MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Thermodynamic**			Module Delivery	
Module Type	**Core**			☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	**NRE23012**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	UGII		Semester of Delivery	3	
Administering Department	BSC-NRE		College		
Module Leader	Dr. Saad Fadhil Mahmood		e-mail	Saadfadhil32@uomousl.edu.iq	
Module Leader's Acad. Title	Lecture		Module Leader's Qualification	P.hD.	
Module Tutor	Duaa Hassian		e-mail	Duaaaaltamer@uomosul.edu.iq	
Peer Reviewer Name	None		e-mail	E-mail	
Scientific Committee Approval Date	01/06/2023		Version Number	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	These objectives provide a general overview of the knowledge and skills you can expect to acquire during the Thermodynamics module. 1- Understand the behavior of gases and the concept of an ideal gas. 2- Study the properties of gases, including pressure, temperature, volume, and their interrelationships. 3- Apply the combined gas law to analyze the changes in pressure, temperature, and volume of a gas. 4- Comprehend the principles of the kinetic molecular theory and its application to gases. 5- Calculate and analyze heat capacity, including specific heat capacity and molar heat capacity. 6- Gain knowledge of the First Law of Thermodynamics and its applications in energy conservation and heat transfer. 7- Familiarize oneself with the Second Law of Thermodynamics and its implications for energy conversion and entropy. 8- Understand the concept of the Third Law of Thermodynamics and its relationship to absolute zero and entropy. 9- Participate in quizzes to assess understanding and knowledge of the topics covered in each respective period.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Understand the behavior of gases and apply the concept of an ideal gas to solve problems related to pressure, volume, and temperature. 2- Describe and analyze the properties of gases, including pressure, temperature, and volume, and apply the appropriate gas laws to solve related problems. 3- Explain the principles of the kinetic molecular theory and its application to gases, including the relationship between molecular motion and gas properties. 4- Apply the combined gas law to analyze changes in pressure, volume, and temperature of gases, and solve problems involving the interrelation of these variables. 5- Calculate and analyze heat capacity, including specific heat capacity and molar heat capacity, and understand their significance in energy transfer and temperature changes.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Week 1, 2: Gases and Ideal Gas • Introduction to the behavior of gases • Gas laws: Boyle's law, Charles's law, and Avogadro's law • Ideal gas equation and its applications • Calculation of gas properties using the ideal gas equation • Gas stoichiometry and molar volume Week 3, 4: Properties of Gases

	• Pressure and its measurement • Temperature scales and thermometers • Gas mixtures and partial pressures • Dalton's law of partial pressures • Real gases and their deviations from ideal behavior • Van der Waals equation and its significance First Quiz: Assessment of understanding and knowledge of gases and ideal gas behavior. Week 5, 6: Kinetic Molecular Theory • Introduction to the kinetic molecular theory • Molecular motion and the relationship with temperature • Distribution of molecular speeds and kinetic energy • Effusion and diffusion of gases • Graham's law of effusion • Mean free path and collision theory Week 7, 8: Combined Gas Law • Combined gas law and its derivation • Applications of the combined gas law • Gas density and molar mass determination • Gas laws and changes in state (Boyle's law, Charles's law, Avogadro's law) Second Quiz: Assessment of understanding and application of the kinetic molecular theory and the combined gas law. Week 9, 10: Heat Capacity • Introduction to heat and thermal energy • Specific heat capacity and its measurement • Calculation of heat transfer and temperature changes • Calorimetry and heat exchange • Molar heat capacity and its relationship with specific heat capacity Week 11, 12: The First Law • Introduction to the First Law of Thermodynamics • Internal energy and its relationship with heat and work • Heat transfer processes: conduction, convection, and radiation • Enthalpy and enthalpy change Application of the First Law to various thermodynamic systems Third Quiz: Assessment of understanding and application of heat capacity and the First Law of Thermodynamics. Week 12, 13: The Second Law • Introduction to the Second Law of Thermodynamics • Heat engines and their efficiency • Carnot cycle and Carnot efficiency • Entropy and its relationship with heat transfer • Entropy change in reversible and irreversible processes Week 14, 15: The Third Law • Introduction to the Third Law of Thermodynamics

	• Absolute zero and its significance • Entropy at absolute zero • Calculation of entropy changes • Applications of the Third Law to thermodynamic systems

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: used to introduce and explain key concepts related to Thermodynamic. 2. Interactive discussions: used to engage students Thermodynamic 3. Multimedia resources: used to enhance student engagement and understanding of Thermodynamic concepts related to nuclear energy through videos, animations, and simulations. 4. Assessment and feedback: used to measure student learning and provide feedback on their progress through quizzes, exams, and projects.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.9
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Gases and Ideal gas
Week 2	Gases and Ideal gas continue
Week 3	Properties of gases
Week 4	Properties of gases continue
Week 5	Kinetic molecular theory
Week 6	Kinetic molecular theory continue
Week 7	Combined gas Law
Week 8	Combined gas Law continue
Week 9	Heat Capacity
Week 10	Heat Capacity continue
Week 11	The First Law
Week 12	The First Law Applications
Week 13	The Second Law
Week 14	The Second Law Applications
Week 15	The Third Law
Week 16	Final Exam

Delivery Plan (Weekly Lab. /Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1,2,3,4	Determination of the Absolute Density of Liquids
Week 5,6,7,8	Determination of the Absolute Density of Solids
Week 9,10,11,12	Determination of the Surface Tension of Liquids
Week 13,14,15	Determination of the Relative Viscosity of Liquids using Viscometer
Week 16	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1-Physical chemistry by ATKINS 2-	No
Recommended Texts	1.	No
Websites	None	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Tidal Energy**			Module Delivery	
Module Type	**Core**			☒ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	**NRE48042**				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level	**UGIV**		Semester of Delivery	8	
Administering Department	BSc_NRE		College		
Module Leader	????		e-mail	??????@uomosul.edu.iq	
Module Leader's Acad. Title	Lecture		Module Leader's Qualification	M.Sc.	
Module Tutor	None		e-mail	E-mail	
Peer Reviewer Name	None		e-mail	E-mail	
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	These objectives highlight the goals of the course in mathematical modeling, and illustrate the knowledge and skills that students will develop throughout their studies in this department 1. Understanding the definition and concept of modeling. 2. Familiarizing with the different types of modeling techniques. 3. Exploring the advantages and disadvantages of modeling. 4. Developing skills in mathematical modeling. 5. Identifying and understanding the essential elements of modeling. 6. Gaining proficiency in analytical modeling techniques. 7. Analyzing and discussing real-world examples of modeling applications. 8. Understanding the components involved in the modeling process. 9. Differentiating between modeling variables and modeling parameters. 10. Exploring the concept of simulation models and their characteristics. 11. Developing skills in numerical analysis for modeling purposes. 12. Exploring the role of digital-to-analog converters in modeling and simulation.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Define modeling and its significance in various fields. 2. Identify different types of modeling techniques used in practice. 3. Explain the advantages and disadvantages of modeling in decision-making processes. 4. Apply mathematical modeling to represent real-world systems. 5. Identify and describe the essential elements involved in the modeling process. 6. Utilize analytical modeling techniques to solve mathematical problems. 7. Demonstrate an understanding of modeling through relevant examples. 8. Identify and describe the components involved in the modeling process. 9. Differentiate between modeling variables and modeling parameters. 10. Understand simulation models and their role in representing complex systems. 11. Characterize the process and importance of simulation in modeling. 12. Apply numerical analysis techniques in solving modeling problems. 13. Understand the concept of a digital-to-analog converter and its relevance in modeling
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Definition of modelling 2. Types of modeling 3. Advantage and disadvantage of modelling 4. Math. modelling 5. modelling elements 6. Analytical modelling 7. examples 8. Modelling components

	9. Modelling variables 10. Modelling parameters 11. Simulation models 12. Characterizing of simulation 13. Numerical analysis 14. DAC

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: Traditional lectures can be used to present foundational concepts, theories, and principles to students. This allows for the dissemination of information and provides a framework for understanding the subject matter. 2. Discussions and Debates: Encouraging students to engage in discussions and debates promotes critical thinking and analysis of different perspectives. It allows them to delve deeper into the subject matter, challenge assumptions, and develop their communication and argumentation skills. 3. Case Studies: Presenting real-world case studies relevant to the course material can help students apply theoretical concepts to practical situations. This enables them to develop problem-solving skills and understand the real-life implications of the theories they are learning. 4. Group Projects: Assigning group projects or presentations that require students to work collaboratively can enhance their understanding of the material. It promotes teamwork, research skills, and the application of theoretical concepts in a practical context. 5. Multimedia and Visual Aids: Incorporating multimedia resources such as videos, interactive simulations, and visual aids (e.g., diagrams, charts, infographics) can enhance student engagement and understanding. Visual representations can often simplify complex concepts and make them more accessible. 6. Self-directed Learning: Encouraging students to take ownership of their learning through self-directed activities, such as independent research, literature reviews, or project-based assignments, fosters critical thinking, independent thought, and a deeper understanding of the subject matter. 7. Assessments: Utilizing a variety of assessment methods, such as quizzes, tests, essays, or reflective journals, allows students to demonstrate their understanding of the material and provides feedback for their learning progress. Assessments should be aligned with the learning outcomes and encourage critical thinking and analysis.

Student Workload (SWL)

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

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	What is modelling
Week 2	Types of modeling
Week 3	Advantage and disadvantage of modelling
Week 4	Math. modelling
Week 5	modelling elements
Week 6	Analytical modelling
Week 7	examples
Week 8	examples
Week 9	Modelling components

Week 10	Modelling variables
Week 11	Modelling parameters
Week 12	Simulation models
Week 13	Characterizing of simulation
Week 14	Numerical analysis
Week 15	DAC
Week 16	Final Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Modelling and simulation 1st edition by Hartmut Bossel	No
Recommended Texts	None	No
Websites	None	

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Wind Energy**			Module Delivery	
Module Type	**Core**			☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	**NRE36027**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	UGIII		Semester of Delivery	6	
Administering Department	BSC-NRE		College	Type College Code	
Module Leader	Ghada Ghanim Younis		e-mail	ghadaghanim@uomosul.edu.iq	
Module Leader's Acad. Title	Lecture		Module Leader's Qualification	Ph.D.	
Module Tutor	None		e-mail	E-mail	
Peer Reviewer Name	None		e-mail	E-mail	
Scientific Committee Approval Date	01/06/2023		Version Number	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The main objectives of a wind energy module that covers the basics of wind energy and how wind generates electricity could include: 1. Understanding the basic principles of wind energy: This objective would cover the fundamental principles of wind energy, including the characteristics of wind energy, Power Extracted from the Wind, and the Principle of Wind Turbine Operation. 2. Understanding the generation and movement of wind: This objective would cover wind energy, which could meet the world's energy needs. and compared it with traditional energy sources. 3. Understanding the components of a wind turbine: This objective would cover the major parts of a wind turbine, including the tower, rotor, high-speed and low-speed shafts, gearbox, generator, sensors and yaw drive, power regulation and control units, safety systems. 4. Examining the benefits and drawbacks of wind energy: This objective would cover the advantages and disadvantages of wind energy as a source of electricity, including its reliability, safety, cost-effectiveness, and environmental impact. 5. Evaluating the future of wind energy: This objective would cover the potential for new and emerging wind technologies, including different types of wind turbines, and their potential impact on the energy landscape. It would also cover wind energy's role in meeting future energy needs and reducing greenhouse gas emissions.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the fundamental principles of wind energy, including the characteristics of wind energy, Power Extracted from the Wind, and the Principle of Wind Turbine Operation. 2. Identify the major components of a wind turbine and their functions. 3. Describe how a wind turbine works and how it generates electricity. 4. Explain the safety measures and regulations in place to ensure the safe operation of a wind turbine. 5. Evaluate the advantages and disadvantages of wind energy as a source of electricity. 6. Understand wind energy's role in meeting future energy needs and reducing greenhouse gas emissions. 7. Apply critical thinking and problem-solving skills to evaluate complex issues related to wind energy. 8. Communicate effectively about wind energy concepts and issues with others.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Theory:</u> Definition of Energy and Power - work, energy, power

	- Energy conservation and efficiency principles. - Wind Power [6 hrs] Introduction to Wind Energy - Overview of wind energy and its history - Basic principles of wind energy physics - Wind generation and movement factors [6 hrs] Power Extracted from The Wind - wind power potential or wind power density - wind velocity -swept area - air density [6 hrs] Wind energy characteristics - Wind shear - wind direction - Turbulence - Wind Speed Histograms - Duration Curve [6 hrs] Wind Speed Distributions - Rayleigh distribution - Weibull distribution - MODE, MEAN, AND RMC SPEEDS [6] Wind turbine Design - Components of a Wind turbine - Wind turbine types and applications - Safety systems and mechanisms [9 hrs] Maximum efficiency and Betz's law - Power Curve of the Wind Turbine - Power generation and control [6 hrs] Challenges in wind power generation - Environmental impacts - Wind turbine noise - Integration of wind power into the grid - Thermal management of wind turbines - Wind energy storage - Wind turbine lifetime [9 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: used to introduce and explain key concepts related to nuclear energy and electricity generation from reactors. 2. Interactive discussions: used to engage students in critical thinking and problem-solving related to nuclear energy through group discussions, debates, case studies, and simulations.

	3. Multimedia resources: used to enhance student engagement and understanding of complex concepts related to wind energy through videos, animations, and simulations. 4. Assessment and feedback: used to measure student learning and provide feedback on their progress through quizzes, exams, and projects.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	82	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Definition of Energy and Power , Energy conservation and efficiency principles
Week 2	Overview of wind energy and its History, Basic principles of wind energy physics - Wind generation and movement factors

Week 3	Power Extracted from The Wind , wind power potential or wind power density
Week 4	wind velocity, swept area, air density
Week 5	Wind Speed Histograms, Duration Curve, turbulence
Week 6	Wind Speed Distributions, Rayleigh distribution, Weibull distribution
Week 7	MODE wind speed, MEAN wind speed, RMC wind speed
Week 8	Wind turbine Design, Components of a Wind turbine
Week 9	Wind turbine types and applications
Week 10	Maximum efficiency and Betz's law
Week 11	Power Curve of the Wind Turbine, Power generation and control
Week 12	Challenges in wind power generation, Environmental impacts
Week 13	Wind turbine noise, Integration of wind power into the grid
Week 14	Thermal management of wind turbines, Wind energy storage, Wind turbine lifetime
Week 15	Final Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1- "Wind Energy Fundamentals, Resource Analysis and Economics". By: Sathyajith Mathew 2- "Fundamentals of wind energy". By: Wei Tong	No
Recommended Texts	1. "CLEAN ENERGY PROJECT ANALYSIS: RETSCREEN ENGINEERING & CASES"	No
Websites	https://energypedia.info/wiki/Estimation_of_Wind_Energy_Production#toc	

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	السلامة المهنية Vocational safety			Module Delivery	
Module Type	**Core**			☒ Theory ☒ Lecture ☐Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	**NRE24017**				
ECTS Credits	**2**				
SWL (hr/sem)	50				
Module Level		UGII	Semester of Delivery		4
Administering Department		BSC- NRE	College	Type College Code	
Module Leader	Ala Ismael Ayoob		e-mail	ala i ayoob@uomosul.edu.iq	
Module Leader's Acad. Title		Professor	Module Leader's Qualification		Ph.D
Module Tutor	None		e-mail		
Peer Reviewer Name		Name	e-mail	E-mail	
Scientific Committee Approval Date		07/05/2024	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	يجب ان يعرف الطالب: مفهوم السلامة . والاهداف التي تسعى لتحقيقها . والمخاطر الناتجة من الاستخدام السيء للمواد.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	تعريف السلامة والاهداف والمخاطر الكيميائية والعوامل المؤثرة على مدى الاستجابة لتأثيرات المواد الكيميائية وكيفية تصنيف المواد الكيميائية وقواعد ومواصفات السلامة في المختبرات وشروط تخزين المواد بصورة عامة.
Indicative Contents المحتويات الإرشادية	يتضمن المحتوى الإرشادي على :- البطاقات التعريفية والملصقات

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. المحاضرة المصحوبة بالشرح والتحليل. 2. الحلقات النقاشية. 3. الاسئلة والاجوبة. 4. المشاركة الصيفية .

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الأسبوعي النظري

	Material Covered
Week 1	مفهوم السلامة والاهداف التي نسعى الى تحقيقها
Week 2	المخاطر الكيميائية وكيفية دخول المواد الى جسم الانسان
Week 3	العوامل المؤثرة على مدى الاستجابة لتأثيرات المواد الكيميائية
Week 4	تصنيف المواد الكيمياوية والبطاقات التعريفية
Week 5	قواعد ومواصفات السلامة في المختبرات
Week 6	الشروط الواجب اتباعها من قبل العاملين في المختبرات (طلبة وباحثين)
Week 7	شروط تخزين المواد الكيمياوية والبايولوجية الخطرة والسامة
Week 8	فئات الخطورة وشروط تخزينها
Week 9	المذيبات والمواد القابلة للاشتعال
Week 10	المواد المؤكسدة والبير وكسيدات العضوية
Week 11	المواد المشعة والمواد الاكلة
Week 12	الاحماض غير العضوية القوية
Week 13	الاحماض العضوية القوية
Week 14	التوعية بدلالة العلامات التحذيرية
Week 15	اختبار

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts		
Recommended Texts	.	
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	اللغة العربية Arabic Languge			Module Delivery	
Module Type	BASIC			☒ Theory ☐ Lecture ☐Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	UOM101				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level		1	Semester of Delivery		1
Administering Department		New & Renewable Energy	College	Science	
Module Leader	د. عبير طارق الحاصود		e-mail	Abeer.t.d@uomosul.edu.iq	
Module Leader's Acad. Title		lecturer	Module Leader's Qualification		Ph.D.
Module Tutor			e-mail		
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date			Version Number		

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	تعريف الطلاب بأساسيات اللغة العربية. كذلك كسر حاجز الخجل وزيادة ثقتهم داخل وخارج الفصل. هناك فرصة كبيرة لإشراكهم في مناقشات قصيرة حيث يمكنهم الكتابة أو التعبير عن أنفسهم شفهيًا. بالإضافة إلى ما سبق ، ستعمل الدورة على تحسين مهارات القراءة والكتابة والاستماع والتحدث كطلاب ، وتقوية ملكة الطلاب الأدبية لتذوق أساليب اللغة وإدراك مواطن الجمال فيها
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- خلق وعي كامل بالاستخدام الصحيح لقواعد اللغة العربية في الكتابة والمحادثة. 2- إدراك أهمية اللغة العربية داخل وخارج الحياة الجامعية. 3- سيحسن الطلاب قدرتهم على التحدث باللغة العربية من حيث الطلاقة والاستيعاب. 4- سيقوم الطلاب بمراجعة الأشكال النحوية للغة العربية واستخدام هذه الأشكال في سياقات تواصلية محددة ، والتي تشمل: الأنشطة الصفية ، والواجبات المنزلية ، وقراءة النصوص ، والكتابة. 5- سيعزز الطلاب قدرتهم على كتابة فقرات قصيرة وملخصات باستخدام نهج العملية.
Indicative Contents المحتويات الإرشادية	مقدمة عن الاتصال بشكل عام واللغة العربية بشكل خاص ، مع مقدمة عن فئات الكلمات (أجزاء الكلام) في اللغة العربية [4 ساعات]. شرح كل جزء من الكلام في اللغة العربية مثل الأسماء والضمائر والأفعال والصفات والظروف وحروف الجر وحروف العطف والاقتران [16 ساعة]. المهارات الأساسية في تعلم اللغة الإنجليزية: القراءة والكتابة يتم تقديمها بشكل تدريجي خلال الأسابيع الماضية [6 ساعات]. الجزء الأخير مخصص لبعض جلسات تصحيح الأخطاء وردود الفعل [2 ساعة]. -جعل الطلبة على دراية بالعلاقة بين أساليب التعلم وأساليب التدريس. -تشجيع الطلبة على "توسيع" أساليبهم.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. المحاضرة المصحوبة بالشرح والتحليل. 2. الحلقة النقاشية. 3. التقارير والبحوث. 4. عرض المادة عبر شرائح (بوربوينت) . 5. الاسئلة والاجوبة. 6. المشاركة الصفية .

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	1
Unstructured SWL (h/sem)	17	Unstructured SWL (h/w)	1

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

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

Delivery Plan (Weekly Syllabus) المنهاج الأسبوعي النظري	
	Material Covered
Week 1	**الكلام وأقسامه**
Week 2	**علامات الاسم**
Week 3	**علامات الفعل**
Week 4	**قواعد كتابة العدد**
Week 5	**قواعد كتابة العدد**
Week 6	**أنوع المفاعيل**
Week 7	**المبتدأ والخبر**
Week 8	**همزة القطع وهمزة الوصل**
Week 9	**الهمزة المتوسطة وهمزة السطر**
Week 10	**الفرق بين الضاد والضاء**
Week 11	**الفرق بين التاء المربوطة والتاء المفتوحة**
Week 12	**زيادة الحرف وحذفه**
Week 13	**زيادة الحرف وحذفه**
Week 14	**الأفعال الناقصة ، الحروف المشبه بالفعل**

Week 15	**اختبار**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	لا يوجد
Week 1	
Week 2	
Week 3	
Week 4	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	شرح ابن عقيل على الفية ابن مالك ، المرشد في الاملاء ، محمد شاكر سعيد	Yes Yes
Recommended Texts	الاسلوب ، احمد الشايب ، طرق تعليم التعبير ، محمد عبد القادر أحمد	Yes Yes
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Analytical Chemistry**			Module Delivery	
Module Type	**Basic**			☒ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	**NRE12009**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	1		Semester of Delivery	2	
Administering Department	Type Dept. Code		College	Type College Code	
Module Leader	Lamya Adnan Sarsam		e-mail	lamyasarsam@uomosul.edu.iq	
Module Leader's Acad. Title	Assistant Professor		Module Leader's Qualification	Ph.D	
Module Tutor	None		e-mail	E-mail	
Peer Reviewer Name	None		e-mail	E-mail	
Scientific Committee Approval Date	12/06/2023		Version Number	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The main objectives of a General Chemistry I module that covers the basics of general Chemistry and how to solve their parameters, include: 1. Understanding the Buffer solutions, Volumetric Analysis. ,Types of Titration. , Gravimetric Analysis. , Analytical Statistics. ,Analytical Separation Methods. And Green Chemistry . 2. Understanding about Buffer solution Understanding about Buffer solutions and the Buffer capacity , how can solve the problems of Buffer calculate when used strong acid and strong base or weak acid and base. 3. Understanding volumetric analysis , This objective would cover the types of classical methods with the titration steps and explain them details and solve their different question. 4. Understanding the second type of classical method it's gravimetric analysis and define the types of it , also explain the different between organic an in organic reagents , and the steps of gravimetric analysis in details. and examining the advantage and disadvantages between the types of gravimetric analysis. 5. Study the analytical Statistics ,this objective would cover statistical laws with learning how to used them to solve the practical data. 7. Explain another type of analytical chemistry is Analytical Separation Methods, and types of column which used to separate the different positive and negative ion . explain also how can separated the analyte from the interferences in the same sample , and which masking agent should used to avoid the interferences. 8. Green Chemistry, this objective would cover after all the subjects which the student studied them. how can chose the green material and used it instead of chemistry materials, or at least the students will Know how to choose the material which is safety for health and the environment From that this section would also cover the role that green chemistry may play in meeting future energy needs and reducing greenhouse gas emissions.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The students will be able to: 1. Solve the solubility constant 2. Calculate the molar solubility 3. How can identify the primary standard materials and solutions . 4. How can identify the secondary standard materials and solutions . 5. Calculate the pH function for strong and weak acid and base , and how to distinguish between them. 6. Calculate the concentration of the liquid example and the percentage of example. 7. How to derive the calibration curve. 8. How to determine of Calcium or Magnesium ions which cause hardness in water at PH 10. 9. How to determination of halids in presence of the other without problem or side reaction. 10. How to calculate the mean, Recovery , Relative standard division and

	relative error. 11. How to separated the different ions from the other 12. How can avoid the interferences. 13. What is green chemistry .
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Theory: - Buffer solutions and their calculations. [3 hrs]. - Volumetric Analysis. ,Types of Titrations., Acid- base titrations [12hrs] - Gravimetric Analysis. [9hrs] - Analytical Statistics. [3hrs] - Analytical Separation Methods. [18hrs] - Green Chemistry [3hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: used to introduce and explain key concepts related to Buffer solutions. Volumetric Analysis. Types of Titration, Gravimetric Analysis, Analytical Statistics, Analytical Separation Methods, Green Chemistry. 2.Interactive discussions: used to engage students in critical thinking and problem-solving questions related to calculate the pH ,the percentage , the concentration of metal ion , separation the ion through group discussions, debates, case studies, and simulations. 3.Multimedia resources: used to enhance student engagement and understanding of complex concepts related to the types of chemistry through videos, and animations. 4.Assessment and feedback: used to measure student learning and provide feedback on their progress through quizzes, exams, and projects.

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

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Volumetric Analysis methods , Titrations
Week 2	Neutralization titrations (Acid -base titrations),and solve the problems.
Week 3	Precipitation titrations
Week 4	Solve the problems of Precipitation titrations.
Week 5	Complex-Formation titrations
Week 6	Solve the problems of Complex-Formation titrations.
Week 7	Oxidation -Reduction titrations.
Week 8	Solve the problems of Oxidation -Reduction titrations.
Week 9	Gravimetric analysis methods
Week 10	Steps of Gravimetric analysis.
Week 11	Calculations.
Week 12	Analytical Statistics.
Week 13	Analytical Separation Methods
Week 14	Types of Analytical Separation Methods.
Week 15	Green Chemistry
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1. Fundamental of Analytical Chemistry. by Skoog & West, Holler , Crouch. 10th-Ed 2022 2. Handbook of Green Analytical Chemistry MIGUEL DE LA GUARDIA SALVADOR GARRIGUES 1st Ed. 2012 3. Principle of Instrumental Analysis 7Th Edition By Douglas A. Skoog, F.Games Holler, Stanley R. Crouch 2016.	No
Recommended Texts	1. Analytical Chemistry. by Christian. 2004 2. Fundamental Chemistry for Medical Science By Dr. Jameel M. Dhabab 2020	No
Websites	None	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	جرائم حزب البعث المنحل Crimes of the defunct Baath Party			Module Delivery	
Module Type	B			☒ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	UOM201				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level	UGII		Semester of Delivery	3	
Administering Department	BSC-NRE		College	Type College Code	
Module Leader	Salah avdo ali		e-mail	Salahavdo2@uomosul.edu.iq	
Module Leader's Acad. Title	Assistant Teacher		Module Leader's Qualification	M.Sc	
Module Tutor			e-mail		
Peer Reviewer Name	Name		e-mail	E-mail	
Scientific Committee Approval Date	05/05/2024		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	أ -المعرفة والفهم) الاهداف المعرفية(1- معرفة تاريخ تأسيس دولة العراق والتطورات السياسية المعاصرة. 2- فهم طبيعة النظام السياسي في عهدي الملكي والجمهوري في العراق. 3- إدراك طبيعة الجرائم السياسية والاقتصادية الاجتماعية والثقافية التي ارتكبها نظام حزب البعث البائد ضد أبناء الشعب بمختلف مكوناته خلال حقبة حكمه. 4- دعم مهارات فهم قضايا السياسية, وتعزيز سبل التعليم التفاعلي لتعزيز سبل المشاركة في الشأن العام – المواطنة-. ب - المهارات الخاصة بالموضوع) الاهداف المهاراتية الخاصة بالمقرر(ب -- 1اكتساب الطالب لمهارات التفاوض والتواصل وتبادل الاراء مع الاخرين. ب – 2 اكتساب الطالب مهارات الحوار البناء الهادف . ب – 3 اكتساب الطالب مهارات مواجهة اي موقف والتعبير عن الراي بكل شجاعة وثقة بالنفس. ج- مهارات التفكير ج1- مهارات التحليل. ج2- مهارات التوظيف للمفردات التي تعلمها في الواقع العملي من خلال دراسة مشكلات محددة من الواقع. ج3- مهارات التنبؤ والدراسات المستقبلية للنظم الديمقراطية. د - المهارات العامة والمنقولة (المهارات الأخرى المتعلقة بقابلية التوظيف والتطور الشخصي). د1- القدرة على العمل كفريق. د2- التفاعل مع فريق العمل لتحقيق المهارات المطلوبة. د3- القدرة على القيام بعرض نظري لبعض الموضوعات ذات العلاقة بمفردات المادة. د4- اكتساب مهارات التحليل العلمي لاي ظاهرة سياسية تتعلق بانتهاكات النظام الحاكم.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	.1عرف المفاهيم الاتية: حقوق الانسان، الشرعة الدولية، الديمقراطية، الدمقرطة، التحول الديمقراطي. 2. وضح اهمية الحقوق السياسية والمدنية. 3. اذكر اهم ما جاء في المواثيق الدولية لحقوق الانسان فيما يخص حق الحياة. 4. تكلم باختصار عن انواع الحقوق الاقتصادية والاجتماعية والثقافية. .5ناقش ما جاء في الدستور العراقي لعام 2005 النافذ من ضمانات فيما يخص حقوق الانسان. .6حدد اهم خصائص النظام الديمقراطي .8اشرح انواع الديمقراطية ثم بين اهم الانواع القابلة للتطبيق العملي. .9عدد مع الشرح انواع النظم الانتخابية. .10ناقش الاطار الوظيفي للسلطة التشريعية ضمن مؤسسات النظام السياسي العراقي وفق ما جاء في دستور عام 2005. .11حدد الاطار البنيوي للمؤسسة التنفيذية في النظام السياسي العراقي وفق دستور 2005. .12تكلم عن اختصاصات مجلس النواب في اطار المؤسسة التشريعية. 13. ناقش شروط انتخاب رئيس الجمهورية وفق الدستور العراقي لعام 2005.
Indicative Contents المحتويات الإرشادية	يتضمن المحتوى الإرشادي ما يلي. مفهوم النظام الملكي والجمهوري والتطور السياسي للعراق تاريخياً يتناول تعريف نظام الحكم وتعريف النظام الملكي ونظام الجهوري، تعريفاً لغوياً واصطلاحياً واجرائياً، تأسيس دولة العراق، ثم التطور التاريخي للعراق، من بعد الحرب العالمية الأولى مروراً بالأحداث والثورات والانقلابات العسكرية، ومن ثم وصول حزب البعث البائد إلى الحكم، وما انبثق عن تمركز وتمسط بالسلطة وممارسة الاستبداد والدكتاتورية. (5 ساعات) تأسيس حزب البحث العربي الاشتراكي يتناول تاريخ تأسيسي حزب البعث في سوريا سنة 1946 ومن ثم تأسيس فرع للحزب في العراق سنة 1952. (ساعتان). الانتهاكات والجرائم يتناول اشكال وصور من انتهاكات نظام حزب البعث البائد على المستوى الداخلي من ارتكابه لجريمة الدجيل والانفال والقصف الكيمياوي ومنع الاحزاب السياسية من ممارسة نشاطاتها واعدام الكثير من المعارضين. (3 ساعات). جرائم على مستوى الخارجي

يتناول الجرائم والانتهاكات التي مارسها نظام حزب البعث البائد في علاقاته مع الدول الجوار والاقليمية والعالمية مثل الحرب العراقية الايرانية لثماني سنوات 1980-1988 وغزو واحتلال دولة الكويت سنة 1990 فضلا عن سجن واغتيال السياسيين الاجانب . (4 ساعات).	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. المحاضرة المصحوبة بالشرح والتحليل. 2. الحلقة النقاشية. 3. التقارير والبحوث. 4. عرض المادة عبر شرائح (بوربوينت) . 5. الاسئلة والاجوبة. 6. المشاركة الصفية .

