قسم هندسة السدود والموارد المائية

وصف مواد منهاج القسم حسب مسار بولونيا للعام الدراسي 2023-2024

ملحق رقم 4

CATALOGE 4-MODULE DESCRIPTION UGI – UGII-UGIII-UGVI

اعدت من قبل لجنة مسار بولونيا في القسم – حزيران 2023

كلية الهندسة | جامعة الانبار

MODULE 1

Module Information معلومات المادة الدراسية			
Module Title	**Calculus I**	**Module Delivery**	
Module Type	**Basic Learning Activity**	☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**DWE1201**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		

Module Level	UGI	**Semester of Delivery**	One
Administering Department	DWE	**College**	ENG
Module Leader	Ahmed Dalaf Ahmed	**e-mail**	Ahmeddalaf44@uoanbar.edu.iq
Module Leader's Acad. Title	lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Applying arithmetic, algebraic, geometric, and logical reasoning to solve problems. 2. Evaluating of basic mathematical and/or logical information numerically, graphically, and symbolically. 3. Interrupting of the mathematical and/or logical models such as formulas, graphs, tables, and schematic, and draw inference from them. 4. Students will become proficient in techniques of differentiation. 5. Understanding of the concept of limit and rate of change and how to use it to solve real world problem. 6. Understanding the concept of continues functions and compute instantaneous rate of change. 7. Computing of derivatives of polynomial, logarithmic and trigonometric functions. 8. Determination of derivative of hyperbolic functions as well as inverse hyperbolic functions. 9. Solving related rate and optimization problems using techniques of differentiations.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Apply arithmetic, algebraic, geometric, and logical reasoning to solve problems. 2. Evaluate of basic mathematical and/or logical information numerically, graphically, and symbolically. 3. Understand of the concept of limit and rate of change and how to use it to solve real world problem. 4. Understand the concept of continues functions and compute instantaneous rate of change. 5. Compute of derivatives of polynomial, logarithmic, trigonometric, hyperbolic, and inverse hyperbolic functions in addition to be proficient in techniques of differentiation. 6. Solve related rate and optimization problems using techniques of differentiations.
Indicative Contents المحتويات الإرشادية	Chapter 1: Functions and models -Four ways to represent a function -Mathematical models: a catalogue of essential functions -New functions from old functions -Exponential functions -Inverse functions and logarithms. (10 hrs) Chapter 2: Limits - The tangent and velocity problems. -The limit of a function -Calculating limits using the limit laws. -Continuity, limits at infinity. -horizontal asymptote. -vertical asymptotes -Infinite limits, -derivatives and rates of change (15 hrs)

	Chapter 3: Differentiation rules -Differentiation of Polynomials. -The Product and Quotient Rules. -Derivatives of Trigonometric Functions. -The Chain Rule, -Implicit Differentiation. -Hyperbolic functions. (15 hrs) Chapter 4: Applications of differentiation -Maximum and minimum values. -The mean value theorem. -How derivatives affect the shape of a graph. - Summary of curve sketching. - Optimization problems. -Antiderivatives. -Indeterminate forms and l'hospital's rule. (20 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 أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	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.				
	Report				
Summative assessment	Midterm Exam	2hr	20% (20)	8 and 12	LO #1 - #7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Four ways to represent a function, Mathematical models: a catalogue of essential functions
Week 2	New functions from old functions, Exponential functions
Week 3	Inverse functions and logarithms, The tangent and velocity problems.
Week 4	The limit of a function, calculating limits using the limit laws.
Week 5	Continuity, limits at infinity, horizontal asymptote.
Week 6	Horizontal asymptote, Vertical asymptotes, Infinite limits, derivatives, and rates of change
Week 7	Infinite limits, derivatives, and rates of change
Week 8	**Mid-term Exam1**
Week 9	Differentiation of Polynomials, The Product and Quotient Rules.
Week 10	Derivatives of Trigonometric Functions.
Week 11	The Chain Rule, Implicit Differentiation, Hyperbolic functions.
Week 12	**Mid-term Exam2** + Maximum and minimum values. The mean value theorem.
Week 13	How derivatives affect the shape of a graph, Summary of curve sketching.
Week 14	Optimization problems, Antiderivatives.
Week 15	Indeterminate forms and hospital's rule.
Week 16	**Preparing to final exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Calculus by Thomas & Finney, Advanced Engineering Mathematics, Kreyszig .	No
Recommended Texts	Advanced Engineering Mathematics, Wyle , Further Engineering Mathematics, Stroud. Engineering Mathematics, Kandasamy. Advanced Engineering Mathematics, Gustafson, Elementary Differential Equations, Boyce.	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 2

Module Information معلومات المادة الدراسية					
Module Title	**Physics**			**Module Delivery**	
Module Type	**Basic Learning Activity**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWE1203**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGI	**Semester of Delivery**		One
Administering Department		DWE	**College**		ENG
Module Leader	Ghassan Subhi Jameel		**e-mail**		Ghassan.alkibaisi@uoanbar.edu.iq
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Learn the basics of physics problems. 2. Study the motion of particles in one and two dimensions. 3. Study vectors 4. Study fluid mechanics. 5. Study temperature and thermal equilibrium. 6. Study newton laws. 7. Study work done and energy.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the basic Physics and measurement; Kinematics of motion of a single particle in one and two dimensions; Kinematics of projectile and circular motion. 2. Understand the Newton's Laws; Free body diagrams; various types of mechanical forces; Application on the use of Newton's Laws 3. Understand the Phases of matter; Pressure and density, Equations of Fluid static; Equations of fluid dynamics: Continuity and Bernoulli's equations. 4. Understand the Work done and energy. 5. Understand the concept of temperature and thermal equilibrium, Measuring temperature, Thermal expansion.
Indicative Contents المحتويات الإرشادية	**1- Physics and Measurement** 1.1- Standards of Length, Mass, and Time 1.2- Density of Atomic Mass 1.3- Dimensional Analysis 1.4- Conversion of Units 1.5- Estimate and Order of Magnitude Calculations 1.6- Significant Figures **2- Motion in One Direction** 2.1- Particle Model 2.2- Position, Velocity and Speed 2.3- Instantaneous Velocity and Speed 2.4- Acceleration 2.5- One-Dimensional Motion with Constant Acceleration 2.6- Freely Falling Object **3- Vectors** 3.1- Coordinate System 3.2- Vector and Scalar Quantity 3.3- Some Properties of Vectors 3.4- Adding Vectors 3.5- Subtracting Vectors 3.6- Component of Vectors and Unit Vectors **4- Motion in Two Dimension** 4.1- The Position, Velocity and Acceleration Vectors 4.2- Two-Dimensional Motion with Constant Acceleration 4.3- Projectile Motion 4.4- Horizontal Range and Maximum Height of a Projectile

	4.5- Uniform Circular Motion 4.6- Tangent and Radial Acceleration 4.7- Relative Velocity and Relative Acceleration **5- The Laws of Motion** 5.1- Newton's First Law and Inertial Frames 5.2- Mass 5.3- Newton's Second Law 5.4- The Gravitational Force and weight 5.5- Newton's Third Law 5.6- Forces and Friction 5.7- Experimental Observations **6- Circular Motion and Other Applications of Newton's Law** 6.1- Non uniform Circular Motion 6.2- Resistance Force Proportional to Object Speed 6.3- Air Drag at High Speed **7- Temperature** 7.1- Zeroth Law of Thermodynamics 7.2- Thermometers and The Celsius Temperature Scale 7.3- The Constant Volume Gas Thermometer and The Absolute Temperature Scale 7.4- Thermal Expansion and of Solids and Liquids 7.5- The Unusual Behavior of Water 7.6- Macroscopic Description of an Ideal Gas **8- Energy and Energy Transfer** 8.1- Work Done by Constant Force 8.2- The Scalar Product of Two Vectors 8.3- Work Done by Varying Force 8.4- Work DONE by a Spring 8.5- Kinetic Energy and the Work-Kinetic Energy Theorem 8.6- Conservations of Energy 8.7- Situations Involving Kinetic Energy 8.8- Power 8.9- Energy and the Automobile **Physics 1 Lab** Mechanical Physics Experiments 1- Determination the Density of Solid Materials 2- Verification of Hooks Law 3- Determination the Value of Gravity Acceleration (Simple Pendulum) 4- Determination the Coefficient of Viscosity 5- Measurement of Liquid Density 6- Verification of Newton's Second Law 7- Verification of continuity Equation 8- Determination the Mechanical Equivalent of Heat 9- Determination the Specific Heat Capacity of a Solid

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in the delivery of the Physics course is to encourage students to understand and analyze kinematic problems and use basic mathematical equations in solving problems as well as participate in exercises, while improving and expanding their critical thinking skills at the same time. This will be achieved through classes and interactive tutorials and by looking at the types of simple experiments that involve investigating theories of kinetic physics.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	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
	Assignments	2	10% (10)	3 and 12	LO #3, #5
	Projects / Lab.		10%(10)	3-13	
	Report				
Summative assessment	**Midterm Exam**	2hr	20% (20)	8 and 12	LO #1 - #4
	Final Exam	3hr	50% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Standards of Length, Mass and Time
Week 2	Density of Atomic Mass, Dimensional Analysis, Conversion of Units
Week 3	Estimate and Order of Magnitude Calculations, Significant Figures
Week 4	Particle Model, Position, Velocity and Speed, Instantaneous Velocity and Speed
Week 5	Acceleration, One-Dimensional Motion with Constant Acceleration, Freely Falling Object
Week 6	Vector and Scalar Quantity, Some Properties of Vectors, Component of Vectors and Unit Vectors
Week 7	Two-Dimensional Motion with Constant Acceleration, Projectile Motion
Week 8	**Mid-term Exam1**
Week 9	Uniform Circular Motion, Tangent and Radial Acceleration, Relative Velocity and Relative Acceleration
Week 10	Newton's First Law and Inertial Frames, Newton's Second Law
Week 11	Newton's Third Law, Forces and Friction
Week 12	**Mid-term Exam2**
Week 13	Non uniform Circular Motion, Resistance Force Proportional to Object Speed, Air Drag at High Speed
Week 14	The Constant Volume Gas Thermometer and The Absolute Temperature Scale, Thermal Expansion and of Solids and Liquids, The Unusual Behavior of Water
Week 15	Work Done by Constant Force, Work Done by Varying Force, Work DONE by a Spring
Week 16	**Preparing to final exam**
Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Determination The Density of Solid Materials
Week 2	Verification of Hooks Law
Week 3	Determination the Value of Gravity Acceleration (Simple Pendulum)
Week 4	Determination the Coefficient of Viscosity
Week 5	Measurement of Liquid Density
Week 6	Verification of Newton's Second Law
Week 7	Verification of continuity Equation

