MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Democracy and Human Rights**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	KUS1103				
ECTS Credits	2				
SWL (hr/sem)	100				
Module Level	1		**Semester of Delivery**	2	
Administering Department	Environmental health Science		**College**	Energy and Environmental Science	
Module Leader	Dr.Mohanad Basim Ibrahim		**e-mail**	mohanad.al.sallami@kus.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**		
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	None		**e-mail**	none	
Scientific Committee Approval Date			**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	تهدف المادة إلى بيان اهمية الحقوق الاصلية اللصيقة بالانسان، التي تتفق مع فطرته، والتي يقبلها العقل المجرد، والتي لا تختلف باختلاف الزمان والمكان، وهذه هي حقوق الانسان.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	تسهم المادة العلمي (لحقوق الانسان) إلى تثقيف الطالب من الناحية القانونية؛ ليكون مطلع على ماهية الحقوق الانسانية، وأصلها التاريخي، وتعريف ماله من حقوق وما عليه من التزامات، من خلال معرفة حقه وحدود ذلك الحق، وحقوق الآخرين، وما سعت إلية الدول والمنظمات الدولية والاقليمية في تعزيز مفاهيم تلك الحقوق، وإلزام الدول للنص عليها في التشريعات الداخلية، والضمانات التي تكفل تطبيق تلك الحقوق العالمية.
Indicative Contents المحتويات الإرشادية	إن المحتويات الارشادية لمادة حقوق الانسان تتلخص بتهذيب سلوك الطالب، [20hr] وتعريفه إن تعامله مع غيره من بني البشر يقوم على مبدأ: ((إن الناس صنفان؛ إما أخوٌ لك في الدين، أو نظيرٌ لك في الخلق)).[20 hr]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	نعمد في هذا الجانب إلى ما يلي: 1- يعرف الطالب إبتداءً بمضمون موجز عن المفردات التي سيتم تناولها خلال المحاضرة، ثم نوجه له بعض الإسئلة التي تحرك ذهنه، وتشد إنتباهه؛ لضمان حسن الاستماع. 2- يتم التعمق بشرح المفردات العلمية في حدود تناسب متوسط المستويات العلمية لضمان عدم تجاوز الفروق الفردية عند عموم الطلبة. 3- يتم ترك مساحة للنقاش الحر في إطار الموضوع المخصص للمحاضرة. 4- الحرص على جانب التغذية الراجعة للمعلومات قبل نهاية المحاضرة. 5- التواصل الكترونيًا مع الطلبة لنشر المحاضرات المسجلة، والمكتوبة من خلال الموقع الرسمي للجامعة.

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

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Seminar	1	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Home work	1	10% (10)	14	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	تعريف وطبيعة حقوق الإنسان, التطور التاريخي لحقوق الإنسان
Week 2	مميزات حقوق الإنسان عن غيرها من الحقوق, حقوق الإنسان في الديانات السماوية
Week 3	حقوق الإنسان في المواثيق الدولية, حقوق الإنسان في التشريعات الداخلية
Week 4	حقوق الإنسان الشخصية, الاجتماعية, الثقافية, الاقتصادية
Week 5	ضمانات حقوق الإنسان الدولية, الاقليمية
Week 6	مفهوم الحرية, الحريات الشخصية والعامة
Week 7	حرية التعبير عن الراي والمساواة امام القانون, حرية التنظيم والاقليات
Week 8	مفهوم الديمقراطية ومميزاتها
Week 9	الديمقراطية في الدستور
Week 10	أنواع الديمقراطية المباشرة وشبه المباشرة
Week 11	الديمقراطية النيابية, العلاقة بين حقوق الانسان والديمقراطية
Week 12	الجزاءات المترتبة على المساس بحقوق الإنسان
Week 13	المجتمع المدني والديمقراطية
Week 14	ضمانات حقوق الإنسان الداخلية (الوطنية)
Week 15	امتحان

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	كتاب/ حقوق الانسان (تطورها، مضامينها، حمايتها) د. رياض عزيز هادي.	Yes
Recommended Texts	كتاب/ حقوق الانسان د. حميد حنون.	No
Websites	https://www.noor-book.com/ https://www.un.org/ar/about-us/universal-declaration-of-human-rights https://ar.wikipedia.org/wiki/	

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

Module Information معلومات المادة الدراسية					
Module Title	**Analytical Chemistry**			**Module Delivery**	
Module Type	**S**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CRE1101				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Environmental Science		**College**	Energy and Environmental Science	
Module Leader	Maha Abdulatteef Yahya		**e-mail**	Maha.yahya85@kus.edu.iq	
Module Leader's Acad. Title	Lecturer Doctor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	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	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. Defining chemical analysis and its divisions 2. Ability to describe the processes of chemical analysis 3. Understanding the principles and types of calibration and the theoretical basis for all types of calibrations 4. Apply calibration calculations in the correct ways to calculate the concentration of the substance 5. Describe the steps of gravimetric analysis and the factors that lead to sediment solubility 6. How to calculate the gravimetric coefficient, the weight of the material to be estimated, and the percentage of the analyzed sample.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Importance of analytical chemistry. 2. Qualitative and quantitative analysis. 3. Determination, and measurement. 4. Some important units of measurement. 5. Stoichiometric. 6. Chemical equilibrium: aqueous solutions and chemical equilibrium. 7. Dissociation of water and applying solubility-product constants. 8. Buffer solution. 9. Effect of electrolytes on chemical equilibrium. 10. Titration methods & types. 11. Equivalence point, end point and Indicator.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A: Theory about important of analytical chemistry and introduction of the qualitative and quantitative analysis. [15 hrs] Characterization analysis, Determination, and measurement and calculation used in analytical chemistry and learning some important units of measurement (units for expressing concentration) [15 hrs] What is stoichiometry with examples. [10 hrs] Classification solution of electrolyte and chemical equilibrium of aqueous solutions and Equilibrium-constant expressions [15 hrs]

	Revision problem classes [6 hrs] <u>Part B - Ion product</u> - Applying the ion product constant for water (dissociation of water) Applying solubility-product constants with introduction to the effects of pH, Applying acid-base dissociation constants. [15 hrs] The effects of pH- Buffer solution: properties of buffer mixtures, preparation of buffer solution. [7 hrs] Introduction about what are the titration methods and their types: acid-base titration, complexometric titration, precipitation titration and redox titration, the Equivalence point, end point and Indicators. [15 hrs]

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

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

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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 #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	4hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction of analytical Chemistry
Week 2	Classification of methods of analytical chemistry
Week 3	Some important units of measurement
Week 4	Stoichiometric

Week 5	Chemical Equilibrium & Equilibrium-constant expressions
Week 6	Mid-course First Exam
Week 7	Ion product, Applying the ion product constant for water (dissociation of water)
Week 8	The effects of pH, Applying acid-base dissociation constants
Week 9	The effects of pH-Buffer solution: properties of buffer mixtures, preparation of buffer solution
Week 10	Titration methods & types
Week 11	Equivalence point, end point and Indicator
Week 12	Theory of neutralization titrations of sample
Week 13	Acid-base indicator, titration based on acid-base reactions
Week 14	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction about analytical lab and definitions of tools and equipment that used in the lab
Week 2	Lab 2: Preparation of approximately (0.1M) HCl
Week 6	Lab 6: Gravimetric Determination of Chloride
Week 3	Lab 3: Standardization of HCl solution with standard solution of Na_2CO_3
Week 4	Lab 4: Analysis of sodium carbonate Na_2CO_3 by titration
Week 5	Lab 5: Analysis of a mixture (sodium hydroxide + sodium carbonate) buffer solution
Week 7	Lab 7: Acid–Base Titrations Experiment by Determination of Replaceable Hydrogen in Acid by Titration

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Skooge, Fundamentals of Analytical Chemistry, 2014	Yes
Recommended Texts	David Harvey, Modern Analytical Chemistry, 2000.	No
Websites	https://chem.libretexts.org/Bookshelves/Analytical_Chemistry	

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

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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	**B**		☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Code	KUS1103		
ECTS Credits	**4**		
SWL (hr/sem)	**100**		
Module Level	1	**Semester of Delivery**	1
Administering Department	Environmental Science	**College**	College of Energy and Environmental Science
Module Leader	Ahmed Adnan	**e-mail**	a.algbory@kus.edu.iq
Module Leader's Acad. Title	Assistant lecturer	**Module Leader's Qualification**	M.SC
Module Tutor	/	**e-mail**	/
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	1. Hardware: Computers consist of physical components, including the central processing unit (CPU), memory (RAM), storage devices (hard drives or solid-state drives), input/output devices (keyboard, mouse, monitor), and other peripheral devices. 2. Software: Software refers to the programs and instructions that enable computers to perform specific tasks. This includes the operating system, applications, and utilities that facilitate user interaction and manage hardware resources. 3. Central Processing Unit (CPU): The CPU is the "brain" of a computer, responsible for executing instructions and performing calculations. It performs tasks such as fetching, decoding, and executing program instructions. 4. Memory (RAM): Random Access Memory (RAM) is a volatile type of computer memory that provides temporary storage for data and instructions needed by the CPU in real-time. It allows for faster data access compared to permanent storage. 5. Storage: Computers use various types of storage devices to store data and programs permanently. Hard disk drives (HDDs) and solid-state drives (SSDs) are common examples. They retain data even when the computer is powered off.

	6. Input and Output Devices: Input devices like keyboards and mice allow users to provide instructions and interact with the computer. Output devices such as monitors and printers display or produce the results of computations or data processing. 7. Operating System (OS): The operating system is software that manages computer hardware and software resources. It provides a user interface, controls system functions, and facilitates the execution of programs. 8. Algorithms and Programming: Algorithms are step-by-step procedures or instructions for solving problems or accomplishing specific tasks. Programming involves writing code using programming languages to create software that instructs the computer to perform desired functions.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the basic components of a computer system, including the CPU, memory, storage devices, and input/output devices. 2. Explain the role and functioning of the operating system in managing computer resources and facilitating user interaction. 3. Describe the binary number system and understand how data is represented and manipulated in digital computers. 4. Comprehend the concept of algorithms and their importance in solving computational problems. 5. Demonstrate knowledge of computer hardware and software interaction, including how the CPU executes instructions and interacts with memory and input/output devices. 6. Explain the basics of computer networking, including protocols, IP addressing, and network topologies. 7. Understand the principles of data storage and retrieval, including file systems and database management systems.

	8. Analyze and evaluate the impact of emerging technologies on the field of computing, such as cloud computing, artificial intelligence, and cybersecurity. 9. Apply programming concepts to solve simple problems, including variables, control structures, and functions. 10. Demonstrate effective and safe use of computer systems, including understanding security measures and ethical considerations in computing.
Indicative Contents المحتويات الإرشادية	1. Introduction to Computers: - Evolution and history of computers - Basic computer components and their functions - Types of computers and their applications 2. Computer Hardware: - Central Processing Unit (CPU) and its architecture - Memory (RAM) and storage devices (hard drives, solid-state drives) - Input devices (keyboard, mouse, etc.) and output devices (monitor, printer, etc.) - Motherboard, power supply, and other peripheral devices 3. Computer Software: - Operating systems and their functions - Application software and utilities - Programming languages and software development tools 4. Data Representation: - Binary number system and conversions - Character encoding (ASCII, Unicode)

	- Representation of integers, floating-point numbers, and characters 5. Algorithms and Problem Solving: - Introduction to algorithms and problem-solving approaches - Pseudocode and flowcharts - Fundamental algorithms like sorting, searching, and recursion 6. Computer Networks: - Basics of computer networking - Network topologies and protocols - IP addressing and subnetting 7. Programming Concepts: - Introduction to programming languages and paradigms - Variables, data types, and operators - Control structures (conditionals, loops) and functions 8. Emerging Technologies: - Cloud computing and its applications - Artificial intelligence and machine learning - Cybersecurity and data privacy considerations

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lecture

	Discussion Practical Experience Clarification and Ask Questions reflect on what you have learned Research and reports

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	75	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	0	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	0
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	5% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	5% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	15% (10)	Continuous	All
	Report	1	5% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	60% (50)	16	All

Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Enabling students to learn about computers and computing
Week 2	Enabling students to define binary representation and data storage
Week 3	Definition of Computer Hardware and CPU Operations
Week 4	Definition of Software and Operating Systems
Week 5	Understanding the algorithms and problem solving
Week 6	Empowering students to understand computer networks and the Internet
Week 7	Empowering students to become acquainted with data representation and encoding
Week 8	Empowering students to Introduction to database systems
Week 9	Empowering students about programming concepts and Constructs
Week 10	Empowering students to get an overview of the software development
Week 11	Empowering students to acquire knowledge about fundamentals of computer security
Week 12	Empowering students to acquire knowledge about artificial Intelligence and machine Learning
Week 13	Enabling students to get an overview of emerging technologies in computing
Week 14	Empowering students to understand the privacy concerns and data protection regulations
Week 15	Review and Final Assessment
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Familiarization with computer components: CPU, RAM, storage devices
Week 2	Lab 2: Installation and configuration of an operating system (e.g., Windows or Linux)
Week 3	Lab 3: Binary number system conversion exercises
Week 4	Lab 4: Implementing simple algorithms using pseudocode
Week 5	Lab 5: Setting up a small computer network
Week 6	Lab 6: Network troubleshooting exercises
Week 7	Lab 7: Working with file systems and organizing files
Week 8	Lab 8: Introduction to a programming language
Week 9	Lab 9: Implementing user-defined functions
Week 10	Lab 10: Discussing ethical implications of computer use
Week 11	Lab 11: Collaborative project to apply learned concepts or review sessions
Week 12	Lab 12: Practice with conditional statements and loops
Week 13	Lab 13: Building modular programs
Week 14	Lab 14: Preparation for final assessments or presentations
Week 15	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Brookshear, J. Glenn, Dennis Brylow, and S. Manasa. "Computer science: An overview." (2009).	Yes
Recommended Texts	Patterson, David A., and John L. Hennessy. Computer organization and design ARM edition: the hardware software interface. Morgan kaufmann, 2016.	No

	Petzold, Charles. Code: The hidden language of computer hardware and software. Microsoft Press, 2000.	
Websites	Computer Science YouTube Channels: Channels like "Computerphile," Computer Science," and "MIT Open Courseware.	

Grading Scheme

مخطط الدرجات

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

University Name: AlKarkh University of Science

College: Energy and Environmental Science

Module Information معلومات المادة الدراسية					
Module Title	Mathematics			**Module Delivery**	
Module Type	B			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	KUS1102				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level			**Semester of Delivery**		
Administering Department	Environmental Science		**College**	College of energy and environmental science	
Module Leader	Haleema swaidan ali		**e-mail**	haleemaswaidan@kus.edu.iq	
Module Leader's Acad. Title			**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	non	**Semester**	
Co-requisites module	non	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Introducing students to mathematical concepts in the subject of linear algebra and matrices. 2. Use and apply these concepts to solve applied problems. 3. Teach students to analyze results using mathematical methods. 4. Teaching students some special functions and their properties. 5. Teaching students to mix and combine mathematical concepts with practical problems. 6. Introducing students to the importance of mathematics
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Solving mathematical problems with scientific material. 2. Writing scientific reports and analyzing data. 3. Self learning method. 4. Solving problems relevant with mathematical subject. 5. Testing the student's ability to solve mathematical problems related to the subjects he studied.
Indicative Contents المحتويات الإرشادية	1. Introduction to Linear Algebra. 2. Linear system -Linear Equations –Solution Of Linear Equations. 3. Matrix Algebra. 4. Logarithmic function. 5. Trigonometric functions. 6. Exponential function. 7. Techniques of integrations.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: Providing students with basic mathematical concepts and their practical applications. 2. Forming discussion groups during lectures to discuss mathematics topics and solve practical problems. 3. Ask the students a set of thinking questions during the lectures, such as what, how, when and why for specific topics in mathematics. 4. Giving students homework that requires self-explanations in different ways. 5. Writing scientific reports and analyzing data. 6. solving problems relevant with mathematical subject.

Student Work load (SWL) الحمل الدراسي للطالب ل 15 اسبوعاً			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	**45**	**Structured SWL (h/W)** الحمل الدراسي المنتظم للطالب خلال الفصل	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	**77**	**Unstructured SWL (h/sem)** الحمل الدراسي غير المنتظم للطالب خلال الفصل	5.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125 **(h/sem)**		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Matrices - the concept of matrices - some types of matrices- operations on matrices
Week 2	Determinants, Properties of the determinants ,Calculate the determinant of a 2x2 matrix and a nxn matrix.
Week 3	The Inverse - Matrix - Properties Of The Inverse - Matrix, The Transpose OperationProperties.
Week 4	practical - method for finding the Inverse the cofactor method.
Week 5	solution of linear systems using the inverse matrix- the adjutant inverse.
Week 6	solution of linear systems using The Cramer's rule.
Week 7	solution of linear systems using Gauss_ Jordan Elimination method.
Week 8	Slop of a line, equation of a line, types of line equation.
Week 9	Trigonometric functions - Derivation of trigonometric functions.
Week 10	Integration of Trigonometric Functions - Applications to Trigonometric Functions.
Week 11	Logarithmic function - properties of logarithmic function – derivation of logarithmic function.
Week 12	Integration of the logarithmic function-Applications to the logarithmic function.
Week 13	Exponential function - properties of the exponential function- derivation of the exponential function - integration of the exponential function.
Week 14	Techniques of integrations (by parts, tables)
Week 15	Techniques of integrations (partial fractions)
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	non

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Larson, Ron, and Bruce H. Edwards. Calculus. Cengage Learning , Calculus 2022.	yes
Recommended Texts	Larson, Ron. Precalculus with limits. Cengage Learing.	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 OF PHYSICS

University Name: AlKarkh University of Science

College: Energy and Environmental Science

Dept: Environmental Science

Module Information					
Module Title	**physics**			**Module Delivery**	
Module Type	S			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**CRE1101**				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		**UGI**	**Semester of Delivery**		first
Administering Department		**Environmental Science**	**College**	**Energy and Environmental Science**	
Module Leader	Dr.Tabark Abdulabass		**e-mail**	tabarak@kus.edu.iq	
Module Leader's Acad. Title		Lecture doctor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Mohammed obaid		**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1- becomes able to know 1. Measurement units and coordinates. 2. Object movement and the use of vectors. 3. Distinguish between work and energy and the relationship between them 4- Understand electric charge and electric field. 5- Knowing the materials. 6- Identify the electric field of charges and electric field lines.

	7- Identifying the forces, moments and electric potential energy. 8- Learn about Causs' law ,Ohm's Law, Coulomb's law.
Module Learning Outcomes	Make the student able to: 1- Determine the coordinates and units of measurement used. 2. Applying Newton's laws of motion 3-Understand electric charge and electric field. 4- Knowing the composition of the material. 5- Know the types of matter. 6- Know the types of electric charge. 7- Learn about Coulomb's law. 8- Identify the electric field of charges and electric field lines. 9- Identifying the forces, moments and electric potential energy. 10- Learn about Causs' law.
Indicative Contents	Indicative content includes the following. Physical Quantities Units, and vectors ,Motion Along a straight Line, Motion in two dimensions,Newton's Laws of Motion,Work and kinetic energy electric charge and electric field, electric charge and structure of matter, types of matter, charge is conserved, charging by induction and friction,electric forces on uncharged objects, Coulomb's law, electric field, electric field on a point charge, electric field calculations, electric field lines, electric dipole, forces, moments and electric potential energy, Causs' law.