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

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

Delivery Plan (Weekly Syllabus) المنهاج الأسبوعي النظري	
	Material Covered
Week 1	نبذة مختصر عن تأسيس واهداف حزب البعث البائد
Week 2	العهد الملكي والعهد الجمهوري في العراق
Week 3	انتهاكات نظام حزب البعث للحقوق والحريات العامة في العراق
Week 4	اثر سلوكيات النظام البعثي في المجتمع العراقي
Week 5	اثر المرحلة الانتقالية في العراق في محاربة السياسة الاستبدادية
Week 6	الآليات النفسية والاجتماعية التي استعملها النظام البعثي في العراق ضد أبناء الشعب
Week 7	الدين والدولة في عهد نظام حزب البعث في العراق
Week 8	الثقافة والاعلام وعسكرة المجتمع في عهد نظام حزب البعث في العراق
Week 9	اثر القمع والحروب على البيئة والسكان في عهد نظام حزب البعث في العراق
Week 10	تجفيف الاهوار والهجرة القسرية في عهد نظام حزب البعث في العراق
Week 11	تدمير البيئة الزراعية والحيوانية في عهد نظام حزب البعث في العراق
Week 12	جريمة المقابر الجماعية في عهد نظام حزب البعث في العراق
Week 13	جريمة الانفال في عهد نظام حزب البعث في العراق
Week 14	جريمة قصف مدينة حلبجة في عهد نظام حزب البعث في العراق
Week 15	التميز العنصري والطائفي بين أبناء الشعب في عهد نظام حزب البعث البائد في العراق

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1 منهاج جرائم حزب البعث البائد في العراق / جمهورية العراق/ وزارة التعليم العالي والبحث العلمي, دائرة الدراسات والتخطيط والمتابعة،	Yes

	بغداد,2023. 2- قيس ناصر وعبدالهادي معتوق, التأسيس المعرفي لدراسة جرائم حزب البعث في العراق (مقدمة عامة), مركز العراقي لتوثيق جرائم التطرف، بغداد,2023.	Yes
Recommended Texts	1. الدستور العراقي الدائم لعام 2005، الامانة العامة لمجلس الوزراء، بغداد، 2006.	Yes Yes
Websites	https://www.google.com /url?sa=t&source=web&rct=j&opi=89978449&url=https://www.youtube.	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Calculas**			Module Delivery	
Module Type				☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code					
ECTS Credits					
SWL (hr/sem)					
Module Level	1		Semester of Delivery	1	
Administering Department	Type Dept. Code		College	Type College Code	
Module Leader	**Zinah Falih Salih**		e-mail	Zn_f2020@uomosul.edu.iq	
Module Leader's Acad. Title	LECTURER		Module Leader's Qualification	M.Sc.	
Module Tutor			e-mail		
Peer Reviewer Name	Name		e-mail	E-mail	
Scientific Committee Approval Date			Version Number	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	N/A	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- Giving an introduction to different types of functions and their basic concepts so that the student can develop the basic concepts in calculus, such as limits, continuity, derivatives, and integrals. 2- The student learns how to solve mathematical problems by applying the laws given to him 3- Practical examples and several problems are taken that the student stopped solving during the middle school stage. 4- Developing the concept of differentiation, new methods of derivation, and studying many types of functions and their behavior. 5- The student learns about other types of functions that he did not discuss in the preparatory stage, such as hyperbolic trigonometric functions and methods of deriving them. 6- Developing the student's concept of integration. 7- The student learns how to solve mathematical problems by applying the laws given to him 8- Practical examples and several problems were taken, which the student had stopped solving in the middle school stage. 9-Developing the concept of integration and finding different ways to integrate complex functions that are difficult to integrate using the usual methods.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. study the functions and the domain . 2. evaluation the range of functions and their drawing. 3. A study of the limits. 4. A continuity study. 5. Derivability. 6. A study of the derivation of the transcendental exponential ,trigonometric and natural logarithm functions. 7. By studying integrations, student can enhance your knowledge of functions, limits, derivatives, and the relationship between them. 8. Mastery of Integration Techniques: Integration involves various methods and techniques such as integration by parts and partial fractions, Studying integrations allows you to become proficient in these techniques, enabling the student to handle different types of integrals effectively. 9. Mastery of Integration Techniques: Integration involves various methods and techniques such as substitution, integration by parts, partial fractions, and trigonometric substitutions. Studying integrations allows you to become proficient in these techniques, enabling the student to handle different types of integrals effectively.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in the delivery of this unit is to encourage students to participate in the exercises, while improving and expanding their critical thinking skills at the same time. This will be achieved through classes and interactive tutorials and by looking at the types of simple experiments that include some sampling activities that are of interest to the students. Mathematics, including calculus, requires practice to reinforce understanding and develop problem-solving skills. Work through a variety of problems, both from your textbook and supplementary resources. Start with simple problems and gradually increase the difficulty level.

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)	3 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1		Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	9	LO #1 - #7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الأسبوعي النظري

	Material Covered
Week 1	definition of the function and Finding Domain and Range of the functions with different techniques.
Week 2	Limit+ Limits Involving Infinity+ Continuity.
Week 3	Derived using definition and laws of derivation with examples.
Week 4	Trigonometric functions and their Derivatives.
Week 5	Graphing trigonometric functions.
Week 6	Exponential functions and their Derivatives.
Week 7	Logarithmic functions and their Derivatives.
Week 8	Inverse trigonometric functions and their Derivatives.
Week 9	Hyperbolic functions.
Week 10	Integration of trigonometric functions.
Week 11	Integration of exponential functions of base e and base a.
Week 12	Integration of natural logarithm functions.
Week 13	Integration methods+ Integration by part.
Week 14	Integration of the functions $sin^n(x) and\ cos^n(x)$.
Week 15	Integration of the functions $tan^n(x) and\ cot^n(x)$ and Integration of the functions $sec^n(x) and\ csc^n(x)$.

Delivery Plan (Weekly Lab. Syllabus) N/A المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1- أي. برسل /الجزء الاول /1982 حسبان التفاضل والتكامل مع الهندسة التحليلية./ 2- George B. Thomas, Jr. Massachusetts '' INSTRUCTOR'S SOLUTIONS MANUAL SINGLE VARIABLE '' 3 - Calculus 11th Thomas	Yes yes Yes
Recommended Texts	1- د. رمضان محمد جهينة و د.احمد عبد العالي هب الريح التفاضل والتكامل /الجزء الاول /دار الكتاب الجديد المتحدة. 2 - ROBERT T. SMITH, ROLAND B. MINTON, '' Calculus Fourth Edition'' 2012	Yes No
Websites	https:// **www.wolframalpha.com .**	

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
عنوان المادة الدراسية	تحليل دوائر كهربائية			Module Delivery	
نوع المادة الدراسية	Core			☒ نظري	
كود المادة	NRE2309			☒ محاضرة	
وحدات النظام ECTS الأوروبي	7			☒ عملي	
SWL (hr/sem)	175			☒ تمارين ☐ ممارسة ☐ حلقة دراسية	
مستوى المادة	UGII		رقم الفصل الدراسي	3	
ادارة القسم	BSc-NRE		الكلية	Type College Code	
مدرس المادة	ابتسام يحيى عبدالله		e-mail	ibtisamyahya@uomosul.edu.iq	
اللقب العلمي لمدرس المادة	مدرس		التحصيل الدراسي لمدرس المادة	P hD.	
مراجع المادة الدراسية	ابتسام يحيى عبدالله		e-mail	ibtisamyahya@uomosul.edu.iq	
Peer Reviewer Name			e-mail		
اللجنة العلمية تاريخ الموافقة	01/02/2024		رقم الاصدار	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
وحدة المتطلبات الأساسية	لا يوجد	الفصل الدراسي	
وحدة المتطلبات المشتركة	لا يوجد	الفصل الدراسي	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1- تعريف الطالب بالأسس النظرية والمبادئ الأساسية لتحليل الدوائر الكهربائية ذات التيار المستمر والتيار المتردد. 2- تعريف الطالب بمكونات الدوائر الكهربائية مثل المقاومات والمكثفات والمحاثات والحمل وغيرها. 3- تمكين الطالب من تحليل الدوائر الكهربائية واستخدام النظريات المختلفة لحلها وحساب التيارات والفولتيات والقدرة في دوائر التيار المستمر والتيار المتردد. 4- تحليل ربط دوائر التوالي والتوازي. 5- حل قوانين الجهد والتيار لكيرتشوف. 6- وصف الحث الكهرومغناطيسي 7- تحليل الدوائر باستخدام نظرية ثيفينين ونظرية نورتون ونظرية التراكب. 8- تمييز وحل قواعد مقسم الجهد والتيار. 9- تحليل فرع التيار والشبكة والتحليل العقدي.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	في نهاية هذه الوحدة، يجب أن يكون الطالب قادرًا على: 1. التعرف على أساسيات الدوائر الكهربائية المتناوبة ومكوناتها. 2. التعرف على دوائر التيار المتردد 3. تطبيق طرق الدوائر الكهربائية في المختبرات. 4. تحديد أسلوب التحليل المناسب لحل المسائل الحسابية 5. تحليل الدوائر الكهربائية بطرق متعددة 6. حل الدوائر الكهربائية للتيار المتردد 7. المقارنة بين طرق تحليل دوائر التيار المتردد المتعددة 8. المقارنة بين طرق تحليل دوائر التيار المستمر والتيار المتردد
Indicative Contents المحتويات الإرشادية	يتضمن المحتوى الإرشادي ما يلي. نظري: 1- نظام الوحدات الكهربائية SI 2- ما هو النظام الدولي للوحدات؟ 3- دائرة كهربائية بسيطة 4- التيار المستمر والمتناوب 5- المصطلحات الأساسية 6- تحليل الدوائر 7- دوائر ربط التوالي 8- مصادر الجهد على التوالي 9- قانون كيرشوف للجهد 10- تبادل عناصر التوالي 11- قاعدة مقسم الجهد 12- دوائر ربط التوازي 13- المقاومة الكلية والتوصيلية الكهربائية 14- الدوائر المتوازية 15- قانون كيرشوف للتيار الكهربائي 16- قاعدة مقسم التيار الكهربائي 17- مسائل 18- تحليل دوائر الربط الفرعي 19- تحليل الشبكة 20- التحليل العقدي 21- نظرية التراكب

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. المحاضرات: تستخدم لتعريف وشرح مفاهيم الدوائر الكهربائية وما هي مكوناتها وأنواعها، 2. المناقشات التفاعلية: تستخدم لإشراك الطلاب في التفكير النقدي وحل المشكلات المتعلقة بالدوائر الكهربائية من خلال المناقشات الجماعية. 3. مصادر الوسائط المتعددة: تستخدم لتعزيز مشاركة الطلاب وفهمهم للمفاهيم المتعلقة بالدوائر الكهربائية من خلال مقاطع الفيديو والرسوم المتحركة. 4. التقييم والتغذية الراجعة: يستخدم لقياس تعلم الطلاب وتقديم التغذية الراجعة حول مدى تقدمهم من خلال الاختبارات والامتحانات والمشاريع.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	88	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	المواد المغطاة
Week 1	نظام الوحدات الكهربائيةSI ، ما هي قائمة وحداتSI ؟
Week 2	الدوائر الكهربائية: مكوناتها وأنواعها والمفاهيم ذات الصلة. التيار المباشر والمتناوب
Week 3	تحليل الدوائر، دوائر التوالي، مصادر الجهد على التوالي
Week 4	قانون كيرشوف للجهد
Week 5	تبادل عناصر ربط التوالي
Week 6	قاعدة مقسم الجهد
Week 7	حل المسائل
Week 8	العناصر المتوازية، التوصيل الكلي والمقاومة
Week 9	الدوائر المتوازية، قانون كيرشوف للتيار الكهربائي
Week 10	قاعدة مقسم التيار الكهربائي
Week 11	حل المسائل
Week 12	فرع التحليل التيار
Week 13	تحليل الشبكة
Week 14	التحليل العقدي
Week 15	نظرية التراكب
Week 16	إمتحان نهائي

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

Week 1	1- قانون اوم
Week 2	2- ربط المقاومات على التوالي والتوازي
Week 3	3- قانون كيرشوف
Week 4	4- تجربة مجزئ الجهد والتيار
Week 5	5- تجربة طريقة التحليل الحلقي
Week 6	6- تجربة نظرية ثيفينن
Week 7	

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1- Introduction circuit analysis, Tenth edition 2- Electronic Circuits: Fundamentals and Application. 2nd edition. Michael Tootey, BA 3- Fundamentals of Electric Circuits: Firth Edition. Charles K. Alexander & Matthew N. O. Sadiku	No
Recommended Texts	1. A Textbook of Electrical Technology, Theraja. Vol. 2 2. ELECTRICAL CIRCUIT ANALYSIS. 2nd edition, MAHADEVAN, K. ،CHITRA, C.	No
Websites	None	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	جرائم حزب البعث المنحل Crimes of the defunct Baath Party			Module Delivery	
Module Type	S			☒ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	UMSCRE24S281				
ECTS Credits	2.00				
SWL (hr/sem)	50				
Module Level	1		Semester of Delivery	1	
Administering Department	Type Dept. Code		College	Type College Code	
Module Leader	**Salah Avdo Ali**		e-mail	Salahavdo2@uomosul.edu.iq	
Module Leader's Acad. Title	Assistant Teacher		Module Leader's Qualification	M.A.	
Module Tutor			e-mail		
Peer Reviewer Name	Assist Prof. Dr. Lamya Adnan Sarsam		e-mail	lamyasarsam@uomosul.edu.iq	
Scientific Committee Approval Date	05/05/2024		Version Number	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية يتم كتابة اهم الأهداف التي تغطيها هذه المادة الدراسية بشكل جمل او فقرات توضح المواضيع التي سيتم التطرق اليها و دراستها و معالجتها)	A- Knowledge and understanding (cognitive objectives) **1**- Knowing the history of the founding of the State of Iraq and contemporary political developments. **2**- Understanding the nature of the political system during the monarchy and republican eras in Iraq. **3**- Understanding the nature of the political, economic, social and cultural crimes committed by the defunct Baath Party regime against the people of all components during its era of rule. **4**- Supporting the skills of understanding political issues, and enhancing interactive education methods to enhance ways of participating in public affairs - citizenship -. B - Subject-specific skills (course-specific skills objectives) B1 - The student acquires the skills of negotiation, communication, and exchanging opinions with others. B2 - The student acquires the skills of constructive, purposeful dialogue. B3 - The student acquires the skills to confront any situation and express his opinion with courage and self-confidence. C- Thinking skills C1- Analytical skills. C2- Skills for employing the vocabulary you have learned in practice by studying specific real-life problems. C3- Forecasting skills and future studies of democratic systems. D - General and transferable skills (other skills related to employability and personal development). D1- The ability to work as a team. D2- Interaction with the work team to achieve the required skills. D3- The ability to make a theoretical presentation of some topics related to the subject's vocabulary. D4- Acquiring the skills of scientific analysis of any political phenomenon related to violations of the ruling regime.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية يتم كتابة اهم المُخرجات او الناتج و الكم العلمي الذي يتم استخدامه للتدريس في هذه المادة على شكل أسئلة أساسية تخص منهاج المادة بأكمله و يجب ان لا تقل هذه المُخرجات من ناحية العدد عن 6 مُخرجات و يفضل ان تكون بعدد أسابيع الدراسة.	1 .Define the following concepts: human rights, the International Charter, democracy, democratization, and democratic transformation. 2 .Explain the importance of political and civil rights. 3 .Mention the most important provisions of international human rights conventions regarding the right to life. 4 .Talk briefly about the types of economic, social and cultural rights. 5 .Discuss the guarantees contained in the Iraqi Constitution of 2005 regarding human rights . 6 .Identify the most important characteristics of a democratic system 8 .Explain the types of democracy, then explain the most important types that are applicable in practice. 9 .Enumerate and explain the types of electoral systems. 10 .Discuss the functional framework of the legislative authority within the institutions of the Iraqi political system according to what was stated in the 2005 Constitution. 11 .Determine the structural framework of the executive institution in the Iraqi political system according to the 2005 Constitution. 12 .He talked about the powers of the House of Representatives within the framework of the legislative institution. 13 .Discuss the conditions for electing the President of the Republic according to the Iraqi Constitution of 2005.
Indicative Contents	Instructional content includes the following.

المحتويات الإرشادية يتم كتابة اهم العناوين الرئيسية للمواضيع بشكل متسلسل و التي تشمل كافة الفقرات التي تحتويها مع إدراج عدد الساعات المطلوبة لتنفيذ كل فقرة.	The concept of the monarchy and republican system and the political development of Iraq historically The definition of the system of government and the definition of the monarchy and the republican system deal, linguistically, terminologically and procedurally, with the establishment of the State of Iraq, then the historical development of Iraq, after the First World War through the events, revolutions and military coups, and then the arrival of the defunct Baath Party to power, and what emerged from the concentration and consolidation of power. And the practice of tyranny and dictatorship. (5 hours) Establishment of the Arab Socialist Research Party It deals with the history of the founding of the Baath Party in Syria in 1946 and then the establishment of a branch of the party in Iraq in 1952. (Two hours). Violations and crimes It deals with forms and images of the defunct Baath Party regime's violations at the internal level, including committing the crimes of Dujail, Anfal, chemical bombing, preventing political parties from carrying out their activities, and executing many opponents. (3 hours). Crimes at the external level It deals with the crimes and violations committed by the defunct Baath Party regime in its relations with neighboring, regional and global countries, such as the eight-year Iran-Iraq war from 1980-1988, the invasion and occupation of the State of Kuwait in 1990, as well as the imprisonment and assassination of foreign politicians. (4 hours).

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies يتم كتابة ملخص الاستراتيجية الرئيسية التي سيتم تبنيها في تقديم هذه المادة	1. The lecture is accompanied by an explanation and analysis. 2. Discussion panel. 3. Reports and research. 4. Presentation of the material via PowerPoint slides. 5. Questions and answers. 6. Class participation.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	32	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	1
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	18	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الأسبوعي النظري

	Material Covered
Week 1	A brief overview of the founding and goals of the defunct Baath Party
Week 2	The royal era and the republican era in Iraq
Week 3	The Baath Party regime's violations of public rights and freedoms in Iraq
Week 4	The impact of the Baathist regime's behavior on Iraqi society
Week 5	The impact of the transitional phase in Iraq on combating authoritarian politics
Week 6	The psychological and social mechanisms used by the Baathist regime in Iraq against the people
Week 7	Religion and the state during the era of the Baath Party regime in Iraq
Week 8	Culture, media, and the militarization of society during the era of the Baath Party regime in Iraq
Week 9	The impact of repression and wars on the environment and population during the era of the Baath Party regime in Iraq
Week 10	Draining of the marshes and forced migration during the era of the Baath Party regime in Iraq
Week 11	Destruction of the agricultural and animal environment during the era of the Baath Party regime in Iraq
Week 12	The crime of mass graves during the era of the Baath Party regime in Iraq
Week 13	The Anfal crime during the era of the Baath Party regime in Iraq
Week 14	The crime of bombing the city of Halabja during the era of the Baath Party regime in Iraq
Week 15	Racial and sectarian discrimination among the people during the era of the defunct Baath Party regime in Iraq

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1 منهاج جرائم حزب البعث البائد في العراق / جمهورية العراق/ وزارة التعليم العالي والبحث العلمي, دائرة الدراسات والتخطيط والمتابعة، بغداد,2023. 2- قيس ناصر وعبدالهادي معتوق, التأسيس المعرفي لدراسة جرائم حزب البعث في العراق (مقدمة عامة), مركز العراقي لتوثيق جرائم التطرف، بغداد,2023.	Yes Yes
Recommended Texts	1. الدستور العراقي الدائم لعام 2005، الامانة العامة لمجلس الوزراء، بغداد، 2006.	Yes Yes
Websites	https://www.google.com /url?sa=t&source=web&rct=j&opi=89978449&url=https://www.youtube.	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
عنوان المادة الدراسية	**اساسيات الكهربائية**			Module Delivery	
نوع المادة الدراسية	**Core**			☒ نظري ☒ محاضرة ☒ عملي ☒ تمارين ☐ ممارسة ☐ حلقة دراسية	
كود المادة	**NRE1205**				
وحدات النظام ECTS الأوروبي	**8**				
SWL (hr/sem)	**200**				
مستوى المادة	UGx11 1	رقم الفصل الدراسي	2		
ادارة القسم	BSc-NRE	الكلية	Type College Code		
مدرس المادة	ابتسام يحيى عبدالله	e-mail	ibtisamyahya@uomosul.edu.iq		
اللقب العلمي لمدرس المادة	مدرس	التحصيل الدراسي لمدرس المادة	P hD.		
مراجع المادة الدراسية	ابتسام يحيى عبدالله	e-mail	ibtisamyahya@uomosul.edu.iq		
Peer Reviewer Name		e-mail			
اللجنة العلمية تاريخ الموافقة	01/02/2024	رقم الاصدار	1.0		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
وحدة المتطلبات الأساسية	لا يوجد	الفصل الدراسي	
وحدة المتطلبات المشتركة	لا يوجد	الفصل الدراسي	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1- التعرف على الكميات الكهربائية 2- فهم بنية المادة. 3- شرح مفهوم الكهرباء والمقصود بالإلكترون الحر. 4- التمييز بين التيارات الساكنة والمتحركة. 5- يعبر عن مفاهيم التيار والجهد والشغل والقدرة. 6- تعريف التيار المباشر والتيار المتردد. 7- وصف القوة الدافعة الكهربائية وفرق الجهد. 8- يصف العلاقة بين المقاومة والتيار والجهد. 9- حساب الطاقة الكهربائية. 10- وصف الحث الكهرومغناطيسي 11- التمييز بين آلة التيار المستمر (محرك ومولد) وآلة التيار المتردد (محرك ومولد) 12- شرح التيارات الدوامية 13- التمييز بين التيار المستمر والتيار المتردد. 14- تمييز الوقت والتردد 15- حساب جذر متوسط قيمة المربع. 16- إيجاد التيار والجهد والمقاومة في الدوائر البسيطة.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	في نهاية هذه الوحدة، يجب أن يكون الطالب قادرًا على: 1. فهم المعنى الفيزيائي للمصطلحات المستخدمة لوصف الداوائر الكهربائية. 2. فهم الأجزاء الرئيسية للذرة. 3. يميز الاختلافات بين الموصلات وأشباه الموصلات والعوازل. 4. التعرف على الكميات الأساسية في الدوائر الكهربائية مثل الجهد والتيار. 5. ربط المعلمات الاساسية الثلاثة للدائرة الكهربائية: الجهد والتيار الكهربائي والمقاومة الكهربائية من خلال قانون أوم. 6. أدرك كيفية استخدام المعلمات الثلاثة المذكورة أعلاه لحساب خصائص وشروط الدائرة الكهربائية. 7. إدراك كيفية استخدام المعلمات المذكورة أعلاه لحساب الطاقة الكهربائية. 8. فهم المعرفة الأساسية للحث الكهرومغناطيسي والمحولات والمولدات. 9. يذكر قوانين فاراداي ولينز للحث الكهرومغناطيسي 10. فهم التيارات الدوامة 11. تحديد أساسيات التيار المتردد
Indicative Contents المحتويات الإرشادية	يتضمن المحتوى الإرشادي ما يلي. النظرية: 1. الذرات، الإلكترونات، الشحنة 2. الموصلات والعوازل 3. التيار الكهربائي 4. الجهد 5. القوة 6. المقاومة 7. المغناطيسية والكهرومغناطيسية 8. مكونات الدائرة الكهربائية والمقاومة

	9. الحث الكهرومغناطيسي 10. قانون فاراداي للحث الكهرومغناطيسي 11. قانون لينز للحث الكهرومغناطيسي 12. التيارات الدوامة 13. المحولات الكهربائية 14. المولد الكهربائي 15. التيار المتردد 16. انواع الموجات 17. الوقت والتردد للموجات الجيبية 18. قيمة RMS للموجة الجيبية 19. الطور

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. المحاضرات: تستخدم للتعريف وشرح المفاهيم الأساسية للكهربائية. 2. المناقشات التفاعلية: تستخدم لإشراك الطلاب في التفكير النقدي وحل المشكلات المتعلقة بالكهرباء من خلال المناقشات الجماعية والمناظرات ودراسات الحالة والمحاكاة. 3. موارد الوسائط المتعددة: تستخدم لتعزيز مشاركة الطلاب وفهمهم للمفاهيم المتعلقة بالكهرباء من خلال مقاطع الفيديو والرسوم المتحركة والمحاكاة. 4. التقييم والتغذية الراجعة: يستخدم لقياس تعلم الطلاب وتقديم التغذية الراجعة حول تقدمهم من خلال الاختبارات والامتحانات والمشاريع.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	108	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	92	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

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

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	نظام الوحدات الكهربائية، المبادئ الأساسية ونظرية الذرة
Week 2	أنواع المواد، أنواع الكهرباء، التيار
Week 3	الجهد، القوة الدافعة الكهربائية وفرق الجهد، مصادر القوة الكهربائية
Week 4	الطاقة الكهربائية
Week 5	المقاومة والمقاومية (قانون أوم)، المقاومية والتوصيلية الكهربائية
Week 6	المغناطيسية والكهرومغناطيسية، الحث الكهرومغناطيسي
Week 7	قانون فاراداي للحث الكهرومغناطيسي
Week 8	قانون لينز للحث الكهرومغناطيسي، تيارات إيدي
Week 9	التيارات الدوامة
Week 10	المحول الكهربائية
Week 11	المحول الكهربائية
Week 12	المولدات الكهربائية
Week 13	التيار المتناوب، أشكال الموجات، زمن وتردد الموجة الجيبية
Week 14	قيمة RMS للموجة الجيبية، الطور
Week 15	إمتحان نهائي

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week 1	معمل1:إيجاد العلاقة بين التيار المار عبر خيط التنغستن وفرق الجهد بين طرفيه
Week 2	معمل 2: الكهرباء الساكنة
Week 3	معمل 3: تحديد قيمة المقاومة المجهولة باستخدام جسر ويتستون.
Week 4	معمل 4: تحديد E. M. F. للبطارية

Week 5	معمل 5: المحولات الكهربائية
Week 6	معمل 6: كفاءة المحولات الكهربائية

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1- Fundamentals of Electric Circuits , Charles K. Alexander | Matthew n. o. Sadiku. FiFth Edition 2- Fundamental Electrical and Electronic Principles , Christopher R Robertson, Third Edition	No
Recommended Texts	1. ELECTRICAL FUNDAMENTALS COMPETENCY, Industry Training Authority of BC. LibreTexts ™ 2. Basic Principles of Electricity, by Prof. Dr. Osman SEVAİOĞLU Electrical and Electronics Engineering Department.	No
Websites	None	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Environmental Pollution			Module Delivery	
Module Type	**Core**			☒ Theory ☒ Lecture ☐ Lab √☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	NRE11004				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGI		Semester of Delivery	1	
Administering Department	Type Dept. Code		College	Type College Code	
Module Leader	Hamid Abdulla Saleh		e-mail	hamid.abdulla@uomosul.edu.iq	
Module Leader's Acad. Title	Lecturer		Module Leader's Qualification	Ph.D.	
Module Tutor	None		e-mail	E-mail	
Peer Reviewer Name	None		e-mail	E-mail	
Scientific Committee Approval Date	01/06/2023		Version Number	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	Here are some basic objectives for a calculus course: 1. Develop an understanding of the causes, effects, and prevention of environmental pollution. 2. Explore the different types of environmental pollution, including air pollution, water pollution, soil pollution, and noise pollution. 3. Understand the impact of pollution on human health, ecosystems, and the environment as a whole. 4. Learn about the laws and regulations related to environmental pollution and their implementation. 5. Understand the role of technology and innovation in preventing and mitigating environmental pollution. 6. Develop critical thinking skills to evaluate and analyze environmental pollution problems and propose solutions. 7. Foster a sense of responsibility and commitment to environmental sustainability and protection. 8. Develop communication and collaboration skills to work effectively with others to address environmental pollution issues.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Identify the different types of environmental pollution, their sources, and their effects on human health and the environment. 2. Understand the scientific concepts, principles, and theories related to environmental pollution. 3. Analyze and evaluate environmental pollution problems using critical thinking skills and scientific methods. 4. Develop strategies and solutions to prevent and mitigate environmental pollution. 5. Evaluate the effectiveness of current environmental policies and regulations related to pollution control and propose improvements. 6. Understand the role of technology and innovation in preventing and mitigating environmental pollution. 7. Develop communication and collaboration skills to work effectively with others to address environmental pollution issues. 8. Understand the ethical and social implications of environmental pollution and the importance of environmental sustainability. 9. Apply knowledge and skills gained in the course to real-world environmental pollution problems. 10. Foster a sense of responsibility and commitment to environmental protection and sustainability.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Principal layers of atmosphere, Earth atmosphere layers specification ,Pollution definition, Pollutants, Point and nonpoint source pollution, Balance of nature, Pollution sources effects, Air pollution, Principal stationary pollution sources, world's population, Aerosol Atmospheric particulate matter. Subtypes of atmospheric particle matter include, Black carbon, Effects of particle

	matter on health, Size, shape and solubility matter, Health problems, Smog What Is Smog, Summer smog, Winter smog, How Can I Protect Myself from Smog. Ozone, What is a temperature inversion, Global warming, Non-greenhouse gases, Two theory about Global Warming, -Is Global Warming Real, Global Warming isn't Real, Important consideration for dealing with air pollution, Pollutant dilution by chimney, Construction of chimneys, Chimney draught or draft, contamination of the soil(soil pollution). Water pollution, Classification of water pollution, Groundwater pollution, Common sources of water pollution, Organic, inorganic and macroscopic water contaminants, Thermal pollution of water, Measurement of water pollutants, Pollution control devices(strategies), Pollution with Oil spill, Sources and rate of oil spill occurrence, Effects of oil spill on the environmental, United Nations Climate Change conference, The Kyoto Protocol, Doha Amendment, The Paris Agreement, How are countries supporting one another?