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1- R.D. Knight, Physics for Scientists and Engineers, 2nd ed., Pearson 2008 Laboratory Manual, Compiled by Instructor	No
Recommended Texts		No
Websites		

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

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

MODULE 3

Module Information معلومات المادة الدراسية					
Module Title	**Chemistry**			**Module Delivery**	
Module Type	**Basic Learning Activity**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWE1205**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	UGI		**Semester of Delivery**	one	
Administering Department	DWE		**College**	ENG	
Module Leader	Majeed Mattar Ramal		**e-mail**	Majeed.mattar@uoanbar.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	M.Sc.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Define the structure of the atom in terms of the nucleus with protons and neutrons, and electrons. 2. Write and balance chemical equations, name inorganic compounds and ions and describe the properties of the main group elements. 3. Carry out chemical calculations, including mass relations in chemical reactions, limiting reagent and reaction yield calculations, and calculations involving reactions taking place in solution. 4. Understand the concept of oxidation-reduction, calculate oxidation numbers, and balance redox reactions. 5. Apply the ideal gas law in solving problems involving the gas phase and Solve problems in chemical thermodynamics and calorimetry.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics and be able to solve problems related to chemical principles. 2. Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors 3. Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts 4. Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives 5. Develop and conduct appropriate experimentation, analyze, and interpret data, and use engineering judgment to draw conclusions.
Indicative Contents المحتويات الإرشادية	Chapter 1: Introduction (significant figures) and Units of Measurement - Measurements. Handling Numbers. Dimensional Analysis in Solving Problems Recognize chemical safety and hazardous materials icons and apply laboratory safety rules. (10 hrs) Chapter 2: Atoms, Molecules, and Ions - Atomic Number, Mass Number, and Isotopes. - The Periodic Table. - Molecules and Ions. Describe laboratory instruments and some basic techniques used in the chemistry laboratory, including balances and standard volumetric equipment Chemical Formulas. Naming Compounds. (10 hrs) Chapter 3: Mass Relationships in Chemical Reactions - Atomic Mass. Avogadro's number and Molar Mass of an Element. - Describe and use UV/VIS spectrophotometric methods of analysis. - Molecular Mass. The Mass Spectrometer. Percent Composition of Compounds. Experimental Determination of Empirical Formulas. Chemical Reactions and Chemical Equations.

	- Describe how to Prepare accurate laboratory reports of their experimental results. - Amounts of Reactants and Products. Limiting Reagent Calculations. Reaction Yield (12 hrs) Chapter 4: Reactions in Aqueous Solutions - General Properties of Aqueous Solutions. Precipitation Reactions. Acid-Base Reactions. Oxidation-Reduction Reactions - Concentration of Solutions. Acid-Base Titrations. Gases. Pressure - Oxidation-Reduction / Redox Reactions - Concentration of Solutions - Titration (12 hrs) Chapter 5: Gases - Substances That Exist as Gases, Pressure of A Gas, The Gas Laws, - The Ideal Gas – Equation Gas Stoichiometry, Dalton's Law of Partial Pressures, The Kinetic Molecular Theory of Gases. (12 hrs) Chapter 6: Thermochemistry - The Nature of Energy and Types of Energy, Energy Changes in Chemical Reactions, Introduction to Thermodynamics, Enthalpy, Calorimetry, Standard Enthalpy of Formation and Reaction, Heat of Solution, and dilution. (12 hrs) Chapter 7: Quantum Theory and The Electronic Structure of Atoms - From Classical Physics to Quantum Theory, The Photoelectric Effect, Bohr's Theory of The Hydrogen Atom, The Dual Nature of The Electron, Quantum Numbers, Electron configuration , The building-up Principle. (12 hrs) Chapter 8: Quantum Theory and The Electronic Structure of Atoms - Periodic Classification of The Elements, Periodic Variation in Physical Properties, Ionization Energy, Electron Affinity, Variation in Chemical Properties of The Representative Elements (12 hrs) Chapter 9: Chemical Bonding - Explain The Formation of Ionic Bonds., Define and Give Examples of Ionic Solids., Explain the Formation of Covalent Bonds., Define and Give Examples of Simple Molecular Solids., explain Metallic Bonding., Relate the structure of sodium chloride to its properties., Distinguish between ionic and simple molecular solids (12 hrs) Chapter 10 : Chemical Bonding I - Lewis Dot Symbols, The Ionic bond, The Covalent bond, Electronegativity, Writing Lewis Structures, Formal Charge and Lewis Structures. - The Concept of Resonance the Exception of Octane Rules (12 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 and by experimental work on lab.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Measurements. Handling Numbers. Dimensional Analysis in Solving Problems Recognize chemical safety and hazardous materials icons and apply laboratory safety rules.
Week 2	Atomic Number, Mass Number, and Isotopes. The Periodic Table. Molecules and Ions. Describe laboratory instruments and some basic techniques used in the chemistry laboratory, including balances and standard volumetric equipment.
Week 3	Chemical Formulas. Naming Compounds. Atomic Mass. Avogadro's number and Molar Mass of an Element. Describe and use UV/VIS spectrophotometric methods of analysis**.**
Week 4	Molecular Mass. The Mass Spectrometer. Percent Composition of Compounds. Experimental Determination of Empirical Formulas. Chemical Reactions and Chemical Equations. Describe how to Prepare accurate laboratory reports of their experimental results.
Week 5	Amounts of Reactants and Products. Limiting Reagent Calculations. Reaction Yield**.**
Week 6	General Properties of Aqueous Solutions. Precipitation Reactions. Acid-Base Reactions. Oxidation-Reduction Reactions.
Week 7	Concentration of Solutions. Acid-Base Titrations. Gases. Pressure.
Week 8	The Ideal Gas Equation. Gas Stoichiometry. Partial Pressures - Substances That Exist As Gases, Pressure of A Gas, The Gas Laws , The Ideal Gas Equation - Gas Stoichiometry - Dalton's Law of Partial Pressures, The Kinetic Molecular Theory of Gases - Deviation From Ideal Behavior
Week 9	The Nature of Energy and Types of Energy. Energy Changes in Chemical Reactions. Introduction to Thermodynamics.
Week 10	Enthalpy of Chemical Reactions. Calorimetry. Standard Enthalpy of Formation and Reaction**.**
Week 11	From Classical Physics to Quantum Theory. Bohr's Theory of the Hydrogen Atom. Quantum Numbers. Atomic Orbitals.
Week 12	Electron Configuration. Development of the Periodic Table. Periodic Classification of the Elements. Periodic Variation in Physical Properties.
Week 13	Ionization Energy. Electron Affinity Lewis Dot Symbols. The Ionic Bond. The Covalent Bond. Electro negativity. Writing Lewis Structures. Formal Charge and Lewis Structures.
Week 14	The Concept of Resonance. Exceptions to the Octet Rule. Bond Energy**.** Molecular Geometry. Dipole Moment. Spectrophotometric Analysis of tetracycline
Week 15	Valence Bond Theory. Hybridization of Atomic Orbital's. Hybridization in Molecules Containing Double and Triple Bonds. Delocalized Molecular Orbital's**.**
Week 16	**Preparing to final exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Safety, Lab Check-in Mass and Volume Measurements
Week 2	Qualitative Analysis of Anions: Part I
Week 3	Qualitative Analysis of Anions: Part II
Week 4	The Empirical Formula of a Metal Oxide
Week 5	Volumetric Analysis: Standardization of Sodium Hydroxide and Determination of Molar Mass of an Acid
Week 6	Applications of Volumetric Analysis: Determination of Active Ingredients of Commercial Bleach and Vinegar.
Week 7	Evaluation of the Universal Gas Constant, R
Week 8	Heat of Formation of Magnesium Oxide
Week 9	UV/VIS Spectroscopy and Spectrophotometry
Week 10	Spectrophotometric Analysis of Aspirin
Week 11	Synthesis of Alum and Crystal Growth

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	GENERAL CHEMISTRY, Raymond Chang & Jason Overby , sixth Edition	yes
Recommended Texts	Chang R. & College W., Chemistry, McGraw Hill 9th ed., 2007	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 4

Module Information معلومات المادة الدراسية					
Module Title	**Fundamentals of Electrical Engineering**			**Module Delivery**	
Module Type	**Basic Learning Activity**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWE1212**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGI	**Semester of Delivery**		one
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Falah Shallal Khaleefah		**e-mail**	f.sh.khalifa@uoanabar.edu.iq	
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		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	DWE1201 CALCULUS I	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To develop problem solving skills and understanding the fundamentals of electrical engineering through the application of techniques. 2. To be able to solve series and parallel DC circuit. 3. To be able to understand Ohms Kirchhoff's current and voltage Laws problems. 4. To be able to analyze Nodal analysis, Mesh analysis, Source transformation. 5. To perform mesh and Nodal analysis. 6. To be able to analyze R, L, C circuit.
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. Understand the basic concept of electrical circuits. 2. Solve series and parallel DC circuits. 3. Apply Methods of Analysis and Circuit Theorems to solve DC circuits. 4. Solve series/parallel circuits with capacitors and inductors.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. - Introduction to electrical engineering, Charge, current, and voltage.[12h] - Ohms law, Kirchhoff laws, Star delta analysis. [15h] - Nodal analysis, Mesh analysis, Source transformation. [18h] - Superposition theorem, Thevenin circuits, Norton circuits.[18h] - Capacitor C, Inductor L, Circuit analysis including R, L, and C.[15h]

