court. (8 hours) - Psychological and social crimes and their effects and the most prominent violations of the Baath regime in psychological crimes. Mechanisms of psychological crimes Effects of psychological crimes. Social crimes Militarization of society The Baath regime's position on religion Violations of Iraqi laws Pictures of human rights violations and crimes of authority Some decisions of political and military violations of the Baath regime, places of prisons and detention of the Baath regime. (8 hours(-Environmental crimes of the Baath regime in Iraq. War and radioactive pollution and mine explosions. Destruction of cities and villages (scorched earth policy). Draining the marshes. Bulldozing palm groves, trees and crops. (5 hours(-Mass grave crimes. Events of the genocide graves in Iraq for the period 1963 AD - 2003 AD. Chronological classification of the genocide graves (5 hours(

Learning and Teaching Strategies	
Strategies	-Participating in the class during the lecture by asking questions from the instructor -Short surprise exams -Sometimes participating with students to explain information from the study material Guiding students to some sources.

Student Workload (SWL)			
Structured SWL (h/sem)	**33**	**Structured SWL (h/w)**	**2.2**
Unstructured SWL (h/sem)	**17**	**Unstructured SWL (h/w)**	**1.13**
Total SWL (h/sem)	**50**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1	10% (10)	Continuous	All
	Assignments	2	10% (20)	Continuous	All
	Project/Lab.	-	-	-	-
	Report	1	10% (10)	12	All
Summative assessment	Midterm Exam	2 hr	10% (10)	9	LO #1 - #8
	Final Exam	3 hr	50 % (50)	-	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	- Crimes of the Baath regime according to the Iraqi Supreme Criminal Court Law of 2005.
Week 2	- The concept of crimes and their divisions.
Week 3	- Definition of crime in language and terminology.
Week 4	- Divisions of crimes.
Week 5	- Crimes of the Baath regime according to the documentation of the Iraqi Supreme Criminal Court Law of 2005.
Week 6	- Types of international crimes.
Week 7	- Decisions issued by the Supreme Criminal Court.
Week 8	- Psychological and social crimes and their effects and the most prominent violations of the Baath regime in psychological crimes.

Week 9	- Mechanisms of psychological crimes.
Week 10	- Effects of psychological crimes
Week 11	- Social crimes.
Week 12	- Militarization of society
Week 13	- The Baath regime's position on religion
Week 14	- Violations of Iraqi laws
Week 15	- Images of human rights violations and crimes of power

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Crimes of the Baath regime in Iraq	No
Recommended Texts		
Websites		

Grading Scheme				
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

Module Information					
Module Title	**Electric circuits**			**Module Delivery**	
Module Type	**Core**			☒**Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EME221**				
ECTS Credits	**8**				
SWL (h/sem)	**200**				
Module Level	**2**		**Semester of Delivery**	**4**	
Administering Department	EME		**College**	CENG	
Module Leader	**Younes S. Alwan**		**e-mail**	Younes.s.al@uosamarra.edu.iq	
Module Leader's Acad. Title	**Senior lecturer**		**Module Leader's Qualification**	**M.Sc.**	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	None		**e-mail**	None	
Scientific Committee Approval Date	**12/08/2024**		**Version Number**	**1.0**	

Relation with other Modules			
Prerequisite module	None	**Semester**	-
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	• Understanding the basics of electric components in terms of interacting with each other. • Being able to comprehend how the different parameters impact on the circuit behavior. • Being able to interpret the results and compare it with the empirical outcomes. Being able to design different circuits for different purposes.
Module Learning Outcomes	• The student should be able to solve different problems in electric circuits. • The student has the ability to explain the different numbers of the

	elements and the quantities. • The student has the ability to compare the theoretical and the experimental results and justify them. The student can deal with computer software simulating electric circuits.
Indicative Contents	• Transient analysis (General) • RL Transient analysis • RC Transient analysis • RLC Transient analysis (Parallel) • RLC Transient analysis (Series) • Three phase analysis • Connection types of the three phase circuits • Two-wattmeter method • Inductance (General) • Mutual inductance • Dot convention • Transformer • Equivalent circuit of transformer • Laplace transformation • Inverse Laplace transformation • Two-port circuits • Multi-stage two-port circuits • Passive filters • Types of filters: LPF/HPF/BPF/BRF • Transfer function of filter • Active filters

Learning and Teaching Strategies	
Strategies	**Lectures and Core Instruction** • **Basic Concepts**: Start with essential principles and theories of electrical circuits. • **Visual Tools**: Employ diagrams, animations, and videos to explain intricate circuits. • **Interactive Learning**: Use quizzes and polls during lectures to engage students and instrument understanding. **Hands-On Demonstrations** • **Lab Work**: Facilitate practical lab sessions where students can work with physical circuit components. • **Working Models**: Demonstrate concepts using real or simulated circuit models. • **Simulations**: Utilize virtual lab software for simulations when physical equipment is not accessible.

	Problem-Based Learning (PBL) • **Practical Problems**: Introduce real-world circuit problems and case studies. • **Team Projects**: Encourage group activities to solve problems and enhance collaboration. • **Case Study Analysis**: Use detailed case studies to apply theoretical knowledge to practical scenarios. **Design Projects** • **Creative Challenges**: Assign projects requiring the design and analysis of electrical systems or components. • **Prototype Construction**: Encourage students to build and test prototypes of their designs. • **Peer Feedback**: Implement a peer review process for constructive criticism and learning enhancement. **Evaluations and Feedback** • **Regular Assessments**: Conduct quizzes, labs, and problem sets for ongoing assessment and feedback. • **Final Assessments**: Use exams and comprehensive projects to evaluate overall understanding. • **Reflective Learning**: Encourage students to reflect on their learning journey and identify areas for improvement. **Additional Resources** • **Books and Journals**: Provide access to essential textbooks and online resources for further study. • **Online Discussions**: Create forums for students to ask questions, share information, and collaborate outside of class. **Industry Exposure** • **Site Tours**: Organize visits to electrical manufacturing plants or research labs to see real-world applications. **Practical Exposure**: Allow students to interact with advanced electrical technologies and systems in action.

Student Workload (SWL)			
Structured SWL (h/sem)	**123**	**Structured SWL (h/w)**	**8.2**
Unstructured SWL (h/sem)	**77**	**Unstructured SWL (h/w)**	**5.13**
Total SWL (h/sem)	**200**		

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

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Circuit analysis (Review)
Week 2	RL Transient analysis
Week 3	RC Transient analysis
Week 4	RLC Transient analysis (parallel)
Week 5	RLC Transient analysis (Series)
Week 6	Three phase circuits
Week 7	Two wattmeter method
Week 8	Inductance calculation
Week 9	Mutual inductance calculation
Week 10	Transformers

Week 11	Two port circuits (Simulation)
Week 12	Laplace transformation (Simulation)
Week13	Inverse Laplace transformation (Simulation)
Week 14	Passive filters
Week 15	Active filters

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Electric circuits, 9th edition, Nilsson and Riedel	Yes
Recommended Texts	Fundamentals of electric circuits, C. Alexander and M. Sadiku, 4th edition.	No
Websites	Fundamentals of Electric Circuits (4th Edition) - Alexander & Sadiku.pdf - Google Drive	

Grading Scheme				
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

Module Information					
Module Title	**Theory of Machines**			**Module Delivery**	
Module Type	**Core**			☒**Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical**	
Module Code	**EME222**				
ECTS Credits	**7**				
SWL (h/sem)	**175**				
Module Level	**2**		**Semester of Delivery**	**4**	
Administering Department	EME		**College**	CENG	
Module Leader	**Amjed Saleh Mahmood**		**e-mail**	dr.amjed.mahmood@uosamarra.edu.iq	
Module Leader's Acad. Title	**Asst. Prof.**		**Module Leader's Qualification**	**PhD**	
Module Tutor	Mustafa Abdul Munem Hameed		**e-mail**	engmustafaalabbsy@gmail.com	
Peer Reviewer Name	None		**e-mail**	None	
Scientific Committee Approval Date	**12/08/2024**		**Version Number**	**1.0**	

Relation with other Modules			
Prerequisite module	None	**Semester**	-
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. **Understand Machine Components:** To provide students with a comprehensive understanding of the fundamental components and mechanisms used in machines, including their functions and interactions. 2. **Apply Theoretical Concepts:** To enable students to apply theoretical concepts and principles of kinematics and dynamics to analyze and design various mechanical systems and mechanisms. 3. 4. **Problem-Solving Skills:** To develop problem-solving skills in the context of mechanical systems, including the ability to model, analyze, and solve real-world mechanical engineering problems. 5. **Design and Optimization:** To introduce students to the principles of design and optimization in mechanical systems, focusing on improving

	performance, efficiency, and reliability.
Module Learning Outcomes	By the end of the module, students should be able to: 1. **Describe and Classify Mechanisms:** Accurately describe and classify different types of mechanical mechanisms and their components, including linkages, gears, cams, and belts. 2. **Analyze Kinematic Chains:** Perform kinematic analysis of mechanical systems, including the determination of velocities and accelerations in various types of mechanisms. 3. **Apply Dynamics Principles:** Apply principles of dynamics to analyze forces, moments, and the motion of components in mechanical systems, using both analytical and computational methods. 4. **Design Mechanisms:** Design and synthesize simple mechanical mechanisms to meet specific functional requirements, considering factors such as motion, force transmission, and mechanical advantage. 5. **Use Simulation Tools:** Utilize simulation and modeling tools to predict the behavior of mechanical systems and validate theoretical analyses. 6. **Evaluate System Performance:** Evaluate the performance of mechanical systems in terms of efficiency, reliability, and functionality, and propose improvements or optimizations as needed.
Indicative Contents	o Basic concepts and definitions o Classification of mechanisms o Velocity diagram of mechanism o Acceleration diagram of mechanism o Synthesis of four-bar mechanism o Synthesis of crank and connecting mechanism o Balancing of rotating systems in one plane o Balancing of rotating systems in different planes o Types of belt drives o Theory of belt drives o Velocity ratio of belt drives o Friction and power transmission in belts and chains o Introduction to Governors: Understanding what governors are and their role in regulating the speed of engines and machinery. o Types of Governors: Brief overview of different types, such as centrifugal, inertia …etc. o Flyweights: Function and design considerations. o Spindle and Shaft: Interaction with flyweights and impact on speed regulation. o Spring Mechanism: How springs are used to control the governor mechanism. o Dynamic Analysis: Mathematical modeling and analysis of the governor's behavior under varying conditions. o Speed Regulation: Calculation of governor speed ranges and performance. o Governor Equations: Derivation and use of equations to determine the governor's characteristics and performance. o Types of Centrifugal Governors: o Simple Governor: Basic design and operation. o Watt Governor: Detailed analysis of its components, operation, and application.

	○ Porter Governor: Detailed analysis of its components, operation, and application. ○ Proell Governor: Detailed analysis of its components, operation, and application. ○ Hartnell Governor: Features, working principle, and applications. ○ Wilson Hartnell Governor: Features, working principle, and applications. ○ Governor Characteristics: ○ Controlling Force: How governors control engine speed. ○ Stability: How governors maintain steady engine speed. ○ Sensitivity: The ability of the governor to react to changes in engine speed.

Learning and Teaching Strategies	
Strategies	***1. Lectures and Theoretical Instruction*** • **Foundational Concepts:** Start with lectures that introduce core concepts, principles, and theories related to machines and mechanisms. • **Visual Aids:** Use diagrams, animations, and videos to illustrate complex mechanisms and processes. • **Interactive Presentations:** Incorporate interactive tools like quizzes and polls during lectures to assess understanding and keep students engaged. ***2. Practical Demonstrations*** • **Lab Sessions:** Conduct hands-on laboratory sessions where students can observe and interact with physical models of mechanisms and machinery. • **Demonstration Models:** Use working models of belts, linkages, and governors to demonstrate theoretical concepts in action. • **Virtual Labs:** Utilize simulation software for virtual lab sessions if physical models are not available. ***3. Problem-Based Learning (PBL)*** • **Real-World Problems:** Present students with real-world engineering problems and case studies related to mechanisms and machinery. • **Group Work:** Encourage collaborative problem-solving and discussion in groups to foster teamwork and deeper understanding. • **Case Studies:** Analyze case studies to apply theoretical knowledge to practical scenarios and develop critical thinking skills. ***4. Design Projects*** • **Design Challenges:** Assign projects where students design and analyze mechanical systems or components, applying principles learned in class. • **Prototype Development:** Encourage students to build prototypes or models of their designs to test and refine their solutions. • **Peer Review:** Implement peer review processes to provide constructive feedback and enhance learning. ***5. Assessments and Feedback***

- **Formative Assessments:** Use quizzes, lab, project design and problem sets to regularly assess understanding and provide timely feedback.
- **Summative Assessments:** Include exams and final projects to evaluate overall learning and application of the concepts.
- **Reflective Practices:** Encourage students to reflect on their learning experiences and identify areas for improvement.