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: used to introduce and explain key concepts related to nuclear energy and electricity generation from reactors. 2. Interactive discussions: used to engage students in critical thinking and problem-solving related to nuclear energy through group discussions, debates, case studies, and simulations. 3. Multimedia resources: used to enhance student engagement and understanding of complex concepts related to nuclear energy through videos, animations, and simulations. 4. Assessment and feedback: used to measure student learning and provide feedback on their progress through quizzes, exams, and projects.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Principal layers of atmosphere, Earth atmosphere layers specification ,Pollution definition, Pollutants.
Week2	Point and nonpoint source pollution, Balance of nature, Pollution sources effects, Air pollution, Principal stationary pollution sources.
Week 3	world's population, Aerosol Atmospheric particulate matter, Tutorial.
Week 4	Subtypes of atmospheric particle matter include, Black carbon, Effects of particle matter on health, Size, shape and solubility matter.
Week 5	Health problems, Smog What Is Smog, Summer smog, Winter smog, How Can I Protect Myself from Smog.
Week 6	Ozone, What is a temperature inversion, Tutorial
Week 7	Mid Exam ,Global warming, greenhouse gases Non-greenhouse gases
Week 8	Two theory about Global Warming, -Is Global Warming Real, Global Warming isn't Real,
Week 9	Important consideration for dealing with air pollution, Pollutant dilution by chimney, Construction of chimneys,
Week 10	Chimney draught or draft, contamination of the soil(soil pollution), Tutorial
Week 11	Water pollution, Classification of water pollution, Groundwater pollution, Common sources of water pollution, Organic, inorganic and macroscopic water contaminants.
Week 12	Thermal pollution of water, , Pollution control devices(strategies), Pollution with Oil spill, Sources and rate of oil spill occurrence, Effects of oil spill on the environmental.
Week 13	United Nations Climate Change conference, The Kyoto Protocol, Doha Amendment, The Paris Agreement, How are countries supporting one another? , Tutorial .

Week 14	Presentation of scientific videos of the material with collective participation.
Week 15	Presentation of scientific videos of the material with collective participation.
Week 16	Final Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. "Pollution – Definition from the Merriam-Webster Online Dictionary". Merriam-webster.com. 2010-08-13. Retrieved 2010-08-26. 2. Carrington, Damian (October 20, 2017). "Global pollution kills 9m a year and threatens 'survival of human societies'". The Guardian. Retrieved October 20, 2017	No
Recommended Texts	1. Patrick Allitt, A Climate of Crisis: America in the Age of Environmentalism (2014) p 206. 2. Gabbatiss, Josh (July 18, 2018). "Meat and dairy companies to surpass oil industry as world's biggest polluters, report finds". The Independent. Retrieved June 29, 2019.	No
Websites	None	

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Solar Cell**			Module Delivery	
Module Type	**Core**			☒ Theory ☒ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	NRE36025				
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level	UGIII		Semester of Delivery	6	
Administering Department	BSc_NRE		College		
Module Leader	Huda M. Muneer Abd Alqader		e-mail	hu.muneer@uomosul.edu.iq	
Module Leader's Acad. Title	Lecture		Module Leader's Qualification	PhD.	
Module Tutor	Mohammed Mahmood		e-mail	@uomosul.edu.iq	
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date	08/05/2024		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 solar energy as an alternative and sustainable energy source. 2- To learn about solar cell as a device that used to convert directly the sunlight to electricity. 3- To perform different type of solar cell.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Investigates the concepts of semiconductors materials. 2. Defines the physical property of solar cell. 3. To learn working principles of solar cells. 4. Distinguish between solar cell types. 5. Students will gain knowledge on how to calculate the parameters for solar cell efficiency. 6. Evaluation the experimental results as required.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Theoretical lectures</u> The element semiconductors, those composed of single species of atoms, such as silicon (Si) and germanium (Ge), can be found in Column IV, the atoms in a silicon lattice is surrounded by four nearest neighbors. Each atom has four electrons in the outer orbit, and each atom shares these valence electrons with its four neighbors. This sharing of electrons is known as covalent bonding, when a semiconductor is doped with impurities, the semiconductor becomes extrinsic and impurity energy levels are introduced. Figure 5a shows schematically that a silicon atom is replaced (or substituted) by an arsenic atom with five valence electrons. The arsenic atom forms covalent bonds with its four neighboring silicon atoms. The arsenic atom is called a donor and the silicon becomes n-type because of the addition of the negative charge carrier. [*10* hrs] The transport of carriers under the influence of an applied electric field produces a current called the drift current, the carriers tend to move from a region of high concentration to a region of low concentration. This current component is called the diffusion current. To understand the diffusion process, let us assume an electron density that varies in the x-direction, the process of introducing excess carriers is called carrier injection, most semiconductor devices operate by the creation of charge carriers in excess of the thermal equilibrium values. We can introduce excess carriers by optical excitation or forward-biasing- a p-n junction. [*8* hrs] The Sun is the star at the center of the Solar System. It is like a ball of hot plasma, heated by nuclear fusion reactions in its core, radiating the energy mainly as visible light, ultraviolet light, and infrared radiation. It is the most important source of energy for life on Earth. Its diameter is about 1.39 million kilometers; Latitude is the geographical coordinate that specifies the north-south position of a point on the Earth's surface. Line of constant latitude run east-west and are measured in degrees. [*10* hrs] p-n junctions are formed by joining n-type and p-type semiconductor materials that are uniformly doped and physically separated before the junction formed, while p-type material contains a large concentration of holes with few electrons, the opposite is true for n-type material [8 hrs] When electron hole pairs are created in the depletion region, they are separated by the built-in electric field. Hence, the potential difference is

	limited by the built-in voltage. On the other hand, only photons with energies larger than the band gap are absorbed in a semiconductor, and hence the light-generated current decreases with the increase in the energy gap due to the limited solar spectrum [3 hrs] Part B – Practical labs Deals with semiconductor materials as well as measuring some parameters such as conductivity and resistivity. [18 hrs] Determining the electrical and optical properties of p-n junction as solar cell, description of I-V characteristics curve, series and shunt resistance, current, voltage, fill factor maximum power point . [18 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Expanding students' perceptions about this science where students can develop a complete project if they were immersed in the industry`. In addition to that the student can distinguishing the types of solar cells through observations of the properties and internal structures and their diagnosis. This will be achieved through lectures, labs, and interactive tutorials .

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	82	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

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

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Element semiconductors, compound semiconductors and intrinsic carrier concentration.
Week 2	Donors and acceptors and carriers transport phenomena.
Week 3	Resistivity, diffusion current and Einstein relation.
Week 4	Current density equations, generation and recombination process.
Week 5	Direct, indirect, surface and Auger recombination.
Week 6	The characteristic of sun light.
Week 7	The black body radiation, the sun and its radiation and solar radiation at the Earth surface.
Week 8	Apparent motion of the sun, basic solar geometry, Earth's tilt and latitude.
Week 9	Longitude, basic Earth-Sun angles, and derived Earth-Sun angles.
Week 10	Calculation solar position and absorption of light.
Week 11	p-n junctions, the structure of p-n junctions and the behavior of solar cell.
Week 12	Effect of light and spectral response.
Week 13	Effect of parasitic resistance.
Week 14	PV cell interconnection, module and circuit design.
Week 15	Component of PV systems, series and parallel connection in PV modules.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Sze, S. M., and Lee, M., (2012). Semiconductor devices: Physics and technology, John Wiley and Sons, Inc. Würfel, P. and Würfel, U., (2016). Physics of solar cells, Wiley, Germany.	Yes No
Recommended Texts	Dharmadasa, I., M., (2018). Advance in thin-film solar cells, Pan Stanford publishing, Singapore.	No

	Li, S., S., (2006). Semiconductor Physical Electronics, Springer science and business media, LIC.	No
Websites	https://www.iop.org/explore-physics/physics-around-you/sustainable-building/solar-panels#gref https://www.coursera.org/learn/physics-silicon-solar-cells https://www.un.org/en/development/desa/news/population/2015-%20report.html.%20Accessed%209%20Apr,%202017	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**General Chemistry I**			Module Delivery	
Module Type	**Core**			☒ Theory ☒ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	**NRE1103**				
ECTS Credits	**7**				
SWL (hr/sem)	**150**				
Module Level	1		Semester of Delivery	1	
Administering Department	Type Dept. Code		College	Type College Code	
Module Leader	Lamya Adnan Sarsam		e-mail	lamyasarsam@uomosul.edu.iq	
Module Leader's Acad. Title	Assistant Professor		Module Leader's Qualification	Ph.D.	
Module Tutor	None		e-mail	lamyasarsam@uomosul.edu.iq	
Peer Reviewer Name	None		e-mail	E-mail	
Scientific Committee Approval Date	12/06/2023		Version Number	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The main objectives of a General Chemistry I module that covers the basics of general Chemistry and how to solve their parameters include: 1. Understanding the basic principles of types of chemistry (Analytical chemistry, organic chemistry, Physical Chemistry, and Inorganic chemistry), This objective would cover the fundamental principles of these types of chemistry, including the Classification of Analytical Chemistry, Qualitative Analysis, and Quantitative Analysis. Properties of Gas, Kinetic Molecular theory of gas, Types of carbon and hydrogen atoms, and electronic structure of the atom. 2. Understanding Properties of Gas, Kinetic Molecular Theory of gas, Pressure and its measurement, Relationship between pressure and volume, Boyle's Law., Relationship between Temperature and volume, Charles's Law., Relationship between Temperature and pressure, Gay- Lussac's law, Vapor pressure & Boiling point, and the principle of the first law of thermodynamics 3. Understanding Alkanes and the structure of alkanes, also types of carbon atoms and hydrogen atoms, in addition to their physical properties, and study how to name the alkanes. Also Understanding Alkenes and their structure (Cis& Trans), and their physical properties. and study how to name the alkenes, their structure, and their physical properties. Finally, study the third type of Alkynes and how to name them. 4. This objective would cover the electronic structure of the atom, and their theories which are Classical theory, Bohr Theory, and Quantum theory, and also broach to a practical example using quantum numbers. In addition to study the Periodic Table of the Elements, Hybridization, Types of Hybridization, and Applications of Hybridization.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The students will be able to know: 1. How can they identify the qualitative of the material? 2. How can they identify the quantitative of the material? 3. Calculate the concentration in different types of Physical and chemical Expression 4. Calculate the equivalent weight. 5. Solve the pH exercise.

	6. How can they name the alkane 7. How can they name the alkene 8. How can name the alkyne 9. Physical properties of alkane 10. Physical properties of alkene 11. Physical properties of alkyne 12. How to prepare the alkane. 13. Explain the Electronic structure of the atom. , Classical theory. Bohr Theory. Quantum theory. Practical examples using quantum numbers. 14. Periodic Table of the Elements. Hybridization Types of Hybridization 1- sp Hybridization, 2- sp2 Hybridization, 3- sp3 Hybridization 15. Applications of hybridization include: 1. Linear molecule 2. Trigonal planar molecules 3-.Tetrahedral molecules. 16. Understanding Properties of Gas, Kinetic Molecular Theory of gas, Pressure and its measurement, Relationship between pressure and volume, Boyle's Law., Relationship between Temperature and volume, Charles's Law., Relationship between Temperature and pressure, Gay- Lussac's law, Vapor pressure & Boiling point. 17. Statement of the first law of thermodynamics - Conservation of energy. - Energy can neither be created nor destroyed but it can change forms. -Total amount of energy in a closed system remains constant
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Theory:</u> -Define Analytical Chemistry, Steps of Analysis, Solutions., Standard Solutions, Methods of Expressing Constant, Physical and Chemical Methods. [3hrs.] - Aqueous Solution and chemical Equilibria, Equilibrium constant expression, Chemical equilibrium. [3hrs.] - Equilibrium constant expression, Solubility product constant, Dissociation constant. , Buffer solutions, calculate buffer solution. [3hrs.] - The common ion effect. [3hrs.] Physical chemistry - Properties of Gas, Kinetic Molecular Theory of gas. [3hrs.] - Pressure and its measurement, Relationship between pressure and volume, Boyle's Law. [3hrs.] - Relationship between Temperature and volume. Charles's Law. , Relationship between Temperature and pressure. Gay- Lussac's law. [3hrs.] - Vapor pressure and boiling point. [3hrs.] - The first law of thermodynamics

	Organic Chemistry - Alkane, Structure of alkane, Types of carbon atoms and hydrogen atoms, Physical properties, Name of alkane. [6hrs.] - Alkene, Structure of alkene (Cis& Trans), Structure of alkene, Physical properties Name of alkene. [3hrs.] -Alkynes, Structure of alkynes, Physical properties, Name of alkynes. [3hrs.] Inorganic chemistry Introduction , Electronic structure of the atom. , Classical theory . -Bohr Theory . Quantum theory . Practical examples using quantum numbers . [3hrs.] -Periodic Table of the Elements . Hybridization Types of Hybridization [6hrs.] 1- sp Hybridization ,2- sp2 Hybridization ,3- sp3 Hybridization - Applications of hybridization 1. Linear molecule 2- Trigonal planar molecules 3- Tetrahedral molecules

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: used to introduce and explain key concepts related to Analytical chemistry, Physical chemistry, Organic chemistry, and inorganic chemistry. 2. Interactive discussions: used to engage students in critical thinking and problem-solving questions related to calculating the molecular weight, types of concentration, pH, and common ion through group discussions, debates, case studies, and simulations. 3. Multimedia resources: used to enhance student engagement and understanding of complex concepts related to the types of chemistry through videos, and animations. 4. Assessment and feedback: used to measure student learning and provide feedback on their progress through quizzes, exams, and projects.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	82	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Define Analytical Chemistry, Steps of Analysis, Solutions., Standard Solutions ., Methods of Expressing Constant, Physical and Chemical Methods
Week 2	Aqueous Solution and chemical Equilibria, Equilibrium constant expression, Chemical equilibrium, Equilibrium constant expression.
Week 3	Solubility product constant, Dissociation constant., Buffer solutions, calculate buffer solution
Week 4	The common ion effect.
Week 5	Alkane, Structure of alkane, Types of carbon atoms and hydrogen atoms, Physical properties, Name of alkane.
Week 6	Alkene , Structure of alkene (Cis& Trans) Structure of alkene , Physical properties Name of alkene .
Week 7	Alkynes, Structure of alkynes Physical properties, Name of alkynes.
Week 8	Properties of Gas. , Kinetic Molecular Theory of gas.
Week 9	Pressure and its measurement. , Relationship between pressure and volume, Boyle's Law.
Week 10	Relationship between Temperature and volume. Charles's Law. Relationship between Temperature and pressure.
Week 11	Gay- Lussac's law. , Vapor pressure and the first law of thermodynamics.

Week 12	Introduction, Electronic structure of the atom. , Classical theory.
Week 13	Bohr Theory. , Quantum theory. , Practical examples using quantum numbers.
Week 14	Periodic Table of the Elements. ,Hybridization,Types of Hybridization 1- sp Hybridization, 2- sp2 Hybridization 3- sp3 Hybridization
Week 15	Applications of hybridization 1. Linear molecule 2- Trigonal planar molecules 3- Tetrahedral molecules
Week 16	**Final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1." Fundamental of Analytical Chemistry. by: Skoog & West. 9th -Ed 2013 2. Organic Chemistry, by: Morison & Boyd. 3. A presentation of the First Law of Thermodynamics. by: Md. Shimul Bhuia 4. Advanced Inorganic Chemistry. by: Cotton, F.A. and Wilkinson, D. 5th ed. 2000	No
Recommended Texts	1. Analytical Chemistry. by Christian. 2004 2. Fundamental Chemistry for Medical Science By Dr. Jameel M. Dhabab 2020 3. Coordination Chemistry. by: Martel, A. E. 2009	No
Websites	https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://www.slideshare.net/shimulbhuia/first-law-of-thermodynamics-143165111&ved=2ahUKEwiHp_mx1cGCAxVOhf0HHXn1BPgQFnoECAsQAQ&usg=AOvVaw2V8kuglg33zEsP01ek2UoX.	

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**General Physics I**			Module Delivery	
Module Type	**Core**			☒ Theory ☒ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	NRE1101				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	UGI		Semester of Delivery	1	
Administering Department	BSc-NRE		College	Type College Code	
Module Leader	Hazim Saleh Ahmed		e-mail	hazimsaleh@uomosul.edu.iq	
Module Leader's Acad. Title	Assistant Prof.		Module Leader's Qualification	Ph.D.	
Module Tutor			e-mail		
Peer Reviewer Name	Ibtisam Yahya Abdullah		e-mail	ibtisamyahya@uomosul.edu.iq	
Scientific Committee Approval Date	01/06/2023		Version Number	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Understanding the basic concepts and principles of physics, such as motion, energy, and forces. 2. Understanding the laws of physics that govern the behavior of matter and energy. 3. Developing the ability to apply physics principles to solve problems in a variety of contexts. 4. Developing critical thinking skills through the analysis and interpretation of experimental data. 5. Understanding the role of physics in the natural world and its applications in technology and engineering. 6. Developing an appreciation for the beauty and elegance of physics theories and their explanatory power. 7. Understanding the concept of energy, potential and kinetic, and its various forms. 8. Understanding the relationship between force, mass, and acceleration. 9. Understanding the role of forces in the motion of objects and the transfer of energy. 10. Understanding the principles of conservation of energy and momentum.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explain and apply the fundamental concepts and principles of physics, including mechanics, electromagnetism, thermodynamics, and optics. 2. Solve problems and conduct experiments using mathematical and scientific reasoning, including the use of algebra, calculus, and laboratory equipment. 3. Apply physics principles to real-world problems in areas such as energy, technology, and the environment. 4. Explain and apply Newton's three laws of motion to various physical systems and phenomena. 5. Analyze and solve problems involving the motion of objects, using concepts such as force, mass, acceleration, and energy. 6. Understand and apply the principles of work, energy, and power to various physical systems and phenomena. 7. Understand and apply the principles of conservation of energy and momentum. 8. Understand and apply the concepts of potential and kinetic energy, and the relationship between them. 9. Understand and apply the principles of simple harmonic motion.10. Understand and apply the principles of gravitation and orbital motion.
Indicative Contents المحتويات الإرشادية	Introduction and Scalars and Vectors Motion in one and two dimensions Newton laws of motion Energy, energy transfer and Potential energy Conservation of Linear momentum Rotation motion Static equilibrium Properties of matter Simple harmonic motion Universal gravitation

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: used to introduce and explain key concepts related to principles of physics, such as motion, energy, and forces and energy transfer and Potential energy. 2. Interactive discussions: used to engage students in critical thinking and problem-solving related to Newton's three laws of motion to various physical systems and phenomena. 3. Multimedia resources: used to enhance student engagement and understanding of complex concepts related to general physics through videos, animations, and simulations. 4. Assessment and feedback: used to measure student learning and provide feedback on their progress through quizzes, exams, and projects.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	82	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction
Week 2	Scalars and Vectors
Week 3	Motion in one and two dimensions
Week 4	Motion in one and two dimensions
Week 5	Newton laws of motion
Week 6	Energy and energy transfer
Week 7	Energy and energy transfer
Week 8	Potential energy
Week 9	Conservation of Linear momentum
Week 10	Rotation motion
Week 11	Static equilibrium
Week 12	Properties of matter
Week 13	Simple harmonic motion
Week 14	Universal gravitation
Week 15	Universal gravitation
Week 16	Final Exam

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1. Physic for Scientists and Engineers.	No
Recommended Texts	1. Serway and Jewett " 8th " edition 2008	No
Websites	None	

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

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	حقوق الانسان والديمقراطية Human Rights and Democracy			Module Delivery	
Module Type	B			☒ Theory ☐ Lecture ☐Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	UOM104				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level	1		Semester of Delivery	1	
Administering Department	Type Dept. Code		College	Type College Code	
Module Leader	Salah avdo ali		e-mail	Salahavdo2@uomosul.edu.iq	
Module Leader's Acad. Title	Assistant Teacher		Module Leader's Qualification	M.A.	
Module Tutor			e-mail		
Peer Reviewer Name	Name		e-mail	E-mail	
Scientific Committee Approval Date	02/06/2023		Version Number	1.0	

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

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

Module Objectives أهداف المادة الدراسية يتم كتابة اهم الأهداف التي تغطيها هذه المادة الدراسية بشكل جمل او فقرات توضح المواضيع التي سيتم التطرق اليها و دراستها و معالجتها)	أ -المعرفة والفهم) الاهداف المعرفية(أ -1ان يكون الطالب ملماً بمفاهيم حقوق الانسان والديمقراطية ويكتسب الوعي والثقافة السياسية. أ -2يستطيع ان يميز بين المصطلحات والمفاهيم المختلفة مثل (حقوق الانسان، الدمقرطة، الديمقراطية، الانتقال الديمقراطي، العدالة الانتقالية.(أ -3القدرة على تحليل تطورات حقوق الانسان والمراحل التي مرت بها. أ -4ان يكون قادرا على ادراك واستيعاب الاعلانات والمواثيق الدولية لحقوق الانسان مثل الاعلان العالمي لحقوق الانسان. أ -5ان يكون قادرا على التعبير عن راية بخصوص واحترام اراء الاخرين . أ -6ان تكون لدية القدرة على تحليل اي مشكلة ووصفها والتنبأ بمستقبل الظاهرة السياسية . أ7- ان يتعرف على انواع الديمقراطية والتمييز فيما بينها داخل النظم السياسية المعاصرة. ب - المهارات الخاصة بالموضوع) الاهداف المهاراتية الخاصة بالمقرر(ب –- 1اكتساب الطالب لمهارات التفاوض والتواصل وتبادل الاراء مع الاخرين. ب – 2 اكتساب الطالب مهارات الحوار البناء الهادف . ب – 3 اكتساب الطالب مهارات مواجهة اي موقف والتعبير عن الراي بكل شجاعة وثقة بالنفس. ج- مهارات التفكير ج1- مهارات التحليل. ج2- مهارات التوظيف للمفردات التي تعلمها في الواقع العملي من خلال دراسة مشكلات محددة من الواقع. ج3- مهارات التنبؤ والدراسات المستقبلية للنظم الديمقراطية. د - المهارات العامة والمنقولة (المهارات الأخرى المتعلقة بقابلية التوظيف والتطور الشخصي). د1- القدرة على العمل كفريق. د2- التفاعل مع فريق العمل لتحقيق المهارات المطلوبة. د3- القدرة على القيام بعرض نظري لبعض الموضوعات ذات العلاقة بمفردات المادة. د4- اكتساب مهارات التحليل العلمي لاي ظاهرة سياسية تتعلق بحقوق الانسان.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية يتم كتابة اهم المُخرجات او الناتج و الكَم العلمي الذي يتم استخدامه للتدريس في هذه المادة على شكل أسئلة أساسية تخص منهاج المادة بأكمله و يجب ان لا تقل هذه المُخرجات من ناحية العدد عن 6 مُخرجات و يفضل ان تكون بعدد أسابيع الدراسة.	1.عرف المفاهيم الاتية: حقوق الانسان، الشرعة الدولية، الديمقراطية، الدمقرطة، التحول الديمقراطي. 2. وضح اهمية الحقوق السياسية والمدنية. 3. اذكر اهم ما جاء في المواثيق الدولية لحقوق الانسان فيما يخص حق الحياة. 4. تكلم باختصار عن انواع الحقوق الاقتصادية والاجتماعية والثقافية. 5.ناقش ما جاء في الدستور العراقي لعام 2005 النافذ من ضمانات فيما يخص حقوق الانسان. 6.حدد اهم خصائص النظام الديمقراطي 8.اشرح انواع الديمقراطية ثم بين اهم الانواع القابلة للتطبيق العملي. 9.عدد مع الشرح انواع النظم الانتخابية. 10.ناقش الاطار الوظيفي للسلطة التشريعية ضمن مؤسسات النظام السياسي العراقي وفق ما جاء في دستور عام 2005. 11.حدد الاطار البنيوي للمؤسسة التنفيذية في النظام السياسي العراقي وفق دستور 2005. 12.تكلم عن اختصاصات مجلس النواب في اطار المؤسسة التشريعية. 13. ناقش شروط انتخاب رئيس الجمهورية وفق الدستور العراقي لعام 2005.
Indicative Contents المحتويات الإرشادية يتم كتابة اهم العناوين الرئيسية للمواضيع بشكل متسلسل و التي تشمل كافة الفقرات التي تحتويها مع إدراج عدد الساعات المطلوبة لتنفيذ	يتضمن المحتوى الإرشادي ما يلي. مفهوم حقوق الانسان وتطور الحقوق تاريخياً يتناول تعريف الحق وتعريف الانسان، تعريفاً لغوياً واصطلاحياً واجرائياً، خصائص حقوق الانسان، ثم التطور التاريخي لحقوق الانسان، من العصور القديمة مروراً بالعصور الوسطى والحديثة، ومن ثم حقوق الانسان المعاصرة، وما انبثق منها من اشكال واجيال لحقوق الانسان، وانواع ومصادر حقوق الانسان ومن ضمنها الحقوق المدنية والسياسية والحقوق الاقتصادية والاجتماعية والثقافية، وحقوق الانسان في المواثيق الدولية والتشريعات الوطنية، والتحديات العالمية لحقوق الانسان ومن ضمنها التحديات الثقافية مثل العولمة والتطور التكنولوجي، والتحديات السياسية مثل الارهاب والحروب اللامتماثلة والحروب بين الدول. (5 ساعات)

حقوق الانسان والحريات العامة في الدستور العراقي يتناول ما تضمنه الدستور العراقي من ضمانات قانونية لحماية حقوق الانسان وحرياته العامة، وانواع تلك الضمانات. (ساعتان). الحريات العامة والديمقراطية يتناول التطور التاريخي للديمقراطية، في الحضارات القديمة لاسيما في دول المدن اليونانية، مروراً بالديمقراطية عند المفكرين الغربيين امثال توماس هوبز ومونتسكيو وجان جاك روسو، ثم النماذج التقليدية للديمقراطية (انواع الديمقراطية)، المباشرة وغير المباشرة وشبه المباشرة، وخصائص وشروط النظام الديمقراطي، وانواع النظم الانتخابية في الانظمة الديمقراطية. (3 ساعات). الديمقراطية في نظام الحكم العراقي وفق دستور 2005 يتناول الاطار البنيوي لمؤسسات النظام السياسي العراقي، بنية المؤسسة التشريعية المكونة من مجلس النواب ومجلس الاتحاد، وبنية المؤسسة التنفيذية المكونة من رئيس الجمهورية ومجلس الوزراء، وبنية المؤسسة القضائية المكونة من مجلس القضاء الاعلى والمحكمة الاتحادية العليا، محكمة التمييز الاتحادية، وجهاز الادعاء العام، وهيئة الاشراف القضائي، والمحاكم الاتحادية الاخرى، ثم الاطار الوظيفي واختصاصات مؤسسات النظام السياسي العراقي (التشريعية، التنفيذية، القضائية)، واخيراً العلاقة بين السلطات (التوازن والتعاون، والفصل بين السلطات). (4 ساعات).	كل فقرة.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies يتم كتابة ملخص الاستراتيجية الرئيسية التي سيتم تبنيها في تقديم هذه المادة	1. المحاضرة المصحوبة بالشرح والتحليل. 2. الحلقة النقاشية. 3. التقارير والبحوث. 4. عرض المادة عبر شرائح (بوربوينت) . 5. الاسئلة والاجوبة. 6. المشاركة الصفية .