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	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to electrical engineering
Week 2	Charge, current, and voltage
Week 3	Ohms law
Week 4	Ohms law
Week 5	Kirchhoff laws
Week 6	Kirchhoff laws
Week 7	Mid-term Exam + Unit-Step Forcing, Forced Response, the RLC Circuit

Week 8	Star delta analysis
Week 9	Nodal analysis
Week 10	Nodal analysis
Week 11	Mesh analysis
Week 12	Source transformation
Week 13	Superposition theorem
Week 14	Thevenin circuits
Week 15	Norton circuits
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Charge, current, and voltage
Week 2	Lab 2: Ohms law
Week 3	Lab 3: Kirchhoff laws
Week 4	Lab 4: Star delta analysis
Week 5	Lab 5: Nodal analysis
Week 6	Lab 6: Mesh analysis
Week 7	Lab 7: Superposition theorem

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Alexander and Sadiku “Fundamentals of Electric Circuits” Third Edition McGraw Hill.	YES
Recommended Texts	Boylestad, R. L., Introductory Circuit Analysis (10th Edition).	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 5

Module Information معلومات المادة الدراسية					
Module Title	Engineering Statistics			**Module Delivery**	
Module Type	**Basic Learning Activity**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	DWE1215				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	UGI		**Semester of Delivery**	one	
Administering Department	DWE		**College**	ENG	
Module Leader	Atheer Saleem Almawla		**e-mail**	eng.atheer84@uoanbar.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		**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	Statistical Engineering models are based on mathematics and probability theory. This course provides students with a working knowledge of fundamental statistics principles and probability in addition to a preface to the regression and correlation analysis. By the end of the semester, students should be able to determine when each of the various topics we have covered is appropriate to use, and to apply them to practical engineering situations or problems. This course will cover techniques on data collection and presentation, descriptive statistics, basic elements of probability theory, sampling techniques and theory, statistical estimation, hypothesis testing and regression analysis
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of this course, the student should be able to: 1. use several methods and techniques for collecting and presentation the sets of data. 2. calculation and demonstration the center tendency and variation of data. 3. compute the probabilities in a simple case and using the rules of probability in computing. 4. give an account of the concept random variable and be able to use some common probability distributions. 5. understand the meaning of the central limit theorem. 6. use point and interval estimates for some typical statistical problems. 7. apply elementary regression for fitting measured data.
Indicative Contents المحتويات الإرشادية	**Chapter One: (2 hours)** **Fundamentals (Introduction to Statistics)** 1. Introduction 2. Descriptive and Inferential Statistics 3. Variables and Types of Data 4. Data Collection and Sampling Techniques 5. Observational and Experimental Studies **Chapter Two: (2 hours)** **Presentation of a Statistical Data** 1. Introduction 2. Organizing Data 3. Grouped Frequency Distributions or Frequency Distributions Table 4. Graphs: Histograms, Frequency Polygons, and Ogive 5. Other Types of Graphs **Chapter Three: (2 hours)** **Data Description** 1. Measures of Central Tendency (Mean, Median and Mode) 2. Measures of Variation 2.1. Population Variance and Standard Deviation 2.2. Sample Variance and Standard Deviation 2.3. Variance and Standard Deviation for Tabulated Data 2.4. Range 3. Coefficient of Variation **Chapter Four: (3 hours)** **Probability and Counting Rules** 1. Sample Spaces and Probability

	2. Tree diagram 3. Basic Probability Rules 4. Venn Diagram 5. The Addition Rules for Probability 6. The Multiplication Rules and Conditional Probability 7. Conditional Probability 8. Counting Rules 8.1. Permutations 8.2. Combinations 9. Probability and Counting Rules **Chapter Five: (3 hours)** **Discrete Probability Distributions** 1. Probability Distributions 2. Mean, Variance, Standard a Deviation 3. The Binomial Distribution 4. The Poisson Distribution **Chapter Six: (3 hours)** **Continuous Probability Distributions** **The Normal Distribution** 1. Normal Distributions 2. Applications of the Normal Distribution 3. Normal Distributions Formula 4. The Standard Normal Distribution 5. Finding Areas Under the Standard Normal Distribution Curve (Table Method) 6. A Normal Distribution Curve as a Probability Distribution Curve 7. Applications of the Normal Distribution 8. Determining Normality 9. The Normal Distribution Approximation to the Binomial Distribution **Chapter Seven: (4 hours)** **Confidence Intervals and Sample Size** 1. Preface 2. Confidence Intervals for the Mean When σ is Known 2.1. A point estimates. 2.2. An interval estimates. 2.3. Confidence Intervals 3. Sample Size 4. t-Distribution 3. Confidence Intervals for the Mean When σ is Unknown. 4. The chi-square Distribution 5. Confidence Intervals for Variances and Standard Deviations 5.1. Confidence Interval for a Variance 5.2. Confidence Interval for a Standard Deviation **Chapter Eight: (5 hours)** **Hypothesis Testing** 1. Preface 2. Steps in Hypothesis Testing—Traditional Method 2.1. The null hypothesis (H_0) 2.2. The alternative hypothesis (H_1) 2.3. The level of significance 3. *z* Test for a Mean 4. P-Value Method for Hypothesis Testing

	5. t Test for a Mean 6. z Test for a Proportion 7. X^2 Test for a Variance or Standard Deviation **Chapter Nine: (3 hours)** **Testing the Difference Between Two Means, Two Proportions, and Two Variances** 1. Preface 2. Testing the Difference Between Two Means: Using the z Test 3. Testing the Difference Between Two Means of Independent Samples: Using the t Test 4. Testing the Difference Between Two Means: Dependent Samples 5. Testing the Difference Between Two Variances **Chapter Ten: (3hours)** **Correlation and Regression** 1. Preface 2. Scatter Plots and Correlation 3. Regression 4. Coefficient of Determination and Standard Error of the Estimate.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering engineering statistic 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 using some important software to analysis the data.

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

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	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.				
	Report				
Summative assessment	Midterm Exam	2hr	20% (20)	8 and 12	LO #1 - #7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Fundamentals (Introduction to Statistics)
Week 2	Presentation of a Statistical Data
Week 3	Data Description : Measures of Central Tendency (Mean, Median and Mode) Measures of Variation
Week 4	Probability and Counting Rules : Sample Spaces and Probability , Tree diagram , Basic Probability Rules
Week 5	Discrete Probability Distributions : Probability Distributions , The Binomial Distribution ….
Week 6	Continuous Probability Distributions : The Normal Distribution
Week 7	Determining Normality : The Normal Distribution Approximation to the Binomial Distribution
Week 8	Mid-term Exam1
Week 9	Confidence Intervals and Sample Size
Week 10	The chi-square Distribution : Confidence Intervals for Variances and Standard Deviations
Week 11	Testing the Difference Between Two Means, Two Proportions, and Two Variances
Week 12	**Mid-term Exam2**
Week 13	P-Value Method for Hypothesis Testing
Week 14	The Normal Distribution Approximation to the Binomial Distribution
Week 15	Correlation and Regression: Scatter Plots and Correlation, Regression
Week 16	**Preparing to final exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Elementary Statistics A Step-by-Step Approach, Eighth Edition, By Allan G. Bluman	No
Recommended Texts	Probability and Statistics For Engineers and Scientists, Fourth Edition, By Sheldon Ross	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 6

Module Information معلومات المادة الدراسية					
Module Title	**English Language**			**Module Delivery**	
Module Type	**Basic Learning Activity**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	DWE1102				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level	UGI		**Semester of Delivery**	One	
Administering Department	Type Dept. Code		**College**	ENG	
Module Leader	Haitham Zeddan Hussein		**e-mail**	Haithamz1978@uoanbr.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**	E-mail	
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		**Semester**	
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
- **Module Objectives** - أهداف المادة الدراسية	- knowledge of English language. - Improving the student English skills of speaking, reading, listening, and writing.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	- Students will learn grammar which include question forms. Understanding verb tenses etc. - Students will improve their English skills which include speaking, reading, listening, and writing. - Students will develop their confidence to use English language in their communication and social life.
Indicative Contents المحتويات الإرشادية	- Indicative content includes the following. - Unit one Question forms. Present continuous tense. Vocabulary. Reading. Social English. Speaking and listening. - Unit Two Present simple tense. Have/ Have got. Vocabulary. Everyday English. Numbers. Prices. Reading. - Unit Three Past Simple. Past Continues. Everyday English. Time Expressions. - Unit Four Expressions of quantity. Articles. Every day English. Requests and offers. - Unit Five Verb patterns. Like doing / would like to do. Will. Going to - Unit Six What……like? Comparative and superlative adjectives. - Unit Seven Present perfect simple - Unit Eight Have to. Must. Should - Unit Nine Will. First conditional. Time clauses - Unit Ten Used to. Question form (2). Question tags. - Unit eleven the passive which includes: present, Past, and Present perfect. - Unit Twelve Verb patterns. Infinitives - Unit Thirteen Second conditional. Might. - Unit Fourteen present perfect - Unit Fifteen Past Perfect - Reported statements and questions