6. Supplementary Resources

- **Textbooks and Journals:** Provide access to key textbooks and online resources for additional reading and research.
- **Online Forums:** Use online discussion forums or platforms for students to ask questions, share resources, and collaborate outside of class.

7. Field Visits and Industry Tours

- **Site Visits:** Organize visits to factories, manufacturing plants, or research facilities where students can see real-world applications of mechanisms and machinery.
- **Hands-On Experience:** Allow students to observe and interact with advanced machinery and technologies in action.

These strategies aim to create a dynamic and engaging learning environment, helping students grasp theoretical concepts, apply their knowledge practically, and develop essential skills for their future careers.

Student Workload (SWL)

Structured SWL (h/sem)	**78**	**Structured SWL (h/w)**	**5.2**
Unstructured SWL (h/sem)	**97**	**Unstructured SWL (h/w)**	**6.46**
Total SWL (h/sem)	**175**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	**1**	**10% (10)**	**Continuous**	**All**
	Assignments	**1**	**5% (5)**	**Continuous**	**All**

	Projects/Lab.	**3**	**5% (15)**	**Continuous**	**All**
	Report	**1**	**10% (10)**	**13**	**All**
Summative assessment	**Midterm Exam**	**2 hr**	**10% (10)**	**10**	**LO #1 - #10**
	Final Exam	**3 hr**	**50 % (50)**	**-**	**All**
Total assessment			**100% (100 Marks)**		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	○ Basic concepts and definitions Classification of mechanism
Week 2	○ Velocity diagram of mechanism Acceleration diagram of mechanism
Week 3	○ Synthesis of four-bar mechanism Synthesis of crank and connecting mechanism
Week 4	Balancing of rotating systems in one plane
Week 5	Balancing of rotating systems in different planes
Week 6	○ Theory of belt drives Types of belt drives
Week 7	○ Velocity ratio of belt drives Friction and power transmission in belts and chains
Week 8	○ Introduction to Governors: Understanding what governors are and their role in regulating the speed of engines and machinery. Types of Governors: Brief overview of different types, such as centrifugal, inertia …etc.
Week 9	○ Flyweights: Function and design considerations. ○ Spindle and Shaft: Interaction with flyweights and impact on speed regulation. ○ Spring Mechanism: How springs are used to control the governor mechanism.

	○ Dynamic Analysis: Mathematical modeling and analysis of the governor's behavior under varying conditions. Speed Regulation: Calculation of governor speed ranges and performance.
Week 10	○ Types of Centrifugal Governors: ○ Simple Governor: Basic design and operation. Mid – term Exam.
Week 11	○ Watt Governor: Detailed analysis of its components, operation, and application. ○ Porter Governor: Detailed analysis of its components, operation, and application. Proell Governor: Detailed analysis of its components, operation, and application.
Week 12	○ Hartnell Governor: Features, working principle, and applications. Wilson Hartnell Governor: Features, working principle, and applications.
Week 13	○ Governor Characteristics: Governor Equations: Derivation and use of equations to determine the governor's characteristics and performance.
Week 14	Controlling Force: How governors control engine speed.
Week 15	○ Stability: How governors maintain steady engine speed. Sensitivity: The ability of the governor to react to changes in engine speed

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	○ Basic concepts and definitions ○ Classification of mechanism
Week 2	○ Velocity diagram of mechanism ○ Acceleration diagram of mechanism
Week 3	○ Synthesis of four-bar mechanism ○ Synthesis of crank and connecting mechanism
Week 4	○ Balancing of rotating systems in one plane
Week 5	○ Balancing of rotating systems in different planes
Week 6	○ Theory of belt drives

	○ Types of belt drives
Week 7	○ Velocity ratio of belt drives ○ Friction and power transmission in belts and chains
Week 8	○ Introduction to Governors: Understanding what governors are and their role in regulating the speed of engines and machinery. ○ Types of Governors: Brief overview of different types, such as centrifugal, inertia …etc.
Week 9	○ Flyweights: Function and design considerations. ○ Spindle and Shaft: Interaction with flyweights and impact on speed regulation. ○ Spring Mechanism: How springs are used to control the governor mechanism. ○ Dynamic Analysis: Mathematical modeling and analysis of the governor's behavior under varying conditions. ○ Speed Regulation: Calculation of governor speed ranges and performance.
Week 10	○ Types of Centrifugal Governors: ○ Simple Governor: Basic design and operation.
Week 11	○ Watt Governor: Detailed analysis of its components, operation, and application. ○ Porter Governor: Detailed analysis of its components, operation, and application. ○ Proell Governor: Detailed analysis of its components, operation, and application.
Week 12	○ Hartnell Governor: Features, working principle, and applications. ○ Wilson Hartnell Governor: Features, working principle, and applications.
Week 13	○ Governor Characteristics: ○ Governor Equations: Derivation and use of equations to determine the governor's characteristics and performance.
Week 14	○ Controlling Force: How governors control engine speed.
Week 15	○ Stability: How governors maintain steady engine speed. ○ Sensitivity: The ability of the governor to react to changes in engine speed

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Theory of machines by R S Khurmi	Yes
Recommended Texts	Theory of machines and Mechanisms by J E Shigley	
Websites	https://nptel.ac.in/ https://ocw.mit.edu/	

Grading Scheme				
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

Module Information

Module Title	Engineering Mathematics		**Module Delivery**	
Module Type	**Supportive**		☒ **Theory** ☐**Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EME223			
ECTS Credits	**6**			
SWL (h/sem)	**150**			
Module Level	2	**Semester of Delivery**	**4**	
Administering Department	EME	**College**	CENG	
Module Leader	**Mohammed F. Hasan**	**e-mail**	albadry_mohamad55@uosamarra.edu.iq	
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	**M.Sc.**	
Module Tutor	None	**e-mail**	None	
Peer Reviewer Name	None	**e-mail**	None	
Scientific Committee Approval Date	**12/08/2024**	**Version Number**	**1.0**	

Relation with other Modules

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

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives أ	Understanding Engineering math.: The module should provide students with a comprehensive understanding of engineering math., including different types of functions and systems of infinite series or sequences , also introducing the techniques of partial derivatives to solve multi variables functions.
Module Learning Outcomes	Upon completion of the module on Engineering Math. , learners should be able

	to achieve the following learning outcomes: 1. Learning about polar coordinates and their relation with rectangular coordinates. 2. Drawing polar curves concluded by rectangular coordinates and vice versa. 3. Learning about infinite series and sequences with their applications on engineering calculations and analysis . 4. Finding the convergence and divergence of each method. 5. Learning and extend about the concept of calculus to functions with two or more variables by using the partial derivatives method. 6. Using first and second order derivatives in engineering analysis and calculations to find the exact solution. 7. Using the chain rule method to solve and find first and second order derivatives in engineering analysis and calculations.

Learning and Teaching Strategies	
Strategies	Planning a unit or lesson involves a number of instructional decisions. The teacher must identify the following: the content and processes to be addressed, the strengths, needs, and interests of students, the Common Essential Learnings that could be incorporated, and the most effective instructional approaches. Such decisions are critical and must be made consciously and purposefully. It begins with the student's interest in engineering tools and the drawing board. To reach the highest level of understanding in the application of all theoretical and laboratory lesson processes

Student Workload (SWL)			
Structured SWL (h/sem)	**93**	**Structured SWL (h/w)**	**6.2**
Unstructured SWL (h/sem)	**57**	**Unstrutured SWL (h/w)**	**3.8**
Total SWL (h/sem)	**150**		

Module Evaluation

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

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	**Thomas' Calculus**: Early Transcendentals, Thirteenth Edition.	yes
Recommended Texts		
Websites		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	**Polar coordinates introduction**
Week 2	**Relationship between polar and rectangular coordinates**
Week 3	**Graph of polar coordinates**
Week 4	**families of circles and curves**
Week 5	**Area in polar coordinates**
Week 6	**Partial derivatives introduction**
Week 7	**Mid-term Exam**
Week 8	**Second order partial derivatives**
Week 9	**The chain rule for derivatives**
Week 10	**Implicit differentiation**
Week 11	**Directional derivatives**
Week 12	**Introduction to infinite series and sequences**
Week 13	**Geometric series**
Week 14	**Convergence and divergence tests**
Week 15	**Preparatory week before the exam**

MODULE DESCRIPTION FORM

Module Information

Module Title	Programming (MATLAB)	**Module Delivery**	
Module Type	Supportive		☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Code	EME224		
ECTS Credits	**4**		
SWL (h/sem)	**100**		

Module Level	**2**	**Semester of Delivery**	**4**
Administering Department	EME	**College**	CENG
Module Leader	**Oras Fadhil Khalaf**	**e-mail**	oras.fadil@uosamarra.edu.iq
Module Leader's Acad. Title	**Lecturer**	**Module Leader's Qualification**	**M.Sc.**
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	None	**e-mail**	None
Scientific Committee Approval Date	**12/08/2024**	**Version Number**	**1.0**

Relation with other Modules

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

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives	• Giving a general idea about the MATLAB program and its uses

	• Dealing with matrices and mathematical operations • How to deal with data processing • Processing two- and three-dimensional graphs
Module Learning Outcomes	Cognitive objectives: • Gain experience and knowledge in the basics of MATLAB. • How to process data. • Processing graphs. Course Skill Objectives. • How to Program Using MATLAB • Solving Mathematical Equations and Electromechanical Problems Using MATLAB
Indicative Contents	1.Introduction to computer programming 2.Introduction to MATLAB Programming 3.MATLAB Standard Library 4.MATLAB Application Development

Learning and Teaching Strategies

Strategies	• Conceptual Understanding: • Practical Practice • Code Review and Feedback Problem Solving Exercises

Student Workload (SWL)

Structured SWL (h/sem)	**48**	**Structured SWL (h/w)**	**3.2**
Unstructured SWL (h/sem)	**52**	**Unstructured SWL (h/w)**	**3.46**
Total SWL (h/sem)	**100**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	5% (10)	5and10	All
	Assignments	2	5% (10)	2and12	All
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	All
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO #1- #6
	Final Exam	3 hr	50 % (50)	-	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	**Learn about the program, its features and uses.**
Week 2	**Basic commands.**
Week 3	**Matrices.**
Week 4	**Dealing with matrices.**
Week 5	**Dealing with matrices.**
Week 6	**logic gates.**
Week 7	**Mid-term Exam + Repeat methods.**
Week 8	**Repeat methods.**
Week 9	**Graphics processing.**
Week 10	**Graphics processing.**

Week 11	**3D drawing.**
Week 12	**3D drawing.**
Week 13	**Polynomial processing.**
Week 14	**Integration and differentiation.**
Week 15	**Dealing with mathematical functions.**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Program interface, mathematical functions
Week 2	Important commands in MATLAB, complex numbers, matrices
Week 3	Arithmetic operations on matrices
Week 4	Repeat, rotate and reshape matrices Applications on matrices
Week 5	Comparison operations and logic gates Some important commands
Week 6	Repetition
Week 7	Repetition
Week 8	Graph in MATLAB 2D
Week 9	Graph in MATLAB 2D
Week 10	The process of placing graphics in separate windows and naming the axes
Week 11	Graph in MATLAB 3D
Week 12	Graph in MATLAB 3D
Week13	Derivative of algebraic expressions
Week 14	Integration of algebraic expressions
Week 15	Mathematical functions.