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	1
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

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

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

Delivery Plan (Weekly Syllabus) المنهاج الأسبوعي النظري	
	Material Covered
Week 1	مفهوم حقوق الانسان
Week 2	التطور التاريخي لحقوق الانسان
Week 3	اشكال واجيال حقوق الانسان
Week 4	حقوق الانسان في المواثيق الدولية
Week 5	التحديات العالمية لحقوق الانسان
Week 6	الحقوق المدنية والسياسية والاقتصادية
Week 7	حقوق الانسان والحريات العامة في الدستور العراقي
Week 8	الحريات العامة والديمقراطية
Week 9	التطور التاريخي للديمقراطية
Week 10	النماذج التقليدية للديمقراطية (انواع الديمقراطية)
Week 11	خصائص وشروط النظام الديمقراطي
Week 12	الديمقراطية في نظام الحكم العراقي وفق دستور 2005
Week 13	الاطار البنيوي لمؤسسات النظام السياسي العراقي (التشريعية، التنفيذية، القضائية)
Week 14	الاطار الوظيفي واختصاصات مؤسسات النظام السياسي العراقي (التشريعية، التنفيذية، القضائية)
Week 15	الاطار الوظيفي واختصاصات مؤسسات النظام السياسي العراقي (التشريعية، التنفيذية، القضائية)

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered لا يوجد

Week 1	Lab 1:
Week 2	Lab 2:
Week 3	Lab 3:
Week 4	Lab 4:

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1. حافظ علوان حمادي الدليمي، حقوق الانسان، وزارة التعليم العالي والبحث العلمي، جامعة بغداد، 2013. 2. محمد سليم محمد، نظرات حول الديمقراطية، دار وائل للطباعة، عمان، 2000.	Yes Yes
Recommended Texts	1. بهاء الدين ابراهيم واخرون، حقوق الانسان بين التشريع والتطبيق، دار الجامعة الجديدة، الاسكندرية، 2008. 2. الدستور العراقي الدائم لعام 2005، الامانة العامة لمجلس الوزراء، بغداد، 2006.	Yes Yes
Websites	https://www.coe.int/en/web/compass/democracy.	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Principle of Energy and Sources**			Module Delivery	
Module Type	**Core**			☒ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	NRE1102				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGx11 UGI	Semester of Delivery		1
Administering Department		Type Dept. Code	College	Type College Code	
Module Leader	Lubna Abdulaziz Salih		e-mail	lubnaabdulaziz@uomosul.edu.iq	
Module Leader's Acad. Title		Assistant Professor	Module Leader's Qualification		Ph.D.
Module Tutor	None		e-mail	E-mail	
Peer Reviewer Name		None	e-mail	E-mail	
Scientific Committee Approval Date		18/06/2023	Version Number		4.0

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 main objectives of an Principle of energy sources that covers the all types of energy 1. The main objective of the course is the importance of all sources of energy and its applications. the future Introducing the student to the basic energy sources on the surface of the earth. 2. This course deals with the basic concept about conventional and non conventional energy sources 3. Learn about the new energy sources 4. Learn about renewable energy sources Studying the types of renewable energy and their principles and applications, and explaining the importance of using such energies from an environmental and economic point of view.. 5. Learn about Primary and secondary sources of energy, Energy and measurement units.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Study all types of Energy(conventional, new and Renewable) on the surface of the earth 2. Understand the meaning of energy and Define the various terms associated with energy sources. 3. Combinations of different energy sources 4. Learn the advantages and disadvantages of each source 5. learn about Photosynthesis; Plantation (energy crops) 6. . learn about production of oil and natural gas by unconventional means: energy alternatives 7 . learn about Energy and measurement units
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Theory:</u> <u>Part A – Theoretical lectures</u> Hydrocarbon resources-Fossil sources-(FES)(conventional sources): 1. Natural gas (NG) Types of N.G: Associated gas: Non Associated gas:. [3hrs] ,. 2. Crude oil and reserves 3. Coal Ranks of coal: Coal formation Wood: FUELS FROM WOOD Tar sands and oil shales: The reality of the change in global energy consumption and the change in the type of sources supplied to it:

	Challenges facing the future of oil: Non-conventional energy sources [*6* hrs] . New and renewable types: New sources: 1: production of oil and natural gas by unconventional means: energy alternatives. Tar sands. Oil shales. Heavy crude oil. Liquid gas. Coal bed methane CBM. Shale gas. Gas hydrate. Gasification and liquefaction of coal. New methods to stimulate the extraction of oil and gas from the fields. Nuclear energy. Hydrogen: [*10* hrs] Renewable energy sources: Hydro – power energy Wind energy Tidal energy Thermal energy of oceans and seas water Geothermal energy Waves energy Solar energy Direct heating Solar furnaces Solar cell Photosynthesis: Plantation (energy crops) Biomass (3h) Biomass as a fuel: Organic waste as an energy source: Primary and secondary sources of energy: Secondary energy sources: Hydrogen: Energy and measurement units [9 h]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: used to introduce and explain key concepts related to all Energy Sources hn the surface of the earth 2. Interactive discussions: used to engage students in critical thinking and

	problem-solving related to nuclear energy through group discussions, debates, case studies, and simulations. 3. Multimedia resources: used to enhance student engagement and understanding of complex concepts related to nuclear energy through videos, animations, and simulations. 4. Assessment and feedback: used to measure student learning and provide feedback on their progress through quizzes, exams, and projects. 5. Expanding students' perceptions about this science and its contents it includes that help in stratigraphic Show related video. White board,& Data show

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Overview of energy sources and its history What is Energy, Work Energy Principles, Principle of conservation of energy, Define of energy, Energy sources on the surface of the earth
Week 2	Fossil energy sources, Natural gas and reserves, Associated gas, Non Associated gas.
Week 3	Crude oil and reserves, Coal, Ranks of coal, Coal formation
Week 4	Wood: FUELS FROM WOOD, Tar sands and oil shales
Week 5	The reality of the change in global energy consumption and the change in the type of sources supplied to it, Challenges facing the future of oil
Week 6	New Energy sources: Coal as a fuel
Week 7	New methods to promote oil extraction from the depleted fields,
Week 8	Coal Bed Methane, Shale Gas,
Week 9	Nuclear fuel,
Week 10	Gas Hydrate
Week 11	Renewable energy sources, Solar energy, Hydro – power energy: Wind energy Tidal energy Ocean Thermal Energy Conversion (OTEC): Geo-thermal energy Solar energy
Week 12	Photosynthesis, Plantation (energy crops). Biomass .
Week 13	Organic waste as an energy source
Week 14	Hydrogen fuel
Week 15	Primary and secondary sources of energy, Energy and measurement units
Week 16	Final Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1- Synthetic Fuel 2- Types of Renewable Energy	No

Recommended Texts	1. Renewable Energy Sources for Sustainable Development By Narendra Singh Rathore, N. L. Panwar · 2007Justin 2. Fossil Fuel Healey • 2013	No
Websites	None	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	اللغة العربية Arabic Languge			Module Delivery	
Module Type	BASIC			☒ Theory ☐ Lecture ☐Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	UOM101				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level		1	Semester of Delivery		1
Administering Department		New & Renewable Energy	College	Science	
Module Leader	د. عبير طارق الحاصود		e-mail	Abeer.t.d@uomosul.edu.iq	
Module Leader's Acad. Title		lecturer	Module Leader's Qualification		Ph.D.
Module Tutor			e-mail		
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date			Version Number		

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	تعريف الطلاب بأساسيات اللغة العربية. كذلك كسر حاجز الخجل وزيادة ثقتهم داخل وخارج الفصل. هناك فرصة كبيرة لإشراكهم في مناقشات قصيرة حيث يمكنهم الكتابة أو التعبير عن أنفسهم شفهيًا. بالإضافة إلى ما سبق ، ستعمل الدورة على تحسين مهارات القراءة والكتابة والاستماع والتحدث كطلاب ، وتقوية ملكة الطلاب الأدبية لتذوق أساليب اللغة وإدراك مواطن الجمال فيها
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- خلق وعي كامل بالاستخدام الصحيح لقواعد اللغة العربية في الكتابة والمحادثة. 2- إدراك أهمية اللغة العربية داخل وخارج الحياة الجامعية. 3- سيحسن الطلاب قدرتهم على التحدث باللغة العربية من حيث الطلاقة والاستيعاب. 4- سيقوم الطلاب بمراجعة الأشكال النحوية للغة العربية واستخدام هذه الأشكال في سياقات تواصلية محددة ، والتي تشمل: الأنشطة الصفية ، والواجبات المنزلية ، وقراءة النصوص ، والكتابة. 5- سيعزز الطلاب قدرتهم على كتابة فقرات قصيرة وملخصات باستخدام نهج العملية.
Indicative Contents المحتويات الإرشادية	مقدمة عن الاتصال بشكل عام واللغة العربية بشكل خاص ، مع مقدمة عن فئات الكلمات (أجزاء الكلام) في اللغة العربية [4 ساعات]. شرح كل جزء من الكلام في اللغة العربية مثل الأسماء والضمائر والأفعال والصفات والظروف وحروف الجر وحروف العطف والاقتران [16 ساعة]. المهارات الأساسية في تعلم اللغة الإنجليزية: القراءة والكتابة يتم تقديمها بشكل تدريجي خلال الأسابيع الماضية [6 ساعات]. الجزء الأخير مخصص لبعض جلسات تصحيح الأخطاء وردود الفعل [2 ساعة]. -جعل الطلبة على دراية بالعلاقة بين أساليب التعلم وأساليب التدريس. -تشجيع الطلبة على "توسيع" أساليبهم.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. المحاضرة المصحوبة بالشرح والتحليل. 2. الحلقة النقاشية. 3. التقارير والبحوث. 4. عرض المادة عبر شرائح (بوربوينت) . 5. الاسئلة والاجوبة. 6. المشاركة الصفية .

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	1
Unstructured SWL (h/sem)	17	Unstructured SWL (h/w)	1

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

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

Delivery Plan (Weekly Syllabus) المنهاج الأسبوعي النظري	
	Material Covered
Week 1	**الكلام وأقسامه**
Week 2	**علامات الاسم**
Week 3	**علامات الفعل**
Week 4	**قواعد كتابة العدد**
Week 5	**قواعد كتابة العدد**
Week 6	**أنوع المفاعيل**
Week 7	**المبتدأ والخبر**
Week 8	**همزة القطع وهمزة الوصل**
Week 9	**الهمزة المتوسطة وهمزة السطر**
Week 10	**الفرق بين الضاد والضاء**
Week 11	**الفرق بين التاء المربوطة والتاء المفتوحة**
Week 12	**زيادة الحرف وحذفه**
Week 13	**زيادة الحرف وحذفه**
Week 14	**الأفعال الناقصة ، الحروف المشبه بالفعل**

Week 15	**اختبار**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	لا يوجد
Week 1	
Week 2	
Week 3	
Week 4	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	شرح ابن عقيل على الفية ابن مالك ، المرشد في الاملاء ، محمد شاكر سعيد	Yes Yes
Recommended Texts	الاسلوب ، احمد الشايب ، طرق تعليم التعبير ، محمد عبد القادر أحمد	Yes Yes
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Biomass Energy**			Module Delivery	
Module Type	**Core**			☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	**NRE47031**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	**UGIV**		Semester of Delivery	7	
Administering Department	BSc_NRE		College		
Module Leader	Hamid Abdulla Salih		e-mail	hamid.abdulla@uomosul.edu.iq	
Module Leader's Acad. Title	Lecture		Module Leader's Qualification	PH D.	
Module Tutor	None		e-mail	E-mail	
Peer Reviewer Name	None		e-mail	E-mail	
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	These objectives highlight the goals of the course in biomass definition, and illustrate the knowledge and skills that students will develop throughout their studies to convert biomass to biofuels in this department 1. Understanding the definition and concept of biomass. 2. Familiarizing with the different types ofbiomass techniques. 3. Exploring the advantages and disadvantages of biomass. 4. Developing skills in biomass convertion. 5. Identifying and understanding the essential types of biomass. 6. Gaining proficiency in bio fuel production. 7. Understanding the components of ligno cellulosic biomass. 8. Differentiating between variant process of bio fuel production. 9. Explain the benefits of bio fuel. 10. Explain the types of bio fuel as the alternative to fossil fuel.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Define of biomass. 2. Identify different types of biomass. 3. Explain the advantages and disadvantages of biomass 4. Apply an examples of of biomass types. 5. Identify and describe the biofuel products 6. Identify and describe the bio fuel types. 7. Differentiate between biomass conversion processes. 8. Understand biomass conversion systems. 9. Characterize the process and importance bio fuels. 10. The advantage of biofuels. 11. Uses of bio fuels
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Definition of biomass 2. Types of biomass 3. Advantage and disadvantage of biomass 4. Biomass conversion. 5. Processes of biomass conversion 6. biomass conversion modelling 7. examples of biomass 8. components of biomass 9. bio fuel 10. components of bio fuel 11. uses of bio fuel 12. Advantage and dis advantages of bio fuel 13. Types of bio fuel. 14. Types of bio fuel conversion processes.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: Traditional lectures can be used to present foundational concepts, theories, and principles to students. This allows for the dissemination of information and provides a framework for understanding the subject matter. 2. Discussions and Debates: Encouraging students to engage in discussions and debates promotes critical thinking and analysis of different perspectives. It allows them to delve deeper into the subject matter, challenge assumptions, and develop their communication and argumentation skills. 3. Case Studies: Presenting real-world case studies relevant to the course material can help students apply theoretical concepts to practical situations. This enables them to develop problem-solving skills and understand the real-life implications of the theories they are learning. 4. Group Projects: Assigning group projects or presentations that require students to work collaboratively can enhance their understanding of the material. It promotes teamwork, research skills, and the application of theoretical concepts in a practical context. 5. Multimedia and Visual Aids: Incorporating multimedia resources such as videos, interactive simulations, and visual aids (e.g., diagrams, charts, infographics) can enhance student engagement and understanding. Visual representations can often simplify complex concepts and make them more accessible. 6. Self-directed Learning: Encouraging students to take ownership of their learning through self-directed activities, such as independent research, literature reviews, or project-based assignments, fosters critical thinking, independent thought, and a deeper understanding of the subject matter. 7. Assessments: Utilizing a variety of assessment methods, such as quizzes, tests, essays, or reflective journals, allows students to demonstrate their understanding of the material and provides feedback for their learning progress. Assessments should be aligned with the learning outcomes and encourage critical thinking and analysis.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	82	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.46
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	What is bio mass
Week 2	Types of biomass
Week 3	Advantage and disadvantage of biomass
Week 4	Biomass conersion
Week 5	Biomass componenets
Week 6	Analytical biomass
Week 7	examples
Week 8	examples
Week 9	Biofuel production
Week 10	Biofuel types
Week 11	Biofuels types
Week 12	Biofuel uses
Week 13	Characterizing of biofuels
Week 14	Advantages and dis advantages of biofuels
Week 15	Bio fuels and fossil fuels

Week 16	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1-المنظمة العربية للتربية والثقافة والعلوم إدارة برامج العلوم والبحث العلمي مصادر الطاقة النظيفة أداة ضرورية لحماية المحيط الحيوي العربي 2- Renewable Energy Technology Characterizations TR-109496 Topical Report, December 1997 Prepared by Office of Utility Technologies, Energy Efficiency and Renewable Energy, U.S. Department of Energy 1000 Independence Avenue Washington, D.C. 20585. 3-biofuels, solar and wind as renewable energy systems 4-biomass for renewable energy fuels, and chemicals. By:Donald L. Klass. 5-technology transfer for renewable energy. By: Gill Wilkins	No
Recommended Texts	None	No
Websites	None	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Computer Programming**			Module Delivery	
Module Type	**C**			☒ Theory ☒ Lecture ☒ Lab ☒ Tutorial ☒ Practical ☐ Seminar	
Module Code	**NRE24015**				
ECTS Credits	**5.00**				
SWL (hr/sem)	**125**				
Module Level	UGII		Semester of Delivery	4	
Administering Department	BSC-NRE		College	Type College Code	
Module Leader	Zakaria Abdul wahid		e-mail	zakriahamoalnaish@uomosul.edu.iq	
Module Leader's Acad. Title	Lecture		Module Leader's Qualification	PhD.	
Module Tutor	Nagam Salim		e-mail		
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date	01/02/2024		Version Number	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Fundamental of Computer Science	Semester	NO
Co-requisites module	Modeling of Renewable Energy	Semester	NO

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1- Teaching the students, the basic concept of programming 2- To increase the ability of the student in writing programs using Matlab
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. To enable the students to call and use the functions in Matlab 2. To help students master the art of designing and analyzing. 3. To encourage students, to develop their own skills in writing programs.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Theory: 1. Program 2. Function 3. Command 4. M-file

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: used to introduce and explain key fundamentals of programing. 2. Interactive discussions: used to engage students in critical thinking and problem-solving related to matlab programming 3. Multimedia resources: used to enhance student engagement and understanding of concepts related to matlab programming examples through videos. 4. Assessment and homework: used to measure student learning and provide feedback on their progress through quizzes, exams, and projects.

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	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Programming principal
Week 2	Basics of Matlab environment
Week 3	Solving Mathematical equations in Matlab
Week 4	Working with vectors
Week 5	Built in function
Week 6	Working with matrixes
Week 7	Logic and arithmetic operations on matrixes
Week 8	Writing functions
Week 9	For statement
Week 10	While statement
Week 11	If statement
Week 12	Switch case statement
Week 13	Plotting (2D)
Week 14	Image processing
Week 15	Final Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1- MATLAB® Programming Fundamentals, © COPYRIGHT 1984–2018 by The MathWorks, Inc.	No
Recommended Texts	1. MATLAB® for Engineers, Third Edition, HOLLY MOORE, 2012	No
Websites	None	

Grading Scheme
مخطط الدرجات

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

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Fundamental of computer science**			Module Delivery	
Module Type	**Core**			Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	UOM103				
ECTS Credits					
SWL (hr/sem)	3				
Module Level	2		Semester of Delivery	4	
Administering Department	Type Dept. Code		College	Type College Code	
Module Leader	Zakaria Abdul Wahid Hameed and Dr. nagham salim al_lella		e-mail	Nagham.salim@uomosul.edu.iq zakriahamoalnaish@uomosul.edu.iq	
Module Leader's Acad. Title	lecturer		Module Leader's Qualification	Ph.D.	
Module Tutor			e-mail		
Peer Reviewer Name	Name		e-mail	E-mail	
Scientific Committee Approval Date	02/03/2024		Version Number	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Mathematic ,material energy science, electromagnetic	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Teaching students fundamental computer. 2. Teaching student Using the Microsoft office word. 3. Learn about the basics of Windows 7 and how to use it. 4. Understanding the world wide web
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 2. Learn the basics of computer® through this introductory tutorial on commonly used features and workflows. 2. help student use internet in various field, benefit of using search engines for finding information over the internet. 3. create and save, edit, modify, rename, delete and move content in Microsoft word . 4. To encourage students, develop their own skills in using the computer. 5. Introducing the student to computer basics and the purpose of the operating system. As for the goals of the practical side It provides the student with skills in using the Word printing program And also use the Windows operating system.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Basic window, objective, how use widow, operate on window, background and control panel, computer type, desktop, laptop, personal computer, server, memory type, size, important, internet, word wide web, type of internet browser, use internet, Microsoft word, how use it, open new file, save, adding text, close file, save it, editing, adding table, editing on table, insert text and picture, algin it, etc Matlab, command window, inept, output, workspaces, command history, File, edit, debug, desktop, window, help. Course Outcomes: Teaching the student to be familiar with the basic rules for dealing with and managing a computer to help him complete projects Printing matters, preparing statistics and graphs, creating presentations and designing engineering plans And others, and the emergence of the Internet as a means of communication available to everyone, it has become very necessary for students to learn to use Computer due to the role of the Internet in many fields, including education, scientific research, trade and marketing Through electronic correspondence, web pages, and electronic communication.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The theoretical method and explanation is by presenting the material on the Point Power program in the form of diagrams and pictures This is to attract the student's attention and help him not feel bored. The practical method is to apply what has been presented On the calculator and conduct daily and monthly exams

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	40	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	60	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	3	10% (10)	3 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	5% (5)	Continuous	All
	Report	1	5% (5)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered

Week 1	Lab 1: Learn about the basics of Windows
Week 2	Lab 2: using windows on computer .
Week 3	Lab 3: computer types
Week 4	Lab 4: computer memory types
Week 5	Lab 5: basic internet
Week 6	Lab 6: world wide web
Week 7	Lab 7: fundamental of Microsoft word file
Week 8	Lab 8: add table in Microsoft file
Week 9	Lab9: adding picture in Microsoft word file
Week10	Lab 10: add, deleting, editing, Microsoft word file content
Week 11	Lab 11: Change the text in the file, line, style text, ect
Week 12	Lab 12: Desktop and control panel wallpapers

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	.Computer literacy BASICS 2012, LeBlanc, Brandon."A closer look at the, windows 7. 2009	yes
Recommended Texts	Computing Fundamentals, Innovative training works USA, Inc, 2006	Yes
Websites	Classroom Digital 2010 Word. https://www.agitraining.com/books/microsoft-officebooks/word-2010-digital-classroom-book	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Conductive Polymers**			Module Delivery	
Module Type	**Core**			☒ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	**NRE48038**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	**UGIV**		Semester of Delivery	8	
Administering Department	BSc_NRE		College		
Module Leader	Lubna Abdulaziz Salih		e-mail	lubnaabdulaziz@uomosul.edu.iq	
Module Leader's Acad. Title	Assistant Professor		Module Leader's Qualification	Ph.D	
Module Tutor	None		e-mail	E-mail	
Peer Reviewer Name	None		e-mail	E-mail	
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	The main objectives of Conductive Polymers that covers Polymer conductivity and its contemporary applications 1. Introducing the student to the basic Conductive polymers – theory and story 2. This course deals with the basic Properties of polymers 3. Introduction to Polymers and Conducting Polymers 4. Learn about the Applications
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Study all types of polymers 2. conductive polymers associated with renewable energy. 3. Modern industrial applications, especially in the field of solar cells 4. Learn the advantages and disadvantages .
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Theory: Part A – Theoretical lecture. Introduction to Polymers and Conducting Polymers Properties of polymers what is conductivity? Conductive polymers – theory and story Conducting Polymers for Advanced Energy Applications Processing of Conjugated Polymers Applications and Devices Based on Conjugated Polymers

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: Traditional lectures can be used to present foundational concepts, theories, and principles to students. This allows for the dissemination of information and provides a framework for understanding the subject matter. 2. Discussions and Debates: Encouraging students to engage in discussions and debates promotes critical thinking and analysis of different perspectives. It allows them to delve deeper into the subject matter, challenge assumptions, and develop their communication and argumentation skills. 3. Case Studies: Presenting real-world case studies relevant to the course material can help students apply theoretical concepts to practical situations. This enables them to develop problem-solving skills and understand the real-life implications of the theories they are learning.

	4. Group Projects: Assigning group projects or presentations that require students to work collaboratively can enhance their understanding of the material. It promotes teamwork, research skills, and the application of theoretical concepts in a practical context. 5. Multimedia and Visual Aids: Incorporating multimedia resources such as videos, interactive simulations, and visual aids (e.g., diagrams, charts, infographics) can enhance student engagement and understanding. Visual representations can often simplify complex concepts and make them more accessible. 6. Self-directed Learning: Encouraging students to take ownership of their learning through self-directed activities, such as independent research, literature reviews, or project-based assignments, fosters critical thinking, independent thought, and a deeper understanding of the subject matter. 7. Assessments: Utilizing a variety of assessment methods, such as quizzes, tests, essays, or reflective journals, allows students to demonstrate their understanding of the material and provides feedback for their learning progress. Assessments should be aligned with the learning outcomes and encourage critical thinking and analysis.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.46
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

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

assessment	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Polymers
Week 2	Polymer basics
Week 3	Properties of polymers:
Week 4	conductivity
Week 5	Conductive polymers – theory and story
Week 6	Applications
Week 7	Conductive Polymers as Organic Nano metal
Week 8	Conducting Polymer Fiber Production and Applications
Week 9	Polymers for Use in Polymeric Light-Emitting Diodes
Week 10	Conjugated Polymer Electronics—Engineering Materials and Devices.....
Week 11	Conjugated Polymer-Based Photovoltaic Devices....
Week 12	Optical Biosensors Based on Conjugated Polymers .....
Week 13	Conjugated Polymers for Microelectromechanical and Other Microdevices ..
Week 14	Corrosion Protection Using Conducting Polymers ..
Week 15	Corrosion Protection Using Conducting Polymers ..
Week 16	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Handbook of Conducting Polymers Third Edition Edited by Terje A. Skotheim and John R. Reynolds CONJUGATED	No

	POLYMERS PROCESSING AND APPLICATIONS	
Recommended Texts	None	No
Websites	None	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Digital Electronics**			Module Delivery	
Module Type	**Core**			☒ Theory ☒ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	**NRE24013**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	UGII		Semester of Delivery	4	
Administering Department	BSC-NRE		College		
Module Leader	Dr. Assim Ahmed Issa		e-mail	Assim.ahmed@uomousl.edu.iq	
Module Leader's Acad. Title	Lecture		Module Leader's Qualification	PhD.	
Module Tutor	none		e-mail		
Peer Reviewer Name	None		e-mail	E-mail	
Scientific Committee Approval Date	07/05/2024		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	These objectives provide a general overview of the knowledge and skills you can expect to acquire during the Digital Electronics. 1- Understand the behavior of Binary Arithmetic. 2- Hexadecimal Numbers and Octal Numbers. 3- Logic Gates , The Inverter. The AND Gate and The OR Gate 4- The NAND Gate and The NOR Gate. 5- The Exclusive-OR and Exclusive-NOR Gates. 6- DeMorgan's Theorems. 7- Flip-Flops, Flip-Flop Operating Characteristics, Flip-Flop Applica
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Understand the Digital Electronics.. 2- Understand the behavior of Binary Arithmetic . 3- Understand Logic Gates , The Inverter. The AND Gate and The OR Gate The NAND Gate and The NOR Gate. 4- Calculate and analyze Binary Arithmetic and Logic Gates
Indicative Contents المحتويات الإرشادية	Students do study the following fields: 1- Decimal Numbers and Binary Numbers . 2- Binary Arithmetic. 3- Complements of Binary Numbers and Signed Numbers. 4- Hexadecimal Numbers and Octal Numbers 5- Logic Gates , The Inverter. The AND Gate and The OR Gate 6- The NAND Gate and The NOR Gate. 7- The Exclusive-OR and Exclusive-NOR Gates. 8- DeMorgan's Theorems. 9- Flip-Flops, Flip-Flop Operating Characteristics, Flip-Flop Applications. Course Outcomes: the student will be able to: 1. know the type of number system . 2- Use number system to solve problem and solve problems. 3- Connecting electrical circuits, Logic Gates , The Inverter. The AND Gate and The OR Gate, The NAND Gate and The NOR Gate 4. Explanation of the DeMorgan's theory.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. know the type of number system . 2- Use number system to solve problem and solve problems. 3- Connecting electrical circuits, Logic Gates , The Inverter. The AND Gate and The OR Gate, The NAND Gate and The NOR Gate 4. Explanation of the DeMorgan's theory.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	82	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Decimal Numbers .
Week 2	Binary Numbers.
Week 3	Decimal-to-Binary Conversion solved problems
Week 4	First Quiz, Decimal-to-Binary Conversion solved problems.
Week 5	Binary Arithmetic.
Week 6	Binary Arithmetic,
Week 7	Complements of Binary Numbers .
Week 8	Signed Numbers solved problems.