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 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	17	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	63	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**75**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	1 to 5
	Assignments	2	10% (10)	2 and 12	1 to 5
	Projects / Lab.				
Summative assessment	**Midterm Exam**	2hr	20% (20)	7 and 13	All
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Unit one Question forms. Present continuous tense. Reading. Social English. Speaking and listening.
Week 2	Unit Two Present simple tense. Have/ Have got. Everyday English. Numbers. Prices. Reading.
Week 3	Unit Three Past Simple. Past Continues. Everyday English. Time Expressions.
Week 4	Unit Four Expressions of quantity. Articles. Every day English. Requests and offers

Week 5	Unit Five Verb patterns. Like doing / would like to do. Will. Going to
Week 6	Unit Six What……like? Comparative and superlative adjectives.
Week 7	**Mid-term Exam1**
Week 8	Unit Seven Present perfect simple Unit Eight Have to. Must. Should
Week 9	Unit nine Will. First conditional. Time clauses Unit Ten Used to. Question form (2). Question tags.
Week 10	Unit eleven the passive which includes: present, Past, and Present perfect
Week 11	Unit Twelve Verb patterns. Infinitives
Week 12	Unit Thirteen Second conditional. Might.
Week 13	Unit Fourteen present perfect
Week 14	Unit Fifteen Past Perfect - Reported statements and questions
Week 15	**Mid-term Exam2**
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	
Week 8	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	HEADWAY pre-intermediate	Yes
Recommended Texts		
Websites		

Grading Scheme

مخطط الدرجات

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

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

MODULE 7

Module Information معلومات المادة الدراسية					
Module Title	**Calculus-II**			**Module Delivery**	
Module Type	**Basic Learning Activity**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWE1202**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGI	**Semester of Delivery**		Two
Administering Department		DWE	**College**	ENG	
Module Leader	Ghassan Subhi Jameel		**e-mail**	Ghassan.alkibaisi@uoanbar.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Calculus-**I**	**Semester**	1
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Destining and solve the definite, indefinite and improper integrals by using different integration techniques. 2. Ability to determine of popular and important two of the applications of integration techniques. 3. Identify and find area, arc length and volume, in polar coordinates. 4. Identify the properties of sequences and their limits with identifying standard convergent operations of power series.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Evaluate of definite, indefinite, and improper integrals by using different integration techniques. 2. To determine arc length, surface area and volume by using the applications of integration techniques. 3. Define polar coordinate graphs and solve related problems including area, arc length and volume. 4. Identify the properties of sequences and their limits with identifying standard convergent operations of power series.
Indicative Contents المحتويات الإرشادية	1. Fundamentals of Integrals 2. Definite and indefinite integrals 3. Integration Techniques -Integration by Parts. 4. Integration Techniques- Trigonometric Integrals. 5. Integration Techniques- Partial Fractions. 6. Applications of Integrals- Arc Length and Surface area 7. Applications of Integrals- Volumes (Disk, Washer, Shell) 8. Polar Coordinates - Common Polar Coordinate Graphs. 9. Polar Coordinates - Tangents with Polar Coordinates, Curves defined by parametric equations. 10. Sequences and Series. 11. Power series and their convergence test

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in the delivery of the Calculus-II course is to encourage students to understand and analyze integration problems and use its principles in solving problems related to applications of integration like arc length and find surface area in polar coordinates, while improving and expanding their critical thinking skills at the same time. This will be achieved through classes and interactive tutorials.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	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
	Assignments	2	10% (10)	3 and 12	LO #2,
	Projects / Lab.			3-13	
	Report				
Summative assessment	**Midterm Exam**	2hr	20% (20)	8 and 12	LO #1 - #4
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Techniques of integration: Integration by Parts. Trigonometric Integrals, Trigonometric Substitution
Week 2	Integrating Rational Functions by Partial Fractions. Integrals involving roots
Week 3	Improper integrals: Types of Improper Integrals and Methods of valuation
Week 4	Comparison Test for Improper Integrals.
Week 5	Applications of Integrals: Applications of Integrals, Arc length, Surface Area,
Week 6	Parametric Equations and Curves.
Week 7	Tangents with Parametric Equations
Week 8	**Mid-term Exam1**
Week 9	Polar Coordinates Technique: Polar Coordinates, Common Polar Coordinate Graphs
Week 10	Tangents with Polar Coordinates Curves defined by parametric. equations.
Week 11	Arc Length with Polar coordinates, Area in Polar Coordinates
Week 12	**Mid-term Exam2**
Week 13	Sequences and Series: Infinite series.
Week 14	The comparison. Ratio and Root tests.
Week 15	Alternating series. Conditional convergence
Week 16	**Preparing to final exam**

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

Week 5	
Week 6	
Week 7	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Calculus, 8th edition (2007) by Howard Anton, (John Wiley & Sons, Inc, New York). Chapters: 7,8,10&11	No
Recommended Texts	1 – Advanced Engineering Mathematics, Kreyszig 2 - Calculus by Thomas & Finney.	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 8

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Mechanics (Statics)**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**DWE1213**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGI		**Semester of Delivery**	Two	
Administering Department	DWE		**College**	ENG	
Module Leader	Mohammed T. Nawar		**e-mail**	Mohammad.nawar@uoanbar.edu.iq	
Module Leader's Acad. Title	Lect.		**Module Leader's Qualification**	M.SC	
Module Tutor	Mohammed H. Abdullah		**e-mail**	mohammed.alani@uoanbar.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Physics DWE1203	**Semester**	1
Co-requisites module	Calculus- I DWE 1201	**Semester**	1

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Draw free-body diagrams. 2. Formulate and solve the equations of equilibrium. 3. Analyze internal forces for simple structures. 4. Construct shear force and bending moment diagrams for beams. 5. Determine the centroid, center of gravity, and moment of inertia. 6. Determine friction forces and their effects on rigid bodies.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explain the principles of static equilibrium. 2. Use Free Body Diagrams to solve static problems involving components and pulley systems. 3. Solve problems relating to the forces in truss members using the method of joints and the method of sections. 4. Determine the center of mass and centroids of Lines, areas, and Volumes of simple and composite bodies. 5. Solve problems relating to hydrostatics including pressures on submerged surfaces, buoyancy, and stability of floating objects. 6. Solve problems relating to dry friction, including inclined planes and screw threads.
Indicative Contents المحتويات الإرشادية	**Chapter 1: Introduction** **Concepts of weight.** **- Force.** **- Moments.** **- Units.** **- Centre of gravity.** **- Vector Algebra.** **Chapter 2: Force Systems** **- Component forces.** **- Resultant force.** **-Resultant Moment.** **- Wrench.** **- Free body diagrams.** **Chapter 3: Equilibrium** **- System Isolation.** **- Free Body Diagram.** **- 2-D and 3-D equilibrium equations.** **Chapter 4: Structures** **- Plane Trusses.** **- Method of Joints.** **-Method of Sections.** **Chapter 5: Centers of Mass and Centroids** **- Centre of Mass.** **- Centroids of Lines.**

	- Areas and Volumes. **Chapter 6: Fluid Statics** **- Forces on submerged surfaces.** **- Forces of buoyancy.** **- Stability of floating objects.** **Chapter 7: Friction** **- Dry Friction.** **- Wedges.** **- Screws.**

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	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.				
	Report				
Summative assessment	Midterm Exam	2hr	20% (20)	8 and 12	LO #1 - #7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Introduction** Concepts of weight, Force, Moments, Units, Centre of gravity, Vector Algebra.
Week 2	**Force Systems** Component forces, Resultant force, Resultant Moment. - Wrench. - Free body diagrams.
Week 3	**Force Systems** Moment, Couples, Free body diagrams.
Week 4	**Equilibrium** System Isolation, Free Body Diagram, 2-D and 3-D equilibrium equations.
Week 5	**Equilibrium** System Isolation, Free Body Diagram, 2-D and 3-D equilibrium equations.
Week 6	**Equilibrium** System Isolation, Free Body Diagram, 2-D and 3-D equilibrium equations.
Week 7	**Equilibrium** System Isolation, Free Body Diagram, 2-D and 3-D equilibrium equations.
Week 8	**Mid-term Exam1**

Week 9	**Structures** Plane Trusses, Method of Joints, Method of Sections.
Week 10	**Structures** Plane Trusses, Method of Joints, Method of Sections.
Week 11	**Centers of Mass and Centroids** Centre of Mass, Centroids of Lines, Areas and Volumes
Week 12	**Centers of Mass and Centroids** Centre of Mass, Centroids of Lines, Areas and Volumes
Week 13	**Mid-term Exam2**
Week 14	**Fluid Statics** Forces on submerged surfaces, Forces of buoyancy, Stability of floating objects.
Week 15	**Chapter 7: Friction** Dry Friction, Wedges, Screws
Week 16	**Preparing to final exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	**. L. Meriam, L. G. Kraige:** 2007, Engineering mechanics: Statics, 6th, Wiley, Hoboken,	No
Recommended Texts	Engineering Mechanics: Statics (13th Edition) by R.C. Hibbeler.	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 9