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	MATLAB Programming for Engineers Sixth Edition Stephen J. Chapman BAE Systems Australia	Yes
Recommended Texts		
Websites	https://www.mathworks.com/support/learn-with-matlab-tutorials.html	

Grading Scheme				
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 Information

Module Title	Arabic Language		**Module Delivery**	
Module Type	Basic		☒**Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EME225			
ECTS Credits	**3**			
SWL (h/sem)	**75**			
Module Level	**2**	**Semester of Delivery**	**4**	
Administering Department	EME	**College**	CENG	
Module Leader	**Mohanad Abduljabbar Hassan**	**e-mail**	mohanad.abduljabbar@uosamarra.edu.iq	
Module Leader's Acad. Title	**Lecturer**	**Module Leader's Qualification**	**PhD**	
Module Tutor	None	**e-mail**	None	
Peer Reviewer Name	None	**e-mail**	None	
Scientific Committee Approval Date	**12/08/2024**	**Version Number**	**1.0**	

Relation with other Modules

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

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives	This semester aims to enable students to deal with a wide range of grammar, syntax, morphology, and spelling rules in reading and writing. It also aims to help them master the rules of the language and avoid making spelling and grammatical errors, whether in formal correspondence or social and cultural situations.
Module Learning Outcomes	1-Demonstrate knowledge and understanding of grammar, morphology and spelling rules in theory and practice and avoid making common mistakes. 2-nderstand the language and distinguish between the subject and predicate,

	the verb and the agent and not confuse them. 3-Know the methods of speaking, communicating and formal writing using eloquent language free of grammatical errors and mistakes. 4-Write articles in correct language free of errors
Indicative Contents	Grammar rules: an introduction to the Arabic language, discussing the parts of speech (noun, verb, and particle), the nominal sentence and the verbal sentence, the additions to the nominal and verbal sentence, the quasi-sentence, the presentation and delay, the methods of writing the hamza, the number and the counted, morphology and what it includes in terms of chapters and the morphological scale.

Learning and Teaching Strategies	
Strategies	The method that will be used in this course: 1. Theoretical lectures. 2. Articles. 3. Discussions in the classroom.

Student Workload (SWL)			
Structured SWL (h/sem)	**33**	**Structured SWL (h/w)**	**2.2**
Unstructured SWL (h/sem)	**42**	**Unstructured SWL (h/w)**	**2.8**
Total SWL (h/sem)	**75**		

Module Evaluation

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

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Speech and what it consists of, noun, verb and particle.
Week 2	Nominal sentence.
Week 3	Nominal sentence additions.
Week 4	Verbal sentence.
Week 5	Verbal sentence additions.
Week 6	Sentence styles.
.Week 7	Request and exclamation
Week 8	Quasi-sentence + mid-term exam
Week 9	Call and confirmation.
Week 10	Condition and oath.

Week 11	Arabic sentence complements.
Week 12	Exception, and meanings of prepositions.
Week 13	Number, writing the Hamza
Week 14	Writing the taa, and the letters that are pronounced but not written and writing the dad and the thaa
Week 15	The morphological scale and the verb chapters

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Ibn Aqils Commentary On Ibn Maliks ALfiyyah .AL-Nahw AL-Wafi, and Jami AL-Durus AL-Arabiyyah	Yes
Recommended Texts		
Websites		

Grading Scheme				
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

Module Information

Module Title	Human Rights and Democracy	**Module Delivery**	
Module Type	Basic	☒**Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EME226		
ECTS Credits	**2**		
SWL (h/sem)	**50**		

Module Level	2	**Semester of Delivery**	**4**
Administering Department	EME	**College**	CENG
Module Leader	**Fateen TUMA KURDEE**	**e-mail**	faten.tuma@uosamarra.edu.iq
Module Leader's Acad. Title	**Lecturer**	**Module Leader's Qualification**	**M.Sc.**
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	None	**e-mail**	None
Scientific Committee Approval Date	**12/08/2024**	**Version Number**	**1.0**

Relation with other Modules

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

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives	Teaching the subject of Human Rights and Democracy in universities aims to achieve several main objectives: - Promoting awareness of human rights:

	Teaching this subject seeks to promote understanding and awareness of the basic human rights stipulated in the international charters and agreements to which Iraq is committed. This includes citizens' rights and economic, social and cultural rights. - Promoting the principles of democracy: The main objective of teaching this subject includes promoting the concept and values of democracy among students. This includes understanding the importance of civic engagement, voting rights and political participation, ensuring the rule of law and respecting minority rights. - Developing critical thinking skills: The study of human rights and democracy enhances critical thinking skills among students, helping them to evaluate political and social issues in a logical manner based on ethical principles and human rights. - Promoting the values of justice and equality: Human rights lessons contribute to promoting the values of justice and equality in society, and encourage combating discrimination and achieving the rights of the individual regardless of his social or cultural background. - Stimulating community participation: Teaching human rights and democracy aims to motivate students to participate in civil and community life, and motivate them to take responsibility for building a society that respects human rights and relies on the principles of democracy. In general, teaching human rights and democracy in Iraqi universities seeks to prepare students to participate effectively in society and work to build a society based on justice and respect for human rights.
Module Learning Outcomes	Learning human rights and democracy in Iraqi universities can result in a range of important and valuable outcomes, including: A deep understanding of human rights: Students are expected to gain a deep understanding of the concept of human rights and the state's obligations towards them, and to acquire the ability to analyze the challenges facing the realization and respect of human rights. An appreciation of democratic values: Students are expected to gain an understanding of the values and principles of democracy, including civic participation, respect for minority rights, and good governance. Developing critical thinking skills: Students are expected to develop critical thinking skills in dealing with issues related to human rights and democracy, enabling them to evaluate the situation logically and understand the potential implications of political decisions and transformations. The ability to participate effectively: Students are encouraged to participate effectively in society and political life, whether through participation in dialogues, public work, or even by engaging in discussions on human rights issues. Enhancing cultural awareness: Learning human rights and democracy can increase students' awareness of cultural diversity and mutual respect between different cultures, which enhances understanding Global and international

	cooperation. Motivation for social interaction: Students are expected to be motivated to contribute to improving social and political conditions through collective action and social activism. In general, learning about human rights and democracy is an opportunity for students to develop personally and socially, and to enable them to take responsibility for building a society based on the principles of justice and respect for human rights..
Indicative Contents	Guiding Content for the Human Rights and Democracy Course, Some points that may be included: 1. Basic concepts: Definitions and explanations of concepts such as human rights, democracy, fundamental freedoms, and social justice. 2. History: The development of human rights and democracy throughout history, including important international documents such as the Universal Declaration of Human Rights. 3. Legal frameworks: International agreements and treaties that deal with human rights and democracy, in addition to national constitutions and relevant laws. 4. Contemporary issues: Discussing issues such as discrimination, individual and collective freedoms, children's rights, women's rights, and social justice. 5. International and local mechanisms: Bodies and organizations concerned with human rights and the promotion of democracy, both within countries and at the international level. 6. Case studies: Analysis of the application of human rights and democracy in certain countries or regions, with a focus on challenges and achievements. 7. Social interaction: The role of civil society, the media, and academic institutions in promoting and protecting human rights and promoting democracy.

Learning and Teaching Strategies	
Strategies	Learning and teaching strategies that can be used in teaching human rights and democracy . *Discussions and dialogues: Organizing group discussions on various topics related to human rights *Social media and technology: Using social media platforms and technology to encourage academic discussions and exchange of ideas among students outside the classroom.

Student Workload (SWL)

Structured SWL (h/sem)	**33**	**Structured SWL (h/w)**	**2.2**
Unstructured SWL (h/sem)	**17**	**Unstructured SWL (h/w)**	**1.13**
Total SWL (h/sem)	**50**		

Module Evaluation

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

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Human Rights (Human Rights in Ancient Civilizations)
Week 2	Human Rights in Divine Laws and Religions
Week 3	Sources of Human Rights / International Sources
Week 4	Sources of Human Rights / National Sources
Week 5	Human Rights Guarantees / Guarantees at the Domestic Level
Week 6	Human Rights Guarantees / Guarantees in Islam
Week 7	Human Rights Guarantees / Guarantees at the International Level

Week 8	The Role of Regional Organizations in Protecting Human Rights
Week 9	Mid-Term Exam
Week 10	The Future of Human Rights - Globalization and Human Rights
Week 11	Chapter Two Children's Rights (The Origin and Development of Children's Rights Rules)
Week 12	Children's Rights in Civilizations and Divine Religions
Week 13	International and Regional Agreements on Children's Rights
Week 14	Democracy, Human Rights Guarantees / Guarantees at the International Level
Week 15	Parliament, Elections and the Most Important Electoral Systems

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	Human Rights, Children and Democracy, authored by .Professor Dr. Maher Saleh Alawi and others	Yes
Recommended Texts		
Websites		

Grading Scheme				
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

Module Information معلومات المادة الدراسية					
Module Title	**Heat Transfer**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EME 311				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	3		**Semester of Delivery**	1	
Administering Department	EME		**College**	CENGS	
Module Leader	Name: Zainab Abdulmaged Khalaf		**e-mail**	E-mail: Zainab.abd@uosamarra.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor			**e-mail**	E-mail:	
Peer Reviewer Name			**e-mail**	E-mail:	
Scientific Committee Approval Date	18/09/2025		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	This course aims to provide students with a solid understanding of the fundamental principles of heat transfer and its various mechanisms, enabling them to analyze and design thermal systems in diverse engineering applications. The course seeks to introduce students to the phenomena of thermal conduction, convection, and radiation, and their roles in transferring thermal energy across different materials and media, while clarifying the mathematical relationships governing each mechanism. The course also focuses on developing students' ability to solve engineering problems related to thermal distribution in solids and fluids, and to calculate heat transfer rates in various systems. It also illustrates applications of heat transfer in heat exchangers, thermal insulation, refrigeration, and air conditioning. Furthermore, the course works to enhance students' ability to use differential equations and numerical methods in analyzing complex heat transfer problems, and to develop their critical thinking, engineering analysis, and problem-solving skills in the field of thermal system design. This contributes to preparing them academically and professionally for work in the fields of energy and industry, meeting future requirements.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Provide students with a solid scientific foundation in the field of heat transfer and its three mechanisms. 2. Introduce students to the laws of thermal conduction and solve Fourier's equation in steady-state and transient cases. 3. Enable students to understand the principles of natural and forced convection and calculate convective heat transfer coefficients. 4. Develop students' ability to analyze radiation heat transfer and calculate radiative exchange rates between surfaces. 5. Introduce students to types of heat exchangers and methods for their design and efficiency calculation. 6. Provide students with applied knowledge about thermal insulation, types of insulating materials, and their applications. 7. Introduce students to the principles of heat transfer in extended fins and calculate their efficiency and effectiveness. 8. Clarify the fundamentals of heat transfer in boiling and condensation systems and their industrial applications. 9. Demonstrate the role of numerical methods in solving complex two-dimensional and three-dimensional heat transfer problems. 10. Develop students' skills in analysis, comparison, and engineering evaluation of various heat transfer systems. 11. Prepare students to apply heat transfer concepts in real-world applications and serve industry and society.
Indicative Contents	Indicative content includes the following: **Introduction to Heat Transfer** - Understanding the basic concepts of heat transfer and its three mechanisms (conduction, convection, radiation).

المحتويات الإرشادية	- Explaining Fourier's law for thermal conduction and Newton's law of cooling. • **Steady-State Heat Conduction** - Solving the heat conduction equation in plane walls, cylinders, and spheres. - Understanding thermal resistance and heat conduction in composite systems. - Analyzing heat transfer in extended fins. • **Transient Heat Conduction** - Solving transient heat conduction problems using the lumped capacitance method. - Using Heisler charts in solving transient problems. - Understanding the effect of Biot and Fourier numbers on thermal distribution. • **Forced Convection** - Explaining the principles of thermal and velocity boundary layers. - Calculating convective heat transfer coefficients in pipes and channels. - Using Nusselt, Prandtl, and Reynolds numbers in thermal analysis. • **Natural Convection** - Describing the mechanism of natural convection and the role of Rayleigh and Grashof numbers. - Calculating heat transfer coefficients in natural convection from different surfaces. • **Thermal Radiation** - Explaining thermal radiation laws (Stefan-Boltzmann law, Planck's law). - Calculating radiative exchange rate between surfaces using view factors. - Understanding the characteristics of black, gray, and real surfaces. • **Heat Exchangers** - Identifying types of heat exchangers and their industrial applications. - Calculating heat transfer rate using LMTD and NTU-Effectiveness methods. - Analyzing heat exchanger performance and calculating efficiency. • **Boiling and Condensation** - Explaining the principles of nucleate boiling and film boiling. - Understanding the mechanism of filmwise and dropwise condensation. - Calculating heat transfer coefficients in boiling and condensation processes.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**The main strategy to be followed in delivering this unit is:** **Lectures:** These aim to provide a comprehensive overview of the fundamental concepts and principles in the field of heat transfer, through classroom lessons, reading from curriculum books and scientific references, utilizing electronic resources in self-learning, as well as classroom discussions. **Assignments and Examinations:** These aim to enable students to apply what they have learned to real-world problems, and to verify their understanding of the scientific material through monthly and final examinations, in addition to short quizzes, active participation in class, and submission of scientific and theoretical reports.