Week 9	Second Quiz, and Arithmetic Operations with Signed Numbers
Week 10	Arithmetic Operations with Signed Numbers.
Week 11	Hexadecimal Numbers solved problems.
Week 12	Third Quiz , The AND Gate and The OR Gate.
Week 13	The NAND Gate and The NOR Gate and DeMorgan's Theorems.
Week 14	Flip-Flops, Flip-Flop Operating Characteristics.
Week 15	Flip-Flop Applications and solved problems.
Week 16	Final Exam

Delivery Plan (Weekly Lab. /Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1,2,3,4	
Week 5,6,7,8	
Week 9,10,11,12	
Week 13,14,15	
Week 16	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Digital Fundamentals , Thomas L. Floyd Pearson Education Limited 2015	No
Recommended Texts	Lecture Notes for Digital Electronics Raymond E. Frey Physics Department University of Oregon Eugene, OR 97403, USA rayfrey@uoregon.edu March, 2000	No
Websites	https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials/	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**ECONOMICS OF ENERGY**			Module Delivery	
Module Type	**Core**			☒ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	**NRE36026**				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level	2		Semester of Delivery	1	
Administering Department	BSc_NRE		College		
Module Leader	Dr. Saad Fadhil Mahmood		e-mail	Saadfadhil32@uomousl.edu.iq	
Module Leader's Acad. Title	Lecture		Module Leader's Qualification	P.hD.	
Module Tutor			e-mail	E-mail	
Peer Reviewer Name	None		e-mail	E-mail	
Scientific Committee Approval Date	8/5/2024		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- Definition of the term sustainable development, which the world has become calling for the need to achieve. 2- Linking between economic, social and environmental goals. 3- Knowing the role that renewable energy can play in achieving sustainable development.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Develop a comprehensive understanding of renewable energy, including its definition, importance, and relevance in the context of sustainable development. 2- Gain knowledge about various sources of renewable energy, such as solar energy, wind energy, hydroelectric power, biomass energy, nuclear energy, and geothermal energy. They will learn about the characteristics, advantages, and limitations of each energy source. 4- Acquire technical knowledge and understanding of renewable energy systems, including photovoltaic solar energy systems. They will learn about the components, functioning, and design considerations for solar energy systems. 5- Economic Analysis of Renewable Energy: Students will explore the economics of renewable energy sources. They will analyze the costs, benefits, and financial considerations associated with the deployment and operation of renewable energy projects. They will also learn about the calculation of costs for solar power plants and compare them with other energy sources, such as diesel power plants. 6- Able to apply their knowledge of renewable energy economics to real-world scenarios. They will gain practical skills in evaluating the economic viability of renewable energy projects and making informed decisions based on economic analysis.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Week 1: Introduction to Renewable Energy • Definition and importance of renewable energy • Environmental and economic benefits of renewable energy • Overview of the role of renewable energy in achieving sustainability goals Week 2: Sources of Renewable Energy • Exploration of different sources of renewable energy • Detailed study of solar energy, wind energy, hydroelectric power, and their characteristics • Introduction to biomass energy, nuclear energy, and geothermal energy as additional renewable energy sources Week 3: Technical Aspects of Renewable Energy Sources • Understanding the technical aspects of solar energy systems • Study of wind energy systems and their design considerations • Overview of hydroelectric power plants and their operation Week 7: Photovoltaic Solar Energy and Solar Cells • In-depth study of photovoltaic solar energy and its applications • Understanding the working principles and efficiency of solar cells • Examination of different types of solar cells and their technological advancements

	Week 11: The Economics of Renewable Energy Sources • Analysis of the economic aspects of renewable energy projects • Evaluation of costs and benefits associated with renewable energy deployment • Examination of policy frameworks and financial incentives for renewable energy

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Engage students actively in solving real-world energy economics problems. with a complex energy-related scenarios or case studies and challenge them to analyze the economic implications, consider various factors, and propose solutions. Facilitate group discussions and provide guidance as students work through the problems, encouraging them to apply economic principles and models to make informed decisions. 2. Create experiential learning opportunities for students. Develop interactive simulations or scenarios that simulate energy markets, policy decision-making processes, or investment scenarios. Assign student's specific roles, such as energy investors, policymakers, or renewable energy project developers, and guide them in making decisions based on economic factors and market dynamics. This strategy enhances students' understanding of the complexities of energy economics in a practical and engaging manner.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	27	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	What is renewable energy.
Week 2	sources of renewable energy.
Week 3	Solar energy, wind energy, hydroelectric power and energy
Week 4	Biomass energy, nuclear energy, and geothermal energy
Week 5	Technical aspects of renewable energy sources
Week 6	Technical aspects of renewable energy sources continue
Week 7	Photovoltaic solar energy and solar cells
Week 8	Photovoltaic solar energy and solar cells continue
Week 9	Types of solar energy systems
Week 10	Components of solar energy systems
Week 11	The economics of renewable energy sources
Week 12	The economics of renewable energy sources continue
Week 13	Solar power plant designs
Week 14	Solar power plant designs continue
Week 15	Calculating the costs of solar and diesel power plants
Week 16	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1-Energy Economics 2-	No
Recommended Texts	1.	No
Websites	None	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**English**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory**	
Module Code	**UOM102**			☐ **Lecture**	
ECTS Credits	**2**			☐ **Lab**	
SWL (hr/sem)	**50**			☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	UGI		**Semester of Delivery**	2	
Administering Department	New and Renewable Energies		**College**	College of sciences	
Module Leader	Dr. Saad Fadhil Mahmood		**e-mail**	Saadfadhil32@uomousl.edu.iq	
Module Leader's Acad. Title	Lecture		**Module Leader's Qualification**	P.hD.	
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name	None		**e-mail**	E-mail	
Scientific CommitteeApproval Date	01/06/2023		**Version Number**	1.0	

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

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	*1- Develop an understanding of the English language and its importance inthe field of renewable energy.* *2- Gain knowledge of the overview of the English language, including itshistory, grammar, vocabulary, and pronunciation.* *3- Acquire the necessary English language skills to effectively communicateand discuss renewable energy topics.* *4- Explore the specific vocabulary, terminology, and expressions related to renewable energy sources.* *5- Enhance English language proficiency through the study and discussion ofvarious renewable energy sources, such as solar energy, wind energy, tidal energy, wave energy, geothermal energy, and biofuels.* *6- Develop the ability to comprehend and interpret written and spokenEnglish texts related to renewable energy.* *7- Practice and improve English language skills, including reading, writing, listening, and speaking, within the context of renewable energy discussions.* *8- Participate in quizzes to assess understanding and knowledge of bothEnglish language concepts and renewable energy topics.*
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	*1- Develop a comprehensive understanding of the English language, including its grammar, vocabulary, pronunciation, and overall structure.* *2- Acquire specialized knowledge and vocabulary related to renewable energy sources, such as solar energy, wind energy, tidal energy, wave energy, geothermal energy, and biofuels.* *3- Enhance English language proficiency in all four language skills - reading,writing, listening, and speaking - within the context of renewable energy discussions.* *4- Demonstrate the ability to comprehend and interpret written and spoken*

	English texts related to renewable energy sources and effectivelycommunicate ideas and opinions on these topics. *5- Apply English language skills to effectively discuss, analyze, and present information about renewable energy sources in English.*
Indicative Contents المحتويات الإرشادية	*Indicative content includes the following.* • *Introduction to the English language and its importance in the field of renewable energy* • *Overview of English grammar, including tenses, sentence structure, andparts of speech* • *Vocabulary building exercises related to renewable energy* • *Pronunciation practice and drills* • *Introduction to common idioms and expressions in English* • *Introduction to renewable energy sources and their significance* • *Vocabulary and terminology related to renewable energy* • *Reading and discussing articles and texts on renewable energy topics* • *Writing exercises on renewable energy sources and their benefits* • *Listening to and practicing spoken English related to renewable energy*

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	*Integrated Language and Scientific Content: Integrate the teaching of English language skills with scientific content related to Renewable Energy. Incorporate reading scientific articles, analyzing data, and discussing researchfindings in English to enhance students' scientific literacy and language skills simultaneously.*

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ٥١ اسبوعا			
Structured SWL (h/sem)	*31*	***Structured SWL (h/w)***	*2*

الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	*44*	***Unstructured SWL (h/w)*** الحمل الدراسي غير المنتظم للطالب أسبوعيا	*3.1*
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	***75***		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	*English language overview*

Week 2	*English language overview continue*
Week 3	*Renewable Energy in English book*
Week 4	*Renewable Energy continue*
Week 5	*Solar Energy in English book*
Week 6	*Solar Energy continue*
Week 7	*Wind Energy in English book*
Week 8	*Wind Energy continue*
Week 9	*Tidal Energy in English book*
Week 10	*Tidal Energy continue*
Week 11	*Wave Energy in English book*
Week 12	*Wave Energy continue*
Week 13	*Geothermal Energy in English book*
Week 14	*Geothermal Energy continue*
Week 15	*Biofuels in English book*
Week 16	***Final Exam***

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	***Available in the Library?***
Required Texts	*1-* *2-*	*No*
Recommended Texts	*1.*	*No*
Websites	*None*	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Fundamental of Electricity**			Module Delivery	
Module Type	**Core**			☒ Theory ☒ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	**NRE1205**				
ECTS Credits	**8**				
SWL (hr/sem)	**200**				
Module Level	UGx11 1		Semester of Delivery	2	
Administering Department	Type Dept. Code		College	Type College Code	
Module Leader	Ibtisam Yahya Abdullah		e-mail	ibtisamyahya@uomosul.edu.iq	
Module Leader's Acad. Title	Lecture		Module Leader's Qualification	P hD.	
Module Tutor	Ibtisam Yahya Abdullah		e-mail	ibtisamyahya@uomosul.edu.iq	
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date	01/02/2024		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 Electrical Quantities 2- Understand the structure of matter. 3- Explain the concept of electricity and what's meant by the free electron. 4- Distinguish between static and moving current. 5- Expresses current, voltage, work, and power concepts. 6- Defines direct current and alternating current. 7- Describe the Electromotive Force & Potential Difference. 8- Describes the relationship between resistance, current and voltage. 9- Calculate the electric power. 10- Describe the Electromagnetic Induction 11- Distinguish the D.C Machine (Motor & Generator) and A.C Machine (Motor & Generator) 12- Explain the Eddy currents 13- Distinguish between DC & AC Current. 14- Distinguish the Time & Frequency 15- Calculate the Root mean square value. 16- Find current, voltage, and resistance in simple circuits.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	At the end of this module, a student should be able to: 1. Understand the physical meaning of variables used to describe electricity. 2. Understand the major parts of an atom. 3. Discuss the differences between conductors, semiconductors, and insulators. 4. Understand the basic quantities in electric circuits such as voltage and current. 5. Understand the basic quantities in electric circuits such as voltage and current. 6. Relate the three main parameters of an electric circuit: the voltage, the electric current, and the electrical resistance through Ohms law. 7. Realize how the above three parameters are used to compute circuit characteristics and conditions. 8. Realize how the above parameters are used to compute electrical power. 9. Demonstrate an understanding of the basic knowledge of Electromagnetic Induction, Transformers and generator. 10. State the Faraday's &Lenz's laws of Electromagnetic Induction 11. Understand the Eddy currents 12. Identify the A.C. Fundamental 13. Solve the circuit connected of Capacitance & Inductance.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Theory:</u> 1. Atoms, Electrons, Charge 2. Conductors and Insulators

	3. Current 4. Voltage 5. Power 6. Resistance 7. Magnetism and Electromagnetism 8. Circuit Components and Resistance 9. Magnetism and Electromagnetism 10. Electromagnetic Induction 11. Faraday's law of Electromagnetic Induction 12. Lenz's law of Electromagnetic Induction 13. Eddy currents 14. Transformer 15. Generator 16. Alternating Current 17. Type of Waveforms 18. Time & Frequency of the Waveform: 19. RMS Value of a Sine Wave 20. Phase

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Finding the relationship between the current passing through the tungsten filament and the potential difference between its ends
Week 2	Lab 2: Static electricity
Week 3	Lab 3: Determine the value of unknown resistance by using a Wheatstone bridge.
Week 4	Lab 4: Determination of the E. M. F. of a Battery
Week 5	Lab 5: Electrical transformer
Week 6	Lab 6: Efficiency of the electrical transformer

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: used to introduce and explain key fundamentals of electricity. 2. Interactive discussions: used to engage students in critical thinking and problem-solving related to electricity through group discussions, debates, case studies, and simulations.

	3. Multimedia resources: used to enhance student engagement and understanding of concepts related to electricity through videos, animations, and simulations. 4. Assessment and feedback: used to measure student learning and provide feedback on their progress through quizzes, exams, and projects.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	108	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	92	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Electrical unit system, Basic principles & Atomic theory Atoms
Week 2	Types of Materials , Types of Electricity , Current
Week 3	Voltage, Electromotive Force and Potential Difference, Sources of electrical force

Week 4	Electric Power
Week 5	Resistance and resistivity (Ohm's Law), Resistance & Conductance,
Week 6	Magnetism and Electromagnetism, Electromagnetic Induction
Week 7	Faraday's law of Electromagnetic Induction
Week 8	Lenz's law of Electromagnetic Induction, Eddy currents
Week 9	Eddy currents
Week 10	Transformer
Week 11	Transformer
Week 12	Generators
Week 13	Alternating Current , Type of Waveforms, Time & Frequency of the Waveform
Week 14	RMS Value of a Sine Wave , Phase
Week 15	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week 1	Lab 1: Finding the relationship between the current passing through the tungsten filament and the potential difference between its ends
Week 2	Lab 2: Static electricity
Week 3	Lab 3: Determine the value of unknown resistance by using a Wheatstone bridge.
Week 4	Lab 4: Determination of the E. M. F. of a Battery
Week 5	Lab 5: Electrical transformer
Week 6	Lab 6: Efficiency of the electrical transformer

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1- Fundamentals of Electric Circuits , Charles K. Alexander | Matthew n. o. Sadiku. FiFth Edition 2- Fundamental Electrical and Electronic Principles , Christopher R Robertson, Third Edition	No

Recommended Texts	1. ELECTRICAL FUNDAMENTALS COMPETENCY, Industry Training Authority of BC. LibreTexts ™ 2. Basic Principles of Electricity, by Prof. Dr. Osman SEVAİOĞLU Electrical and Electronics Engineering Department.	No
Websites	None	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Fuel and Hydrogen Cells**			Module Delivery	
Module Type	**Core**			☒ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	**NRE47036**				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level	**UGIV**		Semester of Delivery	7	
Administering Department	BSc_NRE		College		
Module Leader	Mustafa Hussein ibrahim		e-mail	??????@uomosul.edu.iq	
Module Leader's Acad. Title	Lecture		Module Leader's Qualification	M.Sc.	
Module Tutor	None		e-mail	E-mail	
Peer Reviewer Name	None		e-mail	E-mail	
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	These objectives highlight the goals of the course in mathematical modeling, and illustrate the knowledge and skills that students will develop throughout their studies in this department 1. Understanding the definition and concept of modeling. 2. Familiarizing with the different types of modeling techniques. 3. Exploring the advantages and disadvantages of modeling. 4. Developing skills in mathematical modeling. 5. Identifying and understanding the essential elements of modeling. 6. Gaining proficiency in analytical modeling techniques. 7. Analyzing and discussing real-world examples of modeling applications. 8. Understanding the components involved in the modeling process. 9. Differentiating between modeling variables and modeling parameters. 10. Exploring the concept of simulation models and their characteristics. 11. Developing skills in numerical analysis for modeling purposes. 12. Exploring the role of digital-to-analog converters in modeling and simulation.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Define modeling and its significance in various fields. 2. Identify different types of modeling techniques used in practice. 3. Explain the advantages and disadvantages of modeling in decision-making processes. 4. Apply mathematical modeling to represent real-world systems. 5. Identify and describe the essential elements involved in the modeling process. 6. Utilize analytical modeling techniques to solve mathematical problems. 7. Demonstrate an understanding of modeling through relevant examples. 8. Identify and describe the components involved in the modeling process. 9. Differentiate between modeling variables and modeling parameters. 10. Understand simulation models and their role in representing complex systems. 11. Characterize the process and importance of simulation in modeling. 12. Apply numerical analysis techniques in solving modeling problems. 13. Understand the concept of a digital-to-analog converter and its relevance in modeling
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Definition of modelling 2. Types of modeling 3. Advantage and disadvantage of modelling 4. Math. modelling 5. modelling elements 6. Analytical modelling 7. examples 8. Modelling components

	9. Modelling variables 10. Modelling parameters 11. Simulation models 12. Characterizing of simulation 13. Numerical analysis 14. DAC

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: Traditional lectures can be used to present foundational concepts, theories, and principles to students. This allows for the dissemination of information and provides a framework for understanding the subject matter. 2. Discussions and Debates: Encouraging students to engage in discussions and debates promotes critical thinking and analysis of different perspectives. It allows them to delve deeper into the subject matter, challenge assumptions, and develop their communication and argumentation skills. 3. Case Studies: Presenting real-world case studies relevant to the course material can help students apply theoretical concepts to practical situations. This enables them to develop problem-solving skills and understand the real-life implications of the theories they are learning. 4. Group Projects: Assigning group projects or presentations that require students to work collaboratively can enhance their understanding of the material. It promotes teamwork, research skills, and the application of theoretical concepts in a practical context. 5. Multimedia and Visual Aids: Incorporating multimedia resources such as videos, interactive simulations, and visual aids (e.g., diagrams, charts, infographics) can enhance student engagement and understanding. Visual representations can often simplify complex concepts and make them more accessible. 6. Self-directed Learning: Encouraging students to take ownership of their learning through self-directed activities, such as independent research, literature reviews, or project-based assignments, fosters critical thinking, independent thought, and a deeper understanding of the subject matter. 7. Assessments: Utilizing a variety of assessment methods, such as quizzes, tests, essays, or reflective journals, allows students to demonstrate their understanding of the material and provides feedback for their learning progress. Assessments should be aligned with the learning outcomes and encourage critical thinking and analysis.

Student Workload (SWL)

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

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	What is modelling
Week 2	Types of modeling
Week 3	Advantage and disadvantage of modelling
Week 4	Math. modelling
Week 5	modelling elements
Week 6	Analytical modelling
Week 7	examples
Week 8	examples
Week 9	Modelling components

Week 10	Modelling variables
Week 11	Modelling parameters
Week 12	Simulation models
Week 13	Characterizing of simulation
Week 14	Numerical analysis
Week 15	DAC
Week 16	Final Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Modelling and simulation 1st edition by Hartmut Bossel	No
Recommended Texts	None	No
Websites	None	

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Gen. Physics (Optics)**			Module Delivery	
Module Type	**Core**			☒ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	NRE1207				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	1		Semester of Delivery	1	
Administering Department	Type Dept. Code		College	Type College Code	
Module Leader	Basheer Khalil ahmed		e-mail	basheerahmed@uomosul.edu.iq	
Module Leader's Acad. Title	Assistant Professor		Module Leader's Qualification	Msc	
Module Tutor	None		e-mail	E-mail	
Peer Reviewer Name	None		e-mail	E-mail	
Scientific Committee Approval Date	18/06/2023		Version Number	4.0	

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 main objectives of an Principle of gen physics (optics) 1. The main objective of the course is the importance of all physics and its applications . the future introducing the student to different types of optics such as geometrical optics , physical optics and quantum optics . 2. This course deals with who a image formed by mirrors and lenses 3. Learn about the application of mirrors and lenses in different application of solar energy 4. Learn about the optical instrument such as microscope , telescope and fiber glass
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Study all types of optics such as geometrical optics ,physical optics and quantum optics. 2. Understand the meaning of nature of light 3. Studing the thin and thick lensses 4. Learn how the image formed by mirrors and lenses. 5. Studing some appling physics such as rain bow and total internal reflection. 6. Learn the some optical instrument such as Camera ,Microscope ,Telescope and eye.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Theory: Part A – Theoretical lectures Nature of light Type of optics Geometric optics Physical optics Quantum optics Ray tracing Reflection Refraction Fermat principle Image formation by mirrors The lenses Image formation by lenses Thin and thick lenses Combination of lenses Optical instrument Microscope ,Telescope

	Camera ,Eye and fiber glass Physical optics Interface diffraction

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: used to introduce and explain key concepts related to all Energy Sources hn the surface of the earth 2. Interactive discussions: used to engage students in critical thinking and problem-solving related to nuclear energy through group discussions, debates, case studies, and simulations. 3. Multimedia resources: used to enhance student engagement and understanding of complex concepts related to nuclear energy through videos, animations, and simulations. 4. Assessment and feedback: used to measure student learning and provide feedback on their progress through quizzes, exams, and projects. 5. Expanding students' perceptions about this science and its contents it includes that help in stratigraphic Show related video. White board,& Data show

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

Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Nature of light
Week 2	Type of optics Geometric optics
Week 3	Physical optics Quantum optics
Week 4	Ray tracing
Week 5	Reflection
Week 6	Refraction
Week 7	Fermat principle
Week 8	Image formation by mirrors
Week 9	The lenses Image formation by lenses
Week 10	Thin and thick lenses Combination of lenses
Week 11	Optical instrument
Week 12	Microscope ,Telescope
Week 13	Camera ,Eye and fiber glass

Week 14	Physical optics
Week 15	Interface
Week 16	diffraction

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1- Synthetic Fuel 2- Types of Renewable Energy	No
Recommended Texts	1. Fundamentals of optics by Jenkins and white. 2. Optics by Addison Wesley, Eugene hecht. 3. Introduction to optics geometrical and physical by Jhon k .Robertson. 4. Optics by Francis Weston sears. 5. Collage Physics by serway and jewett.	No
Websites	None	

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Graduation Project**			Module Delivery	
Module Type	**Core**			☒ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	**NRE48041**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	**UGIV**		Semester of Delivery	7	
Administering Department	BSc_NRE		College		
Module Leader	Alaa Ismael ayyob		e-mail	ala.iayoob@uomosul.edu.iq	
Module Leader's Acad. Title	professor		Module Leader's Qualification	Ph.D	
Module Tutor	None		e-mail	E-mail	
Peer Reviewer Name	None		e-mail	E-mail	
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	تعليم الطالب كيفية اعداد مشروع البحث وكيفية اجراء الكتابة الاكاديمية
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	ان يكون الطالب قادرا على كتابة بحث علمي رصين يخضع للمعايير الاكاديمية
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: Traditional lectures can be used to present foundational concepts, theories, and principles to students. This allows for the dissemination of information and provides a framework for understanding the subject matter. 2. Discussions and Debates: Encouraging students to engage in discussions and debates promotes critical thinking and analysis of different perspectives. It allows them to delve deeper into the subject matter, challenge assumptions, and develop their communication and argumentation skills. 3. Group Projects: Assigning group projects or presentations that require students to work collaboratively can enhance their understanding of the material. It promotes teamwork, research skills, and the application of theoretical concepts in a practical context. 4. Multimedia and Visual Aids: Incorporating multimedia resources such as videos, interactive simulations, and visual aids (e.g., diagrams, charts, infographics) can enhance student engagement and understanding. Visual representations can often simplify complex concepts and make them more accessible. 5. Self-directed Learning: Encouraging students to take ownership of their learning through self-directed activities, such as independent research, literature reviews, or project-based assignments, fosters critical thinking, independent thought, and a deeper understanding of the subject matter. 6. Assessments: Utilizing a variety of assessment methods, such as quizzes, tests, essays, or reflective journals, allows students to demonstrate their understanding of the material and provides feedback for their learning progress. Assessments should be aligned with the learning outcomes and encourage critical thinking and analysis.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	اساسيات البحث العلمي
Week 2	كيفية اعداد المشروع
Week 3	كيفية التخطيط لكتابة مشروع البحث
Week 4	كيفية كتابة الصفحات التمهيدية للبحث
Week 5	ملخص البحث
Week 6	مقدمة البحث
Week 7	مشكلة البحث
Week 8	كيفية كتابة الدافع البحثي
Week 9	كيفية تلخيص وكتابة الدراسات السابقة

Week 10	الجزء العملي في البحث العلمي وطرق اعداده
Week 11	الفحوصات والقياسات
Week 12	كيفية استخراج النتائج
Week 13	مناقشة المخرجات البحثية
Week 14	كيفية كتابة الاستنتاجات والملخصات
Week 15	طرق كتابة المصادر والمراجع البحثية
Week 16	تقييم

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Research Methodology by CR Kothari	No
Recommended Texts	None	No
Websites	None	

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Grid connected system**			Module Delivery	
Module Type	**Core**			☒ Theory	
Module Code	**NRE48040**			☐ Lecture	
ECTS Credits	**5**			☐ Lab	
SWL (hr/sem)	**125**			☒ Tutorial ☐ Practical ☐ Seminar	
Module Level	UGIV		Semester of Delivery	8	
Administering Department	BSc_NRE		College		
Module Leader	Mustafa Hussein Ibrahim		e-mail	mustafahussein@uomosul.edu.iq	
Module Leader's Acad. Title	Lecture		Module Leader's Qualification	M.Sc.	
Module Tutor	Mustafa Hussein Ibrahim		e-mail	mustafahussein@uomosul.edu.iq	
Peer Reviewer Name			e-mail		
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	These objectives highlight the goals of the course in grid connecting system , and illustrate the knowledge and skills that students will develop throughout their studies in this department 1. Understand the functioning mechanism of each component in standalone and grid-tied solar energy systems, and how to provide optimal conditions for their operation. 2. Perform all calculations related to the design of photovoltaic solar energy systems. This includes calculating the required size and capacity of solar modules, batteries, inverters, and other system components. 3. Comprehend the methods for connecting renewable energy systems to the local grid. This includes understanding how to integrate solar energy systems with the existing infrastructure and connect them to the local distribution network. 4. Familiarize with the methods for recording and accounting renewable energy in accordance with global standards. This includes understanding how to measure and record the generated renewable energy, calculate system performance, and monitor energy consumption.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand and optimize the operation of solar energy systems. 2. Design and size photovoltaic solar energy systems. 3. Integrate renewable energy systems with the local grid. 4. Evaluate and analyze the performance of renewable energy systems. 5. Follow international standards for renewable energy accounting. 6. Assess the economic and environmental aspects of renewable energy. 7. Troubleshoot and propose solutions for system challenges. 8. Communicate effectively and collaborate in multidisciplinary teams.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1- *Stand Alone PV System* 2- Solar (PV) Array 3- Solar Cell Efficiency: 4- The external factors that affecting upon the modules Efficiency.