Module Information معلومات المادة الدراسية					
Module Title	**Computer Science**			**Module Delivery**	
Module Type	**Basic Learning Activity**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWE1209**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		UGI	**Semester of Delivery**		Two
Administering Department		DWE	**College**	ENG	
Module Leader	Ahmed Saoud		**e-mail**	@uoanbar.edu.iq	
Module Leader's Acad. Title		Assistant Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. The most important aspect of computer science is problem solving, an essential skill for life. 2. Students study the design, development and analysis of software and hardware used to solve problems in a variety of business, scientific and social contexts. 3. computers solve problems to serve people, there is a significant human side to computer science as well.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**1. Computing is part of everything we deal with.** **2. Enables Students to solve complex, challenging problems.** **3. Enables to positive difference in academic projects.** **4. Computing offers great opportunities for true creativity and innovativeness.** **5. Describe the main functions in Word and Excel applications.**
Indicative Contents المحتويات الإرشادية	1. This is the very initial step to start where first learn to prepare and manage a document. 2. Word document writing, begins and finishes in the same manner. beginning by generating a document, and you conclude by saving it. 3. Sounds simple, but to efficiently manage the Word documents, to know more than just the essentials. 4. This semester describes the various ways to build a new Word document, such as beginning from an existing document or adding text to a predesigned template, and how to select the optimal method for your specific project. 5. You will also learn how to work more efficiently and effectively by modifying document's display. 6. Utilizing Word's Outline view for brainstorming, then switch to Print view when ready to create a printed copy.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in the delivery of the Physics course is to encourage students to understand and analyze kinematic problems and use basic mathematical equations in solving problems as well as participate in exercises, while improving and expanding their critical thinking skills at the same time. This will be achieved through classes and interactive tutorials and by looking at the types of simple experiments that involve investigating theories of kinetic physics.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	22	**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**	2	10% (10)	5 and 10	LO #1, #2
	Assignments	2	10% (10)	3 and 12	LO #3, #5
	Projects / Lab.		10%(10)	3-13	
	Report				
Summative assessment	**Midterm Exam**	2hr	20% (20)	8 and 12	LO #1 - #4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Computer Fundamentals and safety
Week 2	Computer safety
Week 3	Computer Components
Week 4	Main Computers systems
Week 5	Operation system
Week 6	Applications of operation systems
Week 7	First Mid Term exam
Week 8	Introduction to office applications
Week 9	Introduction to MS-Word
Week 10	Insert objects in MS-Word
Week 11	Additional tasks in MS-Word
Week 12	Introduction to MS-Power Point
Week 13	Introduction to MS-Excel
Week 14	Second Mid Term Exam
Week 15	Applications in Word and excel
Week 16	**Preparing to final exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Computer Fundamentals and safety
Week 2	Computer Components
Week 3	Operation system
Week 4	Introduction to MS-Word
Week 5	Insert objects in MS-Word
Week 6	Additional tasks in MS-Word
Week 7	Introduction to MS-Power Point

Learning and Teaching Resources

مصادر التعلم والتدريس

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

Grading Scheme

مخطط الدرجات

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

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

MODULE 10

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Drawing**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWE 1210**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGI	**Semester of Delivery**		Two
Administering Department		DWE	**College**	ENG	
Module Leader	Dr.Ahmed Adnan Saeed		**e-mail**	Ahmed.adnan@uoanbar.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	Ahmed Ashoor		**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		**Semester**	
Co-requisites module	Construction Building	**Semester**	4

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Recognize the value of engineering graphics as a language of communication. 2. Infer the nature of engineering graphics, the relationships between 2D and 3D environments. 3. Visualize, comprehend, and deduce wide variety of objects, drawing the missing views/section views, and orthographic projections of an object. 4. Produce three dimensional drawings utilizing CAD software.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the engineering drawing and measurement. 2. Understand drawing with AutoCAD programmed
Indicative Contents المحتويات الإرشادية	**1- Drawing and Measurement** 1.1- Standards of line type 1.2- engineering operation with draw 1.3- Dimensional Analysis 1.4- engineering projects 1.5- Sections 1.6- Isometric **2- AutoCAD** 2.1- principles of draw 2.2- items of Modify 2.3- Dimensions 2.4- text

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in the delivery of engineering drawing course is to encourage students to understand and draw of principles engineering drawing and use basic tools, while improving and expanding their critical thinking skills at the same time. This will be achieved through classes and interactive tutorials and by looking at the types of simple experiments that involve investigating operations of engineering drawing.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	57	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	93	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	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
	Assignments	2	10% (10)	3 and 12	LO #3, #5
	studio.		10%(10)	3-13	
	Report				
Summative assessment	**Midterm Exam**	2hr	20% (20)	8 and 12	LO #1 - #4
	Final Exam	3hr	50% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1	Introduction: graphic language, standards, instruments, letters…etc
Week 2	Basics for interpreting drawings, line types, types of drawings and sketches
Week 3	Rules for using calipers to draw circles
Week 4	Engineering processes and their application for drawing geometric shapes
Week 5	Applications on the computer using the AutoCAD program
Week 6	Orthographic views. Deducing front, top, and side views from a pictorial
Week 7	Dimensioning and Drawing Scale
Week 8	Applications on the computer using the AutoCAD program
Week 9	Sectional views: full and half sections
Week 10	Applications on the computer using the AutoCAD program
Week 11	Applications on the computer using the AutoCAD program
Week 12	Drawing a missed view from given two views
Week 13	Applications on the computer using the AutoCAD program
Week 14	Pictorial sketching: isometric and oblique
Week 15	Applications on the computer using the AutoCAD program
Week 16	**Preparing to final exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Principles of Autocad
Week 2	Items of Draw
Week 3	Items of Modify
Week 4	Items of Dimensions
Week 5	Texts
Week 6	Drawing of shape
Week 7	Drawing of shape

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	كتاب الرسم الهندسي – عبد الرسول علي	yes
Recommended Texts		No
Websites		

Grading Scheme

مخطط الدرجات

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

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

MODULE 11

Module Information معلومات المادة الدراسية					
Module Title	**Arabic Language**			**Module Delivery**	
Module Type	**Basic Learning Activity**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWE1101**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	UG1		**Semester of Delivery**	Two	
Administering Department	EE		**College**	Engineering	
Module Leader	Majid Hadi Talal		**e-mail**	@uoanbar.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	01/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	This course aims to build students' knowledge and competence in the Arabic language, rhetoric, and Arabic literature of all kinds, to increase their ability to appreciate literature and develop their awareness of its concepts through the study of poetry, novels, and short stories. story. C- thinking skills: 1. Work on developing the intellectual property of the student. 2. Ensuring the personal development of the student at the academic level.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Develop academic essay writing proficiency 2. Apply reading skills 3. Expand academic vocabulary through reading 4. Improve critical thinking skills 5. Developing the student's intellectual property in the field of the Arabic language, to acquire verbal and actual ability and skill.
Indicative Contents المحتويات الإرشادية	- Study the text of the Quran and analyze its language, spelling, and rules. [5 hrs] - The rules of writing the hamza, Written verbatim by Arab and of number and numerical adjective. [15 hrs] - Punctuation. [5 hrs] - The method of detection for words in Arabic Dictionaries, - The applications of grammar and language- the actor and his deputy, - Debutante and the news Acts missing, The case and exception. [10 hrs] - Ancient literary studies, Definition of literature and its importance, Ages historical Arabic literature – Modern Literary Studies, Study the texts of poetic eras (pre-Islamic, Islamic, Umayyad, Abbasid, Andalusia), Study of ancient prose texts (speeches, messages), examine the texts of modern poetry and contemporary, examine the texts of modern prose (drama, novel, article). [10 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	- Raise the students' linguistic level and build their intellectual progress by highlighting the importance of the Arabic language in their lives as their mother tongue.

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

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Arabic grammar
Week 2	Arabic grammar
Week 3	Arabic grammar, Arabic grammar, its importance and place in the language.
Week 4	Arabic grammar, Hamza al-Wasl sites and parts.
Week 5	Dictionaries of the Arabic language, And ways to reveal the meanings of words in dictionaries

Week 6	The rules of number and number, the rule of distinguishing the number and its formulation, the definition of the number and how to read it
Week 7	Mid-term Exam + Unit-Step Forcing, Forced Response, the RLC Circuit
Week 8	Arabic literature / the most prominent features and characteristics of Arabic literature.
Week 9	Arabic literature / Historical eras of Arabic literature.
Week 10	Arabic literature / **The novel and its elements.**
Week 11	Rhetoric/ Truth and metaphor.
Week 12	Rhetoric/ The arts of rhetoric
Week 13	Rhetoric/ The arts of rhetoric
Week 14	Rhetoric/ Poetry / Muallaqat poets and some contemporary poets.
Week 15	Rhetoric/ Poetry / Muallaqat poets and some contemporary poets.
Week 16	**Preparatory week before the final Exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Lectures in the Arabic language.	Yes
Recommended Texts	Meanings of grammar / Prof. Dr. Fadel Al-Samarrai	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 12

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Geology**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWE1303**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGI	**Semester of Delivery**		Two
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Rafid Saadoon Rashid		**e-mail**	Rafid.alboresha@uoanbar.edu.iq	
Module Leader's Acad. Title		Assistant Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		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. To study and identify different types natural materials like rocks & minerals. 2. To know the physical properties of rocks & minerals. 3. Have knowledge about geohazards, earthquakes, and tunneling. 4. To know the importance of geological maps.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the basic concept of geology. 2. Understand the formation of rocks and structural features. 3. Apply acquired knowledge in dams and water resources engineering projects such as dams, tunnels and slopes.. 4. Have skills to understand geological survey maps. 5. be able to identify potential problems associated with: slope stability; drilling a tunnel; construction of a dam. 6. Ability to work in a group.
Indicative Contents المحتويات الإرشادية	

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

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	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 Definition, purpose and scope The Earth and Its Systems -
Week 2	**Minerals** Types and classifications of minerals
Week 3	**Rocks** Types and cycle of rock formation -geological folds, faults and joint
Week 4	Engineering & physical properties of rocks
Week 5	First Exam
Week 6	**Engineering Maps** (Topographic & Geological Maps)
Week 7	**Geohazards** -ground movements -ground failure
Week 8	-slope unstability -seisms
Week 9	Second Exam