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

Student Workload (SWL)			
Structured SWL (h/sem)	60		4
Unstructured SWL (h/sem)	86		
Total SWL (h/sem)			

	150

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	20% (20)	2, 5, 10, 12	
	Assignments	2	5%(5)	2, 12	
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	5% (5)	13	
Summative assessment	Midterm Exam	2 hr	10% (10)	8	
	Final Exam	4hr	50% (50)	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	1. Fundamentals of physics.
Week 2	2. Coordinates and units of measurement used in the field of physics
Week 3	3. The motion of bodies and the application of Newton's laws.
Week 4	4. The relationship between work and energy
Week 5	5 - Analysis of the influencing forces
Week 6	Analysis of the influencing forces
Week 7	electric charge, electric field, electric charge and structure of matter.
Week 8	Mid exam + types of matter, charge is conserved, charging by induction and friction
Week 9	electric forces on uncharged objects, Coulomb's law
Week 10	electric forces on uncharged objects, Coulomb's law
Week 11	electric field, electric field on a point charge,
Week 12	electric field calculations, electric field lines,
Week 13	electric dipole, forces, moments and electric potential energy
Week 14	Causs' law, electric flux and the enclosed charge
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Lab 1: Ohms law and Ohmic and Non Ohmic materials
Week 2	Lab 2: Diffraction grating
Week 3	Lab 3: Archimedes principle
Week 4	Lab 4: Spiral spring
Week 5	Lab 5: Simple pendulum
Week 6	Lab 6: speed and sound
Week 7	Lab 7: The flywheel

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Edward M.Purcell, Electrisity and magnetism,3rd edition	yes
Recommended Texts	University physics with modern physics, 13th edition	Yes
	University Physics, 13th Edition Hugh D. Young and Roger A. Freedman Addison-Wesley publishing.	yes
	Physics for Scientists and Engineers with Modern Physics, Ninth Edition .Raymond A. Serway and John W. Jewett, Jr	yes

Grading Scheme				
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 مادة اللغة العربية

Module Information معلومات المادة الدراسية					
Module Title	**اللغة العربية**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	KUS1106				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Environmental Science		**College**	Energy and Environmental Science	
Module Leader	Dr. Ahmed kahlaf		**e-mail**	Ahmed.k@kus.edu.iq	
Module Leader's Acad. Title	Assistant lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**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 Aims أهداف المادة الدراسية	1- تعلم العربية السليمة كونها اللغة الرسمية للوطن 2- اللغة جوهر الهوية ورمزها 3- اللغة تختلف عن اللهجة، فالاولى عالمية والثانية محلية 4- توظيف المفردات الفصيحة في الصياغة الاكاديمية للبحوث العلمية مترجمة بنظيرها الفصيح 5- التمكّن من كتابة البحوث والمقالات ذات المحتوى العلمي الصرف باللغة العربية الفصحى 6- تجنب الاخطاء الشائعة في الكتابة واختيار المفردات الصائبة 7- اثراء الخزين المعجمي لدى الطالب للمساعدة في بناء كاريزما التواصل الكلامي 8- الاطلاع على نماذج من الادب العربي شعرا ونثرا لما لها من اساس في بناء الجانب الثقافي المتنوع لدى الطالب 9- كتابة الاعداد بتمكّن فضلا الكتابة الصحيحة في صياغة الطلبات الرسمية 10- التعرف على الدرس الصوتي في اللغة العربية وعلاقته بعلم الفيزياء
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	عند انتهاء مفردات المادة الدراسية يكون الطالب متمكنا من: 1- الكتابة السليمة خالية من الاخطاء 2- التعبير العلمي الاكاديمي الصحيح 3- استعمال المفردات الفصيحة توظيفا ونطقا 4- اضافة رصيد لغوي ومفاهيم جديدة لمعاني الكلمات 5- القدرة على المخاطبة الادارية في الطلبات الرسمية
Indicative Contents المحتويات الإرشادية	1– لكل تخصص لغته التي تومئ اليه، وتدل عليه، ولغة كل علم تنبع من طبيعة كنه، فالاختصاصات العلمية لها معجم خاص بها يعبر عن جوهرها ومضمونها، فضلا عن المصطلحات الخاصة بها التي تدل عليها، وكذلك المصادر العلمية التي يُرجع اليها، والحال كما في اللغة الادبية؛ فهي ايضا لها مفرداتها وطريقة كتابتها والتعبير بها وعبرها، ومصطلحاتها الخاصة بها التي تعبر عنها وتدل عليها.**[4 hrs]** 2– المعاجم – بشكل عام - على اختلاف موارها تمثل محتوىً وكنفا لمفردات اي لغة مقترنة بالشرح والتفسير لتلك المفردات، اما المعاجم في اللغة العربية فهي واسعة ومتنوعة؛ فهناك معاجم غير معجمات اللغة، فالعربية فيها اول معجم جغرافي في التاريخ، معجم البلدان لـــ (ياقوت الحموي)، فضلا عن المعاجم المتخصصة في جزئية معينة، مثل معاجم البلاغة، فضلا عن تنوع المدارس في تأليف المعاجم وتبويبها وطريقة البحث عن المفردة فيها.**[4 hrs]** 3- العلامة تندرج ضمن حقل علم السيمياء او السيميائية، وعلامات الترقيم من المواضيع المهمة بالأخص في البحوث الاكاديمية، بغض النظر عن التخصص، سواء كان التخصص علميا، او انسانيا، من هنا تأتي اهمية علامات الترقيم؛ فلها دور سيميائي، ودلاليّ مهم في الكتابة النّصيّة وفي بناء النص، فهي تُسهّل الفهم على القارئ، وتوضح المعنى المقصود، عبر القراءة والتلفّظ بالعبارة، فعلامات التّرقيم خير وسيلة لإظهار الصّراحة وبيان الوضوح في الكلام المكتوب؛ لأنّه يدلّ النّاظر إلى تلك العلامات الاصطلاحيّة وعلى العلاقات التي تربط أجزاء الكلام بعضها ببعض بوجه عام، وأجزاء كلّ جملة بوجه خاص، وكما يقول المتخصصون عن علامات الترقيم: بأن الوقف ليس مستقلّاً، وإنّما هو من توابع التّفكير، أي: إنّ السّكتات المقرّرة بمقادير مضبوطة في مواضع معينة، ليست مجرد محطّات تنفسيّة بالمعنى البيولوجيّ للتّنفس، وإنّما في المقام الأوّل وقفات معنويّة. فالعبرة من النّاحية اللّغويّة ليست بأن يستعيدَ القارئ نفسَه، بل المهم أن يتعاطى القارئ السكتَ بمقاديرَ معلومة، وفي مواضعَ محددة من السلسلة المنطوقة رفعاً للَبس، وصوناً لمقصد المتكلّم عن التبدّل، فهذه العلامات تجسيد لمشاعر الكاتب وقصدياته فيها.**[4 hrs]** 4– الاسلوب الكتابي يمثل بصمة للكاتب الذي يصدر عنه، ويتجسد عند القارئ، ولكل كاتب اسلوبه الخاص به، ينعكس ذلك في نتاج الكاتب، وللأسلوب انواع مختلفة، فهناك الاسلوب العلمي، والاسلوب الادبي، والاسلوب الخطابي، ولكل نوع خصائصة، وقالبه الذي يتكون فيه.**[4 hrs]**

Indicative Contents المحتويات الإرشادية	5– الاحداث التي تقترن بالزمن تمثل الافعال، والأفعال في العربية تناظر الازمنة في اللغات الاخرى من جانب معين، او من جزئية معينة، والعربية تحتوي على عدد كبير من الجذور، جذور الأفعال، ففي العربية أفعال ثلاثية ورباعية وخماسية وسداسية، والفعل جزء مهم من اجزاء الكلام الاساسية، فضلا عن الجانب الصوتي في هذه الجذور، فعلم (الأصوات الفيزيائي) من العلوم المهمة في اللغة العربية، إذ يُعد علم (الأصوات الأكوستيكي) علما أقرب إلى الفيزياء منه للعلوم الإنسانية، وهو يمثل المرحلة الوسطى بين علم الأصوات النطقي وعلم الأصوات السمعي، وعلاقته مع اللغة العربية انطلاقا من البذرة الاولى في دراسة مخارج الحروف فيزيائيا ودلاليا.**[4 hrs]** 6– الكلام عن الشعر لا ينتهي؛ فالشعر تجسيد لمشاعر الفرد المتمثل بالشاعر، والمشاعر الجمعية للانسانية جمعاء، فهو موجود لدى كل بني البشر، والشعر العربي القديم كان بمثابة نشيدا وطنيا لهم، يمثل هويتهم الثقافية الرصينة ويمثل سجلا لتاريخهم وأمجادهم، على اختلاف اغراضه من غزل ومدح ورثاء وغير ذلك، وبحور الشعر في الشعر العربي مبنية بناء صوتيا فريدا عبر التفعيلات التي وضعها الخليل بن احمد الفراهيدي ووضع فلسفتها وكنهها وقواعدها، والشعر رصيد ثقافي، وحجة في الكلام، وزينة ورونقا يضاف على شخصية الفرد والمجتمع بشكل عام.**[4 hrs]** 7– الهمزة من المواضيع الاجرائية لدى الفرد الكاتب، بغض النظر عن التخصص، فيحتاجها كل فرد ناطق كاتب بها، فلها قواعدها التي تصدر عنها، وتُكتب بالشكل السليم منها، فموضوع رسم الهمزة من الاهمية بمكان؛ فرسمها يغير من المعنى، فلا بد من وضعها ورسمها بالشكل الصحيح لتوخي التعبير الدقيق عن المعنى المقصود. **[8 hrs]** 8– المفاعيل في اللغة العربية، من الموضوعات المهة في درس اللغة العربية، ولا بد لكل دارس من معرفتها بشكل عام، وهناك آراء مختلفة بين البلاغيين والنحويين عن المفاعيل، هل ان تلك المفعولات فضلة، أم أنها ركن رئيس في الجملة ؛ فالنحويون يرون انها فضلةً في الجملة، وأن ركني الجملة الأساسيين هما: الفعل، والفاعل ، وأما البلاغيون فيرون :إنها ليست فضلة، وإنما هي ركن أساسي في الجملة؛ لأن كل كلمة تَدُل على معنى في الجملة، واذا ما دلت على معنى فلا تُعد فضلة، وإنما هي ركن رئيس في الجملة وبنائها، ورأي البلاغيين أقرب للصواب من رأي النحويين، فدراستها في العربية لغير المختصين مما يضيف لهم خزينا تعبيريا متنوعا.**[4 hrs]** 9– من المعروف وجود ظاهرة الأخطاء اللغوية نحويةً كانت أو املائية أو اسلوبية، عند متحدّثي اللغة العربية وبالأخص عند غير المختصين بها ولا سيما مَن يعملون في مجال الاعلام، وهذه الظاهرة اتسعت وزاد انتشارها في العصر الحديث، فأخذت هذه الأخطاء تغزو مجالات الدراسة جميعها، من ذلك موضوع (العدد) في اللغة العربية، فنجد كثيراً من الطلبة وكذلك من عامة الناس يستعملون الأرقام بدلاً من كتابتها بالحروف؛ وذلك لتجنب الوقوع في الخطأ وهذا دليل ضعف لا يليق بالدارس أياً كان تخصصه؛ ولهذا فموضوع العدد وقواعد كتابته في اللغة العربية موضوع لا غنىً عنه في زمن لغة الأرقام.**[8 hrs]** 10– هناك مجموعة من الالفاظ متداولة بشكل كبير، تُستعمل في غير مكانها الصحيح، وفي غير ما وُضعت له وهذه الالفاظ تُستعمل في المخاطبات الرسمية الادارية بالمعنى غير الصحيح او الدقيق الذي تحمله تلك الألفاظ من معاني، فضلا عن أهمية توخي الدقة في هذه الألفاظ توظيفا لها في الطلبات الرسمية التي تُقدم على اختلاف موضوعاتها، فالطلب لا بد من ان يكون مختصرا مركزا، يعطي الفكرة الموجزة، والهدف المقصود منه ازاء صاحب الادارة الذي تُقدم اليه الطلبات، وما في ذلك من ايجابيات العمل في التخفيف واختصار للجهد والوقت في تنفيذ المهام الادارية الموكلة الافراد على اختلاف درجاتهم.**[8 hrs]**
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	صناعة شخصية متكاملة للطالب الجامعي من حيث التخصص العلمي الدقيق والتخصص المساند

Student Workload (SWL) الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.46
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, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	الفرق بين اللغة العلمية واللغة الادبية
Week 2	المعاجم العربية وانواعها
Week 3	علامات الترقيم
Week 4	الاسلوب
Week 5	الأفعال – أنواعها وتقسيماتها
Week 6	نماذج مختارة من الشعر العربي القديم - الشعر الاسلامي - الشعر الاموي
Week 7	Mid-term Exam
Week 8	رسم الهمزة / همزة الوصل وهمزة القطع
Week 9	كتابة الهمزة بداية الكلام وآخره
Week 10	المبتدأ والخبر – مهارات كتابة العدد
Week 11	المفاعيل / المفعول به – المفعول لأجله
Week 12	المفعول معه – المفعول فيه – المفعول المطلق
Week 13	النثر العربي
Week 14	الأخطاء الشائعة – طريقة كتابة الطلبات الرسمية

Week 15	نماذج مختارة من الشعر العباسي والشعر الحديث
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	1- كتاب: العربية الجامعية لغير المتخصصين / د. عبده الراجحي **2-** كتاب: النحو التطبيقي / د. عبده الراجحي **3-** الصرف التطبيقي / د. عبده الراجحي **4-** النحو الوافي / عباس حسن **5-** تاريخ الادب العربي / شوقي ضيف	**Available in the Library?**
Required Texts		
Recommended Texts		
Websites	شبكة الفصيح لعلوم اللغة العربية	

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 Information معلومات المادة الدراسية					
Module Title	**Ecology**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ENV12010				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		1	**Semester of Delivery**		2
Administering Department		Environmental Science	**College**	Energy and Environmental Science	
Module Leader	Dr. Alaa Badr Mohammed		**e-mail**	alaaalqaycy7@gmail.com	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	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	None	**Semester**	
Co-requisites module	None	**Semester**	

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	ECOLOGY – Introduction and terms,
Week 2	Branches of Ecology
Week 3	BASIC PRINCIPLES OF ECOSYSTEM
Week 4	Food chains, Food webs and Ecological pyramids
Week 5	Functions of an Ecosystem:
Week 6	Biogeochemical Cycles- Gaseous cycles
Week 7	Biogeochemical Cycles- sedimentary cycle
Week 8	Primary productivity
Week 9	Environmental Factors Affecting the Productivity in Ecosystem
Week 10	Biological interrelationships
Week 11	Limiting factors & tolerance levels
Week 12	Liebige's law of minimum , Shelford's law of tolerance
Week 13	Aquatic Ecosystem
Week 14	Biodiversity and Conservation
Week 15	Human population and the Environment

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week 1	Lab safety
Week 2	Introduction to Practical Ecology
Week 3	Humidity
Week 4	Temperature

Week 5	Atmospheric Pressure
Week 6	Some instrument and devices are used in Ecology
Week 7	Ecology sampling methods
Week 8	Soil sampling and texture
Week 9	Water sampling
Week10	Air sampling

Module Information

معلومات المادة الدراسية

Module Title	**English**	**Module Delivery**	
Module Type	**B**	☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	KUS12012		
ECTS Credits	**4**		
SWL (hr/sem)	**100**		
Module Level	1	**Semester of Delivery**	2
Administering Department	Environmental Science	**College**	College of Energy and Environmental Science
Module Leader	Ahmed Adnan	**e-mail**	a.algbory@kus.edu.iq
Module Leader's Acad. Title	Assistant lecturer	**Module Leader's Qualification**	M.SC
Module Tutor	/	**e-mail**	/
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	1. Vocabulary and Grammar: Introduce learners to essential English vocabulary and grammar structures, allowing them to understand and construct basic sentences and expressions. 2. Listening Skills: Develop learners' ability to comprehend simple spoken English in various contexts, such as greetings, introductions, and everyday conversations. 3. Speaking Skills: Enable learners to engage in basic conversations using appropriate vocabulary, grammar, and pronunciation. Learners will gain confidence in expressing their ideas, opinions, and preferences. 4. Reading Skills: Improve learners' reading comprehension skills by exposing them to short texts and passages on familiar topics. Learners will practice extracting meaning from the text and understanding main ideas and details. 5. Writing Skills: Enhance learners' ability to write simple sentences and short paragraphs with correct grammar, spelling, and punctuation. Learners will focus on expressing themselves coherently and accurately in written form. 6. Pronunciation and Intonation: Help learners develop clear pronunciation and intonation patterns, enabling effective oral communication and comprehension. 7. Cultural Awareness: Introduce learners to cultural aspects of English-speaking countries, promoting understanding and sensitivity toward cultural differences in language use.

	8. Everyday Communication: Provide learners with practical language skills for everyday situations, such as greetings, introducing themselves and others, ordering food, asking for directions, and making basic inquiries. 9. Language Strategies: Equip learners with strategies to improve their language learning, including techniques for vocabulary acquisition, self-study, and independent practice. 10. Confidence and Fluency: Foster learners' confidence in using English and develop their fluency through various speaking and interactive activities. 11. Lifelong Learning: Encourage learners to cultivate a lifelong learning attitude towards English language acquisition, motivating them to continue expanding their language skills beyond the module.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand and use basic English vocabulary and expressions related to daily life, including greetings, introductions, and common objects. 2. Comprehend and respond appropriately to simple spoken English in familiar contexts, such as basic conversations, instructions, and short presentations. 3. Construct grammatically correct and meaningful sentences using basic grammar structures, including verb tenses, pronouns, and basic sentence patterns. 4. Read and understand simple texts and passages on familiar topics, extracting main ideas and specific details. 5. Write simple sentences and short paragraphs with appropriate grammar, spelling, and punctuation, expressing ideas clearly and coherently. 6. Engage in basic conversations and interactions, demonstrating effective communication skills in everyday situations.

	7. Demonstrate improved pronunciation and intonation patterns, enabling clearer oral communication. 8. Develop cultural awareness and sensitivity towards English-speaking cultures, recognizing and respecting cultural differences in language use. 9. Demonstrate increased confidence and fluency in using English to communicate ideas, opinions, and preferences. 10. Apply critical thinking skills to analyze and evaluate simple texts and language use.
Indicative Contents المحتويات الإرشادية	1. Unit 1: Introduction - Greetings and introductions - Personal information (name, age, nationality) - Basic expressions for everyday communication 2. Unit 2: Everyday Life - Describing daily routines and activities - Expressing likes and dislikes - Talking about hobbies and interests 3. Unit 3: People and Places - Describing people's appearances and personalities - Talking about family members and relationships - Asking for and giving directions 4. Unit 4: Food and Drinks - Vocabulary related to food and beverages

	- Ordering food and drinks at a restaurant or café - Talking about preferences and dietary restrictions 5. Unit 5: Shopping - Vocabulary related to shopping and clothes - Describing clothing items and sizes - Making inquiries and purchasing items 6. Unit 6: Travel and Transport - Vocabulary related to travel and transportation - Asking for and giving travel information - Describing modes of transportation and travel experiences 7. Unit 7: Leisure Activities - Talking about leisure activities and hobbies - Discussing weekend plans and free time activities - Making suggestions and invitations 8. Unit 8: Daily Life Skills - Talking about personal routines and habits - Describing abilities and skills - Making requests and giving instructions 9. Unit 9: Health and Well-being - Discussing health and common ailments - Describing symptoms and seeking medical assistance - Giving advice and talking about healthy habits 10. Unit 10: Social Interactions - Engaging in small talk and social conversations

	- Discussing current events and popular topics - Sharing opinions and perspectives

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lecture Discussion Experimental Quizzes Speaking tasks Written assignments Evaluation methods to track their language development

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 13 اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	30	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	5% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	5% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	15% (10)	Continuous	All
	Report	1	5% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	60% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to English Language Basics
Week 2	Language Basics
Week 3	Greetings and Introductions
Week 4	Everyday Conversations
Week 5	Vocabulary Expansion
Week 6	Expressing Likes and Dislikes
Week 7	Describing People and Places
Week 8	Describing Objects
Week 9	Daily Activities
Week 10	Daily Routines
Week 11	Reading Skills Development

Week 12	Reading Skills Development
Week 13	Writing Skills Development
Week14	Writing Skills Development
Week 15	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Soars, John, and Liz Soars. New headway: Beginner student's book. Oxford: Oxford University Press, 2010.	Yes
Recommended Texts	Soars, Liz, John Soars, and Amanda Maris. "American Headway Starter: Teacher's Book."	No
Websites	English language learning websites and mobile applications for additional practice and reinforcement	

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 Information

معلومات المادة الدراسية

Module Title	**Organic Chemistry**	**Module Delivery**	
Module Type	**S**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CRE1207		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level	1	**Semester of Delivery**	2
Administering Department	Environmental Science	**College**	Energy and Environmental Science
Module Leader	Dr. Alaa Badr Mohammed	**e-mail**	alaaalqaycy7@gmail.com
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	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	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. Description of the basics and principles of organic chemistry, the quality of chemical compounds, and the basis for their formation and composition 2. Knowledge and application of traditional methods of chemical organic preparation depending on the nature and conditions of the chemical reaction 3. Understanding organic chemical experiments and their steps 4. Understanding the formation of hydrocarbon chains, types of organic classes, types of organic active groups, chemical interaction 5. Knowledge of the theoretical foundations of the sections and branches of organic chemistry, and the steps of reactions and preparation in the laboratory or laboratory 6. Industry and methods of reactions available for the manufacture of organic compounds and the catalyst and its mechanism
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. That the student be able to define organic chemistry and its divisions 2. That the student be able to describe the sections and categories of organic chemistry 3. That the student be able to understand the principles, types and theoretical basis for each type of organic compounds 4. To be able to apply chemical reaction conditions such as heat or pressure to prepare the organic compound 5. Describe the steps of an organic reaction and study it from the point of view of spontaneous or non-spontaneous occurrence 6. How to explain the presence of the catalyst and the effect of the presence of active groups for each organic variety
Indicative Contents المحتويات الإرشادية	**Part I:** **1. Introduction to Chemistry** Introduction to periodic table Basic of bonding which occurs to form the molecules and study its properties. Main definition of some terms **2. Introduction to Organic Chemistry** **Part II: Nomenclature, Preparation and reaction of:** 3. Acyclic saturated hydrocarbon compounds 4. Cyclic saturated hydrocarbon compounds 5. Acyclic unsaturated hydrocarbon compounds part I 6. Cyclic unsaturated hydrocarbon compounds part I 7. Acyclic unsaturated hydrocarbon compounds part II 8. Cyclic unsaturated hydrocarbon compounds part II

	9. Alcohol 10. Aldehydes 11. Ketones 12. Other Organic Compounds (Carboxylic acids, Ethers, Phenols, Amines) 13. Reactions of Benzene and Substituted Benzenes **Part III:** **14. Physical Properties of Organic Compounds** Boiling Points, Solubility and other properties

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Method of lecturing 2. Student Center 3. Team Project 4. Work Shop 5. Scientific trips to monitor environmental pollution 6. Learning Technologies on Campus 7. Experiential Learning 8. Application Learning

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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 #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	4hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Chemistry
Week 2	Introduction to Organic Chemistry
Week 3	Acyclic saturated hydrocarbon compounds
Week 4	Cyclic saturated hydrocarbon compounds
Week 5	Acyclic unsaturated hydrocarbon compounds part I
Week 6	Cyclic unsaturated hydrocarbon compounds part I
Week 7	Exam 1
Week 8	Acyclic unsaturated hydrocarbon compounds part II
Week 9	Cyclic unsaturated hydrocarbon compounds part II
Week 10	Alcohol

Week 11	Aldehydes
Week 12	Ketones
Week 13	Other Organic Compounds (Carboxylic acids, Ethers, Phenols, Amines)
Week 14	Reactions of Benzene and Substituted Benzenes
Week 15	Physical Properties of Organic Compounds
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Determination of melting point
Week 2	Lab 2: Determination of boiling point
Week 3	Lab 3: Purification of solid organic compounds
Week 4	Lab 4: Purification of liquid organic compounds-simple distillation
Week 5	Lab 5: Purification of liquid organic compounds-fractional distillation
Week 6	Lab 6: Differential Extraction
Week 7	Lab 7: Chromatography

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Bruice, P. Y., Organic Chemistry, 7th Edition, 2014, Pearson Education, Inc.	No
Recommended Texts	Bruice, P. Y., Organic Chemistry, 7th Edition, 2014, Pearson Education, Inc.	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	**Pedology**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ENV12011**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		1	**Semester of Delivery**		1
Administering Department		Environmental Science	**College**	Energy and Environmental Science	
Module Leader	SAADI S. SHAHADHA		**e-mail**		
Module Leader's Acad. Title		LECTURER	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	saadishahadha@kus.edu.iq	
Peer Reviewer Name		Name	**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. Describe the basics, principles, and concepts of soil. 2. Understanding and application of soil classification. 3. Understanding the general experiments and analysis to describe the soil. 4. Increasing students' awareness about the mineral, biological, water, and air composition of the soil. 5. Knowing the most important practical and theoretical bases that evaluate soil quality and suitability for the agriculture and environment. 6. Recognizing that soil is the most important main component for achieving sustainable development and food development.
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. Know the types of soil. 2. Know the importance of soil to humans. 3. To be able to conduct tests for the types of soils available in Iraq. 4. Able to protect the soil from pollution. 5. Can classify the various soils. 6. Able to identify risks that may lead to a decrease in soil productivity efficiency. 7. Examine and analyze the soil. 8. Conduct physical and chemical tests to determine the quality of the soil. 9. Determine the most important major pollutants that may lead to soil damage. 10. A statistic of the most important areas where good soil is found in Iraq.