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	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	22	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to heat transfer and its three mechanisms
Week 2	Steady-state heat conduction in plane walls
Week 3	Steady-state heat conduction in cylinders and spheres
Week 4	Thermal resistance and composite systems
Week 5	Heat transfer in extended fins
Week 6	Transient heat conduction - Lumped capacitance method
Week 7	Transient heat conduction - Heisler charts
Week 8	Midterm Examination
Week 9	Forced convection - External flow
Week 10	Forced convection - Internal flow
Week 11	Natural convection
Week 12	Thermal radiation and surface properties
Week 13	Radiative exchange between surfaces
Week 14	Heat exchangers
Week 15	Boiling and condensation

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Heat Transfer: A Practical Approach, by Yunus A. Cengel	Yes

Recommended Texts	• Fundamentals of Heat and Mass Transfer, by Frank P. Incropera and David P. DeWitt	No
Websites	https://www.khanacademy.org/science/physics/thermodynamics	

Grading Scheme				
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

Module Information معلومات المادة الدراسية					
Module Title	**Electrical DC and AC Machines**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EME312				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	EME		**College**		
Module Leader	Dr. Yahya T. Hussein		**e-mail**	yahya.t.hussein@uosamarra.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor			**e-mail**	E-mail:	
Peer Reviewer Name			**e-mail**	E-mail:	
Scientific Committee Approval Date	22/11/2025		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To introduce the fundamental principles of electromechanical energy conversion. 2. To understand the construction, operating principles, and characteristics of DC machines (motors and generators). 3. To analyze single-phase and three-phase transformers, their equivalent circuits, and efficiency. 4. To study AC machines, including synchronous machines and induction motors. 5. To provide knowledge on performance analysis, testing, and applications of electrical machines in real systems. 6. To prepare students for practical laboratory work to reinforce theoretical understanding.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explain the principles of electromagnetic induction and energy conversion. 2. Describe the construction and operation of DC machines. 3. Analyze the characteristics and performance of transformers. 4. Evaluate the operating principles and performance of synchronous machines. 5. Distinguish between types of induction motors and analyze their performance. 6. Conduct laboratory experiments on DC and AC machines, interpret results, and compare them with theoretical predictions. 7. Apply machine concepts to real-world industrial applications.
Indicative Contents المحتويات الإرشادية	1. Review of electromagnetism, magnetic circuits, and energy conversion principles. 2. Magnetic materials, B–H curve, hysteresis and eddy current losses. 3. Electromagnetic induction, Faraday's law, Lorentz force, and torque production. 4. DC machines: construction, commutation, armature reaction, and types (shunt, series, compound). 5. DC generators: EMF equation, characteristics, efficiency, and testing. 6. DC motors: torque-speed characteristics, starting methods, speed control, losses and efficiency. 7. Transformers: construction, working principle, equivalent circuit, phasor diagrams. 8. Transformer tests: open-circuit and short-circuit tests, voltage regulation and efficiency. 9. Single-phase induction motors: types, equivalent circuits and applications. 10. Three-phase induction motors: operating principle, torque–slip characteristics, starting methods, speed control. 11. Synchronous machines: construction, EMF equation, voltage regulation, V-curves and applications. 12. Machine testing, safety procedures and practical considerations.

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	135	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	9.2
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	**225**		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to electrical machines and electromechanical energy conversion. Course overview and lab safety.
Week 2	Magnetic circuits, magnetic materials, B–H curve and losses.
Week 3	Electromagnetic induction and torque production; machine classifications.
Week 4	DC machines: construction and EMF/torque equations.
Week 5	DC generators: characteristics, efficiency and testing.
Week 6	DC motors: torque–speed, starting and speed control methods.
Week 7	Transformers: construction, principle, equivalent circuit and phasor diagram.
Week 8	Mid exam.
Week 9	Transformer tests (OC/SC), regulation and efficiency.
Week 10	Single-phase induction motors: types and performance.
Week 11	Three-phase induction motors: torque–slip, starting and control.
Week 12	Synchronous generators: construction, EMF equation, voltage regulation.
Week 13	Synchronous motors: V-curves, power factor, applications.
Week 14	Special machines (BLDC, universal, stepper) and industrial applications.
Week 15	**Preparatory week before the final Exam.**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1 & 2	Lab 1: Magnetic circuits and instrumentation; BH curve observation; safety in machine labs.
Week 3 & 4	Lab 2: DC generator no-load/load tests; EMF measurement and characteristics plotting.

Week 5 & 6	Lab 3: DC motor torque–speed characteristics and speed control methods.
Week 7 & 8	Lab 4: Transformer open-circuit and short-circuit tests; equivalent circuit parameters.
Week 9 & 10	Lab 5: Single-phase induction motor performance and starting methods.
Week 11 & 12	Lab 6: Three-phase induction motor torque–slip curve and speed control.

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Fitzgerald, A. E., Kingsley, C., & Umans, S. D. Electric Machinery (7th Edition), McGraw-Hill, 2013 A TEXTBOOK OF ELECTRICAL TECHOLOGY/ B.L THERAJA 2005.	
Recommended Texts	P. S. Bimbhra, Electrical Machinery, Khanna Publishers, 2011. J. Chapman, Electric Machinery Fundamentals, McGraw-Hill, 2012.	
Websites	NPTEL courses on Electrical Machines; IEEE Xplore Digital Library.	

Grading Scheme

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

Module Information معلومات المادة الدراسية					
Module Title	**Vibration**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EME 313				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	EME		**College**	CENGS	
Module Leader	Name: Mohammed O.Attea		**e-mail**	E-mail Mohammedatteaa@uosamarra.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Mustafa Abdulmunem Hameed		**e-mail**	E-mail: mustfa.a.ha@uosamarra.edu.iq	
Peer Reviewer Name	Reyad Azzawi Badr		**e-mail**	E-mail: reyadh.azawi@uosamarra.edu.iq	
Scientific Committee Approval Date	12 /10 /2025		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	11. To explain the vibration science through the application of techniques. 12. Understand fundamental concepts of vibration (natural

	frequency, wave amplitude, resonance phenomena.etc.). 13. To find equivalent basic properties of vibrating system such as stiffness, mass and damping act.). 14. To understand the free vibration. 15. To explain the equation of motion and natural frequency of vibrating system. 16. To apply the Newton 2nd law of dynamic in vibration systems. 17. To explain free vibration in translation, rotation and torsional motion. 18. To study free vibration with damping. 19. To understand forced vibration in two cases (undammed and damped). 20. To study two degree of freedom systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. The student will know about the importance of vibration science and its application areas. 2. Understanding the vibration system elements. 3. Explaining the difference between free and forced vibrating . 4. Understanding the relationship between free body diagram, equation of motion and natural frequency. 5. Identify the concept of energy and energy conservation law and explaining the energy forms (potential, kinetic and dissipated energy). 6. Identify the free vibration (undammed and damped). 7. Learning about forced vibration, and its parameters (magnification factor and frequency ratio) 8. Learning how to get vibrational properties of vibration system. 9. Understanding the applications of vibration in deferent systems. 10. Learning about two degree of freedom systems (2DOF systems) .
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: 1- Dimensions and units of physical quantities. 2- vibrational elements in the system (mass, spring and damping) 4- System properties: parodic time, frequency, amplitude. etc. 5- Static equilibrium and dynamic state of the system. 6- free, forced, undammed and damped cases of the system. 7- basic concepts of vibrational analysis: free body diagram in vibrational system, governing deferential equation, natural frequency. 8- 2nd Newton law of motion and frequency. 9- frequency scales: hertz and rad per sec. 10- stiffness and damping constants scales. 11- Energy forms: potential, kinetic and dissipated.

	12- The 2nd Newton law of motion forms in different types of motion. 15- two degree of freedom systems (2DOF systems).

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** 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**	2	18% (18)	7 and 13	LO #1, #2 , #3 ,#4 ,#5,#6 And 8#, #9,

					#10,11#,12#
	Assignments	2	9% (9)	6 and 12	All
	Lab.	6	7% (7)	1 , 3 , 5, 7,9 and 11	All
	Report	1	6% (6)	14	All
Summative assessment	**Midterm Exam**	2hr	10% (10)	8	LO #1 - #7
	Final Exam	3hr	50% (50)	-	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to the basic principles of mechanical vibrations.
Week 2	The spring element in the vibrating system and methods for calculating its equivalents in simple and complex cases
Week 3	Mass and damping elements in a vibrating system and methods for calculating their equivalents in simple and complex systems
Week 4	Harmonic motion analysis and applications of equivalent systems.
Week 5	-Free vibration of undammed translational system, overall analysis (free body diagram, equation of motion and response).
Week 6	-Free vibration of undammed Rotational system, overall analysis.
Week 7	Free vibration of undammed general system using the energy equation.
Week 8	- Mid exam.

Week 9	- Free vibration of dammed translational system, overall analysis.
Week 10	- Free vibration of undammed Rotational system, overall analysis.
Week 11	- Undammed forced vibration under the influence of sinusoidal excitation.
Week 12	- Damped forced vibration in translational and rotational systems: analysis and applications.
Week 13	- Systems with two degrees of freedom.
Week 14	- Applications of two-degree-of-freedom systems.
Week 15	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1 & 2	Lab 1: Stiffness of Helical Spring.
Week 3 & 4	Lab 2: Equivalent Stiffness.
Week 5 & 6	Lab 3: Free Vibration in translation system.
Week 7 & 8	Lab 4: The natural frequency of a cantilever beam.
Week 9 & 10	Lab 5: simple pendulum.
Week 11 & 12	Lab 6: Free and damped torsional vibration.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Mechanical vibration 5th ed by S.S.Rao	Yes
Recommended Texts	Engineering Mechanics Dynamics by Meriam	yes

Grading Scheme				
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

Module Information معلومات المادة الدراسية					
Module Title	**Air Conditioning**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EME314				
ECTS Credits	4				
SWL (hr/sem)	**100**				
Module Level	3		**Semester of Delivery**	5	
Administering Department	EME		**College**	CENGS	
Module Leader	Name: Omar M. Ahmed		**e-mail**	E-mail: omar.alzayat@uosamarra.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Name: Omar M. Ahmed		**e-mail**	E-mail: omar.alzayat@uosamarra.edu.iq	
Peer Reviewer Name	Reyad Azzawi Badr		**e-mail**	E-mail: reyadh.azawi@uosamarra.edu.iq	
Scientific Committee Approval Date	17/09/2025		**Version Number**		

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1.Understand the fundamental principles of air conditioning. 2.Identify and explain the concepts of humidity and air mixing. 3.Calculate cooling and heating thermal loads for different applications. 4.Analyze thermal comfort systems and their performance. 5.Design air duct systems and evaluate air distribution methods. 6.Determine pressure drops in duct systems and select appropriate fans. 7.Apply theoretical knowledge in laboratory experiments using measuring instruments.

	8.Evaluate and analyze practical HVAC systems in buildings.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Specific and measurable → Each outcome should be observable and assessable (e.g., “Calculate cooling loads” rather than “Understand cooling”). · Student-centered → Focused on what the student will achieve, not what the teacher will cover. · Aligned → Must align with teaching methods, assessments, and the broader programme goals. · Categorized → Often divided into knowledge, skills, and competencies
Indicative Contents المحتويات الإرشادية	• Introduction to air conditioning systems. • Psychrometrics and properties of moist air. • Cooling and heating load calculations. • Thermal comfort and indoor air quality. • Air distribution . • Fans and pressure drop calculations. • Case studies and practical building applications.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Interactive lectures with presentations. 2. Small projects for calculating thermal loads. 3. In-class discussions and problem-solving exercises. 4. Field visits when possible. 5. Continuous assessment through periodic tests, practical tasks, and mini-projects to monitor understanding and provide immediate feedback.