	5- Charge Controller 6- Batteries 7- Depth Of Discharge. 8- Inverter. 9- Grid Connected PV System. 10- grid tie inverter. 11- synchronization process. 12- Electricity Meter. 13- metering system (Gross metering & Bi Directional metering) 14- Net metering system Explanation 15- Hybrid Solar Wind System 16- Solar Houses 17- Pv system sizing

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: Traditional lectures can be used to present foundational concepts, theories, and principles to students. This allows for the dissemination of information and provides a framework for understanding the subject matter. 2. Discussions and Debates: Encouraging students to engage in discussions and debates promotes critical thinking and analysis of different perspectives. It allows them to delve deeper into the subject matter, challenge assumptions, and develop their communication and argumentation skills. 3. Case Studies: Presenting real-world case studies relevant to the course material can help students apply theoretical concepts to practical situations. This enables them to develop problem-solving skills and understand the real-life implications of the theories they are learning. 4. Group Projects: Assigning group projects or presentations that require students to work collaboratively can enhance their understanding of the material. It promotes teamwork, research skills, and the application of theoretical concepts in a practical context. 5. Multimedia and Visual Aids: Incorporating multimedia resources such as videos, interactive simulations, and visual aids (e.g., diagrams, charts,

	infographics) can enhance student engagement and understanding. Visual representations can often simplify complex concepts and make them more accessible. 6. Self-directed Learning: Encouraging students to take ownership of their learning through self-directed activities, such as independent research, literature reviews, or project-based assignments, fosters critical thinking, independent thought, and a deeper understanding of the subject matter. 7. Assessments: Utilizing a variety of assessment methods, such as quizzes, tests, essays, or reflective journals, allows students to demonstrate their understanding of the material and provides feedback for their learning progress. Assessments should be aligned with the learning outcomes and encourage critical thinking and analysis. 8. Guest Speakers or Experts: Inviting guest speakers or subject matter experts to share their knowledge and experiences can provide additional insights and practical examples. It also exposes students to different perspectives and real-world applications of the theoretical concepts being taught.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.13
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	10% (10)	5 and 10	LO #1, #2 and #3, #6
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #5, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #2, #3 and #5
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	*Stand Alone PV System*
Week 2	Solar (PV) Array
Week 3	Solar Cell Efficiency:
Week 4	The external factors that affecting upon the modules Efficiency.
Week 5	Charge Controller
Week 6	Batteries
Week 7	Depth Of Discharge.
Week 8	Inverter.
Week 9	Grid Connected PV System.
Week 10	grid tie inverter.
Week 11	synchronization process.
Week 12	Electricity Meter.
Week 13	metering system (Gross metering & Bi Directional metering)

Week 14	Hybrid Solar Wind System
Week 15	Solar Houses and Pv system sizing
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Grid-connected Solar Electric Systems: The Earthscan Expert Handbook for Planning, Design and Installation 1st Edition by Geoff Stapleton	No
Recommended Texts	None	No
Websites	None	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
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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.

نموذج وصف المادة الدراسية

معلومات المادة الدراسية					
تسليم الوحدة الدراسية				عنوان الوحدة الدراسية	**نظم الربط بالشبكة**
☒ النظرية ☐ القراءة ☐ المختبر ☒ Tutorial ☐ عملي ☐ الحلقة الدراسية				نوع الوحدة الدراسية	**الموارد الأساسية**
				Module Code	**NRE48040**
				ائتمانات ECTS	**5**
				SWL (hr/sem)	**125**
8	الفصل الدراسي التسليم	UGIV UGX11		Module Level	
	الجامعة	BSc_NRE		الإدارة	
mustafahussein@uomosul.edu.iq	e-mail	مصطفى حسين إبراهيم		قائد الوحدة الدراسية	
شهادة البكالوريوس	مؤهلات قائد الوحدة الدراسية	Lecture		أكاد قائد الوحدة الدراسية. العنوان	
mustafahussein@uomosul.edu.iq	e-mail	مصطفى حسين إبراهيم		مدرس وحدة دراسية	
	e-mail			اسم مراجع الأقران	
1.0	رقم الإصدار			تاريخ موافقة اللجنة العلمية	

العلاقة مع المواد الدراسية الأخرى			
	Semester	لا أحد	وحدة دراسية متطلب
	Semester	لا أحد	وحدة المتطلبات المشتركة

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

أهداف المادة الدراسية	تسلط هذه الأهداف الضوء على أهداف الدورة في نظام ربط الشبكة، وتوضح المعرفة والمهارات التي سيطورها الطلاب طوال دراستهم في هذا القسم 1. فهم آلية عمل كل مكون في أنظمة الطاقة الشمسية المستقلة والمرتبطة بالشبكة، وكيفية توفير الظروف المثلى لتشغيلها. 2. إجراء جميع الحسابات المتعلقة بتصميم أنظمة الطاقة الشمسية الكهروضوئية. ويشمل ذلك حساب الحجم والسعة المطلوبة للوحدات الشمسية والبطاريات والمحولات ومكونات النظام الأخرى. 3. فهم طرق ربط أنظمة الطاقة المتجددة بالشبكة المحلية. ويشمل ذلك فهم كيفية دمج أنظمة الطاقة الشمسية مع البنية التحتية الحالية وربطها بشبكة التوزيع المحلية. 4. التعرف على طرق تسجيل وحساب الطاقة المتجددة وفقا للمعايير العالمية. ويشمل ذلك فهم كيفية قياس وتسجيل الطاقة المتجددة المتولدة، وحساب أداء النظام، ومراقبة استهلاك الطاقة.
مخرجات التعلم للمادة الدراسية	1. فهم وتحسين تشغيل أنظمة الطاقة الشمسية. 2. تصميم وتحجيم أنظمة الطاقة الشمسية الكهروضوئية. 3. دمج أنظمة الطاقة المتجددة مع الشبكة المحلية. 4. تقييم وتحليل أداء أنظمة الطاقة المتجددة. 5. اتباع المعايير الدولية للمحاسبة في مجال الطاقة المتجددة. 6. تقييم الجوانب الاقتصادية والبيئية للطاقة المتجددة. 7. استكشاف الأخطاء وإصلاحها واقتراح حلول لتحديات النظام. 8. التواصل بشكل فعال والتعاون في فرق متعددة التخصصات.
المحتويات الإرشادية المحتويات الإرشادية	في المحتوى الإقصائي يشمل ما يلي. 1- *نظام PV* وحده 2- مصفوفات شمسية (PV) 3- كفاءة الخلايا الشمسية: 4- العوامل الخارجية التي تؤثر على كفاءة الوحدات. 5- منظم الشحن 6- البطاريات 7- عمق التفريغ. 8- Inverter. 9- نظام PV متصل بالشبكة. 10- عاكس ربط الشبكة. 11- عملية المزامنة. 12- عداد الكهرباء. 13- نظام القياس (القياس الإجمالي والقياس الإتجاهي) 14- شرح نظام القياس الصافي 15- نظام الرياح الشمسية الهجينة 16- بيوت شمسية

17- تحجيم المنظومات الشمسية	

استراتيجيات التعلم والتعليم	
1. المحاضرات: يمكن استخدام المحاضرات التقليدية لتقديم المفاهيم الأساسية والنظريات والمبادئ للطلاب. وهذا يسمح بنشر المعلومات ويوفر إطارا لفهم الموضوع. 2. المناقشات: تشجيع الطلاب على المشاركة في المناقشات مما يعزز التفكير النقدي وتحليل وجهات النظر المختلفة. يسمح لهم بالتعمق في الموضوع، وتحدي الافتراضات، وتطوير مهارات التواصل والحجج. 3. دراسات الحالة: تقديم دراسات الحالة في العالم الحقيقي ذات الصلة بالمواد وهذا يساعد الطلاب على تطبيق المفاهيم النظرية على الحالات العملية. ويمكنهم من تطوير مهارات حل المشكلات وفهم الآثار الواقعية للنظريات التي يتعلمونها. 4. مشاريع المجموعة: يمكن أن يؤدي تعيين مشاريع جماعية أو عروض تقديمية تتطلب من الطلاب العمل بشكل تعاوني إلى تعزيز فهمهم للمادة. وهو يعزز العمل الجماعي، والمهارات البحثية، وتطبيق المفاهيم النظرية في سياق عملي. 5. الوسائط المتعددة والادوات البصرية: يمكن أن يؤدي دمج موارد الوسائط المتعددة مثل مقاطع الفيديو والمحاكاة التفاعلية والوسائل البصرية إلى تعزيز مشاركة الطلاب وفهمهم. يمكن للتمثيلات البصرية في كثير من الأحيان تبسيط المفاهيم المعقدة وجعلها أكثر سهولة. 6. التعلم الموجه ذاتيا: تشجيع الطلاب على امتلاك تعلمهم من خلال الأنشطة الموجهة ذاتيا، مثل البحث المستقل، أو مراجعات الأدبيات، أو المهام القائمة على المشاريع، يعزز التفكير النقدي، والفكر المستقل، وفهم أعمق للموضوع. 7. التقييمات: استخدام مجموعة متنوعة من أساليب التقييم، مثل الاختبارات أو المقالات مما يسمح للطلاب بإظهار فهمهم للمادة وتقدم ملاحظات لسمتواهم في التعلم. يجب أن تكون التقييمات متوافقة مع نتائج التعلم وتشجيع التفكير النقدي والتحليل. 8. المتحدثون الضيوف أو الخبراء: يمكن لدعوة المتحدثين الضيوف أو الخبراء المتخصصين لتبادل معارفهم وخبراتهم تقديم رؤى إضافية وأمثلة عملية. كما أنه يعرض الطلاب لوجهات نظر مختلفة وتطبيقات العالم الحقيقي للمفاهيم النظرية التي يتم تدريسها.	الاستراتيجيات

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
4	SWL منظم (h/ w) الحمل الدراسي المنتظم للطالب أسبوعيا	63	Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل
4.13	SWL غير منظم (h/ w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	62	Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل

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

Module Evaluation

تقييم المادة الدراسية

نتائج التعلم ذات الصلة	أسبوع مستحق	العلامات (Marks)	الوقت/الرقم		
Lo #1 و #2 و #3 و #6	5 و 10	(10) %10	2	اختبار	التقييم التكويني
Lo #3 و #4 و #5 و #7	2 و 12	(10) %10	2	المهام	
الكل	مستمرة	(10) %10	1	مختبر/ مختبر.	
# 2، # 3 و # 5	13	(10) %10	1	التقرير	
# 1 - # 5	7	(10) %10	2 ساعة	امتحان منتصف المدة	تقييم تلخيصي
الكل	16	(50) %50	3 ساعة	الامتحان النهائي	
		100 في المائة (100 مارك)	مجموع الأنصبة المقررة		

المنهاج الاسبوعي النظري

المواد المغطاة	
نظام PV وحده	الأسبوع 1
مصفوفات شمسية (PV)	الأسبوع 2
كفاءة الخلايا الشمسية:	الأسبوع 3
العوامل الخارجية التي تؤثر على كفاءة الوحدات.	الأسبوع 4
منظم الشحن	الأسبوع 5
البطاريات	الأسبوع 6
عمق التفريغ.	الأسبوع 7

الأسبوع 8	.Inverter
الأسبوع 9	نظام PV متصل بالشبكة.
الأسبوع 10	عاكس ربط الشبكة.
الأسبوع 11	عملية المزامنة.
الأسبوع 12	عداد الكهرباء.
الأسبوع 13	نظام القياس (القياس الإجمالي والقياس الإتجاهي)
الأسبوع 14	نظام الرياح الشمسية الهجينة
الأسبوع 15	المنازل الشمسية وتحجيم نظام PV
الأسبوع 16	الامتحان النهائي

موارد التعلم والتعليم

مصادر التعلم والتدريس

	النص	متوفر في المكتبة؟
النصوص المطلوبة	Grid-connected Solar Electric Systems: The Earthscan Expert Handbook for Planning, Design and Installation 1st Edition by Geoff Stapleton	No
النصوص الموصى بها	لا أحد	No
Websites	لا أحد	

مخطط التصنيف

مخطط الدرجات

التعريف	مارك %	التقدير	الدرجة	المجموعة
أداء رائع	100 - 90	امتياز	أ - ممتاز	مجموعة النجاح (100 - 50)
فوق المتوسط مع بعض الأخطاء	89 - 80	جيد جدا	ب - جيد جدا	
العمل السليم مع أخطاء ملحوظة	79 - 70	جيد	ج - جيد	
عادلة ولكن مع عيوب كبيرة	69 - 60	متوسط	د - مرض	
العمل يلبي الحد الأدنى من المعايير	59 - 50	مقبول	E - Sufficient	

مطلوب المزيد من العمل ولكن الائتمان الممنوحة	(49-45)	راسب (قيد المعالجة)	فكس - فشل	فشل المجموعة
كمية كبيرة من العمل المطلوب	(44-0)	راسب	F - فشل	(0 – 49)

ملاحظة: سيتم تقريب العلامات العشرية فوق أو أقل من 0.5 إلى العلامة الكاملة الأعلى أو الأدنى (على سبيل المثال سيتم تقريب علامة 54.5 إلى 55، في حين سيتم تقريب علامة 54.4 إلى 54. لدى الجامعة سياسة عدم التغاضي عن "فشل المرور القريب"، لذا فإن التعديل الوحيد للعلامات التي تمنحها العلامة (العلامات) الأصلية سيكون التقريب التلقائي الموضح أعلاه.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Hydrology			Module Delivery	
Module Type	core			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	NRE47032				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		UGIV	Semester of Delivery		7
Administering Department		BSc_NRE	College		
Module Leader	Dr.Meaad		e-mail	@uomosul.edu.iq	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		PhD
Module Tutor	None		e-mail		
Peer Reviewer Name		None	e-mail	E-mail	
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	
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: used to introduce and explain key concepts. 2. Interactive discussions: Utilize group discussions, debates, case studies, and simulations as educational tools to encourage students to think critically and solve problems. 3. Multimedia resources: Leverage multimedia resources such as videos, animations, and simulations to enrich student engagement and facilitate comprehension of intricate concepts. 4. Assessment and feedback: used to measure student learning and provide feedback on their progress through quizzes, exams, and projects.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	
Week 8	
Week 9	
Week 10	
Week 11	
Week 12	
Week 13	
Week 14	
Week 15	
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?

Required Texts		No
Recommended Texts		No
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Theory inorganic chemistry / 2 nd semester**			Module Delivery	
Module Type	**Core**			☒ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	**NRE23010**				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level	UGII		Semester of Delivery	3	
Administering Department	BSC-NRE		College	Type College Code	
Module Leader	Thana Yaqup Yousif Al-Obedy		e-mail	Thana.y.yousif@uomosul.edu.iq	
Module Leader's Acad. Title	Assistance Professor		Module Leader's Qualification	M.Sc.	
Module Tutor	Thana Yaqup Yousif Al-Obedy		e-mail	Thana.y.yousif@uomosul.edu.iq	
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date	01/02/2024		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. Acquisition of skills in General Chemistry and Inorganic Chemistry. 2. To develop the ability to correlate the chemical and physical properties of elements and their compounds with their positions in the periodic table. 3. To establish the link between theory and laboratory practice by conducting laboratory experiments. 4. To acquire expertise in chemistry laboratory in handling of reagents and solvents as well as in analytical techniques.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Introduction, Matter, Atom, Electronic structure of the atom 2. Classical theory, Bohr Theory, Quantum theory: Examples 3. Practical examples using quantum numbers 4. Periodic Table of the Elements: s-block, p-block, d-block, f-block 5. Important Notes, 6. Some periodic properties of atoms, Shielding constant 7. To calculate the shielding constant of the electron in orbital s, p: 8. Periodic Properties: Atom radius , Ionization Energy, Electron Affinity, Electronegativity 9. The basic conditions for the composition of ionic compound.[15 hr] 10. Group I (1A): Introduction, The Alkali Metals, General properties 11. The diagonal relation ships: 12. Sodium (Na): Chemical properties, Sodium: reactions of elements 13. Alkaline Earth Metals Group II (IIA): Calcium, Chemical properties, Calcium: reactions of elements 14. Elements of Group IIIA, Boron: reactions of element, Aluminum, Aluminum: reactions of elements 15. Fourth group IVA: Carbon: reactions of elements, Silicon: reactions of elements. 16. Ionic Compound Polarization 17. Factors affecting the increase or decrease of polarization 18. Hydrogen: Preparation Methods of Hydrogen, Reactions of Hydrogen 19. Hydrogen Compounds: Nitrogen Hydrogen Compounds, Phosphorus Hydrogen Compounds, Sulfur Hydrogen Compounds, Halogen Hydrogen Compounds 20. Hydrogen isotopes [15 hr] 21. Hybridization: Types of Hybridization: sp Hybridization, sp2 Hybridization, sp3 Hybridization 22. Applications of hybridization: Linear molecule: Trigonal planar molecules, Tetrahedral molecules, Tetrahedral molecule (Pyramidal), Tetrahedral molecule (V-Shape), Trigonal bipyramid molecule, Octahedral molecule, Conclusion. 23. Valence bond theory: Examples
Indicative Contents المحتويات الإرشادية	1. Matter, Atom, Electronic structure of the atom 2. Classical theory, Bohr Theory, Quantum theory: Examples 3. Periodic Table of the Elements: s-block, p-block, d-block, f-block 4. Important Notes, 5. Group I (1A) 6. Group II (IIA) 7. Group IIIA 8. group IVA 9. Hydrogen isotopes 10. Hybridization: 11. Applications of hybridization 12. Valence bond theory

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Expanding students' perceptions about this science and its contents it includes that help in acquisition of skills in General Chemistry and Inorganic Chemistry. To develop the ability to correlate the chemical and physical properties of elements and their compounds with their positions in the periodic table and involving some examples activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	42	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction, Matter, Atom, Electronic structure of the atom
Week 2	Classical theory, Bohr Theory, Quantum theory: Examples
Week 3	Practical examples using quantum numbers
Week 4	Periodic Table of the Elements: s-block, p-block, d-block, f-block
Week 5	Periodic Properties: Atom radius , Ionization Energy, Electron Affinity, Electronegativity
Week 6	The basic conditions for the composition of ionic compound.[15 hr]
Week 7	Group I (1A): Introduction, The Alkali Metals, General properties
Week 8	Alkaline Earth Metals Group II (IIA): Calcium, Chemical properties, Calcium: reactions of elements
Week 9	Elements of Group IIIA, Boron: reactions of element, Aluminum, Aluminum: reactions of elements
Week 10	Factors affecting the increase or decrease of polarization
Week 11	Hybridization
Week 12	Hydrogen isotopes
Week 13	Valence bond theory: Examples
Week 14	Hydrogen Compounds: Nitrogen Hydrogen Compounds, Phosphorus
Week 15	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Cotton, F.A. and Wilkinsan, D. 2000 . Advanced Inorganic Chemistry. 5th ed. Wiley-Interscience, New York,.	No
Recommended Texts	Martel,A. E. ,2009. Coordination Chemistry. Van Nostrans Reinhold, NewYork.	No
Websites	https://classroom.google.com/u/2/c/NjUxMzQ1MTIwMTEz	

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.				

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Large Solar Energy systems**			Module Delivery	
Module Type	**Core**			☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	**NRE48039**				
ECTS Credits	**8**				
SWL (hr/sem)	**200**				
Module Level	**UGIV**		Semester of Delivery	8	
Administering Department	BSc_NRE		College		
Module Leader	Muhammed Mahmood Younis		e-mail	mohmahnua@uomosul.edu.iq	
Module Leader's Acad. Title	Lecture		Module Leader's Qualification	Dr.	
Module Tutor	None		e-mail	E-mail	
Peer Reviewer Name	None		e-mail	E-mail	
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. Introduction to different types of solar systems 2. Solar collectors 3. Mirrors 4. commercial CST technologies 5. parabolic trough 6. Parabolic trough geometry 7. Effect of Parabolic trough rim angle 8. Heat transfer fluid in direct and indirect systems 9. Fresnel solar system 10. Receivers types and structure 11. Classification of solar systems according storage fluids
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Enabling the student to know the large heliocentric solar systems 2. understand the basics of their structure 3. understand method of operation
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Definition of large solar systems 2. Types of merrors 3. Advantage and disadvantage of solar systems 4. examples 5. define with explanation of parabolic trough 6. define with explanation of Parabolic trough geometry 12. classify Heat transfer fluid in direct and indirect systems 13. classify Receivers types and structure

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: Traditional lectures can be used to present foundational concepts, theories, and principles to students. This allows for the dissemination of information and provides a framework for understanding the subject matter. 2. Discussions and Debates: Encouraging students to engage in discussions and debates promotes critical thinking and analysis of different perspectives. It allows them to delve deeper into the subject matter, challenge assumptions, and develop their communication and argumentation skills. 3. Case Studies: Presenting real-world case studies relevant to the course material can help students apply theoretical concepts to practical situations. This enables them to develop problem-solving skills and understand the real-life implications of the theories they are learning. 4. Group Projects: Assigning group projects or presentations that require students to work collaboratively can enhance their understanding of the material. It promotes teamwork, research skills, and the application of theoretical concepts in a practical context.

	5. Multimedia and Visual Aids: Incorporating multimedia resources such as videos, interactive simulations, and visual aids (e.g., diagrams, charts, infographics) can enhance student engagement and understanding. Visual representations can often simplify complex concepts and make them more accessible. 6. Self-directed Learning: Encouraging students to take ownership of their learning through self-directed activities, such as independent research, literature reviews, or project-based assignments, fosters critical thinking, independent thought, and a deeper understanding of the subject matter. 7. Assessments: Utilizing a variety of assessment methods, such as quizzes, tests, essays, or reflective journals, allows students to demonstrate their understanding of the material and provides feedback for their learning progress. Assessments should be aligned with the learning outcomes and encourage critical thinking and analysis.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	107	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	7.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to different types of solar systems
Week 2	Solar collectors
Week 3	Mirrors
Week 4	Mirrors
Week 5	commercial CST technologies
Week 6	parabolic trough
Week 7	parabolic trough
Week 8	Parabolic trough geometry
Week 9	Effect of Parabolic trough rim angle
Week 10	Effect of Parabolic trough rim angle
Week 11	Heat transfer fluid in direct and indirect systems
Week 12	Fresnel solar system
Week 13	Fresnel solar system
Week 14	Receivers types and structure
Week 15	Classification of solar systems according storage fluids
Week 16	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	• Advanced CSP Teaching Materials • Design And Testing Of A Solar Parabolic Concentrating • Design and Fabrication of Parabolic Trough Solar Collector for Thermal Energy Applications	No
Recommended Texts	None	No
Websites	None	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Material Science**			Module Delivery	
Module Type	**Core**			☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	**NRE-291**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	2		Semester of Delivery	1	
Administering Department	New and Renewable Energies		College	College of sciences	
Module Leader	Dr. Saad Fadhil Mahmood		e-mail	Saadfadhil32@uomousl.edu.iq	
Module Leader's Acad. Title	Lecture		Module Leader's Qualification	P.hD.	
Module Tutor			e-mail	E-mail	
Peer Reviewer Name	None		e-mail	E-mail	
Scientific Committee Approval Date	01/06/2023		Version Number	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1- Understand the principles and methods used to classify materials based on their properties, structures, and applications. 2- Study the properties, characteristics, and behavior of metals and ceramics. 3- Understand the applications and engineering considerations related to metals and ceramics. 4- Gain knowledge of polymers, including their structures, properties, and synthesis methods. 5- Examine the mechanical, thermal, and electrical properties of polymers. 6- Study advanced materials that possess unique properties or exhibit exceptional performance. 7- Gain an understanding of semiconductor materials and their properties. 8- Study the properties, design considerations, and biocompatibility of biomaterials. 9- Examine emerging materials and their potential impact on future technologies. 10- Explore the properties, synthesis methods, and applications of nano-engineered materials.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Able to classify materials based on their properties, structures, and applications, and differentiate between different categories such as metals, ceramics, polymers, composites, advanced materials, semiconductors, biomaterials, and nano-engineered materials. 2- Gain knowledge of the properties, behavior, and characteristics of metals and ceramics, including their mechanical, thermal, and electrical properties, and understand their engineering applications and considerations. 3- Evaluate the properties and behavior of polymers and composites, including their structure, synthesis methods, mechanical, thermal, and electrical properties, and 4- Understanding of advanced materials that possess unique properties or exhibit exceptional performance, and analyze their synthesis techniques, properties, and applications in cutting-edge technologies and industries. 5- Study the principles of semiconductors, including band theory and doping, and analyze their behavior in electronic devices. They will also explore the applications of semiconductors in integrated circuits, optoelectronics, and renewable energy technologies.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Classification of Materials: • Introduction to material science and its importance • Overview of material classification based on properties, structures, and applications • Study of different material categories: metals, ceramics, polymers, composites, etc. Metals and Ceramic: • Properties, characteristics, and behavior of metals and their alloys • Structure and properties of ceramics and their applications

	• Engineering considerations and practical applications of metals and ceramics Polymers and Composites: • Introduction to polymers and their classifications • Study of polymer properties, behavior, and processing techniques • Composites: types, composition, reinforcement, and applications Advanced Materials: • Introduction to advanced materials and their significance • Study of nanomaterials, smart materials, shape memory alloys, etc. • Synthesis methods, properties, and applications of advanced materials Semiconductors: • Overview of semiconductors and their role in electronic devices • Band theory, doping, and semiconductor behavior • Applications of semiconductors in integrated circuits, optoelectronics, and renewable energy technologies Biomaterials: • Introduction to biomaterials and their importance in medical applications • Study of biocompatibility, properties, and behavior of biomaterials • Applications of biomaterials in tissue engineering, implants, and medical devices Materials of the Future: • Emerging materials and their potential impact on future technologies • Study of graphene, carbon nanotubes, nanocomposites, etc. • Exploration of the challenges and opportunities in developing future materials Nano-engineered Materials: • Introduction to nanotechnology and its applications in material science • Synthesis techniques and properties of nano-engineered materials • Study of nanoscale phenomena and their influence on material behavior

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Lectures: Engage students through interactive lectures where the instructor introduces and explains key concepts related to each topic. Use visual aids, demonstrations, and real-life examples to enhance understanding and capture students' interest. 2- Laboratory Work: Provide hands-on laboratory experiments and practical sessions to allow students to observe and analyze the properties and behavior of different materials. This enables them to apply theoretical knowledge and develop practical skills in material characterization and testing. 3- Group Discussions: Encourage students to participate in group discussions and problem-solving activities. This promotes critical thinking and collaborative learning, allowing students to share their insights, exchange ideas, and develop a deeper understanding of the subject matter.