Indicative Contents المحتويات الإرشادية	- Soil as a medium for plant growth. - Soil is clearly distinguished from the inert rock material. - Soil water contains dissolved organic and inorganic solutes. - Minerals are natural inorganic compounds, with definite physical and chemical properties. - Rock fragments and mineral particles in soil vary enormously in size from boulders and stones down to sand grains and very small particles. - Organic and inorganic cations and anions are adsorbed on clay and oxide surfaces as a result. - variables soil-forming factors that controlled the direction and speed of soil formation. - weathering proceeds by physical disruption of the rock structure that exposes the constituent minerals to chemical alteration. - Most of the concerns about soil water involve movement. -

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	75	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	

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

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	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	4hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to the Soil
Week 2	Components of the soil
Week 3	Soil Mineralogy
Week 4	Soil Organic Matter
Week 5	Soil Formation
Week 6	Soil development

Week 7	Soil Texture
Week 8	Soil Structure and Pores
Week 9	Soil Water
Week 10	Soil Water Movement
Week 11	Soil Chemistry – part 1
Week 12	Soil Chemistry – part 2
Week 13	Soil Biology
Week 14	Soil Ecology
Week 15	Soil environmental pollution
Week 16	**The preparatory week before the Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Soil Sampling and Preparation
Week 2	Lab 2: Soil Moisture Content
Week 3	Lab 3: Soil Texture
Week 4	Lab 4: Field Capacity
Week 5	Lab 5: Determination of Soil Densities and Porosity
Week 6	Lab 6: pH and Electrical Conductivity in water extraction
Week 7	Lab 7: Organic Matter
Week 8	Lab 8: Cations Exchange Capacity (CEC)

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	White, R.E., 2006. Principles and practice of soil science: the soil as a natural resource. John Wiley & Sons.	No
Recommended Texts	Coleman, D.C., Callaham, M.A. and Crossley Jr, D.A., 2017. *Fundamentals of soil ecology*. Academic press. Bowen, M.W., 2016. Principles of soil science exercise manual.	No
Websites	https://www.google.com/search?q=Soil+sciences&oq=Soil+sciences+&aqs=chrome..69i57j0i512l2j0i22i30l2j69i60l3.9106j0j7&sourceid=chrome&ie=UTF-8	

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 Information معلومات المادة الدراسية					
Module Title	Biochemistry			**Module Delivery**	
Module Type	**Support or related learning activity**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ENV23017				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	**UGII**		**Semester of Delivery**	**THREE**	
Administering Department	Renewable Energy		**College**	Environment & Renewable Energy Sciences	
Module Leader	Dr. Khattab Adnan Abed		**e-mail**	k.a.alkhafaji@gmai.com	
Module Leader's Acad. Title	Lecturer Dr		**Module Leader's Qualification**	PhD	
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	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	• Understand the fundamental principles of biochemistry: • • Introduce students to the basic concepts, theories, and principles of biochemistry. • Provide a solid foundation in the chemical structure, function, and metabolism of biological molecules.

	• Explore the application of biochemistry in environmental studies: • • Highlight the role of biochemistry in understanding environmental processes, such as nutrient cycling, pollutant degradation, and energy transfer. • Investigate the interactions between biological systems and the environment, including the impact of environmental stressors on biochemical pathways. • Investigate the biochemical basis of environmental issues: • • Examine the biochemical processes underlying environmental challenges, such as climate change, pollution, and ecosystem degradation. • Analyze the mechanisms of action and biochemical effects of environmental pollutants on living organisms. • Explore bioremediation and sustainable bioenergy: • • Introduce students to bioremediation strategies for the detoxification and restoration of polluted environments using biochemical processes. • Explore the principles and applications of bioenergy production from renewable sources, such as biomass and microbial fuel cells.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Knowledge and Understanding: • Demonstrate a comprehensive understanding of the fundamental concepts, theories, and principles of biochemistry as they relate to environmental systems. • Explain the structure, function, and metabolism of biological molecules, including proteins, carbohydrates, lipids, and nucleic acids. • Describe the biochemical processes involved in nutrient cycling, energy transfer, and environmental adaptation. • Application of Biochemical Principles: • Apply biochemical knowledge and techniques to analyze and solve environmental problems, such as pollutant degradation, bioremediation, and sustainable bioenergy production. • Apply biochemical techniques, including protein purification, enzyme assays, and spectroscopy, to investigate and characterize environmental processes. • Critical Thinking and Analysis: • Evaluate and critically analyze scientific literature, research findings, and case studies related to biochemistry and environmental issues. • Interpret and analyze experimental data using biochemical principles and

	statistical analysis methods. • Identify the biochemical mechanisms underlying environmental challenges and propose innovative solutions and strategies based on scientific evidence.
Indicative Contents المحتويات الإرشادية	**1. Introduction to Biochemistry and Environmental Science** Overview of biochemistry and its relevance to environmental science Basic principles and concepts in biochemistry **2. Biomolecules and Environmental Interactions** Structure and function of proteins, carbohydrates, lipids, and nucleic acids Role of biomolecules in environmental processes and interactions **3. Metabolic Pathways and Energy Transfer** Overview of metabolic pathways involved in energy production and utilization Influence of environmental conditions on metabolic regulation **4. Enzymes and Environmental Catalysis** Enzyme structure, function, and catalytic mechanisms Enzymatic reactions and their importance in environmental processes Environmental factors affecting enzyme activity and stability **5. Biochemical Adaptations to Environmental Stress** Biochemical responses to environmental stressors (e.g., temperature, pH, pollutants) Biochemical indicators of environmental stress and health assessment **6. Environmental Toxicology and Detoxification** Introduction to environmental toxicology and its impact on ecosystems Metabolism and detoxification of environmental pollutants **7. Nutrient Cycling and Biogeochemical Processes** Biochemical aspects of carbon, nitrogen, and phosphorus cycles Impact of human activities on nutrient cycling and ecosystem functioning **8. Environmental Genomics and Proteomics** Application of genomics and proteomics in studying environmental systems Environmental applications of molecular biology techniques **9. Bioremediation and Environmental Biotechnology** Biotechnological approaches for environmental cleanup Applications of environmental biotechnology in pollution mitigation

	10. Analytical Techniques in Environmental Biochemistry Techniques for sampling, extraction, and analysis of environmental samples Spectroscopic, chromatographic, and mass spectrometry methods Data interpretation and analysis using statistical and bioinformatics tools **11. Environmental Ethics and Sustainable Practices** Sustainability principles and practices in biochemistry and environmental science Environmental policy and regulation related to biochemistry and environmental issues **Case Studies and Applications** Analysis of case studies showcasing the application of biochemistry in environmental science

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Lectures**: Traditional lectures can be used to deliver foundational knowledge on conductive polymers, their properties, and applications. Lectures can also include discussions on historical developments and key concepts. **Case Studies**: Case studies can be used to explore real-world applications of conductive polymers. Students can analyze and discuss the challenges, opportunities, and outcomes of specific projects or industry collaborations, allowing them to gain insights into practical applications. **Group Discussions and Debates**: Group discussions encourage active participation and critical thinking. Students can engage in debates on topics such as the future of conductive polymers, ethical considerations, or emerging applications. This promotes collaborative learning and develops communication skills. **Problem-Based Learning**: Students can be presented with open-ended problems or scenarios related to conductive polymers. They can work in groups to analyze the problem, propose solutions, and present their findings. This fosters analytical thinking and problem-solving skills. **Research Projects**: Assigning research projects to students allows them to explore specific aspects of conductive polymers in depth. They can conduct literature reviews, design experiments, and analyze data, contributing to the advancement of knowledge in the field. **Online Resources and Virtual Tools**: Utilizing online resources, digital simulations, and virtual tools can enhance learning. These resources can provide interactive demonstrations, virtual experiments, and supplementary materials for self-paced learning.

	Presentations and Poster Sessions: Assigning presentations or poster sessions allows students to communicate their research findings or assigned topics effectively. This develops their presentation skills, promotes peer learning, and encourages critical evaluation of information. **Formative and Summative Assessments**: Regular formative assessments, such as quizzes or group projects, can help monitor students' progress. Summative assessments, such as examinations or research reports, evaluate students' understanding and mastery of the curriculum.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)**	4.5
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)		
	Assignments	2	10% (10)		
	Projects	1	10% (10)		
	Report	1	10% (10)		
Summative assessment	**Midterm Exam**	2 hr	10% (10)		
	Final Exam	4hr	50% (50)		
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction to Conductive Polymers**

	Overview of conductive polymers and their; significance in the energy sector; Conductive polymer properties and characteristics; Applications of conductive polymers in energy technologies; and Historical development and milestones in the field
Week 2	**Synthesis and Characterization of Conductive Polymers** Synthetic routes for conductive polymers Polymerization techniques and methods Characterization techniques for structural and electrical properties Analysis of polymer morphology and microstructure
Week 3	**Electrical Conductivity Mechanisms in Conductive Polymers** Theory of charge transport in polymers Intrinsic and extrinsic doping of polymers Influence of molecular structure on electrical conductivity Relationship between processing conditions and conductivity
Week 4	**Conductive Polymer Composites: Part1** Introduction to conductive polymer composites Types of conductive fillers and their dispersion in polymer matrices
Week 5	**Conductive Polymer Composites: Part 2** Influence of filler loading and distribution on electrical properties Processing techniques and challenges in composite fabrication
Week 6	**Energy Storage Applications: Part 1** Conductive polymer-based batteries Electrode materials and designs Electrochemical properties and performance metrics Strategies for enhancing energy density and cycling stability
Week 7	**Energy Storage Applications: Part 2** Conductive polymer-based supercapacitors Working principles and energy storage mechanisms Electrode materials and architectures Approaches to improving capacitance and power density
Week 8	**Energy Conversion Applications: Part 1** Conductive polymer-based solar cells Photovoltaic principles and device architectures

	Polymer donor and acceptor materials Techniques for improving efficiency and stability
Week 9	**Energy Conversion Applications: Part 2** Conductive polymer-based thermoelectric devices Thermoelectric principles and figure of merit Polymer selection for optimal thermoelectric performance Strategies to enhance thermoelectric efficiency
Week 10	**Emerging Applications and Future Trends** Conductive polymers in flexible and stretchable electronics Conductive polymers for energy-efficient lighting and displays Conductive polymers in sensors and actuators Overview of recent advances and ongoing research Future prospects and potential applications.
Week 11	**Seminars for students Applications of conductive polymers**
Week 12	**Manufacturing and Scale-up of Conductive Polymers** Scale-up considerations and challenges Manufacturing processes for conductive polymer-based devices Quality control and characterization techniques for large-scale production Economic and sustainability aspects of conductive polymer manufacturing.
Week 13	**Environmental Impact and Sustainability** Life cycle assessment of conductive polymers Environmental considerations in material selection and synthesis Recycling and disposal strategies for conductive polymers Eco-friendly alternatives and sustainable practices
Week 14	**Industry Engagement and Case Studies** Collaborations between academia and industry in conductive polymers Case studies highlighting successful applications and commercialization Industry perspectives on challenges and opportunities in the field Career paths and opportunities in the conductive polymer industry
Week 15	**Seminars for students on recent developments in conductive polymers**
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Nelson, D.L., Cox, M.M., and Lehninger, A.L. (2017). Lehninger Principles of Biochemistry. 7th edition. W.H. Freeman and Company. Garrett, R., and Grisham, C.M. (2017). Biochemistry. 6th edition. Cengage Learning.	No
Recommended Texts	Lehninger, A.L., Nelson, D.L., and Cox, M.M. (2012). Lehninger Principles of Biochemistry. 6th edition. W.H. Freeman and Company.	No
Websites		

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

معلومات المادة الدراسية

Module Title	**climatology**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ENV23015**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		

Module Level	2	**Semester of Delivery**	1
Administering Department	Environmental Dept.	**College**	College of Renewable and environmental sciences
Module Leader	Aqeel D. Salman	**e-mail**	aqeel.dawood@kus.edu.iq
Module Leader's Acad. Title	Lecutrer	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	
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	1. Definition of climate science and weather 2. Definition of atmospheric layers and characteristics of each layer 3. Identification of vertical temperature and pressure changes 4. Knowledge of how the wind forms and the forces that affect the direction and strength of the wind 5. Knowledge of how clouds form 6. Identification of pressure systems 7. Knowledge of solar radiation and atmospheric processes that affect it.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. To enable students to define climate science, weather, and its relationship to other sciences. 2. Definition of solar radiation and energy transport 3. Identification of factors affecting solar radiation within the atmosphere 4. Recognition of the concept of latent heat, sensible heat, and thermal exchange between the atmosphere and the surface of the earth 5. Introduction to the global distribution of temperature and global warming 6. Clarify the concept of pressure in general, atmospheric pressure, and its relation to density and temperature. 7. Recognition of horizontal and vertical distribution of pressure, 8. Define the coriolis force, pressure gradient force as well as hydrostatic balance 9. enable students to know the processes form clouds as well as how the rain and the factors affecting the size of the distillery are formed,
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Atmospheric layers – pressure distributions, temperature distributions, temperature changes with Hight. Radiations – interactions of radiation with the atmosphere. Heat transfer mechanism. Seasons, global warming, wind, cyclone and anticyclone. Cloud, humidity, cloud formation mechanism.

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	75	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	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	4hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction – Atmospheric layers
Week 2	Basics of the Energy and the radiation
Week 3	Seasons, and the main causes of the seasons
Week 4	the radiation interaction with the atmosphere
Week 5	Temperature distributions
Week 6	Temperature changes and global warming
Week 7	Pressure distributions
Week 8	Cyclone and anticyclone
Week 9	Pressure gradient force, Coriolis force and hydrostatic balance pressure
Week 10	Cloud and precipitation
Week 11	Cloud formations mechanisms
Week 12	Precipitation types

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Recommended Texts	Meteorology today: an introduction to meteorology	No

Grading Scheme

مخطط الدرجات

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

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

Module Information
معلومات المادة الدراسية

Module Title	**Microbiology**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ENV23014		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		

Module Level	2	**Semester of Delivery**	3
Administering Department	Environmental science	**College**	Energy and Environmental science
Module Leader	Zahraa jaafar jameel	**e-mail**	Dr.zahraa.j@kus.edu
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Marwa khadhum	**e-mail**	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	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. The definition of microbiology science 2. Types of microorganisms and bacterial infections. 3. To be able to isolate, diagnose, and identify the type of the bacteria. 4. To understand the construction of the bacteria. 5. The laboratory enforcement to culture the bacteria on different types of media. 6. To analysis the results obtained by the student compared with the standard results.
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. Recognition of Microbiology science. 2. Identify the types of bacteria, and how bacteria are classified. 3. Identify the most important bacterial disease and infections in human body. 4. Understand the immune response to bacterial infections. 5. Identify the different virulence factors used by bacteria to cause an infection. 6. Understand the difference between prokaryotes and eukaryotes cell. 7. Recognize the structure of viruses. 8. Recognize the components of cell well, types of nutrition, and methods of transfer of genetic material 9. Identify the production of toxins, and the ways of antibiotics resistance.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – Prokaryotes the components of prokaryotic cell, prokaryotic cells have a nucleoid region, DNA and RNA as their genetic material ribosomes that make proteins, and cytosol that contains a cytoskeleton that organizes cellular materials, and the difference between prokaryotes and eukaryotes. (15hr.) The function of each organelle, Capsule, found in some bacterial cells, this additional outer covering protects the cell when it is engulfed by other organisms. Cell Wall, an outer covering that protects the bacterial cell and gives it shape. Cytoplasm is a gel-like substance composed mainly of water that also contains enzymes, salts, cell components, and various organic molecules., cell membrane surrounds the cell's cytoplasm and regulates the flow of substances in and out of the cell. , flagella Hair-like structures on the surface of the cell that attach to other bacterial cells. Shorter pili called fimbriae help bacteria attach to surfaces. , Flagella: Flagella are long, whip-

	like protrusions that aid in cellular locomotion. Ribosomes: Ribosomes are cell structures responsible for protein production. Plasmids: Plasmids are gene-carrying, circular DNA structures that are not involved in reproduction. Nucleoid Region: Area of the cytoplasm that contains the single bacterial DNA molecule. prokaryotes divided into the Bacteria and Archaea (originally Eubacteria and Archaebacteria) because of the major differences in the structure and genetics between the two groups of organisms. Archaea were originally thought to be extremophiles, living only in inhospitable conditions such as extremes of temperature, pH, and radiation but have since been found in all types of habitats. The resulting arrangement of Eukaryota (also called "Eucarya"), Bacteria, and Archaea is called the three-domain system, replacing the traditional two-empire system. Part B – Prokaryotes Groups Bacteria , cell wall component , classification of bacteria according to difference in cell wall component into Gram positive and Gram negative using Gram stain method , nutrition method of bacteria , Genetic material transferring by conjugation or F plasmid , toxins production and types of toxins (endo and exotoxins) , bacteria resistance to antibiotics resistance mechanisms fall into four main categories 1) limiting uptake of a drug; (2) modifying a drug target; (3) inactivating a drug; (4) active drug efflux.

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.7
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 #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	4hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered

Week 1	**Introduction to Microorganisms**
Week 2	**Organelles and its function**
Week 3	**Prokaryotes Group**
Week 4	**Introduction to Bacteria**
Week 5	**Cell Wall**
Week 6	**Bacterial growth curve**
Week 7	nutrition
Week 8	**Gene Transfer Between Bacteria**
Week 9	**GENETIC VARIATION**
Week 10	**Toxins**
Week 11	**Control of microorganisms**
Week 12	**the essential characteristics of viruses**
Week 13	**Replication of viruses**
Week 14	**Exam**
Week 15	**Seminar**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Lab Safety
Week 2	Lab2: sterilization process
Week 3	Lab3:TYPE OF MEDIA and PREPARATION OF CULTURE MEDIA
Week 4	Lab4:isolation of bacteria from soil
Week 5	Lab5:isolation of bacteria from water

Week 6	Lab6: Lab4:isolation of bacteria from air
Week7	Lab 7: Smear Preparation and the Simple Stain
Week 8	Lab 8: Gram stain
Week 9	Lab 9: Determination of Bacterial Numbers
Week 10	Lab 10: The Effects of Chemical Agents on Bacteria: Antimicrobial Agents (Kirby-Bauer Method)
Week 11	Lab 11: Isolation of Escherichia coli Bacteriophages from Sewage and Determining Bacteriophage Titers
Week12	Lab 12: isolation of fungi 1
Week 13	Lab13:Phycomycetes, Ascomycetes, and Basidiomycetes
Week 14	exam
Week 15	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts		Yes
Recommended Texts	Microbiology, Nina Parker, Shenandoah University, 2016. **Lippincott Illustrated Reviews: Microbiology** Edition: 4 (2019)	No
Websites	https://microbiologysociety.org	

Grading Scheme

مخطط الدرجات

Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group	**A** - Excellent	امتياز	90 - 100	Outstanding Performance

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Soil Pollution**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ENV23118				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	2		**Semester of Delivery**	3	
Administering Department	Environmental Science		**College**	Energy and Environmental Science	
Module Leader	saadi shahadha		**e-mail**		
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	saadishahadha@kus.edu.iq	
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	ENV12011	**Semester**	2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	7. Describe the basics, principles, and concepts of soil pollution. 8. Understanding and application of soil pollution. 9. Understanding the general experiments and analysis to describe the soil pollution. 10. Increasing students' awareness about the soil pollution. 11. Knowing the most important practical and theoretical bases that evaluate soil quality and suitability for the agriculture and environment. 12. Recognizing that soil is the most important main component for achieving sustainable development and food development.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	11. Know the types of soil pollution. 12. Know the importance of soil to humans. 13. To be able to conduct tests for the types of soil pollution in Iraq. 14. Able to protect the soil from pollution. 15. Can classify the various soil pollutions. 16. Able to identify risks that may lead to a decrease in soil productivity efficiency. 17. Examine and analyze the soil pollution. 18. Conduct physical and chemical tests to determine the quality of the soil. 19. Determine the most important major pollutants that may lead to soil damage. 20. A statistic of the most important areas where good soil is found in Iraq.
Indicative Contents المحتويات الإرشادية	- variables soil-forming factors that controlled the direction and speed of soil formation - Soil as a medium for pollution. - Soil is clearly distinguished from the inert invironment. - Soil water contains dissolved organic and inorganic solutes. - Minerals are natural inorganic compounds, with definite physical and chemical properties. - Heavy Metals and the Soil System. - Organic and inorganic cations and anions are adsorbed on clay and oxide surfaces as a result. - Soil Pollution through Transport Activities. - Pollution Mechanisms and Soil-Pollutants Interaction. - Planning and Realisation of Soil Remediation

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	75	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	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	4hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to the The Origin of Soil
Week 2	Components of the soil
Week 3	Soil Properties
Week 4	Soil Degradation
Week 5	Major Types of Soil Pollutants
Week 6	Inorganic Pollutants
Week 7	Heavy Metals and the Soil System
Week 8	Organic Pollutants
Week 9	Sources of Soil Pollution
Week 10	Soil Pollution through Transport Activities
Week 11	Pollution Mechanisms and Soil-Pollutants Interaction
Week 12	Monitoring of Soil Pollution
Week 13	Field and Laboratory Investigations
Week 14	Measuring Hydraulic Heads in the Vadose Zone
Week 15	Planning and Realisation of Soil Remediation
Week 16	**The preparatory week before the Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Soil Sampling and Preparation
Week 2	Lab 2: Determination of Soil Moisture and Porosity
Week 3	Lab 3: pH and Electrical Conductivity in water extraction
Week 4	Lab 4: Cations Exchange Capacity (CEC)
Week 5	Lab 5: Organic and Inorganic Pollutants
Week 6	Lab 6: Physical Pollution
Week 7	Lab 7: Chemical Pollution
Week 8	Lab 8: Micropial Pollution

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Ibrahim A. Mirsal 2013. **Soil Pollution** Origin, Monitoring & Remediation. Springer-Verlag Berlin Heidelberg	No
Recommended Texts	Yaron, B., Calvet, R. and Prost, R., 1996. *Soil pollution: processes and dynamics*. Springer Science & Business Media.	No
Websites	https://www.google.com/search?q=soil+pollution&tbm=bks&sxsrf=APwXEddy543rGtyV6-96SOTQ4C08LL-3rg:1687272055471&ei=d7qRZIecHMuokdUP9uKeiAQ&start=0&sa=N&ved=2ahUKEwjHs4WcitL_AhVLVKQEHXaxB0E4ChDy0wN6BAgPEAQ&biw=1366&bih=625&dpr=1	

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 Information
معلومات المادة الدراسية

Module Title	**Air Pollution**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ENV24023		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		
Module Level	2	**Semester of Delivery**	4
Administering Department	Environmental Science	**College**	College of Energy and Environmental Science
Module Leader	Mohammed Kadhom	**e-mail**	Kadhom@kus.edu.iq
Module Leader's Acad. Title	Assist Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Anssam Dhaher	**e-mail**	Anssam_dhaher@kus.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	1. 1- Definition of the science of air pollution and when this science originated, and its relationship to other sciences. 2. 2- Definition of air pollution and clarification of the types of pollutants. 3. 3- Identification of the causes of air pollution and the reasons that led to the occurrence of this pollution, as well as the adopted solutions. 4. 4- Understanding the communicable diseases associated with air pollution. 5. 5- Understanding the mechanisms of pollutant transmission. 6. 6- Familiarization with accompanying natural phenomena. 7. 7- Knowledge of air pollution treatment techniques. 8. 8- Understanding the temporal and spatial patterns of pollutants. 9. 9- Classification of the science of air pollution for scientific research purposes.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	A- Cognitive Objectives (After completing the course, the student should be able to): A1- Define air pollutants. A2- Understand the importance of environmental conservation methods. A3- Differentiate between different types of pollutants.