Week 10	**Introduction to Geology of Tunnels & Dams** I- tunnels -types of tunnels. - Methods of tunnel. -tunnel (opening) in massive rock, two-dimensional case.
Week 11	-stress distribution around circular opening. - required studies for tunnels construction (effect of layers, floods and fault).
Week 12	II- dams -dams importance. -dam types. -required studies for dams' construction. -forces affecting dams.
Week 13	required studies for dams' construction. -forces affecting dams.
Week 14	Third Exam
Week 15	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Minerals description
Week 2	Lab 2: Minerals classification
Week 3	Lab 3: Rocks description
Week 4	Lab 4: Rocks classification
Week 5	Lab 5: 6.Volume & Density measurement of rocks
Week 6	Lab 6 Specific Gravity & porosity measurement of rocks
Week 7	Lab 7: Uniaxial Compressive Strength
Week 8	Lab 8: Drawing Engineering Geological Maps

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	• Terry R. West, Geology Applied to Engineering, Waveland Press, 1995.	Yes
Recommended Texts	• Engineering Mechanics (Statics & Dynamics) / Fourth Addition By : R. C. HIBBELER	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 13

Module Information معلومات المادة الدراسية					
Module Title	**Calculus-III**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWE2212**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGII	**Semester of Delivery**		Three
Administering Department		DWE	**College**	ENG	
Module Leader	Muhannad Haqi Aldosary		**e-mail**	Muhannad_dosary@uoanbar.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Calculus II	**Semester**	2
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	To study infinite series and to extend the concepts from one variable calculus to functions of several variables and vector valued functions. These objectives include: 1. Convergence tests 2. Power Series 3. Taylor Series 4. Representations of Functions by Taylor Series 5. representations and operations with functions 6. vector functions 7. directional derivatives 8. gradient 9. tangent planes
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of successful completion of this course, the student will be able to: 1. Perform calculus operations on vector-valued functions, including derivatives, integrals curvature, displacement, velocity, acceleration, and torsion. 2. Perform calculus operations on functions of several variables, including partial derivatives, directional derivatives, and multiple integrals. 3. Find extrema and tangent planes. 4. Solve problems using the Fundamental Theorem of Line Integrals, Green's Theorem, The Divergence Theorem and Stokes' Theorem. 5. Apply the computational and conceptual principles to the solutions of real-world problem

Indicative Contents المحتويات الإرشادية	**1. The Geometry of Space** 1.1 Lines, planes, and surfaces in space 1.2 Cylindrical and spherical coordinates **2. Vector-Valued Functions** 2.1 Space curves and vector-valued functions 2.2 Differentiation of vector-valued functions 2.3 Integration of vector-valued functions 2.4 Applications of vector-valued functions **3. Functions of Several Variables** 3.1 Partial derivatives and differentials 3.2 Chain rule for one or two independent variables 3.3 Implicit partial differentiation 3.4 The directional derivative of a function of two variables 3.5 The gradient of a function of two variables and applications 3.6 Extrema of functions of two variables 3.7 Optimization problems involving functions of several variables 3.8 Constrained optimization: The Lagrange Multipliers method **4. Multiple Integration** 4.1 Iterated integrals and area of a plane region 4.2 Double integrals and volume of a solid region 4.3 Double integrals in polar coordinates 4.4 Triple integrals in cylindrical and spherical coordinates **5. Vector Calculus** 5.1 Vector fields and line integrals 5.2 The fundamental theorem of line integrals 5.3 Green's theorem and applications 5.4 Parametric and surface integrals 5.5 Divergence theorem and applications 5.6 Stokes's theorem and applications

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in the delivery of the Calculus-III course is to encourage students to understand and analyze Vector problems and use its principles in solving problems related to applications of vector valued function like function with several variables and find surface area in three dimension coordinates, while improving and expanding their critical thinking skills at the same time. This will be achieved through classes and interactive tutorials.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	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
	Assignments	2	10% (10)	3 and 12	LO #2,
	Projects / Lab.			3-13	
	Report				
Summative assessment	**Midterm Exam**	2hr	20% (20)	8 and 12	LO #1 - #4
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Vectors and the Geometry of Space Three-Dimensional Coordinate Systems Vectors The Dot Product The Cross Product
Week 2	Lines and Planes in Space Cylinders and Quadric Surfaces
Week 3	Vector-Valued Functions and Motion in Space Curves in Space and Their Tangents
Week 4	Integrals of Vector Functions; Projectile Motion Arc Length in Space
Week 5	Curvature and Normal Vectors of a Curve Tangential and Normal Components of Acceleration
Week 6	Partial Derivatives Functions of Several Variables
Week 7	Limits and Continuity in Higher Dimensions Partial Derivatives
Week 8	**Mid-term Exam1**
Week 9	The Chain Rule Directional Derivatives and Gradient Vectors Tangent Planes and Differentials
Week 10	Extreme Values and Saddle Points Lagrange Multipliers
Week 11	Multiple Integrals Double and Iterated Integrals over Rectangles Double Integrals over General Regions
Week 12	**Mid-term Exam2**
Week 13	Area by Double Integration Triple Integrals in Rectangular Coordinates
Week 14	Integration in Vector Fields (Vector Analysis) Vector Fields and Line Integrals
Week 15	Green's Theorem in the Plane Stokes' Theorem The Divergence Theorem and a Unified Theory
Week 16	**Preparing to final exam**

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

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Calculus, 8th edition (2007) by Howard Anton, (John Wiley & Sons, Inc, New York). Chapters: 7,8,10&11	No
Recommended Texts	1 – Calculus, by H. Anton, I. Bivens, and S. Davis, 8th Edition, 2002, Wiley 2 - Calculus by Thomas & Finney.	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 14

Module Information معلومات المادة الدراسية					
Module Title	**Fluids Mechanics**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWE2305**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGII	**Semester of Delivery**		Three
Administering Department		DWE	**College**	ENGINEERING	
Module Leader	Name: Uday hateem		**e-mail**	Uday_hatem@uoanbar.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		M.Sc.
Module Tutor			**e-mail**	E-mail	
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		**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The goals of this course are to enable students to: Understand the practical concepts of fluid behavior and their interaction with fluid and structures. Apply the knowledge of fluid properties and basic mechanics to analyze and design hydraulic structures that are related to Dams and Water Resources Engineering program.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of successful completion of this course, the student will be able to: 1. The students should be able to define and describe the following basic properties of fluid such as relative density or specific density, viscosity, surface tension, atmospheric pressure as well as Newtonian and Non-Newtonian fluids. 2. The students will be able describe and define the hydrostatic forces on submerged surface and calculate it. 3. The student will be able to identify the laminar and turbulent flow . 4. The students should demonstrate an understanding of the following concepts relating to fluid in motion: Quantity equation, Bernoulli equation, Momentum concept 5. The student will be able to apply the fundamental concepts to problems of flow in pipes. 6. The student will be able to determine the losses of flow in pipes. 7. The students will learn the differences and similarities between pipe flow systems like, pipes in series, pipe in parallel and branch pipes and how solve these problems. 8. The student will be able to draw energy and hydraulic grade lines.
Indicative Contents المحتويات الإرشادية	- The students should be able to define and describe the following basic properties of fluid such as relative density or specific density, viscosity, surface tension, atmospheric pressure as well as Newtonian and Non-Newtonian fluids. - The students will be able describe and define the hydrostatic forces on submerged surface, and calculate it. - The student will be able to identify the laminar and turbulent flow . - The students should demonstrate an understanding of the following concepts relating to fluid in motion: Quantality equation, Bernoulli equation, Momentum concept - The student will be able to apply the fundamental concepts to problems of flow in pipes. - The student will be able to determine the losses of flow in pipes.

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

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	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,
Week 2	Properties of fluids
Week 3	Fluid in static pressure
Week 4	Hydrostatic force on submerged surface
Week 5	Acceleration fluids mass
Week 6	Liquid in motion
Week 7	Rate of change of momentum,
Week 8	Energy and hydraulic grade lines
Week 9	Pipes flow
Week 10	Losses in flow of fluid
Week 11	Friction factor in pipes
Week 12	Simple pipe problems
Week 13	Pipes in series and in parallel
Week 14	Branch of pipes lines
Week 15	**Review**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1 Fluid Properties
Week 2	Lab 2 Fluid Statics
Week 3	Lab 3 Bernoulli Equation
Week 4	Lab 4 Velocity Profiles
Week 5	Lab 5 Sluice Gate
Week 6	Lab 6 Conservation of Momentum
Week 7	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	**Fluid Mechanics, Streeter**	Yes
Recommended Texts		
Websites		

Grading Scheme

مخطط الدرجات

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

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

MODULE 15

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Surveying 1**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWE2306**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGII	**Semester of Delivery**		Three
Administering Department		DWE	**College**	ENG	
Module Leader	Khamis N. Sayl		**e-mail**	knsayl@uoanbar.edu.iq	
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		01/06/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To develop problem solving skills and understanding of measurements theory through the application of techniques. 2. To understand theory of errors. 3. This course deals with the basic concept of leveling. 4. This is course deals with the concept of distance measurements . 5. To understand angles and direction. 6. To understand of coordinates.
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. Recognize how measures distances. 2. List the various terms associated with measuring distances. 3. Summarize what is meant by a basic leveling. 4. Recognize the types of errors. 5. Recognize the types of equipment used for leveling. 6. Identify the basic of electronic distance measurements and their applications. 7. Identify the basic of angles measurements and their applications. 8. Identify the types of direction measurements and their applications. 9. Identify the coordinates computation and adjustments.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – Measurements Theory - Measurements Theory – types of measurements, distances and angles, types of errors, types of quantities, . [6 hrs] - Leveling – types of leveling, differential leveling, reciprocal leveling, trigonometric leveling . [15 hrs] - Distance measurements, tapes kinds, errors of tapes, standard errors, temperature errors, sag errors, . [10 hrs] - Angles measurements, types of angles measurements, types of directions, . [6 hrs] - Revision problem classes [6 hrs] Part B – practical - Measurements Theory, tape measurements, leveling types, . [15 hrs] - Angles measurements . [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	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
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	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction - principles of measurements
Week 2	theory of errors
Week 3	Types of errors
Week 4	Distance measurements
Week 5	tapes errors
Week 6	Principles of leveling
Week 7	Types of leveling
Week 8	Profile and cross sections
Week 9	Angles measurements
Week 10	Types of theodolite
Week 11	directions
Week 12	Types of directions
Week 13	Network computations
Week 14	Networks adjustments
Week 15	Coordinates computations
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction distance measurements
Week 2	Lab 2: distance measurements
Week 3	Lab 3: leveling
Week 4	Lab 4: leveling
Week 5	Lab 5: profiles
Week 6	Lab 6: cross sections
Week 7	Lab 7: angles
Week 8	Lab 8: angles
Week 9	Lab 9: directions
Week 10	Lab 10: network measurements
Week 11	Lab 11: network adjustments
Week 12	Lab 12: coordinates computations