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

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Classification of Materials
Week 2	Classification of Materials continue
Week 3	Metals and Ceramic
Week 4	Metals and Ceramic continue
Week 5	Polymers
Week 6	Composites
Week 7	Advanced materials
Week 8	Advanced materials continue
Week 9	Semiconductors

Week 10	Semiconductors continue
Week 11	Biomaterials
Week 12	Biomaterials continue
Week 13	Materials of the future
Week 14	Materials of the future continue
Week 15	Nano-engineered Materials
Week 16	Final Exam

Delivery Plan (Weekly Lab. /Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1,2,3,4	Heat of Vaporization by Calorimetry
Week 5,6,7,8	Water-Phenol Miscibility Diagram
Week 9,10,11,12	Determination of the molecular weight by measuring the elevation of boiling point
Week 13,14,15	Determination of adsorption ratio for oxalic acid on activated char coal
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1-Matreial science and Engineering by Calister 2-	No
Recommended Texts	1.	No
Websites	None	

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

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نموذج وصف المادة الدراسية

معلومات الوحدة الدراسية معلومات المادة الدراسية					
تسليم الوحدة الدراسية				عنوان الوحدة الدراسية	**نمذجة الطاقة المتجددة**
☒ النظرية ☒ Lecture ☒ المختبر ☐ البرنامج التعليمي ☐ عملي ☒ الحلقة الدراسية				نوع الوحدة الدراسية	**الموارد الأساسية**
				Module Code	**NRE35023**
				ائتمانات ECTS	**6**
				SWL (hr/sem)	**175**
5	الفصل الدراسي التسليم	UGIII		Module Level	
	الجامعة	BSc_NRE		الإدارة	
mustafahussein@uomosul.edu.iq	e-mail	مصطفى حسين إبراهيم		قائد الوحدة الدراسية	
شهادة البكالوريوس	مؤهلات قائد الوحدة الدراسية	Lecture		أكاد قائد الوحدة الدراسية. العنوان	
E-mail	e-mail	لا أحد		مدرس وحدة دراسية	
E-mail	e-mail	لا أحد		اسم مراجع الأقران	
1.0	رقم الإصدار	2023/05/6		تاريخ موافقة اللجنة العلمية	

العلاقة مع الوحدات الأخرى العلاقة مع المواد الدراسية الأخرى			
	Semester	لا أحد	وحدة دراسية متطلب
	Semester	لا أحد	وحدة المتطلبات المشتركة

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
تسلط هذه الأهداف الضوء على أهداف الدورة في النمذجة الرياضية، وتوضح المعرفة والمهارات التي سيطورها الطلاب طوال دراستهم في هذا القسم 1. فهم تعريف ومفهوم النمذجة.	أهداف المادة الدراسية

2. التعرف على أنواع مختلفة من تقنيات النمذجة. 3. استكشاف مزايا وعيوب النمذجة. 4. تطوير المهارات في النمذجة الرياضية. 5. تحديد وفهم العناصر الأساسية للنمذجة. 6. اكتساب الكفاءة في تقنيات النمذجة التحليلية. 7. تحليل ومناقشة أمثلة العالم الحقيقي من تطبيقات النمذجة. 8. فهم المكونات المشاركة في عملية النمذجة. 9. الفرق بين متغيرات النمذجة ومعايير النمذجة. 10. استكشاف مفهوم نماذج المحاكاة وخصائصها. 11. تطوير المهارات في التحليل العددي لأغراض النمذجة. 12. استكشاف دور المحولات الرقمية إلى التناظرية في النمذجة والمحاكاة.	
1. تحديد النمذجة وأهميتها في مختلف المجالات. 2. تحديد أنواع مختلفة من تقنيات النمذجة المستخدمة في الممارسة العملية. 3. شرح مزايا وعيوب النمذجة في عمليات صنع القرار. 4. تطبيق النمذجة الرياضية لتمثيل أنظمة العالم الحقيقي. 5. تحديد ووصف العناصر الأساسية المشاركة في عملية النمذجة. 6. استخدام تقنيات النمذجة التحليلية لحل المشاكل الرياضية. 7. إظهار فهم النمذجة من خلال الأمثلة ذات الصلة. 8. تحديد ووصف المكونات المشاركة في عملية النمذجة. 9. الفرق بين متغيرات النمذجة ومعايير النمذجة. 10. فهم نماذج المحاكاة ودورها في تمثيل الأنظمة المعقدة. 11. وصف عملية وأهمية المحاكاة في النمذجة. 12. تطبيق تقنيات التحليل العددي في حل مشاكل النمذجة. 13. فهم مفهوم المحول الرقمي إلى التناظري وأهميته في النمذجة	مخرجات التعلم للمادة الدراسية
ويشمل المحتوى الإرشادي ما يلي. 1. تعريف النمذجة 2. أنواع النمذجة 3. مزايا وعيوب النمذجة 4. الرياضيات. النمذجة 5. عناصر النمذجة 6. النمذجة التحليلية 7. أمثلة 8. نمذجة المكونات 9. نمذجة المتغيرات 10. نمذجة المعلمات 11. نماذج المحاكاة 12. خصائص المحاكاة 13. التحليل العددي 14. DAC	المحتويات الإرشادية

استراتيجيات التعلم والتدريس استراتيجيات التعلم والتعليم	
1. المحاضرات: يمكن استخدام المحاضرات التقليدية لتقديم المفاهيم الأساسية والنظريات والمبادئ للطلاب. وهذا يسمح بنشر المعلومات ويوفر إطارا لفهم الموضوع.	الاستراتيجيات

2. المناقشات: تشجيع الطلاب على المشاركة في المناقشات مما يعزز التفكير النقدي وتحليل وجهات النظر المختلفة. يسمح لهم بالتعمق في الموضوع، وتحدي الافتراضات، وتطوير مهارات التواصل والحجج. 3. دراسات الحالة: تقديم دراسات الحالة في العالم الحقيقي ذات الصلة بالمواد وهذا يساعد الطلاب على تطبيق المفاهيم النظرية على الحالات العملية. ويمكنهم من تطوير مهارات حل المشكلات وفهم الآثار الواقعية للنظريات التي يتعلمونها. 4. مشاريع المجموعة: يمكن أن يؤدي تعيين مشاريع جماعية أو عروض تقديمية تتطلب من الطلاب العمل بشكل تعاوني إلى تعزيز فهمهم للمادة. وهو يعزز العمل الجماعي، والمهارات البحثية، وتطبيق المفاهيم النظرية في سياق عملي. 5. الوسائط المتعددة والادوات البصرية: يمكن أن يؤدي دمج موارد الوسائط المتعددة مثل مقاطع الفيديو والمحاكاة التفاعلية والوسائل البصرية إلى تعزيز مشاركة الطلاب وفهمهم. يمكن للتمثيلات البصرية في كثير من الأحيان تبسيط المفاهيم المعقدة وجعلها أكثر سهولة. 6. التعلم الموجه ذاتيا: تشجيع الطلاب على امتلاك تعلمهم من خلال الأنشطة الموجهة ذاتيا، مثل البحث المستقل، أو مراجعات الأدبيات، أو المهام القائمة على المشاريع، يعزز التفكير النقدي، والفكر المستقل، وفهم أعمق للموضوع. 7. التقييمات: استخدام مجموعة متنوعة من أساليب التقييم، مثل الاختبارات أو المقالات مما يسمح للطلاب بإظهار فهمهم للمادة وتقدم ملاحظات لسمتواهم في التعلم. يجب أن تكون التقييمات متوافقة مع نتائج التعلم وتشجيع التفكير النقدي والتحليل. 8. المتحدثون الضيوف أو الخبراء: يمكن لدعوة المتحدثين الضيوف أو الخبراء المتخصصين لتبادل معارفهم وخبراتهم تقديم رؤى إضافية وأمثلة عملية. كما أنه يعرض الطلاب لوجهات نظر مختلفة وتطبيقات العالم الحقيقي للمفاهيم النظرية التي يتم تدريسها	

عبء عمل الطالب (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
6	SWL منظم (h/ w) الحمل الدراسي المنتظم للطالب أسبوعيا	93	Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل
6	SWL غير منظم (h/ w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	82	Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل
175			Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل

Module Evaluation تقييم المادة الدراسية					
نتائج التعلم ذات الصلة	أسبوع مستحق	العلامات (Marks)	الوقت/الرقم		
Lo #1 و #2 و #3 و #6	5 و 10	(10) %10	2	اختبار	التقييم التكويني
Lo #3 و #4 و #5 و #7	2 و 12	(10) %10	2	المهام	
الكل	مستمرة	(10) %10	1	مختبر/ مختبر.	
# 2، # 3 و # 5	13	(10) %10	1	التقرير	
# 1 - # 5	7	(10) %10	2 ساعة	امتحان منتصف المدة	تقييم تلخيصي

الكل	16	(50) %50	3 ساعة	الامتحان النهائي	
		100 في المائة (100 مارك)	مجموع الأنصبة المقررة		

المنهج الأسبوعي (Weekly Syllabus) المنهاج الاسبوعي النظري	
المواد المغطاة	
ما هي النمذجة	الأسبوع 1
أنواع النمذجة	الأسبوع 2
مزايا وعيوب النمذجة	الأسبوع 3
الرياضيات. النمذجة	الأسبوع 4
عناصر النمذجة	الأسبوع 5
النمذجة التحليلية	الأسبوع 6
أمثلة	الأسبوع 7
أمثلة	الأسبوع 8
نمذجة المكونات	الأسبوع 9
نمذجة المتغيرات	الأسبوع 10
نمذجة المعلمات	الأسبوع 11
نماذج المحاكاة	الأسبوع 12
خصائص المحاكاة	الأسبوع 13
التحليل العددي	الأسبوع 14
DAC	الأسبوع 15
الامتحان النهائي	الأسبوع 16

موارد التعلم والتعليم مصادر التعلم والتدريس		
متوفر في المكتبة؟	النص	
No	Modelling and simulation 1st edition by Hartmut Bossel	النصوص المطلوبة
No	لا أحد	النصوص الموصى بها
لا أحد		Websites

مخطط التصنيف مخطط الدرجات				
التعريف	مارك %	التقدير	الدرجة	المجموعة
أداء رائع	100 - 90	امتياز	أ - ممتاز	مجموعة النجاح (100 - 50)
فوق المتوسط مع بعض الأخطاء	89 - 80	جيد جدا	ب - جيد جدا	
العمل السليم مع أخطاء ملحوظة	79 - 70	جيد	ج - جيد	
عادلة ولكن مع عيوب كبيرة	69 - 60	متوسط	د - مرض	
العمل يلبي الحد الأدنى من المعايير	59 - 50	مقبول	E - Sufficient	
مطلوب المزيد من العمل ولكن الائتمان الممنوحة	(49-45)	راسب (قيد المعالجة)	فكس - فشل	فشل المجموعة (49 – 0)
كمية كبيرة من العمل المطلوب	(44-0)	راسب	F - فشل	

ملاحظة: سيتم تقريب العلامات العشرية فوق أو أقل من 0.5 إلى العلامة الكاملة الأعلى أو الأدنى (على سبيل المثال سيتم تقريب علامة 54.5 إلى 55، في حين سيتم تقريب علامة 54.4 إلى 54. لدى الجامعة سياسة عدم التغاضي عن "فشل المرور القريب"، لذا فإن التعديل الوحيد للعلامات التي تمنحها العلامة (العلامات) الأصلية سيكون التقريب التلقائي الموضح أعلاه.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Modeling of Renewable Energy**			Module Delivery	
Module Type	**Core**			☒ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	**NRE35023**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	UGIII		Semester of Delivery	5	
Administering Department	BSc_NRE		College		
Module Leader	Mustafa Hussein ibrahim		e-mail	mustafahussein@uomosul.edu.iq	
Module Leader's Acad. Title	Lecture		Module Leader's Qualification	M.Sc.	
Module Tutor	None		e-mail	E-mail	
Peer Reviewer Name	None		e-mail	E-mail	
Scientific Committee Approval Date	6/05/2023		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	These objectives highlight the goals of the course in mathematical modeling, and illustrate the knowledge and skills that students will develop throughout their studies in this department 1. Understanding the definition and concept of modeling. 2. Familiarizing with the different types of modeling techniques. 3. Exploring the advantages and disadvantages of modeling. 4. Developing skills in mathematical modeling. 5. Identifying and understanding the essential elements of modeling. 6. Gaining proficiency in analytical modeling techniques. 7. Analyzing and discussing real-world examples of modeling applications. 8. Understanding the components involved in the modeling process. 9. Differentiating between modeling variables and modeling parameters. 10. Exploring the concept of simulation models and their characteristics. 11. Developing skills in numerical analysis for modeling purposes. 12. Exploring the role of digital-to-analog converters in modeling and simulation.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Define modeling and its significance in various fields. 2. Identify different types of modeling techniques used in practice. 3. Explain the advantages and disadvantages of modeling in decision-making processes. 4. Apply mathematical modeling to represent real-world systems. 5. Identify and describe the essential elements involved in the modeling process. 6. Utilize analytical modeling techniques to solve mathematical problems. 7. Demonstrate an understanding of modeling through relevant examples. 8. Identify and describe the components involved in the modeling process. 9. Differentiate between modeling variables and modeling parameters. 10. Understand simulation models and their role in representing complex systems. 11. Characterize the process and importance of simulation in modeling. 12. Apply numerical analysis techniques in solving modeling problems. 13. Understand the concept of a digital-to-analog converter and its relevance in modeling
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Definition of modelling 2. Types of modeling 3. Advantage and disadvantage of modelling 4. Math. modelling 5. modelling elements 6. Analytical modelling 7. examples 8. Modelling components 9. Modelling variables 10. Modelling parameters

	11. Simulation models 12. Characterizing of simulation 13. Numerical analysis 14. DAC

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: Traditional lectures can be used to present foundational concepts, theories, and principles to students. This allows for the dissemination of information and provides a framework for understanding the subject matter. 2. Discussions and Debates: Encouraging students to engage in discussions and debates promotes critical thinking and analysis of different perspectives. It allows them to delve deeper into the subject matter, challenge assumptions, and develop their communication and argumentation skills. 3. Case Studies: Presenting real-world case studies relevant to the course material can help students apply theoretical concepts to practical situations. This enables them to develop problem-solving skills and understand the real-life implications of the theories they are learning. 4. Group Projects: Assigning group projects or presentations that require students to work collaboratively can enhance their understanding of the material. It promotes teamwork, research skills, and the application of theoretical concepts in a practical context. 5. Multimedia and Visual Aids: Incorporating multimedia resources such as videos, interactive simulations, and visual aids (e.g., diagrams, charts, infographics) can enhance student engagement and understanding. Visual representations can often simplify complex concepts and make them more accessible. 6. Self-directed Learning: Encouraging students to take ownership of their learning through self-directed activities, such as independent research, literature reviews, or project-based assignments, fosters critical thinking, independent thought, and a deeper understanding of the subject matter. 7. Assessments: Utilizing a variety of assessment methods, such as quizzes, tests, essays, or reflective journals, allows students to demonstrate their understanding of the material and provides feedback for their learning progress. Assessments should be aligned with the learning outcomes and encourage critical thinking and analysis. 8. Guest Speakers or Experts: Inviting guest speakers or subject matter experts to share their knowledge and experiences can provide additional insights and practical examples. It also exposes students to different perspectives and real-world applications of the theoretical concepts being taught.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	82	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	What is modelling
Week 2	Types of modeling
Week 3	Advantage and disadvantage of modelling
Week 4	Math. modelling
Week 5	modelling elements
Week 6	Analytical modelling
Week 7	examples
Week 8	examples
Week 9	Modelling components

Week 10	Modelling variables
Week 11	Modelling parameters
Week 12	Simulation models
Week 13	Characterizing of simulation
Week 14	Numerical analysis
Week 15	DAC
Week 16	Final Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Modelling and simulation 1st edition by Hartmut Bossel	No
Recommended Texts	None	No
Websites	None	

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Circuit Analysis**			Module Delivery	
Module Type	**Core**			☒ Theory ☒ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☒ Seminar	
Module Code	**NRE2309**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	UGII		Semester of Delivery	3	
Administering Department	Type Dept. Code		College	Type College Code	
Module Leader	Ibtisam Yahya Abdullah		e-mail	ibtisamyahya@uomosul.edu.iq	
Module Leader's Acad. Title	Lecture		Module Leader's Qualification	P hD.	
Module Tutor	None		e-mail	E-mail	
Peer Reviewer Name	None		e-mail	E-mail	
Scientific Committee Approval Date	01/06/2023		Version Number	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1- Introducing the student to the theoretical foundations and basic principles of analyzing constant-current and alternating-current electrical circuits. 2- Introducing the student to the components of electrical circuits such as resistors, capacitors, inductors, load, etc.

	3- Enable the student to analyze electrical circuits and use different theories to solve them and calculate currents, voltages, and power in direct current and alternating current circuits. 4- Analysis of the Series and Parallel Circuit. 5- Solve the Kirchhoff's voltage and current Laws. 6- Describe the Electromagnetic Induction 7- Analysis of circuits using Thevenin's Theorem, Norton's, and Superposition Theorem. 8- Distinguish and solve the voltage and current divider rules. 9- Analysis of the Branch-Current, Mesh, and Nodal Analysis.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	At the end of this module, a student should be able to: 1. Identify the fundamentals of AC electrical circuits and their components. 2. Recognize the AC circuits 3. Apply the electrical circuit methods in the lab. 4. Determine the suitable analysis method to solve the problems 5. Analyze the electrical circuits by multiple methods 6. Solve the AC electrical circuits 7. Compare multiple AC circuit analysis methods 8. Compare DC & AC circuit analysis methods
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Theory:</u> 1- Electrical unit system SI 2- What is SI Units List? 3- Simple Electrical Circuit 4- The direct and alternating current 5- Basic Terminologies 6- Circuit Analysis 7- Series Circuits 8- Voltage Sources in Series 9- Kirchhoff's Voltage Law 10- Interchanging Series Elements 11- Voltage Divider Rule 12- Parallel Elements 13- Total Conductance and Resistance 14- Parallel Circuits 15- Kirchhoff's Current Law 16- Current Divider Rule 17- Problems 18- Branch-Current Analysis 19- Mesh Analysis 20- Nodal Analysis 21- Superposition Theorem

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: used to introduce and explain the Concepts of Electric Circuits and what are the components and Types, 2. Interactive discussions: used to engage students in critical thinking and problem-solving related to electric circuits through group discussions. 3. Multimedia resources: used to enhance student engagement and understanding of concepts related to electric circuits through videos, and animations. 4. Assessment and feedback: used to measure student learning and provide feedback on their progress through quizzes, exams, and projects.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	88	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Electrical unit system SI, What is SI Units List?
Week 2	Electric Circuits: Components, Types, and Related Concepts. The direct and alternating current
Week 3	Circuit Analysis, Series Circuits, Voltage Sources in Series
Week 4	Kirchhoff's Voltage Law
Week 5	Interchanging Series Elements
Week 6	Voltage Divider Rule
Week 7	Solve problems
Week 8	Parallel Elements, Total Conductance and Resistance
Week 9	Parallel Circuits, Kirchhoff's Current Law
Week 10	Current Divider Rule
Week 11	Solve problems
Week 12	Branch-Current Analysis
Week 13	Mesh Analysis
Week 14	Nodal Analysis
Week 15	Superposition Theorem
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	لا يوجد
Week 1	1- Experiment No.1: Ohm's Law
Week 2	2- Experiment NO.2 Series and parallel connection
Week 3	3- Experiment No.3 Kirchhoff's Laws
Week 4	4- Experiment NO.4 Divider Rules
Week 5	5- Experiment No.5 Mesh Method
Week 6	6- Experiment No.6 Thevenin's Theorem

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1- Introduction circuit analysis, Tenth edition 2- Electronic Circuits: Fundamentals and Application. 2nd edition. Michael Tootey, BA 3- Fundamentals of Electric Circuits: Firth Edition. Charles K. Alexander & Matthew N. O. Sadiku	No
Recommended Texts	1. A Textbook of Electrical Technology, Theraja. Vol. 2 2. ELECTRICAL CIRCUIT ANALYSIS. 2nd edition, MAHADEVAN, K. ،CHITRA, C.	No
Websites	None	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Nanotechnology**			Module Delivery	
Module Type	**Core**			☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	**NRE48037**				
ECTS Credits	**8**				
SWL (hr/sem)	**200**				
Module Level	**UGIV**		Semester of Delivery	8	
Administering Department	BSc_NRE		College		
Module Leader	Ahmed moneer		e-mail	??????@uomosul.edu.iq	
Module Leader's Acad. Title	Assistant professor		Module Leader's Qualification	PhD	
Module Tutor	None		e-mail	E-mail	
Peer Reviewer Name	None		e-mail	E-mail	
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. Clarification of nano scales that can make significant and contribute to a wide range of technical applications. 2. Identify the basics of nanotechnology. 3. This course deals with the basic concept of the most important elements in nano such approaches, the structure of nanomaterials, examples of nanomaterials, tools used to investigate materials, experiments and techniques used for preparing and applications of nano technology. 4. Learn about the most important scientific terms (Terminology) and their definitions related to this topic. 5. To understand and comprehend the impact of these elements from Physics point of view.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. To know about nanotechnology in detail 2. To understand the structures of materials. 3. To comprehend the conditions of obtaining nanotechnologyogy. 4. To go through applications of it. 5. To experience how usage of this technology in developing products. 6. To experience the structures of materials.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – Theoretical lectures Chapter One (Basic Concepts [10 hrs] Chapter Two (approaches): [8 hrs] Chapter Three (tools) [10 hrs] Chapter Four (techniques used in nanotechnology) [8 hrs] [4 hrs] Revision problem classes [3 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Expanding students' perceptions about this science and its contents. In addition, assisting students in knowledge gathering of basic sound and wave motion principles and concepts through understanding behaviors of certain wave components. Practical work should enhance perceptions of students about particular design and analysis of wave motion.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	107	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	7.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction
Week 2	Approaches
Week 3	Tools
Week 4	Tools
Week 5	Experiments
Week 6	Experiments
Week 7	Techniques

Week 8	Techniques
Week 9	Techniques
Week 10	Preparing materials
Week 11	Preparing materials
Week 12	Study materials
Week 13	Study materials
Week 14	Application
Week 15	Revision
Week 16	Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Poole, Charles P., and Frank J. Owens. "Introduction to nanotechnology." (2003): 145-150.	Yes
Recommended Texts	Satyanarayana, T. S. V., & Rai, R. (2011). Nanotechnology: the future. Journal of interdisciplinary dentistry, 1(2), 93.	Yes
Websites	None	

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Nuclear Energy**			Module Delivery	
Module Type	**Core**			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	**NRE47034**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGIV		Semester of Delivery	7	
Administering Department	BSc_NRE		College		
Module Leader	Waheed Abdi SHEEKHOO		e-mail	waheed.abdi@uomosul.edu.iq	
Module Leader's Acad. Title	Assistant Lecture		Module Leader's Qualification	M.Sc.	
Module Tutor	None		e-mail	E-mail	
Peer Reviewer Name	None		e-mail	E-mail	
Scientific Committee Approval Date	01/06/2023		Version Number	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The main objectives of a nuclear energy module that covers the basics of nuclear energy and how reactors generate electricity could include: 1. Understanding the basic principles of nuclear energy: This objective would cover the fundamental principles of nuclear energy, including the structure of the atom, nuclear fission, and radioactive decay. 2. Understanding the components of a nuclear power plant: This objective would cover the major components of a nuclear power plant, including the reactor, control rods, coolant system, turbine, generator, and electrical grid. 3. Understanding the process of nuclear fission and how it generates electricity: This objective would cover the process of nuclear fission in a reactor, including the role of uranium fuel, control rods, and coolant in the reaction. It would also cover how the heat generated by the reaction is used to produce steam, which drives a turbine to generate electricity. 4. Analyzing the safety measures in nuclear energy: This objective would cover the safety measures and regulations in place to ensure the safe operation of nuclear power plants, including emergency response plans and radiation protection. 5. Examining the benefits and drawbacks of nuclear energy: This objective would cover the advantages and disadvantages of nuclear energy as a source of electricity, including its reliability, safety, cost-effectiveness, and environmental impact. 6. Evaluating the future of nuclear energy: This objective would cover the potential for new and emerging nuclear technologies, including advanced reactors, small modular reactors, and nuclear fusion, and their potential impact on the energy landscape. It would also cover the role that nuclear energy may play in meeting future energy needs and reducing greenhouse gas emissions.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the structure of an atom, the basic principles of nuclear energy and biological effects of radiation. 2. Identify the major components of a nuclear power plant and their functions. 3. Describe the process of nuclear fission and how it generates electricity. 4. Explain the safety measures and regulations in place to ensure the safe operation of nuclear power plants. 5. Evaluate the advantages and disadvantages of nuclear energy as a source of electricity. 6. Understand the role that nuclear energy may play in meeting future energy needs and reducing greenhouse gas emissions. 7. Apply critical thinking and problem-solving skills to evaluate complex issues related to nuclear energy. 8. Communicate effectively about nuclear energy concepts and issues with others.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Theory:</u> Nuclear Radiation - Types of radiation and their properties - Biological effects of radiation [6 hrs] Introduction to Nuclear Energy - Overview of nuclear energy and its history - Basic principles of nuclear physics - Types of reactors and fuel cycles [6 hrs] Nuclear Fission - Nuclear fission process and chain reaction - Fissionable materials - Criticality and reactivity control [6 hrs] Nuclear Reactor Design - Components of a nuclear reactor - Reactor types and applications - Safety systems and mechanisms [6 hrs] Nuclear Reactor Operation - Reactor startup and shutdown procedures - Power generation and control - Fuel management and handling [6 hrs] Nuclear Reactor Fuel - Types of nuclear fuels - Fuel fabrication and enrichment - Fuel performance and degradation [9 hrs] Nuclear Reactor Electrical Systems - Electrical power systems in nuclear reactors - Generator, transformer, and transmission line design [9 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: used to introduce and explain key concepts related to nuclear energy and electricity generation from reactors. 2. Interactive discussions: used to engage students in critical thinking and problem-solving related to nuclear energy through group discussions, debates, case studies, and simulations. 3. Multimedia resources: used to enhance student engagement and understanding of complex concepts related to nuclear energy through videos, animations, and simulations. 4. Assessment and feedback: used to measure student learning and provide feedback on their progress through quizzes, exams, and projects.

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

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Types of radiation and their properties
Week 2	Biological effects of radiation
Week 3	Overview of nuclear energy and its history
Week 4	Basic principles of nuclear physics and Types of reactors and fuel cycles
Week 5	Nuclear fission process and chain reaction
Week 6	Fissionable materials and Criticality and reactivity control
Week 7	Components of a nuclear reactor and Reactor types and applications
Week 8	Safety systems and mechanisms
Week 9	Reactor startup and shutdown procedures

Week 10	Types of nuclear fuels
Week 11	Fuel fabrication and enrichment
Week 12	Fuel performance and degradation
Week 13	Electrical power systems in nuclear reactors, generator
Week 14	Electrical power systems in nuclear reactors, transformer
Week 15	Electrical power systems in nuclear reactors, transmission line design
Week 16	Final Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1- "Introduction to Nuclear Engineering" by John R. Lamarsh and Anthony J. Baratta. 2- "Nuclear Energy: An Introduction to the Concepts, Systems, and Applications of Nuclear Processes" by Raymond L. Murray and Keith E. Holbert.	No
Recommended Texts	1. "Fundamentals of Nuclear Science and Engineering" by J. Kenneth Shultis and Richard E. Faw. 2. "Nuclear Reactor Engineering: Reactor Design Basics" by Samuel Glasstone and Alexander Sesonske.	No
Websites	None	

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Organic Chemistry**			Module Delivery	
Module Type	**Core**			☒ Theory ☒ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	NRE24016				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	UGII		Semester of Delivery	4	
Administering Department	BSC-NRE		College	Type College Code	
Module Leader	Ala Ismael Ayoob		e-mail	ala i ayoob@uomosul.edu.iq	
Module Leader's Acad. Title	Professor		Module Leader's Qualification	Ph.D.	
Module Tutor	None		e-mail	E-mail	
Peer Reviewer Name	None		e-mail	E-mail	
Scientific Committee Approval Date	06/03/2024		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 main objective of an organic chemistry that covers the all type of organic 1. The main object of organic chemistry is the importance of organic compounds and its applications. 2. The course deals with the preporation and reaction of organic compound. 3. Learn about the physical and chemical properties. 4. Learn about the sterochemistry of some organic compound.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Study of some organic compound. 2. Understand the meaning of organic compounds that study. 3. Combinations between different kind of organic compounds . 4. learn about conformation , configuration . 5. learn about the uses of organic compound .
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Theory:</u> <u>Theoretical lectures</u> Hydrocarbon compounds ,type of hydrocarbon : 1. Alkanes Structureof alkanes (isomers) Physical properties of alkanes Conformation of alkanes Name of alkanes Preporation of alkanes Reaction of alkanes 2.Alkenes Structureof alkanes (cis - trans) Physical properties of alkenes Name of alkenes Preporation of alkenes Reaction of alkenes 3.Alkynes Structureof alkynes Physical properties of alkynes Name of alkynes Preporation of alkynes Reaction of alkynes Uses of alkynes

	4.Benzene Structure of benzene Resonance of benzene Reaction of benzene 5.Alkyl benzene Structure of alkyl benzene Orientation in disubstuted benzene (O, P ,M) Name of alkyl benzene Reaction of alkyle benzene Preporation of alkyl benzene

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: used to introduce and explain allorganic compound . 2. Interactive discussions: used to engage students in critical thinking and problem-solving to organic compound . 3. Multimedia resources: used to enhance student engagement and understanding of complex concepts related to sterochemistry, conformation.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	82	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

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

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Hydrocarbon (alkane) structure of hydrocarbon name of hydrocarbon
Week 2	Conformation of alkane Preporation of alkane
Week 3	Reaction of alkane Physical properties
Week 4	Alkene structure of alkene name of alkene cis –trans configuration
Week 5	Preporation of alkene Physical properties
Week 6	Reaction of alkene
Week 7	Alkyne Structure of alkyne Physical properties
Week 8	Prreporation of alkynes Acidity of hydrogene atom
Week 9	Reaction of alkynes
Week 10	Benzene Structure of benzene Name of benzene and related compound

Week 11	Orientation in disubstituted benzene (O ,N ,M)
Week 12	Reaction of benzene Physical properties
Week 13	Alkyl benzene Structure of alkyl benzene Physical properties Orientation in disubstied alkyl benzene
Week 14	Preporation of alkyl benzene
Week 15	Reaction of alkyl benzene Mechanism of some kind of reaction .