	A4- Comprehend the cycles of pollutants. A5- Identify key measures to preserve air quality. A6- Conduct research in the environmental field. B- Skills Objectives specific to the course (After learning the course material, the student should be able to): B1- Recognize the significance of air purity. B2- Adopt behavioral changes and encourage others to protect the environment. B3- Develop methods for maintenance and preservation of the environment. B4- Promote environmental awareness within society and seek solutions.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Introduction to Air Pollution: • Definition and types of air pollution. • Sources and major contributors of air pollutants. • Impact of air pollution on human health and the environment. • Atmospheric Composition and Air Pollutants: • Composition and structure of the Earth's atmosphere. • Common air pollutants and their characteristics. • Criteria pollutants and their regulatory standards. • Measurement and Monitoring of Air Pollutants: • Sampling techniques and monitoring methods for air pollutants. • Air quality indices and standards. • Use of instruments and technologies for air quality assessment. • Health Effects of Air Pollution: • Respiratory and cardiovascular diseases associated with air pollution. • Impacts on vulnerable populations (children, elderly, etc.). • Long-term health effects and cancer risks.

	• Indoor Air Quality: • Sources of indoor air pollution (e.g., household chemicals, radon, mold). • Health effects and mitigation strategies. • Ventilation and filtration systems for improving indoor air quality. • Air Pollution Control Technologies: • Pollution prevention and emission reduction strategies. • Regulatory policies and control measures. • Introduction to technologies such as scrubbers, catalytic converters, and filters. • Global and Regional Air Pollution Issues: • Transboundary air pollution and international cooperation. • Acid rain, smog, and their causes. • Climate change and the role of air pollutants (e.g., greenhouse gases, aerosols). • Air Quality Management: • Air pollution modeling and forecasting. • Development and implementation of air quality management plans. • Case studies of successful air pollution control initiatives. • Emerging Issues and Solutions: • Emerging air pollutants and their impact. • Innovative solutions and technologies for air pollution mitigation. • Sustainable practices and policies to improve air quality. • Field Studies and Practical Applications: • Field trips to air quality monitoring stations or industrial sites. • Data analysis and interpretation of air quality measurements. • Group projects or research on specific air pollution topics.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Lecture Discussion Experimental demonstrations Individual experiments Research and reports

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	86	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	0
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	5% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	5% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	15% (10)	Continuous	All
	Report	1	5% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	4hr	60% (50)	16	All

Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Enabling students to define the science of air pollution, understand its origins, and explore its relationship with other sciences.
Week 2	Enabling students to define the science of air pollution, understand its origins, and explore its relationship with other sciences.
Week 3	Definition of Air Pollution and Explanation of the Most Important Types of Pollutants
Week 4	Definition of Air Pollution and Explanation of the Most Important Types of Pollutants
Week 5	Understanding the Relationship between Air Pollution and Diseases... COVID-19 as an Example.
Week 6	Empowering students to understand the methods of air pollutant transmission.
Week 7	Empowering students to become acquainted with accompanying atmospheric phenomena.
Week 8	Empowering students to become acquainted with accompanying atmospheric phenomena.
Week 9	Empowering students to familiarize themselves with the different types of winds and atmospheric phenomena such as summer winds, tides, and ebb and flow.
Week 10	Empowering students to familiarize themselves with the different types of winds and atmospheric phenomena such as summer winds, tides, and ebb and flow.
Week 11	Empowering students to acquire knowledge about air pollution treatment technologies and modern devices.
Week 12	Empowering students to acquire knowledge about air pollution treatment technologies and modern devices.
Week 13	Enabling students to divide the field of air pollution science for scientific research purposes.
Week 14	Enabling students to divide the field of air pollution science for scientific research purposes.

Week 15	Enabling students to divide the field of air pollution science for scientific research purposes.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Unit conversions for gaseous and particulate pollutants
Week 2	Lab 2: Calculation of Dangerous degree of some gaseous and particulate pollutants
Week 3	Lab 3: Installing pollutant rose
Week 4	Lab 4: Calculate the level of noise pollution in the laboratory
Week 5	Lab 5: Estimating the horizontal wind speed at the nozzles
Week 6	Lab 6: Determination of atmospheric stability and its impact on pollution
Week 7	Lab 7: Guess the height of day and night mixing pollutants
Week 8	Lab 8 : Measuring the average amounts of particles accumulated and deposited on horizontal surfaces
Week 9	Lab 9 : Selecting the instantaneous diffusion behavior of pollutants according to atmospheric stability
Week 10	Lab 10 : Estimation of the height of polluted clouds
Week 11	Lab 11 : Calculating the pollutant emission rate from a single chimney
Week 12	Lab 12 : Concentration estimation SO_2 using the Gauss model
Week 13	Lab 13 : Calculating the transparency of dust particles to incident light (visibility range)
Week 14	Lab 14 : Explain global warming
Week 15	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Air Pollution: Sources, Impacts, and Controls. By Pallavi Saxena, Vaiśālī Nāīka, 2019	Yes
Recommended Texts	Fundamentals of Air Pollution. By Arthur C Stern	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 Information

معلومات المادة الدراسية

Module Title	**Environmental Chemistry**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	ENV24022		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	2	**Semester of Delivery**	4
Administering Department	Environmental Science	**College**	Energy and Environmental Science
Module Leader	Dr. Alaa Badr Mohammed	**e-mail**	alaaalqaycy7@gmail.com
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	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	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 the origin of soil formation and its evolution 2. Learn about the origin of water formation 3. Learn the properties of water 4. Identify the components of air 5. Identify the characteristics of water components 6. Learn about the most important interactions that take place in soil, water and air 7. Learn about cycles in the environment 8. Identify the interactions between the components of the environment, soil, water and air
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. To know the concepts of modern scientific differences. 2. To learn about the recent development of environmental chemistry. 3. To understand how environmental factors, affect a living organism 4. To understand how the environment affects it. 5. To recognize the mechanisms of cycles in nature 6. To distinguish between mental measurement and actual measurement 7. Doing practical experiments 8. Doing the lecture 9. Doing environmental activities 10. Spreading environmental awareness
Indicative Contents المحتويات الإرشادية	**15. Introduction to Chemistry** Introduction to periodic table Classification of elements **16. Simple Tool Skills** Unit Conversions Ideal Gas Law Stoichiometry **17. Bonding Models in Inorganic Chemistry** Basic of bonding which occurs to form the molecules and study its properties. **18. The Origin of Radiation** Electromagnetic radiation Wave Properties The particle nature of light Interaction of Radiation and Matter

	Lambert-Beer's law **19. Radioactivity** Stable and unstable nuclides Positron definition Half-life and mode of decay **20. Atmospheric Chemistry** Atmospheric Structure Ozone Catalytic Cycles **21. Greenhouse Gases** Sources of greenhouse effects Increasing GHG concentrations in the troposphere **22. CO_2 Equilibria** Pure Rain Polluted Rain Surface Water **23. Environmental Chemistry of Heavy Metals** Sample Collection Elemental Determinations • Atomic Absorption/Atomic Emission Spectrometry • Neutron Activation/Photon Activation Analysis **24. Environmental Chemistry of Nitrogen** Biogeochemical cycle of nitrogen Environmental biogeochemistry of nitrogen **25. Environmental Chemistry of Organotin** Toxicological Patterns of Organotins Analysis of Organotins at Environmental Levels Degradation of Organotin Compounds • U.V. Irradiation • Biological Cleavage • Chemical Cleavage **26. Fates of Organic Compounds** Vapor Pressure Water Solubility Partition Coefficients

	Lipophilicity Fish Partition Coefficients Adsorption Water–Air Transfer **27. Toxic Environmental Compounds** Pesticides Mercury Lead **28. Inorganic Deposits in Invertebrate Tissues** Metal Deposits Potassium, Magnesium, Calcium, Strontium, and Barium, Aluminium, Silicon, Vanadium, Chromium, Molybdenum, Manganese, Iron, Cobalt, Nickel, Copper, Zinc, Cadmium, and Mercury, Lead

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	9. Method of lecturing 10. Student Center 11. Team Project 12. Work Shop 13. Scientific trips to monitor environmental pollution 14. Learning Technologies on Campus 15. Experiential Learning 16. Application Learning

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	86	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	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
	Midterm Exam	2hr	10% (10)	7	LO #1 - #7

Summative assessment	**Final Exam**	4hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Chemistry
Week 2	Simple Tool Skills
Week 3	Bonding Models in Inorganic Chemistry
Week 4	The Origin of Radiation
Week 5	Radioactivity
Week 6	Atmospheric Chemistry
Week 7	Mid-term Exam
Week 8	Greenhouse Gases
Week 9	CO_2 Equilibria
Week 10	Environmental Chemistry of Heavy Metals
Week 11	Environmental Chemistry of Nitrogen
Week 12	Environmental Chemistry of Organotin
Week 13	Fates of Organic Compounds
Week 14	Toxic Environmental Compounds
Week 15	Inorganic Deposits in Invertebrate Tissues
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Determination of dissolved oxygen in natural water by titration
Week 2	Lab 2: Measure of Alkalinity of water by titration
Week 3	Lab 3: Determination of chloride in water samples
Week 4	Lab 4: Determination of chlorine in water samples by titration
Week 5	Lab 5: Determination of hardness of water
Week 6	Lab 6: Determination of sulfate in water
Week 7	Lab 7: pH of soil
Week 8	Lab 8: Find out the total dissolved solid in the given water sample
Week 9	Lab 9: Biochemical oxygen demand (BOD)
Week 10	Lab 10: Determination dissolved carbon dioxide in water sample

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	H. J. M. Bowen, Environmental Chemistry Volume 3, 1984 The Royal Society of Chemistry	No
Recommended Texts	Ronald A. Hites, Elements of Environmental Chemistry, 2007, Wiley; 1st edition	No
Websites		

Grading Scheme

مخطط الدرجات

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

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Air Pollution**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ENV24023				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		2	**Semester of Delivery**		4
Administering Department		Environmental Science	**College**	College of Energy and Environmental Science	
Module Leader	Mohammed Kadhom		**e-mail**	Kadhom@kus.edu.iq	
Module Leader's Acad. Title		Assist Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Anssam Dhaher		**e-mail**	Anssam_dhaher@kus.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	10. 1- Definition of the science of air pollution and when this science originated, and its relationship to other sciences. 11. 2- Definition of air pollution and clarification of the types of pollutants. 12. 3- Identification of the causes of air pollution and the reasons that led to the occurrence of this pollution, as well as the adopted solutions. 13. 4- Understanding the communicable diseases associated with air pollution. 14. 5- Understanding the mechanisms of pollutant transmission. 15. 6- Familiarization with accompanying natural phenomena. 16. 7- Knowledge of air pollution treatment techniques. 17. 8- Understanding the temporal and spatial patterns of pollutants. 18. 9- Classification of the science of air pollution for scientific research purposes.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	A- Cognitive Objectives (After completing the course, the student should be able to): A1- Define air pollutants. A2- Understand the importance of environmental conservation methods.

	A3- Differentiate between different types of pollutants. A4- Comprehend the cycles of pollutants. A5- Identify key measures to preserve air quality. A6- Conduct research in the environmental field. B- Skills Objectives specific to the course (After learning the course material, the student should be able to): B1- Recognize the significance of air purity. B2- Adopt behavioral changes and encourage others to protect the environment. B3- Develop methods for maintenance and preservation of the environment. B4- Promote environmental awareness within society and seek solutions.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Introduction to Air Pollution: • Definition and types of air pollution. • Sources and major contributors of air pollutants. • Impact of air pollution on human health and the environment. • Atmospheric Composition and Air Pollutants: • Composition and structure of the Earth's atmosphere. • Common air pollutants and their characteristics. • Criteria pollutants and their regulatory standards. • Measurement and Monitoring of Air Pollutants: • Sampling techniques and monitoring methods for air pollutants. • Air quality indices and standards. • Use of instruments and technologies for air quality assessment. • Health Effects of Air Pollution: • Respiratory and cardiovascular diseases associated with air pollution. • Impacts on vulnerable populations (children, elderly, etc.).

	• Long-term health effects and cancer risks. • Indoor Air Quality: • Sources of indoor air pollution (e.g., household chemicals, radon, mold). • Health effects and mitigation strategies. • Ventilation and filtration systems for improving indoor air quality. • Air Pollution Control Technologies: • Pollution prevention and emission reduction strategies. • Regulatory policies and control measures. • Introduction to technologies such as scrubbers, catalytic converters, and filters. • Global and Regional Air Pollution Issues: • Transboundary air pollution and international cooperation. • Acid rain, smog, and their causes. • Climate change and the role of air pollutants (e.g., greenhouse gases, aerosols). • Air Quality Management: • Air pollution modeling and forecasting. • Development and implementation of air quality management plans. • Case studies of successful air pollution control initiatives. • Emerging Issues and Solutions: • Emerging air pollutants and their impact. • Innovative solutions and technologies for air pollution mitigation. • Sustainable practices and policies to improve air quality. • Field Studies and Practical Applications: • Field trips to air quality monitoring stations or industrial sites. • Data analysis and interpretation of air quality measurements. • Group projects or research on specific air pollution topics.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Lecture Discussion Experimental demonstrations Individual experiments Research and reports

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	86	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	0
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	5% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	5% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	15% (10)	Continuous	All
	Report	1	5% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	4hr	60% (50)	16	All

Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Enabling students to define the science of air pollution, understand its origins, and explore its relationship with other sciences.
Week 2	Enabling students to define the science of air pollution, understand its origins, and explore its relationship with other sciences.
Week 3	Definition of Air Pollution and Explanation of the Most Important Types of Pollutants
Week 4	Definition of Air Pollution and Explanation of the Most Important Types of Pollutants
Week 5	Understanding the Relationship between Air Pollution and Diseases... COVID-19 as an Example.
Week 6	Empowering students to understand the methods of air pollutant transmission.
Week 7	Empowering students to become acquainted with accompanying atmospheric phenomena.
Week 8	Empowering students to become acquainted with accompanying atmospheric phenomena.
Week 9	Empowering students to familiarize themselves with the different types of winds and atmospheric phenomena such as summer winds, tides, and ebb and flow.
Week 10	Empowering students to familiarize themselves with the different types of winds and atmospheric phenomena such as summer winds, tides, and ebb and flow.
Week 11	Empowering students to acquire knowledge about air pollution treatment technologies and modern devices.
Week 12	Empowering students to acquire knowledge about air pollution treatment technologies and modern devices.
Week 13	Enabling students to divide the field of air pollution science for scientific research purposes.
Week 14	Enabling students to divide the field of air pollution science for scientific research purposes.

Week 15	Enabling students to divide the field of air pollution science for scientific research purposes.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Unit conversions for gaseous and particulate pollutants
Week 2	Lab 2: Calculation of Dangerous degree of some gaseous and particulate pollutants
Week 3	Lab 3: Installing pollutant rose
Week 4	Lab 4: Calculate the level of noise pollution in the laboratory
Week 5	Lab 5: Estimating the horizontal wind speed at the nozzles
Week 6	Lab 6: Determination of atmospheric stability and its impact on pollution
Week 7	Lab 7: Guess the height of day and night mixing pollutants
Week 8	Lab 8 : Measuring the average amounts of particles accumulated and deposited on horizontal surfaces
Week 9	Lab 9 : Selecting the instantaneous diffusion behavior of pollutants according to atmospheric stability
Week 10	Lab 10 : Estimation of the height of polluted clouds
Week 11	Lab 11 : Calculating the pollutant emission rate from a single chimney
Week 12	Lab 12 : Concentration estimation SO_2 using the Gauss model
Week 13	Lab 13 : Calculating the transparency of dust particles to incident light (visibility range)
Week 14	Lab 14 : Explain global warming
Week 15	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Air Pollution: Sources, Impacts, and Controls. By Pallavi Saxena, Vaiśālī Nāīka, 2019	Yes
Recommended Texts	Fundamentals of Air Pollution. By Arthur C Stern	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	**MICROBIAL ECOLOGY**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ENV24124**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		2	**Semester of Delivery**		4
Administering Department		Environmental Science	**College**	Energy and Environmental Science	
Module Leader	Name		**e-mail**	E-mail	
Module Leader's Acad. Title		Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	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	ENV23014	**Semester**	3
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 are to introduce the general biology of microorganisms and general concepts of microbial ecology, furthermore important microbial processes in natural and technical systems are studied
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Apply knowledge of the biology and distribution of certain species of microorganism, bacteria in order to use them as bio indicator of contamination 2. Apply the metabolic processes of microorganisms principally bacteria to industrial processes 3. Develop analysis and synthesis skills
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A - Circuit Theory</u> DC circuits – Current and voltage definitions, Passive sign convention and circuit elements, Combining resistive elements in series and parallel. Kirchhoff's laws and Ohm's law. Anatomy of a circuit, Network reduction, Introduction to mesh and nodal analysis. [15 hrs] AC circuits I – Time dependent signals, average and RMS values. Capacitance and inductance, energy storage elements, simple AC steady-state sinusoidal analysis. [15 hrs] AC Circuits II - Phasor diagrams, definition of complex impedance, AC circuit analysis with complex numbers. [10 hrs] RL, RC and RLC circuits - Frequency response of RLC circuits, simple filter and band-pass circuits, resonance and Q-factor, use of Bode plots, use of differential equations and their solutions. Time response (natural and step responses). Introduction to second order circuits. [15 hrs] Revision problem classes [6 hrs] <u>Part B - Analogue Electronics</u> Fundamentals Resistive networks, voltage and current sources, Thevenin and Norton equivalent circuits, current and voltage division, input resistance, output resistance, coupling and decoupling capacitors, maximum power transfer, RMS and power dissipation, current limiting and over voltage protection. [15 hrs] Components and active devices – Components vs elements and circuit modeling, real and ideal elements. Introduction to sensors and actuators, self-generating vs modulating type sensors, simple circuit interfacing. [7 hrs]

	Diodes and Diode circuits – Diode characteristics and equations, ideal vs real. Signal conditioning, clamping and clipping, rectification and peak detection, photodiodes, LEDs, Zener diodes, voltage stabilization, voltage reference, power supplies. [15 hrs]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

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

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

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	45	**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	
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	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 الاسبوعي النظري	
	Material Covered
Week 1	Introduction to environmental microbiology, microorganisms found in the environment
Week 2	Bacterial growth in pure culture in flasks and growth in the environment
Week 3	Earth environment, soil as a microbial environment
Week 4	Aeromicrobiology
Week 5	Aquatic environment
Week 6	Extreme environments
Week 7	Environmental sample collection and processing
Week 8	Microscopic technologies
Week 9	Cultural methods
Week 10	Physiological methods
Week 11	Immunological methods
Week 12	Nucleic acids-based methods
Week 13	Biogeochemical cycling
Week 14	Microorganisms' and organic pollutants
Week 15	Microorganisms' and metal pollution
Week 16	Microorganisms and water pollution
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: introduction to clinical microbiology, safety practices and preliminary identification methods of microorganisms
Week 2	Lab 2: staphylococcus species and gram-positive rods, antimicrobial susceptibility
Week 3	Lab 3: Enterobacteriaceae
Week 4	Lab 4: miscellaneous Gram-negative Bacilli
Week 5	Lab 5: spirochetes and anaerobes
Week 6	Lab 6: mycology and virology
Week 7	Lab 7: parasitology (protozoan parasites and the helminths