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Fundamentals of Geomatics	Yes
Recommended Texts	Surveying	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

Grading Scheme

مخطط الدرجات

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

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

MODULE 16

Module Information معلومات المادة الدراسية					
Module Title	**Concrete Technology**			**Module Delivery**	
Module Type	**Basic learning activity**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWE2309**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGII	**Semester of Delivery**		Three
Administering Department		DWE	**College**	ENG	
Module Leader	Ayad S. Aadi		**e-mail**	Ayad_saeed@uoanbr.edu.iq	
Module Leader's Acad. Title		Assistant Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		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		**Semester**	
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	knowledge of concrete properties. Understand the practical behavior of concrete and mix design.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Students are introduced to concrete as a task building material. Students will learn basic concrete components and their additives. Students will learn the behavior and properties of concrete. Students will introduce to the concrete mix design procedure. Students will learn the properties and behavior of special types of concrete and their applications.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. - Part A - Concrete Material Properties and Concrete Developments General explanation of the constituent materials, manufacture and development of concrete - Part B - Admixtures Explain the importance and uses of concrete admixtures and distinguish between them - Part C - Special types of Concrete and Manufacture of Concrete Knowledge of special concrete types and their work - Part D - Concrete Mix Design Learn how to design concrete mixes for ordinary concrete and high strength concrete and calculate their quantities and mixing ratios. - Part E - Concrete Mix Design Learn how to design concrete mixes for ordinary concrete and high strength concrete and calculate their quantities and mixing ratios. - Part F - Properties and Testing of Fresh Concrete A detailed study of the properties of soft concrete, including work, testing, casting and curing - Part G - Properties and Testing of Hardened Concrete A detailed study on the properties of hardened concrete in terms of resistance to compression, tensile strength, shear strength, flexural strength, and bonding with reinforcing steel.

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

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Concrete properties and developments
Week 2	Admixtures
Week 3	Admixtures
Week 4	Special types of Concrete
Week 5	Special types of Concrete
Week 6	Manufacture of Concrete
Week 7	Quiz with resolve problems and discussion
Week 8	Concrete Mix Design
Week 9	Concrete Mix Design
Week 10	Properties and Testing of Fresh Concrete
Week 11	Properties and Testing of Fresh Concrete
Week 12	Properties and Testing of Hardened Concrete
Week 13	Properties and Testing of Hardened Concrete
Week 14	Non-Destructive Testing of Concrete
Week 15	Quiz with resolve problems and discussion
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Making concrete mixtures according to mixing proportions and how to prepare test sample
Week 2	Lab 2: Explanation of the practice of making cement and aggregate tests
Week 3	Lab 3: Explanation and practice of making models to test the compressive strength of cubic and cylindrical concrete
Week 4	Lab 4: Explanation and practice of making models to test the flexural strength of prism concrete sample
Week 5	Lab 5: Explanation and practice of making models to test the shear strength of cylinder concrete sample
Week 6	Lab 6: Conducting tests for the samples of the above experiments and taking their results
Week 7	Lab 7: Students learned how to share and compare the obtained results with them
Week 8	Lab 8: Comprehensive review

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Concrete Technology – Dr. M.S.Shetty Properties of Concrete – A.M.Neville Concrete – Dr. Mahmood Al Imam	Yes
Recommended Texts		
Websites		

Grading Scheme

مخطط الدرجات

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

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

MODULE 17

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Mechanics (Dynamics)**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**DWE2304**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	UGII		**Semester of Delivery**	Three	
Administering Department	DWE		**College**	ENG	
Module Leader	Mohammed T. Nawar		**e-mail**	Mohammad.nawar@uoanbar.edu.iq	
Module Leader's Acad. Title	Lect.		**Module Leader's Qualification**	MSC	
Module Tutor	Mohammed H. Abdullah		**e-mail**	mohammed.alani@uoanbar.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	5.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The goal of this course is to develop the ability in students to evaluate fundamental engineering problems in a simple manner by creating free body diagrams and to determine the dynamic behavior of structures by utilizing equilibrium principles under dynamic loading conditions, as well as equilibrium equations based on these principles.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Understand basic kinematics concepts – displacement, velocity and acceleration (and their angular counterparts). Understand basic dynamics concepts – force, momentum, work and energy. Understand and be able to apply Newton's laws of motion. Understand and be able to apply other basic dynamics concepts - the Work-Energy principle. Impulse-Momentum principle and the coefficient of restitution. Learn to solve dynamics problems. Appraise given information and determine which concepts apply, and choose an appropriate solution strategy. Gain an introduction to basic machine parts such as pulleys and mass-spring systems.
Indicative Contents المحتويات الإرشادية	**Chapter 1: Basic Concepts** Concepts of space, time, mass, velocity, acceleration and force. Scalar and vector quantities. Newton's law of motion. Law of gravitation. **Chapter 2: Kinematics of a Particle** Rectilinear Motion. Curvilinear Motion – Rectangular Coordinates. Projectile Motion. Curvilinear Motion – Normal & Tangential Coordinates. Curvilinear Motion – Polar Coordinates. Relative Motion. Constrained Motion of Particles. **Chapter 3: Kinetics of Particles: Force & Acceleration** Newton's 2nd Law. Equations of Motion. Rectangular Coordinates. Normal & Tangential Coordinates. **Chapter 4: Kinetics of Particles: Work & Energy** Work of a Force. Work & Energy. Potential Energy. **Chapter 5: Kinetics of Particles: Impulse & Momentum** Linear Impulse & Momentum. Angular Momentum. Angular Impulse & Momentum.

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	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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.				
	Report				
Summative assessment	**Midterm Exam**	2hr	20% (20)	8 and 12	LO #1 - #7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Basic Concepts** Concepts of space, time, mass, velocity, acceleration and force, Scalar and vector quantities, Newton's law of motion, Law of gravitation.
Week 2	**Kinematics of a Particle** Rectilinear Motion, Curvilinear Motion – Rectangular Coordinates, Projectile Motion.
Week 3	**Kinematics of a Particle** Curvilinear Motion – Normal & Tangential Coordinates, Curvilinear Motion – Polar Coordinates.
Week 4	**Kinematics of a Particle** Relative Motion, Constrained Motion of Particles.
Week 5	**Kinetics of Particles: Force & Acceleration** Newton's 2nd Law, Equations of Motion.
Week 6	**Kinetics of Particles: Force & Acceleration** Rectangular Coordinates.
Week 7	**Kinetics of Particles: Force & Acceleration** Normal & Tangential Coordinates.
Week 8	**Mid-term Exam1**
Week 9	**Chapter 4: Kinetics of Particles: Work & Energy** Work of a Force, Work & Energy.
Week 10	**Chapter 4: Kinetics of Particles: Work & Energy** Potential Energy.
Week 11	**Kinetics of Particles: Impulse & Momentum** Linear Impulse & Momentum.
Week 12	**Kinetics of Particles: Impulse & Momentum** Angular Momentum.
Week 13	**Mid-term Exam2**
Week 14	**Kinetics of Particles: Impulse & Momentum** Angular Impulse & Momentum.
Week 15	**Preparing to final exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Engineering mechanics dynamics (6th edition) j. l. meriam, l. g. kraige.	No
Recommended Texts	Engineering Mechanics: Dynamics, 15th edition Russell C. Hibbeler.	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 18

Module Information معلومات المادة الدراسية					
Module Title	**Human Rights & Democracy**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWE2103**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level		UGII	**Semester of Delivery**		Three
Administering Department			**College**	Engineering	
Module Leader	Majid Hadi Talal		**e-mail**	@uoanbar.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	This course is designed to give the student a definition of human rights and democracy idiomatically, the legitimacy of the origin of the right in the view of Islamic law, the pillars of the right and its types, personal freedom, intellectual freedom, economic rights and freedoms, Islam and slavery, the goals of human rights, the use of freedom and the general legitimate right, the right of a Muslim to His Muslim brother, the rights of parents, the right neighbor, the right of women, human rights in the divine religions, religious tolerance in Islam. thinking skills 1. Work on developing the intellectual property of the student. 2. Ensuring the student's personal development at the academic level. 3. Drawing ways of intellectual success to achieve personality building on the (family, social, academic, and professional) levels. 4. Learn the art of dealing with the above character building levels.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explain the concept of "human rights and democracy" 2. The status of human rights and freedoms in Islam 3. Define and describe the relationship between human rights and democracy
Indicative Contents المحتويات الإرشادية	**Course Topics:** 1. Introducing human rights, democracy and the principle of freedoms. [Two hours] 2. The origin of right and freedom from the point of view of Islamic law, and the general concept. [3 hours] 3. Elements and types of human rights and freedoms. [8 hours] 4. Economic and political rights and freedoms. [3 hours] 5. Islam and slavery. [1 hour] 6. The objectives of human rights and democracy. [4 hours] 7. The project of using freedom and public right. [2 hours] 8. The right of a Muslim and humanity. [2 hours]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Raise the intellectual level of students, which is the importance of human rights when it is reflected on the individual, society and the state