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	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	22	**Unstructured SWL (h/w)** 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**		10%		
	Assignments		10%		
	Lab.				
	Report		10%		
Summative assessment	**Midterm Exam**		20%		
	Final Exam		50%	-	
Total assessment			100%		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Air Conditioning
Week 2	Psychrometric Processes
Week 3	Cooling Load Calculation (Part 1)
Week 4	Cooling Load Calculation (Part 2)
Week 5	Cooling Load Calculation (Part 3)
Week 6	Comfort Air Conditioning
Week 7	Duct Design
Week 8	Pressure Drop and Fan Selection
Week 9	System Efficiency
Week 10	Design Case Study

Week 11	General Review
Week 12	Psychrometric Processes
Week 13	Heating Load Calculation part1
Week 14	Heating Load Calculation part2
Week 15	**Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Air Conditioning Principles and Systems, Edward Gupta .	Yes
Recommended Texts	Modern Refrigeration and Air Conditioning, Althouse	No
Websites	www.ashrae.org, www.engineeringtoolbox.co	

Grading Scheme

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

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Analysis**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EME315				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	EME		**College**	CENGS	
Module Leader	Name: Zainab Abdulmaged Khalaf		**e-mail**	E-mail: Zainab.abd@uosamarra.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor			**e-mail**	E-mail:	
Peer Reviewer Name			**e-mail**	E-mail:	
Scientific Committee Approval Date	18/09/2025		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1 -Understanding complex functions and their solution methods 2 -The student learns the types of differential equations: ordinary and partial. 3 -Solving problems related to electromechanical engineering applications using ordinary and partial differential equations. 4 -Describe and understand the Laplace transform and its use in solving differential equations. 5 -Describe and understand Fourier series.

	6- The student learns to choose the optimal method for solving problems in electromechanical engineering.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	12. Definition of complex functions 13. Student's knowledge of continuity and derivatives of complex functions 14. Understanding Cauchy's theorem and its applications 15. Identifying types of complex functions (exponential, hyperbolic, logarithmic) 16. Student's knowledge of integration of complex functions 17. Student's knowledge of Gamma and Beta functions and their applications 18. Definition of Laplace transform 19. Student's knowledge of solving differential equations using Laplace transform 20. Definition of Fourier series 21. Student's knowledge of even and odd Fourier series and half-range series 22. Student's knowledge of determining the half-range of Fourier series 23. Introduction to complex Fourier series and their applications 24. Solving differential equations using separation of variables 25. Understanding the solution of wave and heat equations in one and two dimensions 26. Understanding the solution of wave and heat equations in one and two dimensions
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: 1. Complex Function Definition and examples of complex functions Domain, range, and mapping of complex functions Continuity and differentiability of complex functions Cauchy–Riemann equations and conditions for analyticity 2. Applications of Cauchy's Theorem Statement and proof of Cauchy's theorem Cauchy's integral formula and its applications Consequences: Liouville's theorem, Maximum Modulus principle 3. Special Complex Functions Exponential, logarithmic, trigonometric, and hyperbolic functions Multivalued functions and branch cuts Applications in engineering problems 4. Integration of Complex Functions Line integrals and contour integrals Residue theorem and evaluation of integrals Application to real definite integrals 5. Gamma and Beta Functions Definitions and properties of Gamma and Beta functions Relationship between Gamma and factorial Applications in integrals and special functions in engineering 6. Laplace Transform Definition and properties (linearity, shifting, scaling, convolution) Laplace transforms of elementary functions Inverse Laplace transform methods (partial fraction, convolution)

	Application: solving ordinary differential equations (ODEs) with Laplace transform 7. Fourier Series Definition and derivation of Fourier series expansion Conditions for convergence (Dirichlet's conditions) Even and odd functions in Fourier series Half-range expansions (sine series, cosine series) Complex form of Fourier series and its applications in engineering 8. Fourier Transforms (Optional Extension) Concept of Fourier integral Fourier transform and its engineering applications (signal processing, heat transfer) 9. Partial Differential Equations (PDEs) Method of separation of variables for PDEs Applications to wave and heat equations: One-dimensional wave equation: vibrating string, boundary conditions Two-dimensional wave equation: membrane vibration One-dimensional heat equation: transient conduction in a rod Two-dimensional heat equation: steady-state conduction in plates

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**The teaching and learning strategy aims to:** Introducing engineering analysis concepts through the theoretical aspect supported by practical examples implemented by students **This is carefully delivered through:** 1 .Lectures that include question-and-answer sessions. 2 .Presentation of pre-recorded and pre-prepared content. 3 .Sessions devoted to problem-solving. 4 .Practical lessons and classroom exercises

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	100	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	48	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Complex functions
Week 2	Continuity and derivatives of complex functions
Week 3	Cauchy's theorem
Week 4	Complex functions (exponential, hyperbolic, logarithmic)
Week 5	Integration of complex functions
Week 6	Gamma and Beta functions
Week 7	Laplace transform
Week 8	Solving differential equations using Laplace transform
Week 9	Mid Exam

Week 10	Fourier series , Even and odd Fourier series and half-range series
Week 11	Determining the half-range of Fourier series
Week 12	Complex Fourier series
Week 13	Solving differential equations using separation of variables
Week 14	Solution of wave and heat equations in one and two dimensions
Week 15	Final Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Advanced Engineering Analysis C. Ray Wylie	Yes
Recommended Texts	• Number theory and discrete mathematics / A.K. Agarwal ... [et al.]. • Advanced Engineering Mathematics, Kreyszig Kreyszig, 10th Edition, John Wiley & Sons, Inc	No
Websites	https://www.thriftbooks.com/w/advanced-engineering-mathematics_clarence-raymond-wylie/327947/#edition=3546946&idiq=4215961	

Grading Scheme

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

Module Information معلومات المادة الدراسية					
Module Title	**Analog communication**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EME316				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	3		**Semester of Delivery**	1	
Administering Department	EME		**College**	CENGS	
Module Leader	Name: Eman Adel Mahmood		**e-mail**	E-mail: eman.a.m@uosamarra.edu.iq	
Module Leader's Acad. Title	Asst.Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor			**e-mail**	E-mail: shaymaa.h.ab@uosamarra.edu.iq	
Peer Reviewer Name			**e-mail**	E-mail: reyadh.azawi@uosamarra.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 Objectives أهداف المادة الدراسية	1. Familiarize with the functional elements of a communication system, study the basics and learn about the communication model and its components ¬ 2. Develop a comprehensive understanding of signal analysis techniques, including the transforms, to classify and interpret both periodic and non-periodic signals effectively. 3. Gain a thorough understanding of various modulation techniques, specifically Amplit

	Modulation (FM and PM), including the design, operation, and performance anal 4. Analyze and classify systems based on their characteristics, utilizing concepts to evaluate the performance and efficiency of different communication systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explain basic communication system concepts and proper use of lab equipment. 2. Classify signals and apply Fourier transforms practically. 3. Analyze systems and compute PSD using MATLAB, link results to theory. 4. Explain AM concepts and apply practically. 5. Apply and analyze AM applications. 6. Evaluate theoretical knowledge and practical skills from previous topics. 7. Compare AM and FM both theoretically and practically. 8. Evaluate acquired practical skills and review theory. 9. Design and test FM transmitter and receiver systems. 10. Apply PM concepts practically and link with theory. 11. Implement practical projects and document results. 12. Solve advanced problems and connect theory with practice. 13. Evaluate understanding of updated theoretical knowledge. 14. Comprehensive evaluation of theoretical knowledge and practical skills.
Indicative Contents المحتويات الإرشادية	1.Introduction: Introduction to communication engineering systems, communications model, functional elements of a communication system. 2) Communication System Elements (Signal Analysis): Signal classification of periodic and non-periodic signals (Fourier series and Fourier transforms), classification of systems, power spectral density and correlations. 3) Amplitude Modulation and Demodulation AM modulation, DSB, SSB, VSB, AM transmitter, AM receiver. 4) Angle Modulation and Demodulation Frequency modulation (FM), FM transmitter, FM receiver, Phase modulation (PM), power and bandwidth (BW) of FM signal.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Theoretical Component:** - Interactive lectures with multimedia presentations. - Guided brainstorming sessions to link theoretical concepts to practical applications. - Flipped classroom: Assign students to watch educational videos before class, followed by discussion and clarification.

	- Group discussions and mini-projects, dividing students into teams. **Practical Component:** - Hands-on experiments and practical applications using laboratory equipment and software (e.g., MATLAB) for communication systems analysis and design. - Student performance evaluated through lab reports and short quizzes after each topic. - Mini-projects to assess comprehension of applied concepts.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		**Unstructured SWL (h/w)** 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**				
	Assignments				
	Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	10% (10)		
	Final Exam	3hr	50% (50)		
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**-Introduction to Communication Systems: Definition, Engineering Model, and System Elements**
Week 2	**-Signal Classification, Fourier Series**
Week 3	**-Fourier Transforms**
Week 4	**- System Classification, Power Spectral Density & Correlations**
Week 5	**Correlations And convolution**
Week 6	**- Amplitude Modulation (AM) – DSB: Modulation and Demodulation**
Week 7	**- Continuation of AM: DSB-SC, SSB, VSB Applications**
Week 8	**Frequency Modulation (FM) – Basic Concepts: Modulation and Demodulation**
Week 9	**Midterm Exam (Theory)**
Week 10	**Type FM, Power & Bandwidth of FM**
Week 11	**Phase Modulation (PM) Basic Concepts**
Week 12	**- Power & Bandwidth of PM and Demodulation**
Week 13	**. Final Project Presentations**
Week 14	**-Advanced Problem Solving and General Review**
Week 15	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1 & 2	Lab 1: introduction and review of how to use lab measuring devices.
Week 3 & 4	Lab 2: Amplitude modulation AM
Week 5 & 6	Lab 3: Amplitude demodulation
Week 7 & 8	Lab 4: Frequency Modulation FM
Week 9 & 10	Lab 5: Frequency Demodulation
Week 11 & 12	Lab 6: Phase Modulation PM.
Week 13 & 14	Lab 7: Phase Demodulation

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• Introduction to Communication Systems. Ferrel G. Stremler. • Communication Systems, an Introduction to Signals and Noise in Electrical Communications. Bruce Carlson. • Communication Systems Engineering. John G. Proakis and Masoud Salehi.	
Recommended Texts	Modern Digital and Analog Communication Systems. B. P. Lathi.	No
Websites	1. https://pdfcoffee.com/principles-of-communication-systems-by-herbert-taub-amp-donald-schilling-pdf-2-pdf-free.html 2. https://archive.org/details/BookModernDigitalAndAnalogCommunicationSystems4thEditionByLathi 3. https://pdfcoffee.com/communication-system-bruce-carlson-4ed-pdf-free.html	

Grading Scheme				
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

Module Information معلومات المادة الدراسية					
Module Title	Turbomachinery			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EME317**				
ECTS Credits	**9**				
SWL (hr/sem)	**225**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	EME		**College**	CENGS	
Module Leader	Name: Omar M. Ahmed		**e-mail**	E-mail: omar.alzayat@uosamarra.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Shaymaa Husham AbdllMalek		**e-mail**	E-mail: shaymaa.h.ab@uosamarra.edu.iq	
Peer Reviewer Name	Reyad Azzawi Badr		**e-mail**	E-mail: reyadh.azawi@uosamarra.edu.iq	
Scientific Committee Approval Date	11/11/2023		**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 Objectives أهداف المادة الدراسية	1. Application of similarity laws in fluid machinery 2. Analysis of water flow in an impulse turbine 3. Identification of the functions of reaction turbine components, flow analysis according to its types, and performance evaluation

	4. Study of cavitation phenomenon in reaction turbines and methods of prevention 5. Description of centrifugal pump components and analysis of internal flow 6. Detection of cavitation in pumps, its causes, and methods of prevention 7. Study of gas turbine performance and analysis of gas flow through the blades 8. Analysis of gas flow in a centrifugal compressor and calculation of its efficiency
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**A – Knowledge and Understanding** • Understanding the relationship between the laboratory model and the prototype according to similarity laws. • Identifying the operating principle of the impulse turbine and calculating the work done on it. • Understanding the flow direction of water in different types of reaction turbines. • Identifying the cavitation phenomenon in turbines and pumps and addressing its causes. • Understanding the operation of compressors and gas turbines, analyzing the flow within them, and evaluating their performance. **B – Course-Specific Skills Objectives** • Ability to distinguish between types of hydraulic turbines according to their operating principle and flow direction. • Ability to interpret negative phenomena such as cavitation and propose methods for their mitigation. • Ability to analyze two-dimensional flow and relative motion in rotating machinery. • **B** Ability to use measuring instruments and practically calculate the efficiency of pumps and turbines.
Indicative Contents المحتويات الإرشادية	1. Introduction to Fluid Machines o Definition and classification: turbines (impulse & reaction) and pumps (centrifugal & positive displacement). o Applications in industry and power generation. 2. Basic Fluid Properties o Density (ρ), viscosity (μ), specific weight (γ), specific volume (v). o Importance in pump and turbine design. 3. Energy in Fluid Flow o Bernoulli's equation, energy head (pressure, velocity, elevation). o Hydraulic energy, shaft work, efficiency. 4. Pump Fundamentals o Types: centrifugal, axial, mixed-flow, reciprocating. o Pump characteristic curves: head, flow rate, efficiency. o Net Positive Suction Head (NPSH) and cavitation. 5. Pump Performance o Specific speed (Ns), affinity laws, selection criteria.