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	W.P Grant and P.E> Long, 1981, environmental microbiology	Yes
Recommended Texts	Moat and Foster, 2002, Microbial physiology,4th edition, Pub. Wiley Lliss and son's, Inc	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	**AlgaL ecology**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ENV35026**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		3	**Semester of Delivery**		5
Administering Department		Environmental Science	**College**	Energy and Environmental Science	
Module Leader	Name: Elaf imad abdulhussein		**e-mail**	E-mail: elaf.imad@kus.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		Mcs.
Module Tutor	Name (if available)		**e-mail**	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	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- What does algae mean? 2- Identification of prokaryotic and eukaryotic algae. 3- Identification of algae groups. 4- Learn about reproduction methods, growth stages, and life cycles of algae 5- High knowledge of the role of algae in the environment in general.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After completing the course, the student will be able to: 4. It describes the morphological and anatomical characteristics of algae, their ways of living, their reproduction, their role in the environment, their relationship with other organisms and their economic importance. 5. Explains the basic concepts and foundations used in the classification of algae. 6. Distinguish between algae and other organisms. 7. It isolates algae from their environments.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • An alga (**singular for algae**) is a plant-like organism that uses sunlight to produce energy in a process called **Photosynthesis**. Algae are extremely important organisms because they are considered to be the primary oxygen-producing organisms on Earth • **The prokaryotic algae** **(Blue green algae ,cyanobacteria, cyanoprokaryota) are placed in the monera (Eubacteria) and the eukaryotic algae in the protista . the algae do not belong to kingdom of Plantae . Nevertheless , it is widely accepted (because of the photosynthesis characteristic)to interpret algae as (lower plants)in distinction to the vascular (higher plants).** • **The eukaryotic algae** **Posses membrane –bound organelles such as nuclei, Golgi body mitochondria and plastids . the prokaryotic cyanobacteria do not exhibit such organelles:;their DNA and photosynthetic thylakoids lie free in the cytoplasm.**

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	75	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	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	4hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to the algae
Week 2	Algae structure
Week 3	The nucleus
Week 4	Reproduction
Week 5	Classification
Week 6	Environmental changes and evaluation of algae
Week 7	Fresh water algae toxins
Week 8	Marine algae toxins and other harmful effects of algae
Week 9	Division: The prokaryotic algae (*Cyanobacteria*)
Week 10	Division : chlorophyta
Week 11	Divition: Euglenophyta
Week 12	Divition: chrysophyta
Week 13	
Week 14	Algal application
Week 15	
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: lab safety
Week 2	Lab 2: Laboratory equipment and supplies
Week 3	Lab 3: culture media
Week 4	Lab 4: Sampling and collection of algae
Week 5	Lab 5: isolation of algae from the aquatic environment
Week 6	Lab 6:
Week 7	Lab 7: Divition: Phaeophyta

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Wahhab, T. A., & Hassan, F. M. (2023). Environmental parameters drive the phytoplankton community structure: a case study in Baghdad Tourist Island Lake, Iraq. *Ibn AL-Haitham Journal For Pure and Applied Sciences*, *36*(1), 74-87.	Yes
Recommended Texts	Al Hassany, J. S., Hassan, F. M., & Gitan, R. N. (2014). An environmental study of epiphytic algae on Ceratophyllum demersum in Tigris River within Baghdad City, Iraq. *Baghdad science Journal*, *11*(3)	No
Websites	https://www.google.iq/books/edition/Southern_Iraq_s_Marshes/_A8tEAAAQBAJ?hl=en&gbpv=1&dq=envomential+algae+in+baghdad+UNIVERSITY&pg=PA110&printsec=frontcover	

Grading Scheme مخطط الدرجات

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

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

University Name: AlKarkh University of Science

College: Energy and Environmental Science

Dept: Environmental Science

Module Information معلومات المادة الدراسية			
Module Title	Environmental Toxicology	**Module Delivery**	
Module Type	**Core**	☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ENV35029		
ECTS Credits	4		
SWL (hr/sem)	100		
Module Level	**3**	**Semester of Delivery**	**5**

Administering Department	Environmental science	**College**	Environment & Renewable Energy Sciences
Module Leader	Dr. Khattab Al-Khafaji	**e-mail**	k.a.alkhafaji@gmai.com
Module Leader's Acad. Title	Assist Prof	**Module Leader's Qualification**	PhD
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	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	• Develop a solid foundation in the principles and concepts of environmental toxicology: • Provide students with a comprehensive understanding of the interdisciplinary nature of environmental toxicology, including its connections to ecology, chemistry, and public health. • Familiarize students with key toxicological principles, such as dose-response relationships, exposure assessment, and risk assessment. • Understand the sources, fate, and transport of environmental pollutants: • Explore the various sources of environmental pollutants, including industrial processes, agriculture, and urban activities. • Investigate the behavior of pollutants in the environment, including their movement through air, water, and soil, and their potential for bioaccumulation and biomagnification. • Analyze the effects of environmental pollutants on ecosystems and biodiversity: • Examine the impacts of toxicants on different levels of ecological organization, from individual organisms to populations and communities. • Investigate the mechanisms of toxicity, including the molecular and cellular responses to toxicants, and the ecological consequences of these effects. • Evaluate the human health implications of environmental pollutants:

	• Understand the pathways of human exposure to environmental toxicants, including occupational exposure, ingestion, and inhalation. • Examine the health effects associated with exposure to different classes of environmental pollutants, such as carcinogens, neurotoxicants, and endocrine disruptors.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• **Knowledge and Understanding:** • Demonstrate a comprehensive understanding of the principles and concepts of environmental toxicology, including the sources, fate, and transport of environmental pollutants. • Understand the mechanisms of toxicity and the effects of pollutants on ecosystems and human health. • Explain the principles and methodologies of risk assessment and risk management in environmental toxicology. • **Application of Toxicological Principles:** • Apply toxicological knowledge and skills to analyze and assess the potential risks and impacts of environmental pollutants on ecosystems and human populations. • Apply appropriate methods and techniques for the sampling, analysis, and detection of environmental toxicants. • Apply toxicological data and principles to develop strategies for the management and mitigation of environmental risks. • **Critical Thinking and Analysis:** • Critically evaluate scientific literature, research findings, and case studies in environmental toxicology. • Analyze and interpret toxicological data, including dose-response relationships, exposure assessments, and risk characterizations. • Synthesize and integrate information from multiple sources to evaluate and communicate the potential risks and impacts of environmental pollutants.
Indicative Contents المحتويات الإرشادية	**12. Introduction to Environmental Toxicology:** • Definition and scope of environmental toxicology • Historical development and importance of the field • Key concepts and principles in environmental toxicology **13. Toxicological Principles:** • Toxicity and dose-response relationships • Routes of exposure and absorption of toxicants • Factors influencing toxicity, such as age, sex, and genetics • Mechanisms of toxic action at the cellular and molecular levels

	14. Environmental Pollutants: • Classification and sources of environmental pollutants (e.g., heavy metals, pesticides, industrial chemicals, air pollutants) • Fate and transport of pollutants in the environment • Bioaccumulation and biomagnification processes **15. Ecotoxicology:** • Effects of pollutants on ecosystems and biodiversity • Assessment of ecological risks and impacts • Population and community-level effects of toxicants • Case studies on the effects of specific pollutants on ecosystems **16. Human Health Toxicology:** • Human exposure to environmental contaminants • Health effects of environmental pollutants (e.g., carcinogens, endocrine disruptors, neurotoxicants) • Risk assessment and risk management approaches • Regulatory frameworks for protecting human health **17. Analytical Techniques in Environmental Toxicology:** • Sampling and analysis of environmental samples for toxicants • Instrumental methods for detection and quantification • Biomarkers and bioassays for assessing exposure and effects **18. Toxicokinetics and Toxicodynamics:** • Absorption, distribution, metabolism, and excretion of toxicants in organisms • Molecular mechanisms of toxic action • Interactions between toxicants and biological targets • Individual and species sensitivity to toxicants **19. Environmental Toxicology and Policy:** • Environmental legislation and regulations • Risk communication and public perception of environmental risks • Ethical considerations in environmental toxicology research and decision-making • Application of toxicological data in environmental policy and management **20. Emerging Issues in Environmental Toxicology:** • Emerging contaminants and their potential risks (e.g., pharmaceuticals, nanomaterials, microplastics) • Climate change and its implications for toxicology • Ecotoxicological implications of emerging technologies **21. Toxicological Research and Case Studies:** • Critical evaluation of toxicological studies and research methodologies • Analysis of case studies and real-world examples in environmental toxicology

	• Design and implementation of toxicological studies **22. Risk Assessment and Management:** • Principles and methods of risk assessment • Development of risk management strategies • Integration of toxicological data into decision-making processes • Application of precautionary principles in environmental management **23. Environmental Toxicology and Public Health:** • Understanding the links between environmental toxicology and public health • Communicating toxicological information to the general public and stakeholders • Collaboration with public health agencies and professionals

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Integration of Theory and Practical Application:** **Provide a balance between theoretical knowledge and practical application by incorporating laboratory experiments, fieldwork, case studies, and real-world examples.** **Encourage students to apply theoretical concepts to solve environmental toxicology problems and analyze real-world scenarios.** **Active Learning:** **Implement interactive teaching methods such as group discussions, debates, role plays, and problem-solving exercises.** **Engage students in hands-on activities, field trips, and practical assignments to foster active participation and critical thinking.** **Integration of Interdisciplinary Approaches:** **Emphasize the interdisciplinary nature of environmental toxicology by integrating knowledge from other fields, such as biology, chemistry, ecology, and public health.** **Encourage collaboration and team-based projects that involve students from different disciplines to address complex environmental toxicology issues.** **Use of Case Studies and Real-World Examples:** **Incorporate case studies and real-world examples that illustrate the application of environmental toxicology principles to address environmental challenges and inform decision-making.** **Encourage students to analyze and critically evaluate these case studies, considering the scientific, ethical, and societal dimensions of environmental toxicology.** **Incorporation of Technology:**

	Utilize technology-based tools and resources such as computer simulations, modeling software, online databases, and multimedia presentations to enhance learning and understanding of complex toxicological processes and data analysis. **Fieldwork and Site Visits:** **Organize fieldwork and site visits to relevant environmental settings, industrial sites, pollution control facilities, or regulatory agencies to provide students with firsthand exposure to environmental toxicology practices and challenges.** **Engage experts and professionals working in the field of environmental toxicology as guest speakers to share their experiences and insights.** **Critical Evaluation of Scientific Literature:** **Teach students how to critically evaluate scientific literature and research papers in environmental toxicology.** **Guide students in assessing the quality and validity of research studies, interpreting data, and identifying gaps in knowledge.** **Ethical Considerations and Responsible Conduct:** **Incorporate discussions and activities that explore ethical considerations and responsible conduct in environmental toxicology research, including the responsible use of animals, data integrity, and transparency in reporting findings.** **Foster discussions on the ethical implications of toxicological research and its application to decision-making and policy development**

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	45	**Structured SWL (h/w)**	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)**	
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)		
	Assignments	2	10% (10)		

	Projects	1	10% (10)		
	Report	1	10% (10)		
Summative assessment	**Midterm Exam**	2 hr	10% (10)		
	Final Exam	3hr	50% (50)		
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Introduction to Environmental Toxicology:**
Week 2	**Toxicological Principles:**
Week 3	**Environmental Pollutants:**
Week 4	**Ecotoxicology**
Week 5	**Human Health Toxicology:**
Week 6	**Analytical Techniques in Environmental Toxicology:**
Week 7	**Toxicokinetics and Toxicodynamics:**
Week 8	**Environmental Toxicology and Policy**
Week 9	**Emerging Issues in Environmental Toxicology:**
Week 10	**Toxicological Research and Case Studies:**
Week 11	**Risk Assessment and Management:**
Week 12	**Environmental Toxicology and Public Health:**
Week 13	**Seminars for Environmental Toxicology**
Week 14	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	"Introduction to Environmental Toxicology: Impacts of Chemicals Upon Ecological Systems" by W.G. Landis, Y. Yu, and M. Menzie	No

	"Fundamentals of Ecotoxicology: The Science of Pollution" by M. Newman "Environmental Toxicology: Biological and Health Effects of Pollutants" by D.J. Ecobichon	
Recommended Texts	"Environmental Toxicology and Chemistry" by D. Hoffmann and B. Kosian	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
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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	**Statistical Application**			**Module Delivery**	
Module Type	**Core**			☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ENV35030**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	3		**Semester of Delivery**	5	
Administering Department	environmental science		**College**	Energy and Environmental Science	
Module Leader			**e-mail**	E-mail	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	MSc.	
Module Tutor	Hamza Imran		**e-mail**	hamza.ali1990@kus.edu.iq	
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	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. Environmental Data Understanding: To equip students with an understanding of how to collect, analyze, and interpret environmental data using statistical methods. 2. Statistical Method Application: To apply statistical methods such as regression analysis, hypothesis testing, and probability distribution in the field of environmental science. 3. Software Utilization: To gain proficiency in the use of statistical software packages and programming languages (such as R, Python, or SPSS) for analyzing and interpreting environmental data. 4. Understanding of Environmental Trends: To develop skills to discern patterns, trends, and correlations in environmental data that can help in decision-making and policy formulation. 5. Ethical and Sustainable Approach: To instill a sense of ethical responsibility and sustainability when applying statistical methods to environmental science, acknowledging potential impacts on ecosystems and communities
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Data Interpretation Skills: Students will demonstrate the ability to collect, analyze, and interpret environmental data using appropriate statistical methods. 2. Proficiency in Statistical Methods: Students will show competence in applying various statistical methods to solve problems and answer research questions in environmental science. 3. Software Mastery: Students will exhibit proficiency in using statistical software and programming languages for data analysis in the field of environmental science. 4. Understanding of Environmental Patterns: Students will effectively identify and explain patterns, trends, and correlations in environmental data, demonstrating a clear understanding of their implications. 5. Sustainability Awareness: Students will showcase an understanding of ethical considerations and sustainability in statistical applications, incorporating these principles in their approach to environmental problem-solving.
Indicative Contents المحتويات الإرشادية	Part A - Introduction to Environmental Statistics • The Role of Statistics in Environmental Science (3 hrs): An overview of why statistics are important in environmental science, including examples of real-world applications.

	• Data Collection and Preprocessing (3 hrs): Techniques for gathering environmental data and preparing it for analysis, including data cleaning, outlier detection, and handling missing values. Part B - Basic Statistical Techniques • Descriptive Statistics and Data Visualization (3 hrs): How to summarize and visualize data using measures of central tendency, dispersion, and graphs/charts. • Probability and Distributions (3 hrs): Introduction to probability theory and the types of distributions commonly used in environmental science. • Hypothesis Testing and Confidence Intervals (3 hrs): Basics of hypothesis testing and calculating confidence intervals in the context of environmental data. Part C - Intermediate Statistical Techniques • Regression Analysis (3 hrs): How to perform and interpret simple and multiple regression analysis in environmental data. • Analysis of Variance (ANOVA) (3 hrs): Applying ANOVA for analyzing environmental data. • Introduction to Statistical Software (SPSS) (3 hrs): Hands-on introduction to statistical software SPSS for environmental data analysis. Part D - Advanced Statistical Techniques • Time Series Analysis (3 hrs): Applying time series analysis in environmental data, e.g., for studying trends in climate change. • Spatial Statistics (3 hrs): Analyzing spatial data, which is critical for many areas of environmental science.

	• Multivariate Analysis (3 hrs): Applying techniques like Principal Component Analysis (PCA) to reduce the dimensionality of environmental data. Part E - Case Studies and Ethics • Case Studies in Environmental Statistics (3 hrs): Reviewing real-world case studies to understand the practical applications of statistical methods in environmental science. • Ethics and Sustainability in Environmental Statistics (3 hrs): Discussing ethical and sustainability considerations in data collection and statistical analysis in environmental science.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The course "Statistical Applications " will employ various teaching strategies. These include traditional lectures for introducing key concepts, practical exercises, and software tutorials for hands-on learning of statistical tools. Group projects and case study analyses will enhance collaborative and critical thinking skills. Discussions and debates will engage students with ethical and sustainability considerations. Self-directed learning will be encouraged through readings and research projects. Regular assessments will monitor student progress and provide constructive feedback. Guest lectures from industry professionals will offer real-world insights.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	45	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	0
Total SWL (h/sem)	**100**		

الحمل الدراسي الكلي للطالب خلال الفصل	

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2 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 الاسبوعي النظري

	Material Covered
Week 1	Introduction to Environmental Statistics
Week 2	Data Collection and Preprocessing
Week 3	Descriptive Statistics and Data Visualization
Week 4	Probability and Distributions
Week 5	Hypothesis Testing and Confidence Intervals
Week 6	Review and Midterm Exam Preparation
Week 7	Midterm Exam

Week 8	Regression Analysis
Week 9	Analysis of Variance (ANOVA)
Week 10	Advanced Statistical Methods I
Week 11	Advanced Statistical Methods II
Week 12	Case Studies in Environmental Statistics
Week 13	Ethics and Sustainability in Environmental Statistics
Week 14	**Review and Preparation for Final Exam**
Week 15	**Review and Preparation for Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to Lab Environment
Week 2:	Lab 2: Data Collection Exercise
Week 3:	Lab 3: Data Cleaning and Visualization Lab with SPSS
Week 4:	Lab 4: Probability and Distribution Lab with SPSS
Week 8:	Lab 8: Regression Analysis Lab with SPSS
Week 9:	Lab 9: ANOVA Lab with SPSS
Week 10:	Lab 10: Advanced Functions in SPSS
Week 11:	Lab 11: Advanced Methods Lab I with SPSS
Week 12:	Lab 12: Advanced Methods Lab II with SPSS

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Data Analysis in Management with SPSS Software 2013th Edition	Yes

Recommended Texts	Data Analysis with SPSS: A First Course in Applied Statistics 4th Edition	No
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	**Water Pollution**	**Module Delivery**
Module Type	**Core**	☐**Theory**

Module Code	**ENV35025**			☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	3		**Semester of Delivery**	5	
Administering Department	Environmental science		**College**	Energy and Environmental Science	
Module Leader	Dr. Fadhil Muhi Mohammed		**e-mail**	fadhil.mohammed@kus.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**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. Definition of water pollution and its relationship to human activities 2. Definition of water pollution sources and types of pollutants (chemical, biological, etc.) 3. This course deals with measurements of physical, chemical and biological properties.

	4. Knowledge of methods for measuring the physical and chemical properties of polluted water 5. Identify the causes of water pollution and what are the solutions used to reduce pollution.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**Cognitive and skills goals** Upon completing this course, students will be able to: 1. Understanding of surface and wastewater pollutants 2. Full knowledge of environmental conservation. 3. Have solid knowledge about the nature of point and nonpoint sources of surface and ground water pollution 4. Understanding of current approaches to water quality protection and enhancement. 5. Measure physical, chemical and biological properties of water polluted 6. Research in the field of water pollution. 7. Approaches to water quality management (water index), water quality standards and criteria for drinking water and treated water for irrigation purposes, the National Pollutant Discharge Elimination System 8. Knowledge of standard specifications for drinking water and treated water for irrigation purposes. 9. **Know the importance of water purity** 10. **Awareness of the responsibility to protect water in particular and the environment in general.** 11. **Full awareness of climate changes.** 12. **Spreading the culture of guidance in water consumption and finding solutions to reduce its pollution**
Indicative Contents المحتويات الإرشادية	**Indicative content** includes the following. <u>Part A – Water pollution sources</u> General water pollution sources: • Municipal Wastewater (Sewage, Storm water runoff) [15 hrs.] • industrial wastewater such as Battery manufacturing , Electric power plants, Food industry, Pulp and paper industry, Textile mills, etc. [15 hrs] • Agricultural wastewater (Irrigation runoff, Animal wastes) • Marine shipping (oil spills comes from oil tankers accidents, Waste water a large cruise ship generates an estimated 1,000,000 liters per day of wastewater, Solid waste generated on a ship includes glass, paper, cardboard, aluminum and steel cans, and plastics) [15 hrs] • Thermal pollution (coolant by power plants and industrial manufacturers) <u>Part B –Physical, chemical and microbiological parameters</u> • Physical parameters (TDS, TSS, MLSS, turbidity, color, odor and taste)

	• Chemical parameters (hardness, alkalinity, heavy metals) • Microbiological parameters, the microbiological quality of drinking water have traditionally been assessed by monitoring bacteria called fecal indicator organisms (coliforms, E.coli, and enterococci). Part C- BOD, COD and DO • BOD: Biochemical oxygen demand is the amount of dissolved oxygen needed by aerobic biological organisms to break down organic material present in a given water sample at certain temperature over a specific time period. • COD: Chemical Oxygen Demand is a measurement of the oxygen required to oxidize soluble and particulate organic matter in water. According to WHO, COD limit in drinking water is below 5 ppm • DO: Dissolved oxygen is a measure of how much oxygen is dissolved in the water - the amount of oxygen available to living aquatic organisms. The amount of dissolved oxygen in a stream or lake can tell us a lot about its water quality. Saturation value of DO in water is 8-15 mg/L (depending on temperature and salinity water).