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Organic chemistry by morrison and boyed	No
Recommended Texts	Organic chemistry by finar	No
Websites	None	

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Petroleum ENERGY			Module Delivery	
Module Type	**Core**			☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	NRE36029				
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level		UGIII	Semester of Delivery		6
Administering Department		BSc_NRE	College	Type College Code	
Module Leader	Lubna Abdulaziz Salih		e-mail	lubnaabdulaziz@uomosul.edu.iq	
Module Leader's Acad. Title		Assistant Professor	Module Leader's Qualification		Ph.D.
Module Tutor			e-mail	lubnaabdulaziz@uomosul.edu.iq	
Peer Reviewer Name		Name	e-mail	E-mail	
Scientific Committee Approval Date		8/5/2024	Version Number		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	. 1. Learn about oil and its derivatives as the basis of energy sources 2. This course deals with the basic concept of the most important Physical and technical specifications and methods for evaluating oil and petroleum products 3. Specifications and quality measurement. 4. The possibility of merging with renewable energy sources 5. . Study the specifications of derivatives and their uses
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. List with description, petroleum,crude oil, oil cuts, 2. Define the various terms associated with petroluem and distillates. 3.. The ability to conduct experiments and determine the quality of the derivative according to its field of use 4. Chemistry of basic refining process 5. Methods of production
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Theoretical lectures</u> 1- Introduction, Origin of Petroleum;(3h) 2- Methods of production;(6h) 3- Classification of petroleum( )3h 4- Evaluation of petroleum and its distillates;(3h) 5- Chemical composition of petroleum;(3h) 6- Chemistry of basic refining process;(6h) 7- Petroleum products;(6h) <u>Part B – Practical labs</u> Introduction, distillation of crude oil; thermal degredation; catalyst cracking; [18 hrs] Thermal properties: pour point; cloud point. Flash point. Fire point, Aniline point: conradson Residue

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	

	Expanding students'The ability to determine the quality of the oil derivative, Simulation of refining processes in refineries, Identifying the quality of the derivative through physical measurements, that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	82	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

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

Delivery Plan (Weekly Syllabus) المنهاج الأسبوعي النظري	
	Material Covered
Week 1	Introduction Origin of Petroleum Methods of production

Week 2	. Classification of petroleum
Week 3	Evaluation of petroleum and its distillates
Week 4	Chemical composition of petroleum
Week 5	Chemical composition of petroleum
Week 6	Introduction to refining process
Week 7	Refining chemistry
Week 8	Distillation Thermal cracking
Week 9	Thermal cracking
Week 10	. Catalytic craking
Week 11	. Chemistry of basic refining process
Week 12	Petroleum products
Week 13	Octane number of Gasoline Cetane number of diesel fuel
Week 14	Tutorial and scientific video show
Week 15	Final-term exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1. Introduction
Week 2	Lab 2:distillation of crude oil 1
Week 3	Lab 3: distillation of crude oil 2
Week 4	Lab 4: thermal cracking
Week 5	Lab 5: physical properties
Week 6	Lab 6: Evaluation of products; density; viscosity; refractive Index; . [6 h) ;(6h) Determination of water in crude oil(3h) Purification of sulfur(3h)
Week 7	Lab 7: Thermal properties: pour point; cloud point. Flash point. Fire point
Week 8	Lab 8:. Aniline point: conradson Residue(3h)
Week 9	Lab9:. Purification of sulfur(3h)
Week10	Lab 10 Aniline point: conradson Residue(3h)

Week 11	Lab 11: Determination of water in crude oil
Week 12	Lab 12: exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1- The Chemistry and Technology of Petroleum James G. Speight 2- Practical Petroleum Geochemistry for Exploration and Production By Harry Dembicki	Yes Yes
Recommended Texts	•An Introduction to Petroleum Technology, Economics, and Politics •By James G. Speight	Yes No
Websites	Fundamentals of Petroleum Refining By Mohamed A. Fahim,	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Hydro Electric Energy			Module Delivery	
Module Type	CORE			☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	NRE35024				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level		GUIII	Semester of Delivery		5
Administering Department		BSc_NRE	College		
Module Leader	Dr.Meaad Salim Younes Al-hadidi		e-mail	meaadsalim@uomosul.edu.iq	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		PhD
Module Tutor	None		e-mail		
Peer Reviewer Name		None	e-mail	E-mail	
Scientific Committee Approval Date		8/5/2024	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 primary goals of a semester include: 1. Explain the concept of sustainability and how this relates to energy systems and primary energy sources 2. Understand the key role of the sun as the main source of renewable energy 3. Understand the concepts of energy, and power, the difference between them and the essential units used to describe them. 4. Understand the structure of hydropower system. 5. Use mechanical laws that related to the system power. 6. knowledge about the types of turbines (Design and applications).
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the structure of hydropower system. 2. Distinguish between hydropower system and other renewable systems. 3. knowledge of hydroelectric power stations in the world and Iraq. 4. knowledge of hydroelectric power stations in the world and Iraq. 5. Solve mathematical problems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Theory: 1. The importance of hydropower system 2. understand the structure of hydropower system 3. The elements of hydropower system. 4. Solve mathematical problems

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: used to introduce and explain key concepts. 2. Interactive discussions: Utilize group discussions, debates, case studies, and simulations as educational tools to encourage students to think critically and solve problems. 3. Multimedia resources: Leverage multimedia resources such as videos, animations, and simulations to enrich student engagement and facilitate comprehension of intricate concepts. 4. Assessment and feedback: used to measure student learning and provide feedback on their progress through quizzes, exams, and projects.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem)	27	Unstructured SWL (h/w)	2

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction Water resource distribution of water resource, cycle of water resource, and condition of water resource in the world.
Week 2	Introduction of hydroelectric power production.
Week 3	Components of hydropower station (Dam or a weir, Water Reservoir (artificial lake), Intake or Control Gates, The Penstock (Pressure pipe))
Week 4	Components of hydropower station (Turbines, Power generations, Powerhouse, Grid connection and Tail race).
Week 5	Classification of hydropower plants.
Week 6	Impact of climate change on resource potential
Week 7	Types of Hydroelectric power stations • Low pressure power stations • Pumping power stations
Week 8	Hydraulic Turbines
Week 9	Pelton turbine (Design and applications)
Week 10	Kaplan and Frances turbines (Design and applications)

Week 11	Hydroelectric power stations in the world (Guri hydroelectric power plants)
Week 12	Hydroelectric power stations in the world (Venezuela, Grand Coulee)
Week 13	hydroelectric power plant (three gorges hydroelectric power plant)
Week 14	Hydroelectric power stations in Iraq (Mosul, Sammara, Kuut, Hindia)
Week 15	Environment impacts (Advantages and disadvantages)
Week 16	Final Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Hydropower Paul Breeze · 2018	No
Recommended Texts	Introduction to Hydro Energy Systems Basics, Technology and Operation By Hermann-Josef Wagner, Jyotirmay Mathur · 2011	No
Websites	https://www.siemens-energy.com/global/en/offerings/power-generation/power-plants/small-hydro-power.html?stc=wwse101009&ef_id=CjwKCAjwz_WGBhA1EiwAUAxIcUY52dTg5iCRBkeByz_BsAgGmCq5hsz7GbWCu44i0RJrKU4B0WKgRhoCK40QAvD_BwE:G:s&s_kwcid=AL!11761!3!487935440282!e!!g!!hydroelectric%20plant&gclid=CjwKCAjwz_WGBhA1EiwAUAxIcUY52dTg5iCRBkeByz_BsAgGmCq5hsz7GbWCu44i0RJrKU4B0WKgRhoCK40QAvD_BwE	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Electronic Measurement and Control			Module Delivery	
Module Type	CORE			☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	NRE3519				
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level		UGIII	Semester of Delivery		5
Administering Department		BSc_NRE	College		
Module Leader	Dr.Meaad Salim Younes Al-hadidi		e-mail	meaadsalim@uomosul.edu.iq	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		PhD
Module Tutor	None		e-mail		
Peer Reviewer Name		None	e-mail	E-mail	
Scientific Committee Approval Date		8/5/2024	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 primary goals of a semester include: 1. The aim is to understand the fundamental principles of electronic components of devices. 2. Quantities, units and standards 2. Gaining insight and information on types of transducers. 3. Understand the structure, design and work of some electrical instruments. 4. Distinguish between types of computer ports and their characteristics. 5. Solve mathematical problems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the structure of electronic components of devices. 2. Distinguish between computer ports. 3. Units of Measurement Common in electrical circuits (elements). 4. knowledge of parts of electrical circuits 5. Solve mathematical problems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Theory: 1. The importance of Transducers 2. understand the Electrical measurements and definition of instruments 3. The elements of an electronic circuit. 4. Solve mathematical problems

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: used to introduce and explain key concepts. 2. Interactive discussions: Utilize group discussions, debates, case studies, and simulations as educational tools to encourage students to think critically and solve problems. 3. Multimedia resources: Leverage multimedia resources such as videos, animations, and simulations to enrich student engagement and facilitate comprehension of intricate concepts. 4. Assessment and feedback: used to measure student learning and provide feedback on their progress through quizzes, exams, and projects.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem)	82	Unstructured SWL (h/w)	4

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction - Quantities, units and standards
Week 2	Basic Units and Derived Units - Standards – Prefixes - Identification of basic electronic components
Week 3	Transducers - Passive and active transducers - Principle of operation
Week 4	Classification of transducers
Week 5	Examples of the transducers (Temperature transducer)
Week 6	Examples of the transducers (pressure transducers)
Week 7	Examples of the transducers (strain gangs transducers)
Week 8	Electrical measurements
Week 9	Solve Mathematical problems
Week 10	Definition of instruments (Absolute Instrument- Secondary Instrument)
Week 11	Voltage measurements- current measurements
Week 12	Errors in Measurement- Types of Errors
Week 13	Solve Mathematical problems

Week 14	the oscilloscope - signal analysis- spectrum.
Week 15	Super capacitors
Week 16	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1. Electrical and Electronics Measurements and Instrumentatio *By* Prithwiraj Purkait, Budhaditya Biswas, Santanu Das and Chiranjibm Koley 2. Modern electronic instnmentation technique *By* Abent D.Hdfrick	No
Recommended Texts	Electrical Measurement and Control *By* S.K. Bhattacharya & S. Bhattacharya	No
Websites	https://www.vikaspublishing.com/books/engineering/electrical-engineering/electrical-measurement-control- for-wbscte/9789325984592/	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Meteorology			Module Delivery	
Module Type	CORE			☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	NRE36028				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level		UGIII	Semester of Delivery		6
Administering Department		BSc_NRE	College		
Module Leader	Dr.Meaad Salim Younes Al-hadidi		e-mail	meaadsalim@uomosul.edu.iq	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		PhD
Module Tutor	None		e-mail		
Peer Reviewer Name		None	e-mail	E-mail	
Scientific Committee Approval Date		01/02/2024	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 primary goals of a semester dedicated to meteorology include: 1. The aim is to understand the fundamental principles of atmospheric structure, encompassing the various layers of the atmosphere, their individual purposes, as well as the pressure and temperature characteristics within each layer. 2. Gaining insight into the formation process and advantages of the ozone layer. 3. Analyzing the report of the weather station: This objective would cover the main content of the weather station report including the weather situation, warning and weather forecast 4. Understanding the weather and climate characteristics, controls and elements. 5. Solve mathematical problems associated with weather conditions.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the structure of an atmosphere including the importance of earth's atmosphere and the layers of atmosphere. 2. Distinguish between weather and climate. 3. Units of Measurement Common in Meteorology 4. knowledge about Atmospheric Structure 5. information about the weather and climate elements and controls. 6. Solve mathematical problems. 7. Types of winds, clouds and precipitations
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Theory: 1. The importance of earth's atmosphere 2. The structure and layers of the atmosphere 3. The elements and controls of the atmosphere 4. Solve mathematical problems 5. Radiation in the atmosphere 6. Weather and climate. 7. Cloud Classification

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: used to introduce and explain key concepts related to meteorological science. 2. Interactive discussions: Utilize group discussions, debates, case studies, and simulations as educational tools to encourage students to think critically and solve problems pertaining to meteorological science. 3. Multimedia resources: Leverage multimedia resources such as videos, animations, and simulations to enrich student engagement and facilitate comprehension of intricate concepts. 4. Assessment and feedback: used to measure student learning and provide feedback on their progress through quizzes, exams, and projects.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	27	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Principle of atmosphere physics - The structure of Earth atmosphere
Week 2	The layers of the atmosphere
Week 3	Providing an overview of the origin of the atmosphere and highlighting the significance it holds.
Week 4	Fundamental principles underlying the cyclic processes of atmospheric gases.
Week 5	introduction to Weather and Climate.
Week 6	Elements of Weather and Climate (Air pressure, Temperature, Humidity, Solar radiation, Winds, Cloudiness)
Week 7	Types of Precipitation
Week 8	Brightness of the Sun, Storms, Visibility

Week 9	The Water Cycle , Mathematical problems
Week 10	Types of Wind and air Current
Week 11	Controls of weather and climate (Latitude, Altitude, Land and water, Low and high pressure cells, Ocean currents)
Week 12	Metrological elements tools and measurements Radiation in atmosphere Atmosphere optics Radar metrology Weather satellites
Week 13	Continental and marine position of Iraq Air fonts on Iraq
Week 14	Winds and precipitations on Iraq Dust and sand storm on Iraq
Week 15	Iraq tropical atmosphere system
Week 16	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1. Introduction to Climate Change: Lecture Notes for Meteorologists Prepared Author: David D. Houghton 2. Meteorology Today: An Introduction to Weather, climate, and the Environment Author: C. Donald Ahrens	No
Recommended Texts	1/ Reading the Clouds: How You Can Forecast the Weather Author: Oliver Perkins 2/ The weather handbook Author: Alan Watts	No
Websites	The Habitable Planet: A Systems Approach to Environmental Science https://www.learner.org/series/the-habitable-planet-a-systems-approach-to-environmental-science/	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Energy Transmission and storage			Module Delivery	
Module Type	core			☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	NRE35022				
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level		GUIII	Semester of Delivery		FIVE
Administering Department		BSs_NRE	College		
Module Leader	Dr.Meaad Salim Younes Al-hadidi		e-mail	meaadsalim@uomosul.edu.iq	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		PhD
Module Tutor	None		e-mail		
Peer Reviewer Name		None	e-mail	E-mail	
Scientific Committee Approval Date		8/5/2024	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 primary goals of a semester include: 1. Understand the fundamental principles of batteries' work. 2. Gaining insight and information on types of batteries. 3. Comprehend the composition of the batteries. 4. Distinguish between primary and secondary batteries based on their types. 5. Solve mathematical problems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the structure of batteries. 2. Distinguish between batteries' types. 3. Units of Measurement Common in electrical circuits (elements). 4. Understanding the components of batteries and comprehending the functioning of each battery type. 5. Solve mathematical problems. 6. The structure and operational principles of a flywheel.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Theory: 1. The importance of batteries. 2. understand the structure, designing and work of batteries. 3. Identify the types of batteries. 4. Use Peukert's law and other laws to solve problems.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: used to introduce and explain key concepts. 2. Interactive discussions: Utilize group discussions, debates, case studies, and simulations as educational tools to encourage students to think critically and solve problems. 3. Multimedia resources: Leverage multimedia resources such as videos, animations, and simulations to enrich student engagement and facilitate comprehension of intricate concepts. 4. Assessment and feedback: used to measure student learning and provide feedback on their progress through quizzes, exams, and projects.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	82	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4

Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction - Types of batteries.
Week 2	Lead acid, Nickel-metal hydride
Week 3	Lithium-ion , Lithium-polymer, Zinc-air
Week 4	Battery Performance (Battery Ratings, Energy efficiency, Internal resistance)
Week 5	Battery Performance (Charge efficiency, self-discharge and trickle charge, memory effect, effect of temperature
Week 6	Internal loss and temperature rise, random failure, wear out failure
Week 7	Various batteries compared, Battery design
Week 8	Battery charging , Charge regulators, Multiple charge rates
Week 9	Solve Mathematical problems
Week 10	Unregulated charging, Battery management
Week 11	Monitoring and controls, Safety
Week 12	Flywheel, Energy relating, Flywheel benefits over battery
Week 13	Solve Mathematical problems

Week 14	Compressed air
Week 15	Super conducting coil
Week 16	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Power System Energy Storage Technologies Paul Breeze	No
Recommended Texts	Energy Storage Technologies & Their Role in Renewable Integration Andreas Oberhofer	No
Websites	Energy saving https://en.wikipedia.org/wiki/Electric_battery https://www.britannica.com/technology/battery-electronics	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	اخلاقيات المهنة Professional Ethics			Module Delivery	
Module Type	S			☒ Theory ☐ Lecture ☐Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	NRE47035				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level		UGIV	Semester of Delivery		7
Administering Department		BSc_NRE	College		
Module Leader	Salah avdo ali		e-mail	Salahavdo2@uomosul.edu.iq	
Module Leader's Acad. Title		Assistant lecturer	Module Leader's Qualification		M.A.
Module Tutor	Thana Yaqup Yousif Al-Obedy		e-mail	THANA.Y.YOUSIF@UOMOSUL.EDU.IQ	
Peer Reviewer Name		Name	e-mail	E-mail	
Scientific Committee Approval Date		02/06/2023	Version Number	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية يتم كتابة اهم الأهداف التي تغطيها هذه المادة الدراسية بشكل جمل او فقرات توضح المواضيع التي سيتم التطرق اليها و دراستها و معالجتها)	أ- المعرفة والفهم) الاهداف المعرفية(1/ أن يعرف الطالب أخلاقيات المهنة ومكانتها في الإسلام. 2/ أن يدرك الطالب أهمية أخلاقيات المهنة في نجاح العمل وحياة الفرد. 3/ أن يلم الطالب بتطبيقات أخلاقيات المهنة في العمل الوظيفي. ب - المهارات الخاصة بالموضوع) الاهداف المهاراتية الخاصة بالمقرر(ب –- 1اكتساب الطالب لمهارات اخلاقيات الحسنة والجميلة في الوظيفة. ب – 2 اكتساب الطالب مهارات التعامل الجيد مع المحيطين به في العمل. ب – 3 اكتساب الطالب مهارات مواجهة اي موقف والتعبير عن الراي بكل اخلاص وأمانة وثقة بالنفس. ج- مهارات التفكير ج1- مهارات التحليل. ج2- مهارات التوظيف للمفردات التي تعلمها في الواقع العملي من خلال دراسة مشكلات محددة من الواقع. ج3- مهارات التنبؤ والدراسات المستقبلية للنظم الديمقراطية. د - المهارات العامة والمنقولة (المهارات الأخرى المتعلقة بقابلية التوظيف والتطور الشخصي). د1- القدرة على العمل كفريق. د2- التفاعل مع فريق العمل لتحقيق المهارات المطلوبة. د3- القدرة على القيام بعرض نظري لبعض الموضوعات ذات العلاقة بمفردات المادة. د4- اكتساب مهارات التحليل العلمي لاي ظاهرة سياسية تتعلق بحقوق الانسان.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية يتم كتابة اهم المُخرجات او الناتج و الكم العلمي الذي يتم استخدامه للتدريس في هذه المادة على شكل أسئلة أساسية تخص منهاج المادة بأكمله و يجب ان لا تقل هذه المُخرجات من ناحية العدد عن 6 مُخرجات و يفضل ان تكون بعدد أسابيع الدراسة.	1- عرف المفاهيم الاتية: الاخلاق، الانسان، اخلاقيات المهنة، الرقابة الذاتية، الفساد الاداري والمالي. 2. وضح اهمية اخلاقيات المهنة. 3. اذكر اهم مقومات اخلاقيات المهنة. 4- تكلم باختصار عن وسائل ترسيخ اخلاقيات المهنة. 5- ناقش ما جاء حول مصادر اخلاقيات المهنة. 6- حدد اهم اخلاقيات المهنة المحمودة في الاسلام. 7- اشرح المقومات العامة لأخلاقيات المهنة. 8- عدد مع الشرح وسائل ترسيخ اخلاقيات المهنة. 9- ناقش التحديات الداخلية والخارجية التي تواجه اخلاقيات المهنة. 10- تكلم عن الفساد الاداري والمالي. 11- ناقش عناصر ومكونات المسؤولية الاجتماعية.
Indicative Contents المحتويات الإرشادية يتم كتابة اهم العناوين الرئيسية للمواضيع بشكل متسلسل و التي تشمل كافة الفقرات التي تحتويها مع إدراج عدد الساعات المطلوبة لتنفيذ كل فقرة.	يتضمن المحتوى الإرشادي ما يلي. مفهوم اخلاقيات المهنة يتناول تعريف الاخلاق وتعريف الانسان، تعريفاً لغوياً واصطلاحياً واجرائياً، أهمية اخلاقيات المهنة، مصادر اخلاقيات المهنة، ثم المقومات العامة لأخلاقيات المهنة. (5 ساعات) وسائل ترسيخ اخلاقيات المهنة يتناول ما تضمنه من الوسائل مثل تمنية الرقابة الذاتية، الدقة في وضع الانظمة والتعليمات، القدوة الحسنة، محاسبة المقصرين. (ساعتان). التحديات واثرها في اخلاقيات المهنة يتناول التحديات الداخلية مثل اولاً: الانحرافات السلوكية أو الاخلاقية، الانفراد بالرأي أو التسلط، ثانياً: التحديات الخارجية مثل المنافسة غير الشريفة، الفساد الاداري، تضارب المصالح. (3 ساعات). المسؤولية الاجتماعية يتناول مفهوم المسؤولية الاجتماعية، انواع المسؤولية الاجتماعية، عناصر المسؤولية الاجتماعية، مجالات المسؤولية الاجتماعية، أهمية المسؤولية الاجتماعية. (4 ساعات).

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies يتم كتابة ملخص الاستراتيجية الرئيسية التي سيتم تبنيها في تقديم هذه المادة	1. المحاضرة المصحوبة بالشرح والتحليل. 2. الحلقة النقاشية. 3. التقارير والبحوث. 4. عرض المادة عبر شرائح (بوربوينت) . 5. الاسئلة والاجوبة. 6. المشاركة الصفية .

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	32	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	1
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

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

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي النظري	
	Material Covered
Week 1	محاضرة تعريفية بمفردات المادة واهدافها
Week 2	المفاهيم: الأخلاق، المهنة، اخلاق المهنة
Week 3	مصادر أخلاق المهنة
Week 4	المقومات العامة لأخلاقيات المهنة (الإخلاص في العمل، الأمانة)
Week 5	المقومات العامة لأخلاقيات المهنة (الصدق، التواضع وحسن التعامل، النزاهة)
Week 6	وسائل ترسيخ اخلاقيات المهنة (تنمية الرقابة الذاتية، الدقة في وضع الانظمة والتعليمات)
Week 7	وسائل ترسيخ اخلاقيات المهنة (القدوة الحسنة، محاسبة المقصرين)
Week 8	التحديات وأثرها في اخلاقيات المهنة التحديات الداخلية
Week 9	التحديات وأثرها في اخلاقيات المهنة التحديات الخارجية
Week 10	الفساد الإداري والمالي
Week 11	صور وأشكال الفساد الإداري والمالي
Week 12	اسباب انتشار الفساد الاداري والمالي
Week 13	سبل معالجة الفساد الاداري والمالي
Week 14	المسؤولية الاجتماعية (مفهومها، أنواعها، عناصرها، مكوناتها)
Week 15	المرتكزات الاساسية لأخلاقيات المهنة

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

Learning and Teaching Resources مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. - أخلاقيات الإدارة في الوظيفة العامة / أ.د.فهد العثيمين.	Yes Yes
Recommended Texts	1. - أخلاقيات العمل/ د. بلال خلف السكارنه.	Yes Yes
Websites	1 https://youtu.be/jcJMfOlU4LI?si=D04RSZnOzt_pczN 2 https://youtu.be/PffMlbwjlPE?si=Wq_xLX_wRWREnrTs	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Small Solar Energy systems**			Module Delivery	
Module Type	**Core**			☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	**NRE47033**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	**UGIV**		Semester of Delivery	7	
Administering Department	BSc_NRE		College		
Module Leader	Ghada Ghanim Younis		e-mail	ghadaghanim@uomosul.edu.iq	
Module Leader's Acad. Title	Lecture		Module Leader's Qualification	Ph.D.	
Module Tutor	None		e-mail	E-mail	
Peer Reviewer Name	None		e-mail	E-mail	
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	These objectives highlight the goals of the course in solar water heater, and illustrate the knowledge and skills that students will develop throughout their studies in this department 1. Understanding the basic principles of thermal solar energy: This objective would cover the fundamental principles of solar energy, including the Fundamentals of Heat Transfer, Solar Water Heating Application, and the Principle of Solar Water Heating System Operation. 2. Understanding the use of solar energy for heating air and water: This objective would cover the manufacture of solar water heaters has become an established industry in several countries. 3. Understanding the components of a solar water heater: This objective would cover the major parts of a solar water heater, including the collector, tank, valve, meters, and pipes. 4. Examining the benefits and drawbacks of thermal solar energy: This objective would cover the advantages and disadvantages of thermal solar energy as a source of air and water heater, including its reliability, safety, cost-effectiveness, and environmental impact. 5. Evaluating the future of thermal solar energy: This objective would cover the potential for new and emerging wind technologies, including different types of solar water heaters, and their potential impact on the energy landscape. It would also cover wind energy's role in meeting future energy needs and reducing greenhouse gas emissions
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the fundamental principles of thermal solar energy, including the fundamental principles of solar energy, including Fundamentals of Heat Transfer, Solar Water Heating Application, and the Principle of Solar Water Heating System Operation. 2. Identify the major components of a Solar Water heater and their functions. 3. Describe how a Solar Water heater works and how the Calculation of heat balance. 4. Explain the safety measures and regulations in place to ensure the safe operation of a solar water heater. 5. Evaluate the advantages and disadvantages of solar water heaters as a source of clean energy. 6. Understand thermal solar energy's role in meeting future energy needs and reducing greenhouse gas emissions. 7. Apply critical thinking and problem-solving skills to evaluate complex issues related to thermal solar energy. 8. Communicate effectively about thermal solar energy concepts and issues with others.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Theory:

	Heat Transfer. - conduction - Free and forced convection. - Nusselt number [6 hrs] Calculation of convective heat transfer - Free convection between parallel plates - Convective cooling of a cooking pot - Forced plus free convection [6 hrs] Radiation - Thermal Radiation - Surface Property - Blackbody Radiation - Real body Radiation [6 hrs] Thermal Resistance - Thermal Resistance Network - resistors in parallel - resistors in series [6 hrs] Heat transfer by mass transport - Heat transfer by single phase - Heat transfer by phase change [6hrs] Solar water heaters Design - Components of a Solar water heater - Solar water heater types and applications - Safety systems and mechanisms [9 hrs] Solar Water Heating Application - Solar collector - Flat-Plate Collector - Evacuated-Tube Solar Collectors - Heat Pipe Evacuated Tube Collectors - Direct Flow Evacuated Tube Collector - Integral Collectors [9 hrs] Calculation of heat balance: general remarks - The heat balance of an unsheltered black bag - Heat balance of a sheltered collector - Efficiency of a flat plate collector - Metal–semiconductor stack [9 hrs] Water Heating Systems - Active systems with forced circulation - Passive systems with thermosiphon circulation [6 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: Traditional lectures can be used to present foundational concepts, theories, and principles to students. This allows for the dissemination of information and provides a framework for understanding the subject matter.

	2. Discussions and Debates: Encouraging students to engage in discussions and debates promotes critical thinking and analysis of different perspectives. It allows them to delve deeper into the subject matter, challenge assumptions, and develop their communication and argumentation skills. 3. Case Studies: Presenting real-world case studies relevant to the course material can help students apply theoretical concepts to practical situations. This enables them to develop problem-solving skills and understand the real-life implications of the theories they are learning. 4. Group Projects: Assigning group projects or presentations that require students to work collaboratively can enhance their understanding of the material. It promotes teamwork, research skills, and the application of theoretical concepts in a practical context. 5. Multimedia and Visual Aids: Incorporating multimedia resources such as videos, interactive simulations, and visual aids (e.g., diagrams, charts, infographics) can enhance student engagement and understanding. Visual representations can often simplify complex concepts and make them more accessible. 6. Self-directed Learning: Encouraging students to take ownership of their learning through self-directed activities, such as independent research, literature reviews, or project-based assignments, fosters critical thinking, independent thought, and a deeper understanding of the subject matter. 7. Assessments: Utilizing a variety of assessment methods, such as quizzes, tests, essays, or reflective journals, allows students to demonstrate their understanding of the material and provides feedback for their learning progress. Assessments should be aligned with the learning outcomes and encourage critical thinking and analysis.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	82	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.46
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Heat Transfer, conduction, Free and forced convection, Nusselt number
Week 2	- Free convection between parallel plates
Week 3	Calculation of convective heat transfer, Convective cooling of a cooking pot, Forced plus free convection
Week 4	Radiation, Thermal Radiation, Surface Property
Week 5	Blackbody Radiation, Real body Radiation
Week 6	Thermal Resistance, Thermal Resistance Network, resistors in parallel, resistors in series
Week 7	Heat transfer by mass transport, Heat transfer by single phase, Heat transfer by phase change
Week 8	Solar water heaters Design, Components of a Solar water heater
Week 9	Solar water heater types and applications, Safety systems and mechanisms
Week 10	Solar collector, Flat-Plate Collector, Evacuated-Tube Solar Collectors
Week 11	Heat Pipe Evacuated Tube Collectors, Direct Flow Evacuated Tube Collector, Integral Collectors
Week 12	Solar Water Heating Application
Week 13	Calculation of heat balance: general remarks
Week 14	The heat balance of an unsheltered black bag, Heat balance of a sheltered collector
Week 15	Efficiency of a flat plate collector, Metal–semiconductor stack
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?

Required Texts	1- "Solar Engineering of Thermal Processes". By: John A. Duffie and William A. Beckman 2- "Renewable Energy Resources". By: John Twidell and Tony Weir	No
Recommended Texts	"CLEAN ENERGY PROJECT ANALYSIS: RETSCREEN ENGINEERING & CASES"	No
Websites	None	

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

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