	○ Pump losses: friction, leakage, mechanical losses. 6. Turbine Fundamentals ○ Types: ▪ Impulse turbines (Pelton, Turgo) ▪ Reaction turbines (Francis, Kaplan) ○ Velocity triangle, blade velocity, and flow analysis. 7. Turbine Performance ○ Efficiency: mechanical, hydraulic, overall. ○ Specific speed (Ns), selection for head and flow conditions. 8. Velocity and Momentum Analysis ○ Euler's equation for turbomachines. ○ Work done per unit mass, torque, power. 9. Hydraulic Machines under Varying Conditions ○ Cavitation in turbines and pumps, surge in pumps. ○ Methods to prevent cavitation. 10. Pump & Turbine Cycles ○ Pumped storage systems. ○ Turbine operation in hydroelectric plants. 11. Dimensional Analysis and Similarity ○ Model testing, Reynolds and Froude similarity. ○ Scale effects for turbines and pumps. 12. Energy Losses and Efficiency ○ Friction, shock, leakage losses. ○ Performance curves interpretation. 13. Two-phase Flow Considerations ○ Air or vapor in pumps/turbines, effect on performance. 14. Flow Control Devices ○ Guide vanes, diffusers, volutes, nozzles. 15. Applications and Case Studies ○ Selection of pump/turbine type based on head, flow rate, and power. ○ Real-world examples: water supply, hydroelectric plants, cooling systems.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to actively engage students in the study of pumps, turbines, and fluid flow systems, while simultaneously enhancing their analytical and problem-solving skills. This will be achieved through lectures, interactive tutorials, practical demonstrations, and simple laboratory experiments involving flow measurements, pump and turbine performance tests, and other hands-on activities that capture students' interes

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

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري					
Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
1	3	Understand the prediction of real model performance through the study of the laboratory model	Similarity Laws: 1. Similarity in turbines 2. Similarity in pumps	Theoretical	Instant questions, homework, short, oral, and monthly exams
2	3	Understand the working principle of an impulse turbine	Impulse Turbine: 1. Pelton turbine 2. Work done on the impulse turbine	Theoretical	Instant questions, homework, short, oral, and monthly exams
3	3	Know the types of efficiencies in impulse turbines and the relationship between them	Efficiencies in Impulse Turbines	Theoretical	Instant questions, homework, short, oral, and monthly exams
4	3	Understand the working principle of a reaction turbine and identify its types	Reaction Turbine: 1. Main parts of the reaction turbine 2. Types of reaction turbines	Theoretical	Instant questions, homework, short, oral, and monthly exams
5	3	Analyze flow in radial reaction turbines	Radial Flow Reaction Turbine Francis Turbine	Theoretical	Instant questions, homework, short, oral, and monthly exams
6	3	Analyze flow in axial reaction turbines and understand the function of turbine parts through pressure variation	Axial Flow Reaction Turbine Energy and pressure distribution in reaction turbine	Theoretical	Instant questions, homework, short, oral, and monthly exams
7	3	Understand types of losses in reaction turbines and calculate flow in different turbines	Efficiencies in Reaction Turbines Flow rate in Reaction Turbines	Theoretical	Instant questions, homework, short, oral, and monthly exams
8	3	Understand the causes of cavitation and ways to prevent it	Cavitation in Reaction Turbines	Theoretical	Instant questions, homework, short, oral, and monthly exams

9	3	Calculate work done and flow rate in pumps	Pumps: 1. Work done by the pump 2. Flow in centrifugal pump	Theoretical	Instant questions, homework, short, oral, and monthly exams
10	3	Understand the function of pump parts through pressure variation	Pressure increase in centrifugal pump	Theoretical	Instant questions, homework, short, oral, and monthly exams
11	3	Identify types of losses in pumps	Pump Efficiencies	Theoretical	Instant questions, homework, short, oral, and monthly exams
12	3	Understand the causes of cavitation in pumps and how to prevent it	Cavitation in Pumps	Theoretical	Instant questions, homework, short, oral, and monthly exams
13	3	Understand the effect of pump diameter or speed on other properties	Change in Pump Diameter and Speed	Theoretical	Instant questions, homework, short, oral, and monthly exams
14	3	Understand the properties of multi-stage pumps and effect of connection type	Multi-stage Pumps Parallel and Series Connection of Pumps	Theoretical	Instant questions, homework, short, oral, and monthly exams
15	3	Understand pump characteristic curves and calculate optimal operating conditions	Pump Characteristic Curves	Theoretical	Instant questions, homework, short, oral, and monthly exams

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1 & 2	Performance evaluation of a Pelton turbine. Objective: Measure the turbine head, flow rate, shaft work, and efficiency under different operating conditions.
Week 3 & 4	Performance of a centrifugal pump. *Objective:* Measure flow rate, head, shaft work, and efficiency; understand pump characteristic curves

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	A text book of hydraulic machines, R. S. Khurmi	Yes
Recommended Texts	1. Turbomachinery Design and Theory, Rama S. R Gorla & Aijaz A. Khan. Thermal and Hydraulic machines, R. K. Singal & Rishi Singal.	No
Websites	https://www.youtube.com/channel/UC_ig2ffbXLnG4-U2rg4_0sA	

Grading Scheme				
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

Module Information
معلومات المادة الدراسية

Module Title	**Digital communication**			**Module Delivery**
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Code	EME321			
ECTS Credits	**6**			
SWL (hr/sem)	**150**			
Module Level	UGx11 3	**Semester of Delivery**	2	
Administering Department	EME	**College**	CENGS	
Module Leader	Name: Eman Adel Mahmood	**e-mail**	E-mail: eman.a.m@uosamarra.edu.iq	
Module Leader's Acad. Title	Asst.Lecturer	**Module Leader's Qualification**	M.Sc.	
Module Tutor		**e-mail**	E-mail: shaymaa.h.ab@uosamarra.edu.iq	
Peer Reviewer Name		**e-mail**	E-mail: reyadh.azawi@uosamarra.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 Objectives أهداف المادة الدراسية	1. To understand pulse modulation techniques including PAM, PWM, and PPM, with a focus on pulse shaping and signal-to-noise (S/N) performance in analog PAM systems. 2. To analyze and implement time division multiplexing (TDM) and explore its applications in communication systems. 3. To gain a comprehensive understanding of digital modulation techniques including ASK, PSK, FSK, and M-array modulation, and evaluate their performance in noisy environments.

	4. To study quantization in PCM systems and examine different signaling formats such as unipolar, bipolar, and split-phase Manchester encoding. 5. To analyze noise effects on digital modulation schemes and calculate error probabilities using coherent and non-coherent detection method 6. Strengthen theoretical knowledge through practical implementation of scientific experiments.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the fundamental concepts and components of digital communication systems. 2. Understand and analyze pulse modulation techniques (PAM, PWM, PPM) and their S/N performance. 3. Apply and explain the principles of Time Division Multiplexing (TDM). 4. Analyze and implement digital modulation techniques (ASK, PSK, FSK, M-ary) and evaluate their performance in noisy environments. 5. Understand quantization in PCM systems and distinguish between line coding formats (Unipolar, Bipolar, Manchester). 6. Calculate error probabilities for digital modulation schemes using coherent and non-coherent detection. 7. Apply theoretical knowledge through practical laboratory experiments in communication systems. 8. Implement practical projects and document results. 9. Solve advanced problems and connect theory with practice. 10. Evaluate understanding of updated theoretical knowledge. 11. Comprehensive evaluation of theoretical knowledge and practical skills.

Indicative Contents
 	
المحتويات الإرشادية
	• **Introduction to Digital Communication Systems**
	  • Basic concepts, system components, advantages over analog communication
	  • Sampling theory and reconstruction fundamentals
	• **Pulse Modulation Techniques**
	  • Principles of PAM, PWM, and PPM
	  • Pulse shaping and bandwidth considerations
	  • Signal-to-noise performance in analog PAM
	• **Time Division Multiplexing (TDM)**
	  • Synchronous and asynchronous TDM
	  • Frame structure, synchronization, and practical applications
	• **Digital Modulation Techniques**
	  • ASK, FSK, PSK (BPSK, QPSK, DPSK, M-PSK)
	  • M-ary modulation methods and performance trade-offs
	  • BER performance in noisy channels
	• **Pulse Code Modulation (PCM) and Line Coding**
	  • Quantization (uniform and non-uniform), encoding, and companding

	• Line coding formats: Unipolar, Bipolar, Manchester • Spectral properties and synchronization • **Noise and Detection Theory** • Noise models (AWGN, interference) • Coherent and non-coherent detection methods • Error probability calculations for digital modulation schemes • **Practical and Experimental Work** • Laboratory experiments on PAM, PWM, PPM • Digital modulation labs (ASK, FSK, PSK, QAM) • Measurement, analysis, and comparison with theoretical results

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Theoretical Component:** - Interactive lectures with multimedia presentations. - Guided brainstorming sessions to link theoretical concepts to practical applications. - Flipped classroom: Assign students to watch educational videos before class, followed by discussion and clarification. - Group discussions and mini-projects, dividing students into teams. **Practical Component:** - Hands-on experiments and practical applications using laboratory equipment and software (e.g., MATLAB) for communication systems analysis and design. - Student performance evaluated through lab reports and short quizzes after each topic. - Mini-projects to assess comprehension of applied concepts.

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

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		**Unstructured SWL (h/w)** 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**				
	Assignments				
	Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	10% (10)		
	Final Exam	3hr	50% (50)		
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Digital Communications and Pulse Modulation
Week 2	Types of Pulse Modulation: PAM, PPM, PWM
Week 3	Introduction to Digital Modulation and Sampling Process
Week 4	Pulse Code Modulation (PCM) and Analysis
Week 5	First Midterm Exam (Theory)

Week 6	Line Coding & Decoding
Week 7	Time Division Multiplexing (TDM)
Week 8	Introduction to Digital Modulation Techniques (ASK, PSK, FSK)
Week 9	Digital Modulation Techniques: ASK, FSK
Week 10	Digital Modulation Techniques: PSK (BPSK, QPSK, DPSK, M-PSK)
Week 11	Advanced Digital Modulation: QAM, M-ary Modulation
Week 12	Midterm Practical Exam (theory-related preparation)
Week 13	Solving Advanced Problems + General Review
Week 14	Final Project Presentations and Practical Assessment
Week 15	Final Exam (Theory + Practical)

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1 & 2	Lab 1: Lab Experiment on PAM
Week 3 & 4	Lab 2: Lab on PPM
Week 5 & 6	Lab 3: Lab on PWM
Week 7 & 8	Lab 4: Lab FSK practically
Week 9 & 10	Lab 5: Lab on ASK
Week 11 & 12	Lab 6: + Lab on PSK
Week 13 & 14	DAM:Lab 7

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Introduction to Communication Systems. Ferrel G. Stremler. Communication Systems, an Introduction to Signals and Noise in Electrical Communications. Bruce Carlson. Communication Systems Engineering. John G. Proakis and Masoud Salehi.	
Recommended Texts	Modern Digital and Analog Communication Systems. B. P. Lathi.	No
Websites	4. https://pdfcoffee.com/principles-of-communication-systems-by-herbert-taub-amp-donald-schilling-pdf-2-pdf-free.html 5. https://archive.org/details/BookModernDigitalAndAnalogCommunicationSystems4thEditionByLathi 6. https://pdfcoffee.com/communication-system-bruce-carlson-4ed-pdf-free.html	