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	150	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem)	71	**Unstructured SWL (h/w)**	4.733

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction - Water consumption by sector, water sources (surface water, ground water)
Week 2	Sources of water pollution I- (Municipal Wastewater, Industrial wastewater)
Week 3	Sources of water pollution II- (Agricultural wastewater, Marine shipping, Oilfields and Refineries, Thermal pollution)
Week 4	Sources of water pollution III- point and nonpoint sources of surface and ground water pollution

Week 5	Define and measurements methods of dissolved oxygen (DO), chemical oxygen demand (COD), biological oxygen demand (BOD)
Week 6	Physical Parameters I: Total dissolved solids (TDS), Total suspended solids (TSS).
Week 7	Mid-term Exam
Week 8	Physical Parameters II: Mixed liquor suspended solids (MLSS), Turbidity.
Week 9	Physical Parameters III: Color, Odor, Taste
Week 10	Chemical Parameters I: Hardness types and its measurement
Week 11	Chemical Parameters II: Alkalinity, Heavy metals.
Week 12	Microbiological Parameters: fecal indicator organisms (coliforms, E.coli, and enterococci).
Week 13	Water quality assessment
Week 13	Water quality Index (WQI)
Week 14	Organic Pollution Index (OPI)
Week 15	Comprehensive pollution Index (CPI)
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to water pollution
Week 2	Lab 2: conductivity test
Week 3	Lab 3: Odor test (Threshold)
Week 4	Lab 4: Color test
Week 5	Lab 5: Turbidity test
Week 6	Lab 6: Dissolved oxygen measurements

Week 7	Lab 7: pH test
Week 8	Lab 8: COD test
Week 9	Med Term Exam
Week 10	Lab 9: BOD test
Week 11	Lab 10: TSS and TDS measurements
Week 12	Lab 11: MLSS measurements
Week 13	Lab 12: Alkalinity test
Week 14	Lab 13: Hardness test
Week 15	Lab 14: Preparatory week before final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Pollution: Causes, Effects and Control, Roy M. Harrision, fourth edition, 2001	Yes
Recommended Texts	Pollution Control: Management, Technology and Regulations (Air, Water and Soil Pollution Science and Technology	Yes
Websites	different sites from internet	

Grading Scheme

مخطط الدرجات

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

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Molecular Biology			**Module Delivery**	
Module Type	**Core**			☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ENV35027				
ECTS Credits	6				
SWL (hr/sem)	**150**				
Module Level		3	**Semester of Delivery**		5
Administering Department		Environmental science	**College**	Energy and Environmental science	
Module Leader	Assistant Prof. Dr. zahraa jaafar jameel		**e-mail**	E-mail: dr.zahraa.j@kus.edu	
Module Leader's Acad. Title		Assistant Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	

Scientific Committee Approval Date		**Version Number**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To understand the basic principles of molecular biology. 2. To provide the student with the basic knowledge of molecular genetics of eukaryotic and prokaryotic in general 3. To study the main characteristics of DNA importance and their identification. 4. To teach aseptic techniques. 5. To provide an understanding of central dogma
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. - Student Learning Outcome: 2. By the end of the course, the students are being able to: 3. 1- Develop advanced academic knowledge about the concepts and principles of molecular biology. 4. 2- Cover the importance of molecular biology and the history background of this subject. 5. Detail knowledge about the molecular biology and its applications 6. Having knowledge about the up-to-date advancing and development in this field of subject

	7. They could be familiar with the modest instruments in the medical labs like PCR and other technique
Indicative Contents المحتويات الإرشادية	Emotional and value goals 1- Enable students to cooperate with each other in solving practical assignments. 2 - Enabling students to focus on the topic of the lesson and harmony and interaction with it. 3 - Enabling students to organize the information and data they receive during the lesson. 4- Enabling the students to recreate their way of thinking towards living beings and appreciating the greatness of the Almighty Creator

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Evaluation modalities 1- Practical tests 2- Theoretical tests 3- Reports and studies 4- Daily exams with self-solving questions 5- Grades determined by homework

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

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	75	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.7
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 #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	4hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction in molecular Biology – Structure of Protein –Nucleic acid
Week 2	DNA Conformations - Types of DNA

Week 3	DNA as a Carrier of Genetic Information
Week 4	Physical Properties of the DNA
Week 5	Prokaryotic chromosome structure - Chromatin Structure
Week 6	Types of RNA
Week 7	DNA Replication of Prokaryotic Cells
Week 8	DNA Replication of eukaryotic Cells
Week 9	Prokaryotic Transcription
Week 10	Eukaryotic Transcription
Week 11	Translation Process -Mechanism of Protein Synthesis
Week 12	Regulation of transcription in prokaryotes
Week 13	Eukaryotic Gene Regulation
Week 14	Genetic Engineering
Week 15	Gene cloning - Genomics - Metagenomics
Week 16	Examination

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	**equipment's & materials commonly used in a laboratory**
Week 2	Methods For Preparation Of Solutions And Structured Used In Molecular Biology Experiments
Week 3	DNA Extraction Methods
Week 4	Preparation of Genomic DNA From Prokaryotic
Week 5	Preparation of Plasmid DNA From Bacteria
Week 6	DNA Preparation From Eukaryotes
Week 7	Determination of DNA& RAN purity and concentration
Week 8	Examination
Week 9	Determination of the number of G + C % ratio and melting point
Week 10	Gel electrophoresis

Wee;11	Electrolysis of polyacrylamide gel electrophoresis (PAGE)
Week12	Determination of RAN purity and concentration
Week13	Polymerase chain reaction
Week14	Methods of extracting proteins Protein Extraction
Week15	Examination

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Instant NotesIn Molecular Biology. (2005) Third Edition Phil Turner, Alexander McLennan, Andy Bates & Mike White School of Biological Sciences, University of Liverpool, Liverpool, UK Essentials of Molecular Biology. (2013). V. Malathi .Department of Biochemistry Ethiraj College for Women Chennai	Yes
Recommended Texts	From Genes to Genomes. (2012) Third Edition . Jeremy W. Dale, Malcolm von Schantz and Nick Plant *University of Surrey, UK*	yes
Websites	http://www.wiley.com/go/dale/genes3e	

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	Biodiversity	**Module Delivery**	
Module Type	C	☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ENV36134		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	**UGIII**	**Semester of Delivery**	**SIX**

Administering Department	Environmental Science	**College**	Energy and Environmental Science
Module Leader	Dr. Khattab Al-Khafaji	**e-mail**	K.a.alkhafaji@gmail.com
Module Leader's Acad. Title	Lecturer Dr	**Module Leader's Qualification**	PhD
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	ENV25027	**Semester**	5
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Understand the concept of biodiversity: Introduce students to the definition and components of biodiversity, including genetic, species, and ecosystem diversity. Develop an appreciation for the complexity and interdependence of biodiversity within ecological systems. Recognize the value and importance of biodiversity: Highlight the ecological, economic, and cultural significance of biodiversity. Explore the ecosystem services provided by biodiversity, such as pollination, nutrient cycling, and climate regulation. Explore the threats to biodiversity: Identify and understand the primary drivers of biodiversity loss, including habitat destruction, invasive species, pollution, and climate change. Investigate the consequences of biodiversity loss on ecosystem stability, species extinction, and human well-being. Investigate biodiversity conservation strategies:

	Introduce students to different approaches and techniques for biodiversity conservation and management. Explore the role of protected areas, habitat restoration, and sustainable land use practices in conserving biodiversity. Foster an understanding of the relationship between biodiversity and sustainable development: Examine how biodiversity conservation contributes to the achievement of sustainable development goals. Explore the synergies and trade-offs between biodiversity conservation, poverty alleviation, and social equity. Develop practical skills in biodiversity assessment and monitoring: Provide hands-on experience in biodiversity assessment techniques, such as species identification, habitat mapping, and population surveys. Familiarize students with data collection and analysis methods used in biodiversity research. Promote interdisciplinary approaches to biodiversity conservation: Encourage collaboration between students from different disciplines, such as biology, ecology, environmental science, policy, and social sciences. Emphasize the importance of integrating scientific, social, and policy perspectives in biodiversity management. Cultivate ethical and sustainable attitudes towards biodiversity: Foster an understanding of ethical considerations related to biodiversity conservation, including the rights of indigenous communities and the equitable sharing of benefits. Encourage students to explore sustainable practices and responsible decision-making in relation to biodiversity. Encourage critical thinking and problem-solving skills: Stimulate critical analysis of scientific literature, policy documents, and case studies related to biodiversity conservation. Develop the ability to evaluate and propose innovative solutions to biodiversity challenges.
Module Learning Outcomes	1. Demonstrate a comprehensive understanding of the concepts and principles of biodiversity and its relevance to environmental systems. 2. Explain the different levels of biodiversity (genetic, species, and ecosystem

مخرجات التعلم للمادة الدراسية	diversity) and their significance in maintaining ecosystem functioning. 3. Identify and describe the major threats to biodiversity and their implications for environmental sustainability. 4. Understand the value of biodiversity in providing ecosystem services and its role in supporting human well-being. 5. Apply appropriate methods and techniques for assessing and monitoring biodiversity in various ecological contexts. 6. Collect and analyze biodiversity data using field sampling techniques, survey methodologies, and statistical analysis. 7. Interpret biodiversity indices, measurements, and indicators to assess the health and status of ecosystems. 8. Use technology tools, such as remote sensing and geographic information systems (GIS), for biodiversity assessment and monitoring. 9. Understand the principles and strategies of biodiversity conservation and management. 10. Evaluate the effectiveness of different conservation approaches, such as protected areas, habitat restoration, and species management. 11. Apply principles of sustainable land and resource management to conserve biodiversity. 12. Analyze the socio-economic and policy factors influencing biodiversity conservation efforts. 13. Identify and describe the ecosystem services provided by biodiversity, including provisioning, regulating, supporting, and cultural services. 14. Understand the economic and ecological value of ecosystem services and their contribution to human well-being. 15. Assess the interconnections between biodiversity conservation and the sustainable provision of ecosystem services. 16. Evaluate the trade-offs and synergies between biodiversity conservation and other societal goals, such as economic development. 17. Understand the impacts of environmental change, including climate change, habitat loss, and pollution, on biodiversity. 18. Assess the vulnerability of different species and ecosystems to environmental change. 19. Analyze the adaptive capacities of biodiversity and the potential for resilience in the face of environmental challenges. 20. Evaluate strategies for mitigating the impacts of environmental change and

	promoting biodiversity conservation.
Indicative Contents المحتويات الإرشادية	Module 1: Introduction to Biodiversity Definition and scope of biodiversity Importance of biodiversity for ecosystems and human well-being Levels of biodiversity: genetic, species, and ecosystem diversity Measurement and assessment of biodiversity Module 2: Biodiversity and Ecosystem Functioning Ecosystem structure and function Biodiversity-ecosystem function relationships Trophic interactions and biodiversity Biodiversity and resilience of ecosystems Module 3: Threats to Biodiversity Habitat loss and fragmentation Climate change and biodiversity Pollution and its impacts on biodiversity Invasive species and their effects on native biodiversity Module 4: Conservation and Management of Biodiversity Principles and approaches to biodiversity conservation Protected areas and their management Biodiversity conservation strategies and practices Sustainable land and resource management for biodiversity conservation Module 5: Biodiversity Hotspots and Endangered Species Biodiversity hotspots and their significance Endangered species and their conservation International agreements and initiatives for endangered species protection Case studies of successful species conservation programs Module 6: Biodiversity and Ecosystem Services Concept of ecosystem services and their links to biodiversity Provisioning, regulating, supporting, and cultural services Valuation of ecosystem services and economic importance Conservation and restoration of ecosystem services Module 7: Biodiversity Monitoring and Assessment Methods for biodiversity monitoring and assessment

	Sampling techniques and data analysis Indicators and indices for assessing biodiversity status Use of technology and remote sensing in biodiversity monitoring Module 8: Biodiversity and Human Well-being Linkages between biodiversity, human health, and well-being Cultural and spiritual values of biodiversity Traditional ecological knowledge and its role in biodiversity conservation Nature-based solutions for sustainable development and human well-being Module 9: Biodiversity Policy and Governance National and international biodiversity policies and frameworks Access and benefit-sharing of genetic resources Indigenous rights and traditional knowledge in biodiversity management Stakeholder engagement and participation in biodiversity governance Module 10: Emerging Issues and Future Directions in Biodiversity Emerging challenges and opportunities in biodiversity conservation Emerging technologies and research in biodiversity science Integration of biodiversity conservation with sustainable development goals Career opportunities and research pathways in biodiversity science

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Active Learning Approaches:** **Incorporate hands-on activities, fieldwork, and laboratory exercises to engage students in practical biodiversity assessment and monitoring.** **Encourage students to participate in biodiversity research projects, data collection, and analysis to develop their research skills.** **Facilitate group discussions, case studies, and problem-solving exercises to enhance critical thinking and decision-making abilities.** **Integration of Theory and Practice:** **Connect theoretical concepts with real-world examples and case studies to illustrate the importance and application of biodiversity principles.** **Provide opportunities for students to visit biodiversity-rich sites, conservation areas, and ecological research centers to observe biodiversity in its natural habitat.** **Invite guest speakers from conservation organizations, government agencies, and research institutions to share their experiences and expertise.**

	Multidisciplinary Approach: **Foster collaboration and interdisciplinary learning by including students from various disciplines, such as biology, ecology, environmental science, policy, and social sciences.** **Encourage students to work in interdisciplinary teams on projects that require the integration of scientific, social, and policy perspectives.** **Use of Technology and Tools:** **Utilize technology tools, such as GIS, remote sensing, and data analysis software, to enhance biodiversity assessment and monitoring skills.** **Incorporate online databases, biodiversity databases, and citizen science platforms to expose students to real-life biodiversity data and research opportunities.** **Fieldwork and Outdoor Experiences:** **Organize field trips, biodiversity surveys, and ecological expeditions to diverse ecosystems, including forests, wetlands, marine environments, and urban landscapes.** **Conduct practical exercises and experiments in the field to provide students with hands-on experience in biodiversity sampling, identification, and data collection.** **Engagement with Local Communities:** **Foster partnerships with local communities, indigenous groups, and conservation organizations to involve students in community-based biodiversity projects.** **Encourage students to understand and appreciate traditional ecological knowledge and its relevance to biodiversity conservation.** **Critical Thinking and Problem-Solving:** **Pose challenging questions and problem scenarios that require students to analyze complex biodiversity issues, evaluate trade-offs, and propose solutions.** **Encourage students to critically evaluate scientific literature, policy documents, and research findings related to biodiversity.** **Communication and Outreach:** **Provide opportunities for students to develop communication skills by presenting their research findings, organizing awareness campaigns, or writing biodiversity reports.** **Promote participation in environmental education programs, public outreach events, and citizen science initiatives to enhance students' ability to communicate biodiversity concepts to diverse audiences.** **Ethical and Sustainability Considerations:** **Incorporate discussions and activities on ethical considerations, environmental justice, and sustainable practices in biodiversity conservation and management.** **Encourage students to consider the social, economic, and cultural dimensions of biodiversity and to develop environmentally responsible attitudes.**

	Assessment Methods: **Use a variety of assessment methods, including research papers, field reports, group projects, presentations, and examinations, to evaluate students' knowledge, skills, and understanding of biodiversity.**

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	75	**Structured SWL (h/w)**	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)**	
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)		
	Assignments	2	10% (10)		
	Projects	1	10% (10)		
	Report	1	10% (10)		
Summative assessment	**Midterm Exam**	2 hr	10% (10)		
	Final Exam	4hr	50% (50)		
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Introduction to Biodiversity** Definition and scope of biodiversity Importance of biodiversity for ecosystems and human well-being Levels of biodiversity: genetic, species, and ecosystem diversity Threats to biodiversity: habitat loss, climate change, pollution, invasive species

	Conservation and sustainable use of biodiversity
Week 2	**Biodiversity Assessment and Monitoring** Biodiversity measurement techniques: species inventories, biodiversity indices Sampling methods and data collection in the field Remote sensing and GIS applications in biodiversity monitoring Biodiversity databases and information systems Citizen science and public engagement in biodiversity monitoring
Week 3	**Ecosystem Services and Biodiversity** Concept of ecosystem services and their links to biodiversity Provisioning, regulating, supporting, and cultural services Valuation of ecosystem services and economic importance Biodiversity-based strategies for sustainable development Case studies on the role of biodiversity in specific ecosystem services (e.g., pollination, carbon sequestration)
Week 4	**Conservation and Restoration of Biodiversity** Principles and approaches to biodiversity conservation Protected areas and their management Habitat restoration and rewilding Conservation strategies for threatened and endangered species International conventions and policies for biodiversity conservation
Week 5	**Biodiversity and Climate Change** Impacts of climate change on biodiversity Species distribution modeling and climate change scenarios Biodiversity adaptation and resilience to climate change Mitigation of climate change through biodiversity conservation Synergies between biodiversity conservation and climate change action
Week 6	**Biodiversity and Human Health** Linkages between biodiversity, ecosystem health, and human health Biodiversity and infectious diseases Traditional ecological knowledge and medicinal plants Nature-based solutions for human health and well-being Ecotourism and sustainable livelihoods related to biodiversity

Week 7	**Biodiversity Policy and Governance** National and international biodiversity policies and frameworks Access and benefit-sharing of genetic resources Indigenous rights and traditional knowledge in biodiversity management Multilateral environmental agreements related to biodiversity Stakeholder engagement and participation in biodiversity governance
Week 8	**Biodiversity and Sustainable Land Management** Biodiversity in agricultural landscapes Sustainable forestry and biodiversity conservation Urban biodiversity and green infrastructure Biodiversity-friendly land-use planning and management Integrating biodiversity into environmental impact assessments
Week 9	**Biodiversity Communication and Education part1** Communication strategies for biodiversity conservation Education and awareness-raising on biodiversity
Week 10	**Biodiversity Communication and Education part2** Environmental education programs and initiatives Public engagement and behavior change for biodiversity conservation Role of media and technology in promoting biodiversity awareness
Week 11	**Seminars for students Applications of Biodiversity**
Week 12	**Emerging Issues and Future Directions in Biodiversity part 1** Emerging challenges and opportunities in biodiversity conservation New technologies and approaches in biodiversity research and monitoring
Week 13	**Emerging Issues and Future Directions in Biodiversity part 1** Indigenous and local community perspectives on biodiversity Biodiversity and sustainable development goals Research and career pathways in biodiversity science
Week 14	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Primack, R.B. (2014). Essentials of Conservation Biology. Sinauer Associates, Inc. Gaston, K.J., & Spicer, J.I. (2004). Biodiversity: An Introduction. Wiley-Blackwell. Wilson, E.O. (2016). Biodiversity. Harvard University Press. Heywood, V.H., & Watson, R.T. (Eds.). (1995). Global Biodiversity Assessment. Cambridge University Press.	No
Recommended Texts	Primack, R.B., & Rodrigues, E. (2012). Biologia da Conservação. Editora Artmed. Primack, R.B., & Rodrigues, E. (2015). Essentials of Conservation Biology (6th ed.). Sinauer Associates, Inc.	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	**Environmental Awareness**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ENV36035				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	3		**Semester of Delivery**	6	
Administering Department	Environmental Science		**College**	College of Energy and Environmental Science	
Module Leader	Mohammed Kadhom		**e-mail**	Kadhom@kus.edu.iq	
Module Leader's Acad. Title	Assist Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
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	1- Description of the Environment and Ecosystem: The environment refers to the surroundings in which living organisms exist. It includes both biotic (living) and abiotic (non-living) components, such as air, water, soil, plants, animals, and their interactions. The ecosystem, on the other hand, refers to a specific area where living organisms interact with each other and their physical environment. 2- Understanding Environmental Education: Environmental education involves learning about the environment, its challenges, and how to preserve and sustain it. It aims to increase awareness, knowledge, and understanding of environmental issues, promote responsible behavior, and empower individuals to take actions that contribute to a sustainable future. 3- Understanding Environmental Education and Learning: Environmental education and learning encompass various educational approaches and strategies to impart knowledge and skills related to environmental issues. It involves interdisciplinary learning, critical thinking, problem-solving, and hands-on experiences to enhance environmental awareness and foster positive attitudes towards environmental conservation. 4- Understanding Environmental Education and Higher Education: Environmental education in higher education institutions focuses on providing specialized knowledge and skills related to environmental sciences, sustainability, and ecological conservation. It offers academic programs, research opportunities, and

	practical training to prepare individuals for careers in environmental fields and equip them with the expertise to address environmental challenges. 5- Understanding the Role of Media and Environmental Awareness: Media plays a crucial role in raising awareness about environmental issues and promoting environmental consciousness. Through various platforms, such as news outlets, documentaries, social media, and campaigns, the media informs the public, influences opinions, and encourages collective action for environmental protection. 6- Recognizing Environmental Awareness and Human Behavior: Environmental awareness refers to individuals' understanding of environmental issues, their connection to nature, and their recognition of the impact of human behavior on the environment. It involves adopting sustainable practices, reducing environmental footprints, and making informed choices to minimize negative environmental consequences. 7- Understanding Environmental Education from an Islamic Perspective: From an Islamic perspective, environmental education, and the responsibility of humans to protect and conserve the environment. Islamic teachings highlight the importance of sustainable resource management, moderation, and the preservation of biodiversity as acts of worship and ethical obligations. 8- General Recommendations
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	A- Cognitive Objectives (After teaching the course, students should be able to): A1- Define the environment and its components. A2- Identify the most important methods of environmental conservation. A3- Raise awareness within the community about the importance of the environment. A4- Be capable of protecting the environment. A5- Discuss the ethics of dealing with the environment. A6- Recall the position of Islamic Sharia regarding the environment. B- Skills Objectives (Specific to the course, after teaching the course material, students should be able to):

	B1- Understand the importance of environmental elements. B2- Make changes in their behavior and the behavior of others to protect the environment. B3- Find ways to maintain and preserve the environment. B4- Promote environmental awareness in society through media and social means.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction to Environmental Science: Definition and scope of environmental science Interdisciplinary nature of environmental science Importance of environmental awareness Ecosystems and Biodiversity: Introduction to ecosystems and their components Biodiversity and its significance Threats to ecosystems and biodiversity Conservation and restoration efforts Climate Change: Causes and consequences of climate change Greenhouse gases and their impact Mitigation and adaptation strategies International climate change agreements Pollution and Environmental Health: Types of pollution (air, water, soil, noise) Sources and effects of pollution

	Human health impacts of environmental pollution Environmental regulations and policies Sustainable Development: Principles of sustainability Sustainable resource management Sustainable energy practices Sustainable transportation and urban planning Natural Resource Conservation: Water resources and conservation Forest resources and deforestation Land use and conservation Sustainable agriculture and food production Waste Management: Waste generation and composition Solid waste management techniques Recycling and composting Hazardous waste management Environmental Ethics and Responsibility: Ethical considerations in environmental decision-making Individual and collective responsibility for the environment Environmental justice and equity Environmental Policy and Governance:

	Environmental laws and regulations Governmental and non-governmental organizations involved in environmental protection Environmental impact assessments International environmental governance Environmental Awareness and Activism: Effective communication and awareness strategies Engaging in environmental activism and advocacy Promoting sustainable behaviors and lifestyles

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lecture Discussion Experimental demonstrations Individual experiments Research and reports

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	75	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	0

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	5% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	5% (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	4hr	60% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Enabling students to define the environment and the ecosystem.
Week 2	Enabling students to define the environment and the ecosystem.
Week 3	Enabling students to define environmental education.
Week 4	Enabling students to define environmental education.
Week 5	Empowering students to define environmental education and higher education.
Week 6	Empowering students to define environmental education and higher education.