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

MODULE DESCRIPTION FORM

Module Information معلومات المادة الدراسية					
Module Title	**Numerical Analysis**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EME322				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	3		**Semester of Delivery**	6	
Administering Department	EME		**College**	CENGS	
Module Leader	Muhammad Asmail Eleiwi		**e-mail**	dr.muhammad@uosamarra.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**	E-mail:	
Peer Reviewer Name			**e-mail**	E-mail:	
Scientific Committee Approval Date	10/04/2026		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The module aims to introduce, analyze, and implement numerical methods for solving a wide range of engineering problems, including nonlinear equations, numerical integration, interpolation, and differential equations. It examines various computational techniques, their applicability, accuracy, and associated error analysis. Particular emphasis is placed on programming and applying these methods using modern computers. By integrating theoretical principles with practical electromechanical engineering applications, the module develops students'

	computational skills and enhances their understanding of the numerical techniques employed in modern engineering software packages.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	At the end of this module, students will be able to: 1- Explain the fundamental concepts and principles of numerical analysis. 2- Identify appropriate numerical methods for solving engineering problems and evaluate their advantages and limitations. 3- Recognize and formulate the governing equations of typical engineering problems. 4- Demonstrate a critical understanding of numerical methods, including iterative techniques, interpolation, numerical integration, finite-difference approximations, and the numerical solution of initial-value ODEs. 5-Develop and implement numerical algorithms using manual calculations, programming, and common computational software packages. 6- Apply numerical methods to solve various electromechanical engineering problems. 7- Analyze, interpret, and validate numerical results against established benchmark solutions. 8- Estimate and evaluate the errors associated with different numerical methods.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Mathematical Background: • System Of Linear Algebraic Equations • Solving nonlinear equations • Solving Ordinary Differential Equations (finite difference methods) • Numerical interpolation • Numerical Integration • Numerical differentiation • Solving Ordinary Differential Equations (initial value problems)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**The teaching and learning strategy aims to:** 1- Introduce numerical methods and machine learning 2- Through theoretical aspects with practical examples implemented by students

	This is carefully delivered through: 1- Lectures that include question-and-answer sessions 2- Presentation of recorded content 3- Problem solving 4- Tutorials

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	52	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	48	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.2
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**	3	5% (15)	3,6 and 9	LO #1, 2, 3 and 4
	Assignments	2	5% (10)	4 and 8	LO# 1,2,3,4,5,and 6
	Core Exam	1	10% (10)	5	LO #1-4
	Seminar	1	5% (5)	11	Lo# 6
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO # 1-3
	Final Exam	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to numerical methods
Week 2	Introduction to numerical methods for solving nonlinear equations
Week 3	Introduction to numerical methods for solving nonlinear equations
Week 4	Continuation: Numerical methods for solving linear equations
Week 5	Continuation: Numerical methods for solving linear equations
Week 6	Introduction to finite differences in solving ODEs and PDEs
Week 7	Mid Exam
Week 8	Explicit finite difference methods for solving ODEs and PDEs
Week 9	Implicit finite difference methods for solving ODEs and PDEs
Week 10	Teaching students numerical integration methods
Week 11	Teaching students the trapezoidal rule
Week 12	Teaching students :1/3 Simpson's rule
Week 13	Teaching students: 3/8 Simpson's rule
Week 14	Teaching methods for solving ordinary differential equations
Week 15	Continuation: Solving ordinary differential equations

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Numerical Methods for Engineers. By Stephen Chapra	Yes
Recommended Texts	Advanced Engineering Mathematics, Kreyszig Kreyszig, 10th Edition, John Wiley & Sons, Inc	No

Websites	http://umich.edu/~elements/5e/lectures/index.html

مخطط الدرجات				
مجموعة	درجة	التقدير	العلامات %	تعريف
مجموعة النجاح (100 - 50)	أ-ممتاز	امتياز	100 - 90	أداء متميز
	ب-جيد جدًا	جيد جدا	89 - 80	فوق المتوسط مع بعض الأخطاء
	ج-جيد	جيد	79 - 70	عمل به أخطاء ملحوظة
	د-مُرضي	متوسط	69 - 60	عادل ولكن مع عيوب كبيرة
	هـ- كافٍ	مقبول	59 - 50	العمل يلبي الحد الأدنى من المعايير
مجموعة الرسوب (49 – 0)	اف اكس –يفشل	راسب (قيد المعالجة المركزية)	(49-45)	مطلوب المزيد من العمل ولكن تم منح الائتمان
	ف-يفشل	راسب	(44-0)	كمية كبيرة من العمل مطلوبة

ملحوظة:سيتم تقريب الأماكن العشرية أعلى أو أقل من 0.5 إلى العلامة الكاملة الأعلى أو الأدنى (على سبيل المثال، سيتم تقريب علامة 54.5 إلى 55، بينما سيتم تقريب علامة 54.4 إلى 54. تتبع الجامعة سياسة عدم التسامح مع "حالات الفشل القريبة من النجاح"، لذا فإن التعديل الوحيد على العلامات الممنوحة من قبل المصححين الأصليين سيكون التقريب التلقائي الموضح أعلاه.

MODULE DESCRIPTION FORM

Grading Scheme				
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

Module Information معلومات المادة الدراسية					
Module Title	**Measurements and Devices**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EME324**				
ECTS Credits	4				
SWL (hr/sem)	**100**				
Module Level	3		**Semester of Delivery**	2	
Administering Department	EME		**College**	CENGS	
Module Leader	**Sayf Waleed Majeed**		**e-mail**	sayfwaleed@uosamarra.edu.iq	
Module Leader's Acad. Title	**Asst. Lecturer**		**Module Leader's Qualification**	M.Sc.	
Module Tutor			**e-mail**	E-mail:	
Peer Reviewer Name			**e-mail**	E-mail:	
Scientific Committee Approval Date	18/09/2025		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	**1. Identify types of electrical measuring instruments.** **2. Understand the physical principles behind measurement devices.** **3. Apply instruments to measure various electrical quantities.** **4. Analyze experimental data and calculate error percentages.**
Module Learning Outcomes	**This course aims to provide students with essential concepts in electrical measuring instruments, focusing on types of instruments, their operating principles, and their use in engineering applications. It also seeks to**

مخرجات التعلم للمادة الدراسية	**develop students' skills in performing and interpreting electrical measurements accurately and analyzing associated errors.**
Indicative Contents المحتويات الإرشادية	**1. Interactive lectures to explain theoretical principles.** **2. Practical lab experiments using different measuring instruments.** **3. Problem-solving and exercises to apply theoretical knowledge.** **4. Group learning through discussions and evaluations of experimental results.** **5. Use of multimedia (instructional videos, slides) to aid understanding.** **6. Small projects involving electrical variable measurement and analysis.**

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**7. Individual assignments including lab reports and research tasks.** **8. Self-learning through manuals and online technical courses.** **9. Ongoing formative assessment through short quizzes and feedback.** **10. 10.Use of software such as Multisim for simulating measurement devices.**

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	100	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	48	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

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

Formative assessment	**Quizzes**	2	10% (10)	5 and 10	
	Assignments	2	10% (10)	3, 5, 10 , and 11	All
	Lab.	-	-	-	-
	Report	1	10% (10)	11	All
Summative assessment	**Midterm Exam**	2hr	10% (10)	8	
	Final Exam	3hr	60% (60)	-	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Measuring Instruments
Week 2	Units and Measurement Systems
Week 3	Analog Measuring Instruments
Week 4	Digital Measuring Instruments
Week 5	Current and Voltage Measurement
Week 6	Resistance Measurement
Week 7	Midterm Review
Week 8	Midterm Exam
Week 9	Power and Energy Measurement
Week 10	Instrument Operating Principles
Week 11	High Voltage Measurements
Week 12	Measurement Errors
Week 13	Lab Reporting
Week 14	Mini Practical Project

Week 15	Final Review and Exam Preparation

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Electrical Measurements and Measuring Instruments by E.W. Golding & F.C. Widdis	NO
Recommended Texts	• Online learning platforms such as Coursera	No
Websites	https://www.allaboutcircuits.com https://nptel.ac.in/courses/108105153/	

Grading Scheme				
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

Module Information معلومات المادة الدراسية					
Module Title	**Combustion**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**EME325**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	EME		**College**	CENGS	
Module Leader	Name: Riyadh Azzawi Badr		**e-mail**	E-mail: reyadh.azawi@uosamarra.edu.iq	
Module Leader's Acad. Title	Prof. Dr.		**Module Leader's Qualification**	Dr.	
Module Tutor			**e-mail**	E-mail:	
Peer Reviewer Name			**e-mail**	E-mail:	
Scientific Committee Approval Date	18/09/2025		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Understand the fundamental principles of combustion, including chemical reactions, thermodynamics, and heat release . 2. Analyze combustion processes in various systems such as engines, turbines, and industrial furnaces . 3. Identify the factors affecting flame stability, ignition, and combustion efficiency . 4. Evaluate different fuel types and their combustion characteristics . 5. Evaluate pollutant formation mechanisms and emission reduction strategies . 6. Apply combustion theories to design and optimize practical combustion systems..
Module Learning Outcomes	27. Demonstrate a solid understanding of combustion fundamentals, including reaction mechanisms and energy release. 28. Analyze and interpret combustion behavior in different engineering applications.

مخرجات التعلم للمادة الدراسية	29. Use analytical and numerical methods to solve combustion-related problems. 30. Evaluate fuel properties and their impact on combustion performance and emissions. 31. Identify and assess common pollutants generated from combustion and propose reduction strategies. 32. Apply combustion principles to design, optimize, or improve thermal and energy systems.
Indicative Contents المحتويات الإرشادية	1. Introduction to combustion principles and terminology. 2. Chemical reaction basics, stoichiometry, and fuel–air mixtures. 3. Thermodynamics of combustion and energy analysis. 4. Flame types, ignition, and flame stability concepts. 5. Combustion equipment and applications in engineering systems. 6. Emissions, pollutant formation, and environmental considerations.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Interactive lectures to explain key combustion concepts and principles. 2. Problem-based learning activities to enhance analytical and critical-thinking skills. 3. Laboratory demonstrations and experiments to connect theory with real-world applications. 4. Group discussions and collaborative projects to promote teamwork and knowledge sharing. 5. Use of simulation software and practical case studies to improve technical competencies. 6. Quizzes, assignments, and continuous assessment to reinforce learning and track progress.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	100	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	48	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	
	Assignments	4	12% (12)	3, 5, 10 , and 11	All
	Lab.	3	9% (9)	9 , 4 , and 13	All
	Report	1	9% (9)	11	All
Summative assessment	Midterm Exam	2hr	10% (10)	8	
	Final Exam	3hr	50% (50)	-	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Combustion: Definitions, Importance, and Applications
Week 2	Chemical Reactions and Chemical Measurements in Combustion
Week 3	Thermodynamics of Combustion: Heat Release and Energy Analysis
Week 4	Types of Fuels and Their Properties
Week 5	Air-Fuel Mixtures and Combustion Efficiency
Week 6	Flame Structure and Types of Flames
Week 7	Ignition and Flame Stability
Week 8	Combustion in Engines and Industrial Systems
Week 9	Combustion Kinetics and Reaction Mechanisms
Week 10	Combustion Modeling and Simulation

Week 11	Controlling Pollutant Formation and Emissions
Week 12	Environmental and Safety Considerations in Combustion
Week 13	Experimental Techniques and Laboratory Work
Week 14	Case Studies and Practical Applications
Week 15	Final Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• Combustion (Glassman, Yetter & Glumac)	Yes
Recommended Texts	• An Introduction to Combustion by Stephen R. Turns • Theoretical & Numerical Combustion by Thierry Poinsot & Denis Veynante:	No
Websites	-	

Grading Scheme

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

Module Information
معلومات المادة الدراسية

Module Title	**Microcontrollers Systems**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**EME327**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		
Module Level	UG	**Semester of Delivery**	6
Administering Department	**EME**	**College**	PPE
Module Leader	Dr. Yahya T. Hussein	**e-mail**	yahya.t.hussein@uosamarra.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Dr.
Module Tutor		**e-mail**	
Peer Reviewer Name	-	**e-mail**	
Review Committee Approval	-	**Version Number**	1.0

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	5
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 study fundamentals of microprocessor systems. 2 To deal with interfacing of different peripheral devices with Microprocessor. 3 To understand the fundamental concepts of Control systems and mathematical modeling of the physical systems. 4 To analyze time response of the LTI system. 5 To analyze LTI system using frequency response. 6 To develop and analyze State Variables of the system. 7 To study fundamentals of microcontroller systems with Assembly Language Programming . 8 To understand microcontroller C Language Programming concepts. 9 To know the importance of different peripheral devices and their interfacing to microcontrollers. 10 To get familiar with RISC Architecture.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	LO_01	KNOWLEDGE: the student has knowledge about programming systems embedded in bare-metal models using the c language, including access to the peripherals offered by microprocessor systems.	
	LO_02	SKILLS: the student can create software that responds to external signals reaching the microprocessor system.	
	LO_03	FINAL COURSE OUTPUT - SOCIAL COMPETENCES the student understands the essence of creating reliable and high quality embedded systems software and the consequences of possible errors and mistakes	

Indicative Contents

المحتويات الإرشادية

A. Lectures

Content outline
1. programming in c language for embedded systems.
2. introduction to microprocessors and embedded systems as well as tools needed to implement program content. examples of embedded systems. definitions: processor-microprocessor-microcontroller. the history of microprocessors.
3. architecture of microprocessors and microcontrollers. risc vs. cisc, von neumann vs. harvard. ram / rom memory. processing instructions. arm microprocessor. architecture of embedded systems.
4. communication protocols. universal asynchronous receiving and transmitting interface (uart). serial peripheral interface (spi). inter integrated circuit interface (i2c).
5. peripheral systems of microcontrollers. general purpose input-output (gpio), real-time clock (rtc), analog to digital converter (adc), digital to analog converter (dac), pulse width modulation (pwm).