Week 7	Enabling students to understand the role of media and environmental awareness.
Week 8	Enabling students to understand the role of media and environmental awareness.
Week 9	Empowering students to recognize environmental awareness and human behaviors.
Week 10	Empowering students to recognize environmental awareness and human behaviors.
Week 11	Empowering students to define environmental education from an Islamic perspective.
Week 12	Empowering students to define environmental education from an Islamic perspective.
Week 13	Enabling students to draw conclusions and make general recommendations.
Week 14	Enabling students to draw conclusions and make general recommendations.
Week 15	Enabling students to draw conclusions and make general recommendations.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Environmental education and environmental awareness.	Yes
Recommended Texts		
Websites		

Grading Scheme

مخطط الدرجات

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

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Remote sensing**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ENV36031**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		3	**Semester of Delivery**		6
Administering Department		Environmental Science	**College**	Energy and Environmental Science	
Module Leader	MOHAMMED SHEBEB		**e-mail**	E-mail	
Module Leader's Acad. Title		LEC.	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	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	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To understand the primary elements of remote sensing through show student schedule diagrams associated with their explanation. 2. To understand the electromagnetic radiation and spectral regions of radiation related to remote sensing. 3. This course deals with the basic information of remote sensing. 4. To understand the interaction process between the radiation and atmosphere. 5. The importance of gases in remote sensing. 6. To represent and show the datasets of remote sensing. 7. To process the digital images. 8. To learn the ways for correcting processes of digital images. 9. To understand the satellites included: types, properties and their applications.
Module Learning Outcomes	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Recognize the important elements of remote sensing. 2. The relationship between spectral wavelengths of radiation with remote sensing. 3. Summarize what is meant by basic elements of remote sensing.

مخرجات التعلم للمادة الدراسية	4. Describe the process of radiation interaction with the atmosphere. 5. The effect of scattering and absorption on the reflected and received energy by the instruments of remote sensing. 6. Differences between image and photo and digital images. 7. Represent and show the image associates with its enhancement and improvement processes. 8. Orbit of satellites and purposes for their usages.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – elements</u> Seven elements of remote sensing – energy source, radiation and atmosphere, interaction with the target, recording of energy by sensor, transmission, reception and processing, interpretation and analysis, application. Information detailed about electromagnetic of radiation, electromagnetic spectrum. Important of atmospheric gases in remote sensing. Digital image process. Image interpretation and analysis. Assumption for digital image correction. Enhancement process for digital process functions. Image transformation. [15 hrs] <u>Part B – satellite characteristics</u> Fundamentals Orbit of satellites, types of satellite orbits. Weather satellites (GOES, NOAA AVHRR). Land observation satellites. Applications for radar imagining including specific requirements for each application, agriculture (crop type mapping), forestry, geology and hydrology. [15 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Present the lectures associate with asking students some questions related to the main topic to increase the critical thinking of students about the subject. 2. Link between lecture and life information to develop skills in understanding the topic information of remote sensing.

	Homework: writing a short piece of introduction which is required the main paragraphs to enable student how to learn academic writing and understand the topic. This writing can be presented by the following paragraphs: **Paragraph1**: write an introduction about the concept of remote sensing with no more half page. **Paragraph 2:** next page will be about writing information of one example for remote sensing such as radar, etc. This also will be no more half page in length. **Paragraph 3:** writing complementary section relates to these both sections above which is about typing one/all application, usage, effect of that topic on human, what is the development applies by human on that topic during times, etc.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	86	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	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	4hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction – remote sensing
Week 2	Basics of remote sensing elements. The electromagnetic spectrum.
Week 3	Radiation interaction with atmosphere. Image and photo differences.
Week 4	Image interpretation and analysis.
Week 5	Correction methods: assumption for digital image correction.
Week 6	Image enhancement and transformations.
Week 7	Satellite characteristics and weather satellites.
Week 8	Airborne versus spaceborne Radar, applications for Radar imagining.
Week 9	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to GIS, function of GIS, principle of GIS, components of GIS, type of GIS and advantage of GIS.

Week 2	Lab 2: The ArcMap interface and tools.
Week 3	Lab 3: Data View and Layout View.
Week 4	Lab 4: Layers, data frames, and map elements.
Week 5	Lab 5: Layer properties for symbols and labels.
Week 6	Lab 6: Scale dependent display, spatial bookmark.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	University of Anbar, engineering college, department of Dams and water resources: remote sensing and GIS lectures. Dr. Khamis Naba Sayal	Yes
Recommended Texts	Introduction to satellite remote sensing, 2017. William Emery and Adriano Camps.	No
Websites	Related internet sites.	

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

University Name: AlKarkh University of Science

College Energy and Environmental Science

Dept: environmental sciences

Module Information معلومات المادة الدراسية					
Module Title	Scientific research methods			**Module Delivery**	
Module Type	**core**			☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ENV36032				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level	**3**		**Semester of Delivery**	**6**	
Administering Department	Environmental science		**College**	Environment & Renewable Energy Sciences	
Module Leader	Dr. zahraa jaafar jameel		**e-mail**	Dr.zahraa.j@kus.edu	
Module Leader's Acad. Title	Assistant prof.		**Module Leader's Qualification**	PhD	
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	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Develop a comprehensive understanding of conductive research 2. Familiarize students with the study design 3. Equip students with knowledge and skills in the writing of references. 4. Develop an understanding of type of research 5. Provide hands-on writing of research project. 6. Read of paper on journals or thesis or book 7. How to citation on text 8. Components of research project.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	21. Demonstrate a comprehensive understanding of conductive research. 22. Apply knowledge of type of research. 23. Employ various characterization methods to analyze the study design. 24. Explain the research project. 25. Design and optimize conductive the components of research project. 26. Evaluate the method of sampling. 27. Rule of citation. 28. Identify style of citation. 29.
Indicative Contents المحتويات الإرشادية	**24. Introduction to research** **25. Study design** **26. proposal**

	27. **eight steps of research** 28. **components of research** 29. **citation** **Applications**

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Lectures**: Traditional lectures can be used to deliver foundational knowledge on conductive polymers, their properties, and applications. Lectures can also include discussions on historical developments and key concepts. **Case Studies**: Case studies can be used to explore real-world applications of conductive polymers. Students can analyze and discuss the challenges, opportunities, and outcomes of specific projects or industry collaborations, allowing them to gain insights into practical applications. **Group Discussions and Debates**: Group discussions encourage active participation and critical thinking. Students can engage in debates on topics such as the future of conductive polymers, ethical considerations, or emerging applications. This promotes collaborative learning and develops communication skills. **Problem-Based Learning**: Students can be presented with open-ended problems or scenarios related to conductive polymers. They can work in groups to analyze the problem, propose solutions, and present their findings. This fosters analytical thinking and problem-solving skills. **Research Projects**: Assigning research projects to students allows them to explore specific aspects of conductive polymers in depth. They can conduct literature reviews, design experiments, and analyze data, contributing to the advancement of knowledge in the field. **Online Resources and Virtual Tools**: Utilizing online resources, digital simulations, and virtual tools can enhance learning. These resources can provide interactive demonstrations, virtual experiments, and supplementary materials for self-paced learning. **Presentations and Poster Sessions**: Assigning presentations or poster sessions allows students to communicate their research findings or assigned topics effectively. This

	develops their presentation skills, promotes peer learning, and encourages critical evaluation of information. **Formative and Summative Assessments**: Regular formative assessments, such as quizzes or group projects, can help monitor students' progress. Summative assessments, such as examinations or research reports, evaluate students' understanding and mastery of the curriculum.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	30	**Structured SWL (h/w)**	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	18	**Unstructured SWL (h/w)**	
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)		
	Assignments	2	10% (10)		
	Projects	1	10% (10)		
	Report	1	10% (10)		
Summative assessment	**Midterm Exam**	2 hr	10% (10)		
	Final Exam	2hr	50% (50)		
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction of research methodology
Week 2	Type of research
Week 3	Research design
Week 4	Research proposal

Week 5	Eight-step model for carrying out research
Week 6	Exam1
Week 7	Citation and references
Week 8	Citation and references
Week 9	Citation and references
Week 10	Writing article from research project report Conversion of thesis to journal article
Week 11	Content of thesis(chapters)
Week 12	Content of thesis(chapters)
Week 13	Exam2
Week 14	Visiting of library
Week 15	**seminar**
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts		No
Recommended Texts		No
Websites		

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
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	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
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	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	**Green Chemistry**			**Module Delivery**	
Module Type	**E**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ENV36036				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	3		**Semester of Delivery**	6	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Dr. Alaa Badr Mohammed		**e-mail**	alaaalqaycy7@gmail.com	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	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	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	9. Learn about the green chemistry 10. Learn about the principles of green chemistry 11. Learn the types of chemical reactions 12. Identify the types of green catalysis 13. Learn about the green solvents 14. Learn about biological interaction with environmental chemicals 15. Learn about protecting water, food, and air
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	11. To know the concepts of green chemistry. 12. To learn about the principles of green chemistry. 13. To understand how environmental factors, affect a living organism 14. To recognize the chemical reactions. 15. To distinguish between organic chemistry and biochemical. 16. Doing practical experiments 17. Doing the lecture
Indicative Contents المحتويات الإرشادية	**29. Introduction to Green Chemistry** Origin of Green Chemistry What is Green Chemistry? Why green chemistry is called sustainable chemistry?

	Need for green chemistry Goals of Green Chemistry **30. Metrics of Green Chemistry** Concept of Atom Economy or Atom Efficiency Atom Utilization Atom Economy Calculation of Atom Economy Environmental Factor or E-factor Environmental Quotient (EQ) or Q-value Life Cycle Assessment or Life Cycle Analysis (LCA) **31. Principles of Green Chemistry** Pollution Prevention Atom Economy or Atom efficiency Use of less hazardous and toxic chemicals Safer Products by design Innocuous Solvents and Auxiliaries Design for energy efficiency Preferred use of renewable raw materials or feedstocks Reduce derivatives or minimization of steps Use of Catalytic Reagents Design products for degradation or life time of a chemical product Real-time analysis for pollution prevention Inherently safer processes for accident prevention or use of safer substances **32. Chemical Reactions** Describing What Happens with Chemical Equations Balancing Chemical Equations Yield and Atom Economy in Chemical Reactions Catalysts That Make Reactions Go Kinds of Chemical Reactions Oxidation-Reduction Reactions and Green Chemistry Quantitative Information from Chemical Reactions

	Stoichiometry by the Mole Ratio Method Limiting Reactant and Percent Yield Titrations: Measuring Moles by Volumes of Solution Industrial Chemical Reactions: The Solvay Process 33. **Green Solvents in Organic Synthesis** Green Solvents Supercritical fluids (SCFs) Super Critical Water (SCW) Supercritical Carbon Dioxide (SC-CO2) Discussion on some commercial applications of SC-CO2 Reaction in Supercritical Solvents Reaction in Supercritical Water (SCW) Water as Solvent in Organic Synthesis 34. **Solventless Reactions / Solid State Synthesis** Grinding with mortar and pestle method Planetary ball milling method High speed vibration milling (HSVM) in a mixer mill Solid state reaction at room temperature Microwave assisted solid state reactions using solid support **35. Catalysis and Green Chemistry** Catalyst and Catalysis Catalysis in Green chemistry Reactions using biocatalyst Reactions using Phase Transfer Catalyst **36. Green Synthesis of Some Organic Compounds** Synthesis of Adipic Synthesis of catechol Synthesis of Disodium Iminodiacetate (DSIDA) Synthesis of Citral Synthesis of BHT (Butylatedhydroxy toluene) Synthesis of Methyl Methacrylate (MMA)

	Synthesis of Urethane Synthesis of paracetamol (p-acetamido phenol) **37. Energy Relationships** Energy Radiant Energy from the Sun Storage and Release of Energy by Chemicals Energy Sources Conversions Between Forms of Energy Green Engineering and Energy Conversion Efficiency Conversion of Chemical Energy Renewable Energy Sources Nuclear Energy: Will it Rise Again? **38. The Biosphere** Green Chemistry and the Biosphere Biology and the Biosphere Cells: Basic Units of Life Metabolism and Control in Organisms Reproduction and Inherited Traits Stability and Equilibrium of the Biosphere DNA and the Human Genome Genetic Engineering Biological Interaction with Environmental Chemicals Biodegradation The Anthrosphere in Support of the Biosphere **39. The Geosphere, Soil, and Food Production** The Solid Earth Environmental Hazards of the Geosphere Water in and on the Geosphere Anthrospheric Influences on the Geosphere The Geosphere as a Waste Repository Have You Thanked a Clod Today?

	Production of Food and Fiber on Soil — Agriculture Plant Nutrients and Fertilizers Pesticides and Agricultural Production Agricultural Applications of Genetically Modified Organisms **40. Feedstocks** Sources of Feedstocks Utilization of Feedstocks Biological Feedstocks Fermentation and Plant Sources of Chemicals Glucose as Feedstock Cellulose Feedstocks from Cellulose Wastes Direct Biosynthesis of Polymers Bioconversion Processes for Synthetic Chemicals **41. Organic Chemistry and Biochemicals** Rings and Chains of Carbon Atoms Compounds of Carbon and Hydrogen: Hydrocarbons Lines Showing Organic Structural Formulas Functional Groups Giant Molecules from Small Organic Molecules Life Chemicals Carbohydrates Proteins Lipids: Fats, Oils, and Hormones Nucleic Acids 42. **Chemistry in Defense of Human Welfare** Vulnerability to Terrorist Attack Protecting the Anthrosphere Substances That Explode, Burn, or React Violently Toxic Substances and Toxicology Toxic Chemical Attack

	Protecting Water, Food, and Air Detecting Hazards Green Chemistry to Combat Terrorism Green Chemistry for Sustainable Prosperity and a Safer World

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	17. Method of lecturing 18. Student Center 19. Team Project 20. Work Shop 21. Scientific trips to monitor environmental pollution 22. Learning Technologies on Campus 23. Experiential Learning 24. Application Learning

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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 #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 الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Green Chemistry
Week 2	Metrics of Green Chemistry
Week 3	Principles of Green Chemistry
Week 4	Chemical Reactions
Week 5	Green Solvents in Organic Synthesis
Week 6	Solventless Reactions / Solid State Synthesis
Week 7	Mid-term Exam
Week 8	Catalysis and Green Chemistry
Week 9	Green Synthesis of Some Organic Compounds
Week 10	Energy Relationships
Week 11	The Biosphere
Week 12	The Geosphere, Soil, and Food Production
Week 13	Feedstocks
Week 14	Organic Chemistry and Biochemicals
Week 15	Chemistry in Defense of Human Welfare
Week 16	**Preparatory week before the final Exam**

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

Required Texts	Green chemistry and the ten commandments of sustainability, stanley e. Manahan, chemchar research, inc. 2005	No
Recommended Texts	A Textbook of Green Chemistry, Sankar P. Dey and Nayim Sepay, TECHNO WORLD, 2021	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 مادة تشريعات وقوانين بيئية

Module Information معلومات المادة الدراسية			
Module Title	**مادة تشريعات وقوانين بيئية**		**Module Delivery**
Module Type	**C**		☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Code	ENV47040		
ECTS Credits	**3**		
SWL (hr/sem)	**75**		
Module Level	4	**Semester of Delivery**	7
Administering Department	**Environmental Science**	**College**	College of Energy and Environmental Science
Module Leader	Muna Taha	**e-mail**	munataha65@kus.edu.iq
Module Leader's Acad. Title	Assistant lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor	/	**e-mail**	/
Peer Reviewer Name	none	**e-mail**	/
Scientific Committee Approval Date	21/6/2023	**Version Number**	1.0

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

Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1- تحديد الجهود الدولية والعربية لتحديد مفهوم التلوث البيئي . 2- دراسة انواع الملوثات البيئية 3- توضيح الاهتمام الدولي والعربي بقضايا التلوث البيئي. 4- تشريع القوانين لحماية البيئة من التلوث دوليا. 5- تشريع القوانين لحماية البيئة العراقية من التلوث.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- معرفة القوانين والتشريعات 2- التعرف على أسباب ومسببات عقد الإتفاقيات 3- الإطلاع على أهم البروتوكولات التي تنص عليها الإتفاقيات 4- التعرف على أهم الطرق والوسائل لحماية البيئة 5- التعرف على العقوبات الجزائية والمالية لمرتكبي المخالفات
Indicative Contents المحتويات الإرشادية	1- مفهوم البيئة التلوث تعريف البيئة في الاصطلاح العلمي هي : ذلك الحيز الذي يمارس فيه البشر مختلف أنشطة حياتهم، وتشمل ضمن هذا الإطار كافة الكائنات الحية من حيوان ، ونبات ،والتي يتعايش معها الإنسان ، فالبيئة تشمل كل ما يحيط بالإنسان من ماء وهواء وأرض فهو يؤثر فيها ويتأثر بها. 2- أبعاد مشكلة التلوث لقد بات مستقبل الحياة على كوكب الأر ض مهدداً بأخطار جسيمة بسبب سوء ت صرف الإنسان واعتداءاته العمدية و غير العمدية المتزايدة على البيئة المحيطة والتي تشبع له حاجاته ، بل وهي قوام حياته ، وبدأت البيئة بالفعل – رغم نظامها البديع وإمكانياتها الكبيرة – تنوء بما أصابها من جراء ذلك من تلوث وتعجز عن معالجته تلقائياً بما يحقق خير الناس . 3- أنواع التلوث ذات الاهتمام الدولي: أ-النوع الأول : هو الذي يطلق عليه اسم "التلوث عبر الحدود" وهذا النوع يكون مصدر التلوث في إحدى الدول التي ينتج عنه أضرار تعبر حدود دولة المصدر إلى إقليم دولة أخرى.

ب-النوع الثاني : من التلوث الذي يثير الاهتمام الدولي فهو الذي يضر بالمناطق المعروفة باسم "المال العام".

ج-النوع الثالث : من التلوث الذي يلقي عناية واهتمام دوليين هو ما يطلق عليه التلوث الضار "بالتراث الثقافي والطبي العالمي"

د-النوع الرابع : هو عبارة عن تلوث محلي أو داخلي: وهو تلوث يكون مصدره وأثاره الضارة داخل نفس الإقليم.

4- وسائل الحماية من التلوث تستلزم حماية البيئة في أي مكان القيام بعدة مهام أساسية لا غنى عنها جميعا لتحقيق الهدف المنشود.

5--تعريف المنظمات الدولية:

يمكن تعريف المنظمة الدولية: بأنها شخص معنوي من أشخاص القانون الدولي العام ،ينشأ من اتحاد ارادات مجموعة من الدول لرعاية مصالح مشتركة دائمة بينها، ويتمتع بإرادة ذاتية في المجتمع الدولي وفي مواجهة الدول الأعضاء .

6-العناصر الأربعة الرئيسية لنشأة المنظمة الدولية ،والتي يجب توافرها لتكون متمتعة بالشخصية القانونية الدولية ،وهي كما يلي :

.أ- الديمومة أو الاستمرار

.ب- الإرادة الذاتية أو الشخصية المستقلة

. ج- الصفة الدولية

د- الصفة الاتفاقية.

7- تصنيف المنظمات قد اختلفت بحسب زاوية النظر إلى المنظمة وسوف نقصر عرضنا على تصنيفات ثلاث فحسب، الأول منها يقسمها من حيث نطاق العضوية ،والثاني ينظر إليها من حيث نوع السلطات ،ويقسمها الأخير وفقا للطبيعة الموضوعية للمنظمة.

8-القانون البيئي أو قانون الموارد البيئية والطبيعية: هو مصطلح جماعي يصف مجموعة المعاهدات والنظم الأساسية والأنظمة والقوانين العامة والعرفية التي تعالج آثار النشاط البشري على البيئة الطبيعية

9-المواضيع التي يهتم بها القانون البيئي في منع تلوث المياه البحرية وتوفير الحماية والاستخدام المعقول للثروات والأحياء البحرية وحماية الغلاف الجوي من التلوث وحماية النباتات والغابات والحيوانات البرية وحماية المخلوقات الفريدة

10- قانون مكافحة التلوث

جودة الهواءتحكم قوانين جودة الهواء بمستويات انبعاثات تلوث الهواء الناجم عن دخان المصانع

تحكم قوانين جودة الهواء انبعاث ملوثات الهواء في الغلاف الجوي، إذ توجد مجموعة فرعية متخصصة من قوانين جودة الهواء التي تضبط جودة الهواء الداخلي للمباني. غالبًا ما تُصمم قوانين ضبط جودة الهواء خصيصًا لحماية صحة الإنسان عن طريق الحد من تراكيز الملوثات المحمولة في الجو أو القضاء عليها.

11.جودة المياه

تخضع أنابيب تصريف مياه الأمطار وما يشابها إلى قوانين جودة المياه.

12 - إدارة المخلفات

تخضع مكبات النفايات قي العديد من البلدان إلى قوانين إدارة المخلفات

13.- تنظيف الملوثات

تحكم قوانين التنظيف البيئي عمليات إزالة الملوثات كإدارة وتدارك البقع والتسربات النفطية تنظم قوانين التنظيف البيئي إزالة التلوث أو الملوثات من الأوساط البيئية مثل التربة أو المواد المترسبة أو المياه السطحية أو المياه الجوفية. وعلى عكس قوانين مكافحة التلوث، فإن قوانين التنظيف مُصممة للاستجابة بعد حدوث التلوث البيئي، وبالتالي يجب على هذه القوانين في كثير من الأحيان أن تحدد ليس فقط إجراءات الاستجابة الضرورية، ولكن الأطراف التي قد تكون مسؤولة عن التصرف (أو دفع ثمن) مثل هذه الأفعال.

14- استدامة الموارد

تقييم الأثر البيئي (EIA)، وهو تقييم العواقب البيئية (الإيجابية والسلبية) لخطة أو سياسة أو برنامج أو مشروع فعلي، قبل اتخاذ قرار بالمضي قُدُمًا في الإجراء المُقترح.

15- التطور التاريخي للاهتمام بالقانون الدولي المؤتمرات والاتفاقيات الدولية

•لقد تم عقد الكثير من المؤتمرات الدولية المعنية بحماية البيئة

1مؤتمر استكهولم في السويد عام 1972

2مؤتمر هلنسكي للأمن والتعاون الاوربي عام 1975

3- مؤتمر نيروبي عام 1982

4 - مؤتمر ريودي جانيرو عام 199

16- حماية البيئة في العراق

أن الدستور العراقي الصادر عام 2005 يعتبر من الدساتير العربية النادرة التي اهتمت بالحق في البيئة وضرورة المحافظة عليه •. لقد نصت المادة) 33 (الفقرة الاولى منه) لكل فرد حق العيش في ظروف بيئية سليمة.) •اما الفقرة الثانية من نفس المادة فنصت على ان) تكفل الدولة حماية البيئة والتنوع الأحيائي والحفاظ عليها .

17 - التشريعات البيئية في العراق

1- قانون التشجير رقم 43 لسنة 1943
2- قانون تنظيم ذبح الحيوانات رقم 22لسنة 1948
3-قانون المراعي الطبيعية رقم 2لسنة 1983

4-قانون الغابات والمشاجر رقم) 30)لسنة 2009

5-قانون حماية الحيوانات والطيور البرية رقم 21 لسنة 1979

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Lecture Discussion Practical Experience Clarification and Ask Questions reflect on what you have learned Research and reports

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	45	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	27	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	0
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	5% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	5% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	15% (10)	Continuous	All
	Report	1	5% (10)	13	LO #5, #8 and #10

Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	60% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	مفهوم البيئة والتلوث
Week 2	أبعاد مشكلة التلوث
Week 3	أنواع التلوث ذات الاهتمام الدولي
Week 4	الإجراءات الوقائية والحلول المقترحة لمعالجة التلوث
Week 5	وسائل الحماية من التلوث
Week 6	. Mid- tem Exam
Week 7	دور المنظمات الدولية في حماية البيئة من التلوث
Week 8	أنواع المنظمات الدولية
Week 9	دور المنظمات الدولية في حماية البيئة من التلوث .
Week 10	الاهتمام العربي بتلوث البيئة
Week 11	قانون الموارد البيئية والطبيعية
Week 12	قانون مكافحة التلوث
Week 13	التطور التاريخي للاهتمام بالقانون الدولي للبيئة (المؤتمرات والاتفاقيات ا لدولية)
Week 14	حماية البيئة في العراق
Week 15	Review and Final Assessment
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	التلوث البيئي في قوانين حماية البيئة العربية/ د. علي الفيلي 2013	No
Recommended Texts	حماية البيئة والتراث الثقافي في القانون الدولي دور المنظمات الدولية في حماية البيئة/ 2008 عبد الناصر زياد، القانون البيئي : النظرية العامة للقانون البيئي مع شرح التشريعات البيئية، دار الثقافة والنشر والتوزيع،2014	No
Websites	.	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
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	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 Impact Assessment**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**ENV47038**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level		4	**Semester of Delivery**		7
Administering Department		Environmental Science	**College**	College of Energy and Environmental Sciences	
Module Leader	Maad A. Hussein		**e-mail**	maad@kus.edu.iq	
Module Leader's Acad. Title		Lecture	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
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	1- Application of academic programs for environmental sciences. 2- Knowledge of the principles of environmental impact assessment (EIA(. 3- Provide a working knowledge of current environmental, social and economic impacts and methods relating to EIA. 4- Consider in detail how these impacts can be quantified and analyzed. 5- Graduating specialists in the field of environmental sciences with the highest efficiency to deal with all environmental issues.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Gain an understanding of the role of EIA in decision making 2. Gain an overview of the legislative framework for EIA, with a focus towards its application in Iraq. 3. Have knowledge of the EIA process and stages, and how it is applied to specific topic areas, such as landscape and visual impact assessment, ecology, soils and climate change, including its application. 4. Be skilled in review and appraisal of the EIA process and its outputs. 5. Be able to understand the relationship between EIA and development decisions and understand the ways in which EIA can contribute to sustainable development and project design, and its limitations in this regard.
Indicative Contents المحتويات الإرشادية	The module requires the completion of the following parts: Week 1 - Introduction to the course and to Environmental Impact Assessment (EIA). Brief explanation of all assignments. Carrying out an EIA – key stages. Key principles of Strategic Environmental Assessment (SEA) and how it relates to EIA, Week 2 - Key implementation problems of the EIA process. The quality of Environmental Impact Statements (EIS). Week 3 - Data for EIA. Carrying out an EIA – key methods. Use of GIS for EIA. Uncertainty and subjectivity issues. Consultation and public participation in EIA. The importance of scale issues in EIA and the case for scale guidelines. Week 4 - Mitigation, enhancement issues and the use of EIA as a design tool. Key principles of ecological impact assessment. What are Environmental Management Plans (EMPs), how EMPs link to EIA and the role of the Environmental Clerk of Works. Adaptive management. Week 5 - Consultation and public participation in EIA. Cumulative effects assessment. Follow-up. The value of EIA. Scenario simulation.

	Week 6 - Understanding the relationship between EIAs and development decisions – the case of a controversial development. Week 7 - Social Impact Assessment – key principles and links to EIA. Week 8 –Wind Farm and onshore grid connection (buried cable and substation), Environment Manager, Mainstream Renewable Power. Week 9 - EIA of onshore wind farm development. Week 10 - Discussion about the material covered in the class, and on enhancement issues and the use of EIA as a design tool. What are Environmental Management Plans (EMPs), how EMPs link to EIA and the role of the Environmental Clerk of Works. **N.B. The class runs over 10 weeks.**

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The course provides an overview of the legislative framework of EIA and explains the EIA process, providing examples of techniques used in impact assessment relating to topics including soils, ecology and landscape. Much of the teaching input to the course is provided by external practitioners specializing in certain aspects of the EIA process, including developers, representatives from local government and other key stakeholders, as well as EIA consultants

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	1	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	0	0% (0)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	20% (20)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to the course and to Environmental Impact Assessment (EIA).
Week 2	Key implementation problems of the EIA process.
Week 3	Data for EIA. Carrying out an EIA – key methods.
Week 4	Mitigation, enhancement issues and the use of EIA as a design tool.
Week 5	Consultation and public participation in EIA.
Week 6	Understanding the relationship between EIAs and development decisions.
Week 7	Social Impact Assessment.

Week 8	Wind Farm and onshore grid connection.
Week 9	EIA of onshore wind farm development.
Week 10	Mitigation, monitoring and management of environmental impacts
Week 11	Approaches to EIA presentation and report writing
Week 12	Strategic Environmental Assessment
Week 13	Discussion about the material covered in the class.
Week 14	Exams
Week 15	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Glasson, J, Therivel, R (2019). Introduction to Environmental Impact Assessment. Routledge London.	No
Recommended Texts	Morris, P & Therivel, R (2018). Methods of Environmental Impact Assessment. Routledge London.	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	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded

(0 – 49)	**F –** Fail	راسب	(0-44)	Considerable amount of work required

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Job Ethics**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**KUS47042**				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level	4		**Semester of Delivery**	7	
Administering Department	Environmental Science		**College**	College of energy and environmental science	
Module Leader			**e-mail**		
Module Leader's Acad. Title	Lecture		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Application of academic programs Al-karkh University of sciences. 2. To understand the principles of the work ethics. 3. This course deals with the basic concept of job ethics. 4. Providing students with sound thinking methods (deductive thinking, scientific thinking, critical thinking, creative thinking, ...) 5. Graduating specialists in the field of different sciences with the highest efficiency to deal with job problems and decision making.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	6. Understand and define the concepts of integrity and ethics. 7. Understand how to resolve ethical dilemmas. 8. Describe three major theoretical approaches in integrity and ethics. 9. Identify ethical dilemmas and apply different theoretical approaches. 10. Understand the concept of personal integrity in the context of this Module. 11. Understand how to apply social work ethics to professional decision-making.
Indicative Contents المحتويات الإرشادية	Module 1: Introduction and Conceptual Framework Throughout the Module, students will be introduced to concepts and thrown in at the deep end by being asked to make decisions on what they would regard as the most ethical solutions to dilemmas. Students will be guided through three major ethical theories and challenged to agree or disagree with them. Students should not be afraid to take a stance, as this will enhance their learning and enjoyment of the Module. Module 2: Ethics and Universal Values

	This Module explores the existence of universal human values, which are those things or behaviours that we believe should be privileged and promoted in the lives of all human beings. Module 3: Ethics and Society This Module explores the importance of ethics to society and the relationship between these two concepts. Module 4: Ethical Leadership We live in a world in which individuals, organizations, countries and societies are increasingly connected. Therefore, the impact of leadership - both good and bad - reverberates throughout entire political and economic systems. Module 5: Ethics, Diversity and Pluralism This Module explores the concepts of diversity, tolerance and pluralism. It examines ways in which the acceptance of diversity may be challenging but can be understood and accomplished by drawing on ideas and examples of ethical behaviour. Module 6: Challenges to Ethical Living The Module seeks to help students understand some of the psychological mechanisms that can lead one towards unethical behaviour in certain circumstances. Module 7: Strategies for Ethical Action This Module introduces practical strategies for taking ethical action in the workplace (in the public or private sectors), university, community and in life more broadly. Module 8: Behavioural Ethics Evidence from behavioural science research has shown that people are less consistent and less rational in their decisions than they would like to admit to themselves. Module 9: Gender Dimensions of Ethics This Module introduces the gender dimensions of ethics.

	Module 10: Media Integrity and Ethics This Module discusses the relationship between the concepts of ethics and media. It aims to facilitate introspective reflection on the ways in which all of us, as individuals, play a part in the creation and dissemination of media. Module 11: Business Integrity and Ethics This Module introduces students to the idea that integrity and ethics are key to sustainable business success. It examines the reasons why individuals in corporate entities should act with integrity and do business ethically. Module 12: Integrity, Ethics and Law Why is it that some actions are legal but not ethical, or ethical but not legal? This Module is designed to be used by lecturers in a variety of disciplines who wish to introduce their students to the ideas of integrity, ethics and law, including what these concepts stand for and how they are different. Module 13: Public Integrity and Ethics This Module examines methods and approaches to strengthening integrity in the public sector. Module 14: Professional Ethics Should a journalist publish very private information about someone to inform the public about an issue? Should a lawyer withhold confidential client information that would save someone's life? This Module is designed to introduce students to the nature, practices and importance of professional ethics.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Clearly distinguish between personal, theoretical and professional ethic.

	2. Think critically about ethical issues, which are encountered first hand within a career, and apply personal, theoretical, and professional ethics to vexing moral decisions within specific professions. 3. Grasp the challenges posed by potential conflicts between role morality and personal morality, and consider ways of resolving those conflicts. 4. Understand the role of professional codes of ethics, the difference between aspirational and disciplinary codes of ethics, and how professional codes may apply in their career.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	30	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	42	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**200**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	0	0% (0)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	0	0% (0)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	20% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Module 1: Introduction and Conceptual Framework
Week 2	Module 2: Ethics and Universal Values
Week 3	Module 3: Ethics and Society
Week 4	Module 4: Ethical Leadership
Week 5	Module 5: Ethics, Diversity and Pluralism
Week 6	Module 6: Challenges to Ethical Living
Week 7	Module 7: Strategies for Ethical Action
Week 8	Module 8: Behavioural Ethics
Week 9	Module 9: Gender Dimensions of Ethics
Week 10	Module 10: Media Integrity and Ethics
Week 11	Module 11: Business Integrity and Ethics
Week 12	Module 12: Integrity, Ethics and Law
Week 13	Module 13: Public Integrity and Ethics
Week 14	Module 14: Professional Ethics
Week 15	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Business Ethics Activity Book by Dr. Marlene Caroselli Released September 2003 Publisher(s): AMACOM ISBN: 9780814413203	No
Recommended Texts	The Work Ethic: Working Values and Values That Work	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	**Waste Management**			**Module Delivery**	
Module Type	**Core**			☒ ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**ENV47039**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		4	**Semester of Delivery**		7
Administering Department		Environmental Science	**College**	College of Energy and Environmental Sciences	
Module Leader	Maad A. Hussein		**e-mail**	maad@kus.edu.iq	
Module Leader's Acad. Title		Lecture	**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	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1- Application of academic programs for environmental sciences. 2- Knowledge of the principles of solid and hazardous waste management. 3- Knowing and studying the concepts of waste management, its types and methods of separating it. 4- Knowing and studying the concepts of optimal waste disposal and recycling methods. 5- Studying the design and management of sanitary landfills and their optimal use. 6- Graduating specialists in the field of environmental sciences with the highest efficiency to deal with all solid and hazardous materials and waste.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	12. Provide the student with the necessary knowledge about the science of waste management and its applications in the field of the environment. 13. Enabling students to understand the basics of the subject and its scientific requirements. 14. Equipping students with sound thinking methods (deductive thinking, scientific thinking, critical thinking, creative thinking, ...). 15. Preparing specialists in the field of the environment who are distinguished by a high level of knowledge and technological innovation, in line with the strict standards adopted globally in quality assurance and academic accreditation of the corresponding scientific programs.
Indicative Contents المحتويات الإرشادية	1. INTRODUCTION 2. SOLID WASTE MANAGEMENT SYSTEM 3. TYPES OF SOLID WASTE 4. PROSPERITIES OF SOLID WASTE 5. Generation Rates 6. Materials-Balance Analysis 7. Factors that affect the generation rates 8. On-Site Storage 9. ON-SITE PROCESSING OF SOLID WASTE 10. Waste Management 3R Concept 11. Hazardous Waste Management

	11. Disposal and Design of landfills

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	5. Skills of analyzing, separating and isolating waste. 6. Knowledge of hazardous waste and methods of evaluating and dealing with it. 7. Knowledge of the waste management hierarchy and the priorities followed in optimal waste management. 8. Enabling students to play a prominent role as specialists in the field of the environment and finding ideal solutions to reduce the impact.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	75	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

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

	Projects / Lab.	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 الاسبوعي النظري	
	Material Covered
Week 1	INTRODUCTION
Week 2	SOLID WASTE MANAGEMENT SYSTEM
Week 3	TYPES OF SOLID WASTE
Week 4	PROSPERITIES OF SOLID WASTE
Week 5	Exams
Week 6	Generation Rates
Week 7	Materials-Balance Analysis
Week 8	Factors that affect the generation rates
Week 9	On Site Storage
Week 10	ON-SITE PROCESSING OF SOLID WASTE
Week 11	Waste Management 3R Concept
Week 12	Hazardous Waste Management
Week 13	Hazardous Waste Management
Week 14	Disposal and Design of landfills

Week 15	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	INTEGRATED SOLID WASTE MANAGEMENT	No
Recommended Texts	Hazardous WASTE MANAGEMENT, 2nd edition by Micheal D. LaGrea	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	**Environmental Engineering**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**ENV48044**		
ECTS Credits	**7**		
SWL (hr/sem)	**175**		
Module Level	4	**Semester of Delivery**	8
Administering Department	Environmental Science	**College**	College of Energy and Environmental Sciences
Module Leader	Maad A. Hussein	**e-mail**	maad@kus.edu.iq
Module Leader's Acad. Title	Lecture	**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	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1- Application of academic programs for environmental sciences. 2- Knowledge of the principles of environmental engineering. 3- Knowing and studying the concepts of engineering, and the method used for waste treatment. 4- Knowing and studying the environmental pollution in soil, air, and water. 5- Graduating specialists in the field of environmental sciences with the highest efficiency to deal with all environmental issues.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	16. Provide the student with the necessary knowledge about the science environment engineering. 17. Enabling students to understand the basics of the subject and its scientific requirements. 18. Equipping students with sound thinking methods (deductive thinking, scientific thinking, critical thinking, creative thinking, ...). 19. Preparing specialists in the field of the environment who are distinguished by a high level of knowledge and technological innovation, in line with the strict standards adopted globally in quality assurance and academic accreditation of the corresponding scientific programs. 20. Students are able to distinguish between ecosystem and environment.
Indicative Contents المحتويات الإرشادية	1. Introduction 2. Risk Assessment 3. Water Resources Engineering 4. Water Chemistry 5. Water Treatment 6. Water Pollution 7. Wastewater Treatment 8. Air Pollution 9. Noise Pollution 10. Solid Waste Management 11. Hazardous Waste Management 12. Sustainability and Green Engineering 13. Ionizing Radiation

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Describe and apply the fundamentals of air and water pollution to solve basic environmental engineering problems. 2. Describe environmental challenges and identify solutions. 3. Evaluate design solution alternatives. 4. Analyze and environmental problem and define the problem characteristics. 5. Describe the principles and methods of environmental impact assessment.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	90	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	81	**Unstructured SWL (h/w)** 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**	1	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	1	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	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	4hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	1. Introduction
Week 2	2. Risk Assessment
Week 3	3. Water Resources Engineering
Week 4	4. Water Chemistry
Week 5	5. Water Treatment
Week 6	6. Water Pollution
Week 7	7. Wastewater Treatment
Week 8	8. Air Pollution
Week 9	9. Noise Pollution
Week 10	10. Solid Waste Management
Week 11	11. Hazardous Waste Management
Week 12	12. Sustainability and Green Engineering
Week 13	13. Ionizing Radiation
Week 14	Exams
Week 15	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	- Introduction to Environmental Engineering, 6th Edition ISBN10: 1260241092 | ISBN13: 9781260241099 By Mackenzie Davis and David Cornwell - Introduction to Environmental Engineering (The Mcgraw-hill Series in Civil and Environmental Engineering) 5th Edition	No
Recommended Texts	Handbook of Environmental Engineering Calculations 2nd Edition [C C. Lee]	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	**Planning and Environmental Management**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**ENV48045**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	4		**Semester of Delivery**	8	
Administering Department	Environmental Science		**College**	College of Energy and Environmental Sciences	
Module Leader	Maad A. Hussein		**e-mail**	maad@kus.edu.iq	
Module Leader's Acad. Title	Lecture		**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	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1- Application of academic programs for environmental sciences. 2- The importance of environmental planning and management in sustainable development and manufacturing. 3- Understand the policy, legal & ethical issues and critically evaluate the social, economic and technical factors, which influence environmental management to operate and plan sustainable projects. 4- Create environmental management analysis outputs of professional quality, both independently and within team environments. 5- Graduating specialists in the field of environmental sciences with the highest efficiency to deal with all environmental issues.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	21. Identify the essential components and principles of environmental planning, management and sustainable development. 22. Identify and apply a cross-disciplinary and multifaceted approach to understanding sustainability. 23. Develop and apply critical thinking and analytical skills to evaluate the credibility of sustainability policy positions and scientific arguments. 24. Improve decision-making capabilities within the context of sustainability. 25. Consider the importance of the legal and regulatory framework in undertaking environmental planning and successfully implementing environmental management projects.
Indicative Contents المحتويات الإرشادية	1. Introduction to the basic concepts of Environmental Planning and Management. 2. Sustainable development and manufacturing. 3. Environmentally conscious manufacturing: recycling, inverse manufacturing, and design for the environment. 4. Environmental planning. 5. Understanding environmental problems. 6. Life Cycle Assessment: concepts, measuring environmental impacts, evaluation. 7. Air quality problems. 8. Climate change: threats and responses. 9. Deforestation: threats and responses.

	10. Water (in) security: threats and responses. 11. Desertification: threats and responses. 12. Wildlife and habitat management: concepts and conservation. 13. Waste and e-waste: threats and responses.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	This module is intended to introduce the principles and applications of environmental planning and management, as well as those of Life Cycle Assessment, to examples of environmental and habitat protection and sustainable development. Provide an understanding of the practical application of environmental management and its role in the strategic development and operation of organizations and activities; provide an understanding of environmental assessment tools to support the decision-making process and provide the skills and knowledge required to manage the project development process effectively, safely and in a sustainable 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	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	1	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	1	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	0	0% (0)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	20% (20)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to the basic concepts of Environmental Planning and Management.
Week 2	Sustainable development and manufacturing.
Week 3	Environmentally conscious manufacturing.
Week 4	Environmental planning.
Week 5	Understanding environmental problems.
Week 6	Life Cycle Assessment: concepts, measuring environmental impacts, evaluation.
Week 7	Air quality problems.
Week 8	Climate change: threats and responses.
Week 9	Deforestation: threats and responses.
Week 10	Water (in) security: threats and responses.
Week 11	Desertification: threats and responses.
Week 12	Wildlife and habitat management: concepts and conservation.

Week 13	Waste and e-waste: threats and responses.
Week 14	Exams
Week 15	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	- Ajith Sankar, R. N. (2015). Environmental Management. Oxford University Press. India. - Cunningham, W.P. and (Cunningham, M. A. (2011) Principles of Environmental Science. Inquiry and Applications. Sixth Edition. McGraw Hill Publishers. United States.	No
Recommended Texts		No
Websites		

Grading Scheme

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