B. classes, tutorials/seminars, colloquia, laboratories, practical classes

content outline
1. programming in c language for embedded systems.
2. introduction to microprocessors and embedded systems as well as tools needed to implement program content. examples of embedded systems. definitions: processor-microprocessor-microcontroller. the history of microprocessors.
3. architecture of microprocessors and microcontrollers. risc vs. cisc, von neumann vs. harvard. ram / rom memory. processing instructions. arm

	microprocessor. architecture of embedded systems.
	4. communication protocols. universal asynchronous receiving and transmitting interface (uart). serial peripheral interface (spi). inter integrated circuit interface (i2c).
	5. peripheral systems of microcontrollers. general purpose input-output (GPIO), real-time clock (RTC), analog to digital converter (ADC), digital to analog converter (DAC), pulse width modulation (PWM).

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The learning and teaching strategies of the course focus on providing students with a comprehensive understanding of advanced topics in linear algebra and system analysis. Students are expected to attend classes regularly. In case of missing an in-lab activity a student should perform additional work submitted to the instructor within a week after a class was missed. Every topic involves an assignment. A written report on the assignment should be submitted within two weeks from the moment students received a list of problems. The final mark will rely on the same grading policy as for the final exam.

Student Workload (SWL)
الحمل الدراسي للطالب

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	4.7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20%(20)	4,11	LO#1-4 and #8-12
	Assignments	5	10%(10)	Continous	
	Case study	2	5%(5)	6,13	LO#1-5 and #8-12

	Report	5	5%(5)	6,13	LO#1-5 and #8-12
Summative assessment	**Midterm Exam**	3 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	Introduction to Microcontrollers , Microcomputer system Architecture
Week 2	CPU ,Memory (RAM,ROM), Buses (Data ,Control)
Week 3	Input Output Device, Group of instruction
Week 4	Data transfer instruction, Mathematical instruction
Week 5	Logical instruction, Jump instruction
Week 6	addressing mode, Immediate Addressingmode
Week 7	Register Addressingmode, Direct Addressingmode
Week 8	Register Indirect Addressingmode, Determine the delay time by using loops
Week 9	Timer operation , Determine the delay time by using timer
Week 10	Counter operation , Subroutines
Week 11	Look-Up Tables with examples
Week 12	External Interrupt
Week 13	Solution some example , program application
Week 14	More program application
Week 15	Implementation of microcontroller
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Data Transfer: Block Move, Exchange, Sorting, Finding largest element in an array
Week 2	Lab 2: Arithmetic Instructions - Addition/subtraction, multiplication and division, square, Cube – (16 bits Arithmetic operations – bit addressable).
Week 3	Lab 3: Counters.
Week 4	Lab 4: Boolean & Logical Instructions (Bit manipulations).
Week 5	Lab 5: Conditional CALL & RETURN.
Week 6	Lab 6: Code conversion: BCD – ASCII; ASCII – Decimal; Decimal - ASCII; HEX - Decimal and Decimal - HEX.
Week 7	Lab 7: Interface a simple toggle switch to 8051 and write an ALP to generate an interrupt which switches on an LED (i) continuously as long as switch is on and (ii) only once for a small time when the switch is turned on.
Week8	Lab 8: Write a C program to (i) transmit and (ii) to receive a set of characters serially by interfacing 8051 to a terminal.
Week9	Lab 9: Write ALPs to generate waveforms using ADC interface.4. Write ALP to interface an LCD display and to display a message on it.
Week 10	Lab 10: Write ALP to interface a Stepper Motor to 8051 to rotate the motor.
Week 11	Lab 11: Write ALP to interface ADC-0804 and convert an analog input connected to it.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	N. Nise, **Control System Engineering**, Sixth Edition, 2011.	
Recommended Texts	Katsuhiko Ogata , **Modern Control Engineering**, Fifth Edition, 2010. BENJAMIN C. KUO , Automatic Control Systems , Ninth Edition, 2010.	
Websites		

Grading Scheme				
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

Module Information معلومات المادة الدراسية					
Module Title	**Electrical power and protection**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EME				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	4		**Semester of Delivery**	7	
Administering Department	EME		**College**	CENGS	
Module Leader	Younes Saood Alwan		**e-mail**	Younes.s.al@uosamarra.edu.iq	
Module Leader's Acad. Title	Associate Professor		**Module Leader's Qualification**	M. Sc.	
Module Tutor			**e-mail**	E-mail:	
Peer Reviewer Name			**e-mail**	E-mail:	
Scientific Committee Approval Date	/2026		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	This course aims to provide students with a solid understanding of the fundamental principles of electrical power systems and their main components, including generation, transmission, distribution, and electrical loads. It enables students to analyze the performance and operation of power systems under normal and abnormal operating conditions, with emphasis on voltage, current, power flow, losses, and system stability. The course also seeks to introduce students to the principles of electrical protection and its essential role in ensuring the safety, reliability, and continuity of power supply. It explains different types of faults in power systems, methods of short-circuit analysis, and the operation of protective devices such as circuit breakers, relays, and

	fuses. Furthermore, the course clarifies the importance of protection coordination in isolating faulty sections rapidly and selectively while maintaining the operation of the remaining parts of the power network. In addition, the course focuses on developing students' ability to evaluate and compare the performance of different power system components, including generators, transformers, transmission lines, and distribution networks, from technical and operational perspectives. It also enhances their skills in engineering analysis, critical thinking, and problem-solving related to the design, operation, and protection of electrical power systems. This course contributes to preparing students scientifically and professionally for work in power generation stations, transmission and distribution networks, electrical protection systems, and modern power engineering applications, in line with the needs of the electrical energy sector and future engineering practice.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• To provide students with a solid scientific foundation in the field of electrical power systems and their main components. • To familiarize students with the basic structure of power systems, including generation, transmission, distribution, and electrical loads. • To enable students to understand the operating principles of power system components such as generators, transformers, transmission lines, and distribution networks. • To develop students' ability to analyze power system performance under normal operating conditions, including voltage, current, power flow, losses, and efficiency. • To introduce students to the types of faults that occur in electrical power systems and their effects on system operation and equipment safety. • To provide students with practical knowledge of short-circuit analysis and fault current calculations in electrical networks. • To introduce students to the principles of electrical protection, including the functions and applications of circuit breakers, relays, and fuses. • To explain the fundamentals of protection coordination and its role in ensuring fast, selective, and reliable fault isolation. • To demonstrate the role of protection systems in improving the reliability, stability, safety, and continuity of electrical power supply. • To develop students' skills in the analysis, comparison, and engineering evaluation of different operating and fault conditions in power systems. • To prepare students to apply power system and protection concepts in real-world applications, including power stations, transmission networks, distribution systems, and modern electrical engineering practice.
Indicative Contents المحتويات الإرشادية	Introduction to Electrical Power Systems o Understand the need for electrical power systems and their role in the generation, transmission, and distribution of electrical energy. o Identify the main components of a power system, such as generators, transformers, transmission lines, distribution networks, and electrical loads. • Fundamentals of Electrical Power Systems o Explain the basic concepts of power systems, such as voltage, current, active power, reactive power, and power factor. o Understand the operation of power systems under normal operating conditions and the effect of electrical loads on network performance.

	• Analysis of Power Circuits and Systems o Analyze power system components using single-line diagrams. o Understand the representation of generators, transformers, transmission lines, and loads in electrical studies. o Use the per-unit system to simplify power system calculations. • Power Flow Analysis o Understand the concept of power flow in electrical networks. o Calculate voltages, currents, power, and losses in different parts of the power system. o Analyze the effect of load variation on voltage stability and network efficiency. • Faults in Electrical Power Systems o Identify different types of electrical faults, such as phase-to-phase faults and single line-to-ground faults. o Calculate short-circuit currents and analyze their effects on power system components. o Understand the importance of fault studies in the design of protection systems. • Introduction to Electrical Protection o Explain the importance of electrical protection in power systems. o Understand the objectives of protection, such as fast fault isolation, damage reduction, personnel safety, and continuity of power supply. o Identify the characteristics of a good protection system, such as speed, selectivity, sensitivity, and reliability. • Electrical Protection Devices o Explain the operating principles of circuit breakers, fuses, and protective relays. o Identify the types of relays used in power system protection. o Understand how protection devices detect faults and isolate the affected part of the network. • Protection Coordination o Understand the concept of coordination between protection devices. o Study the relationship between relay operating time and circuit breaker operation. o Apply the principles of selectivity to ensure that only the faulty section is disconnected without affecting the remaining parts of the system. • Protection of Power System Components o Explain the principles of generator protection. o Understand the fundamentals of transformer protection against internal and external faults. o Study the protection of transmission lines and distribution networks. o Identify protection methods for important electrical loads and equipment. • Stability and Reliability of Power Systems o Understand the effects of faults and load variations on power system stability. o Explain the role of protection systems in improving the reliability of

	electrical networks. o Evaluate system performance in terms of continuity, efficiency, and speed of response to faults.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The model will rely on a variety of learning and teaching strategies, including: **Lectures**: Aiming to provide a comprehensive overview of the basic concepts and principles in power systems and protection, through classroom lessons, reading from methodological and reference books, and using electronic resources for self-learning, as well as in-class discussions. **Assignments and Quizzes**: Aiming to enable students to apply what they have learned to real-life problems, and to ensure the extent of their understanding by conducting monthly and final tests, in addition to short tests, active participation in class, submitting scientific and theoretical reports.

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	3.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	5% (10)	5 and 9	LO #1, 3, 4 and 5
	Assignments	2	5% (10)	6 and 11	LO# 2, 4, 7 ,8 and 11
	Projects / Lab.	1	10% (10)	12	All
	Seminar	1	10% (10)	13	All

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Electrical Power Systems
Week 2	Components of Electrical Power Systems and the Stages of Generation, Transmission, and Distribution
Week 3	Representation of Electrical Power Systems Using Single-Line Diagrams
Week 4	The Per-Unit System and Its Applications in Power System Calculations
Week 5	Modeling of Generators, Transformers, Transmission Lines, and Electrical Loads
Week 6	Power Flow Analysis in Electrical Networks
Week 7	Calculation of Voltages, Currents, and Losses in Power Systems
Week 8	Introduction to Electrical Faults in Power Systems
Week 9	Types of Electrical Faults: Balanced and Unbalanced Faults
Week 10	Calculation of Short-Circuit Currents and Their Effects on Power System Components
Week 11	Midterm Examination
Week 12	Introduction to Electrical Protection Systems and Their Objectives
Week 13	Electrical Protection Devices: Circuit Breakers, Fuses, and Relays
Week 14	Characteristics of a Good Protection System: Speed, Selectivity, Sensitivity, and Reliability
Week 15	Protection Coordination Between Relays and Circuit Breakers

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	**Power Electronics** **Devices, Circuits, and Applications** Fourth Edition Muhammad H. Rashid	Yes
Recommended Texts	**Power Electronics and Motor Drive Systems** Stefanos N. Manias	No
Websites		

Grading Scheme				
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