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	32	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	18	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Raise the intellectual level of students, which is the importance of human rights when it is reflected on the individual, society and the state

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	The Universal Declaration of Human Rights and other countries speak of human rights over the individual, society and the state. Clarifying the meaning of right, duty, responsibility and guarantees of human rights before the judiciary.
Week 2	Sections of human rights in law and Sharia, statement of the rights of God Almighty and guarantees of human rights. It includes sections of the rights of the individual over society such as the right to protect life, honor and mind, and the right to protect money and property.
Week 3	The right to equality before the law and the right to equality and justice among individuals. The right of the individual to work, learn, express his opinion and freedom of thought.
Week 4	Clauses of preserving the freedoms contained in the Universal Declaration of Human Rights, and the impact of the study. Explanation of the meaning of freedom and democracy and the types and divisions of freedoms.
Week 5	Freedoms related to the material rights of an individual, including personal freedom. Freedoms related to the material rights of an individual, including civil liberties.
Week 6	Freedom of movement, residence and ownership. Freedoms related to the moral rights of the individual.
Week 7	Mid-term Exam + Unit-Step Forcing, Forced Response, the RLC Circuit.
Week 8	Statement of the sanctity of the home and the right of the individual to move. The rights of society over the individual include the right to freedom of belief and life, the right to honor protection, work and education.
Week 9	Ensuring equality before the law and the judiciary, freedom of opinion and thought, and protection of the mind The right to protection of property and travel.
Week 10	The rights of the individual over the individual, including social rights. Financial rights and its importance in ensuring social life.
Week 11	Finally, emphasizing the importance of commitment to applying human rights and their impact on the individual, society and the state.
Week 12	Freedom of belief, freedom of opinion and expression, and freedom of education. Political freedom, the culture of dialogue and its impact on proving freedom of opinion.
Week 13	One of the heroes of enslaving people and proving freedom for individuals. Highlighting the freedom of women and beautifying them in adhering to the teachings of faith and proving the importance of applying the principle of freedoms among individuals.
Week 14	Individual and international interest in applying the principle of freedoms. Rights and freedoms are two interrelated principles. The role of the individual, society and the state in establishing the principle of human rights and freedoms. And a statement of the negatives in the event of non-application of the principle of freedoms.
Week 15	Iraq and international treaties in the field of human rights and Iraq's position in eliminating dictatorship and racism and work to preserve public rights and public money and eliminate financial and administrative corruption.
Week 16	Preparatory week before the final Exam.

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Lectures on human rights, freedoms and democracy	Yes
Recommended Texts	1. Human rights and freedoms. Prof. Dr. Mustafa Al-Zalmi. 2. Some contemporary published research involving human rights and books on the Universal Declaration of Human Rights	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 19

Module Information معلومات المادة الدراسية					
Module Title	**Calculus IV**			**Module Delivery**	
Module Type	**Basic Learning Activity**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWE2212**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGII	**Semester of Delivery**		Four
Administering Department		DWE	**College**	Engineering	
Module Leader	Dr. Muhannad Aldosary		**e-mail**	Muhaannad_dosary@uoanabr.edu.iq	
Module Leader's Acad. Title		senior lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	Hend Saad		**e-mail**	hind.saad@uoanbar.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		**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The laws of nature are expressed as differential equations. Scientists and engineers must know how to model the world in terms of differential equations, and how to solve those equations and interpret the solutions. This course focuses on linear differential equations and their applications in science and engineering. Understand and solve problems using Fourier Series, Solve differential equations using the theory of Laplace transform
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. By the end of the course students will be able to: 2. Model a simple physical system to obtain a first order differential equation. 3. Test the plausibility of a solution to a differential equation (DE) which models a physical situation by using reality-check methods such as physical reasoning, looking at the graph of the solution, testing extreme cases, and checking units. 4. Visualize solutions using direction fields and approximate them using Euler's method. 5. Understand and solve problems using Fourier Series 6. Solve differential equations using the theory of Laplace transform
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Chapter one** - Introduction to first order differential equations : Definitions and reviews, methods of solving first order differential equations, Variable separable , Homogenous, Equations reducible to homogeneous form, Exact, Linear , equation reducible to linear form (Bernoulli's equation) - [20 hrs] **Chapter Two** - Application of First order differential equations, Tank filled with flowed, body falls in a medium, Structural Applications [10 hrs] **Chapter Three** - Second Order Ordinary Differential Equations, Solution of Homogeneous Linear D.Es with constant coefficients, Initial Value and Boundary Value Problems, Solutions of Nonhomogeneous Linear D.E with constant coefficients, The Method of Undetermined Coefficients, Method of Variation of Parameters, [15 hrs] **Chapter Four** - Applications of Second Order Linear Differential Equations with constant, Free Oscillation spring, Damped Oscillation, Column Buckling: [15 hrs] **Chapter Five** - Fourier series, Introduction, Functions with Period 2Pi, Functions with Period 2L [15 hrs] **Chapter Six** - Laplace Transforms, Introduction, Definition of Laplace transforms, Laplace transforms for derivatives, Properties of Laplace Transforms, Inverse of Laplace transforms, Properties of Inverse of Laplace transform , Solution of Ordinary D.E's by Laplace transforms, D.E's with constant coefficients , D.E's with variable coefficients , Simultaneous Linear D.E's , [20 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Mathematics engineering courses require effective learning and teaching strategies to ensure students develop a strong understanding of complex concepts and their practical applications. The range of strategies that can enhance the learning experience for students in Mathematics engineering courses. These strategies include lecture-based teaching, practical applications, problem-solving assignments, group work and discussions, technology integration, assessments and feedback, continuous learning, and encouraging self-directed learning. By incorporating these strategies, educators can create an engaging and comprehensive learning environment that equips students with the knowledge, skills, and critical thinking abilities necessary for success.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.0
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	10% (10)	3, 6,10,14	LO #1, 3,5, and 7
	Assignments	2	5% (5)	2, 12	LO # 4 and 7
	Projects / Lab.	1			
	Report	1	5% (5)	13	LO # 2,6 and 7
Summative assessment	**Midterm Exam**	2 hr	20% (20)	7	LO # 1-7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to first order differential equations : Definitions and reviews, methods of solving first order differential equations
Week 2	Variable separable , Homogenous, reducible to homogeneous form,
Week 3	Exact, Linear , equation reducible to linear form (Bernoulli's equation)
Week 4	Application of First order differential equations, Tank filled with flowed, body falls in a medium, Structural Applications
Week 5	Second Order Ordinary Differential Equations, Solution of Homogeneous Linear D.Es with constant coefficients, Initial Value and Boundary Value Problems
Week 6	Solutions of Nonhomogeneous Linear D.E with constant coefficients, The Method of Undetermined Coefficients
Week 7	Method of Variation of Parameters
Week 8	Applications of Second Order Linear Differential Equations with constant, Free Oscillation spring, Damped Oscillation, Column Buckling
Week 9	Fourier series, Introduction, Functions with Period 2Pi
Week 10	Fourier series, Functions with Period 2L
Week 11	Laplace Transforms, Introduction, Definition of Laplace transforms, Laplace transforms for derivatives
Week 12	Properties of Laplace Transforms,
Week 13	Inverse of Laplace transforms, Properties of Inverse of Laplace transform
Week 14	Solution of Ordinary D.E's by Laplace transforms, D.E's with constant coefficients
Week 15	Solution of Ordinary D.E's with variable coefficients , Simultaneous Linear D.E's
Week 16	**Preparatory week before the final Exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• Differential Equations with Boundary-Value Problems, seventh edition. Dennis G. Zill, Michael R Cullen. Copyright 2009, Brooks/Cole. ISBN-13: 978-0-495-10836-8	Yes
Recommended Texts	• Differential Equations with Boundary-Value Problems Student Solutions Manual. Warren S. Wright, Dennis G. Zill, Carol D. Wright. Copyright 2009, Brooks/Cole Publishing Company. ISBN 978-0-495-38316-1.	Yes
Websites	https://www.uoanbar.edu.iq/Bank-Section.php	

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 20

Module Information معلومات المادة الدراسية					
Module Title	**Open Channels**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWE2315**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGII	**Semester of Delivery**		Four
Administering Department		DWE	**College**	ENGINEERING	
Module Leader	Name: Uday hateem		**e-mail**	Uday_hatem@uoanbar.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		M.Sc.
Module Tutor			**e-mail**	E-mail	
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	Fluids mechanics	**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 goals of this course are to enable students to: Apply the knowledge of open channels and basic concepts to analyze and design many types of it that are related to Dams and Water Resources Engineering program.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of successful completion of this course, the student will be able to: 1. Ability to identify the types and regimes of flow in open channel. 2. Ability to identify the principals of momentum in open channel. 3. Ability to identify the energy and specific energy in open channel 4. Ability to analyze the problems of open channel flow and design open channel. 5. Ability to solve analysis and design problems related to bed material. 6. The student will be able to determine the losses of flow in pipes. 7. The students will learn the differences and similarities between pipe flow systems like, pipes in series, pipe in parallel and branch pipes and how solve these problems. 8. The student will be able to draw energy and hydraulic grade lines.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Ability to identify the types and regimes of flow in open channel. 2. Ability to identify the principals of momentum in open channel. 3. Ability to identify the energy and specific energy in open channel 4. Ability to analyze the problems of open channel flow and design open channel. 5. Ability to solve analysis and design problems related to bed material. 6. The student will be able to determine the losses of flow in pipes. 7. The students will learn the differences and similarities between pipe flow systems like, pipes in series, pipe in parallel and branch pipes and how solve these problems. 8. The student will be able to draw energy and hydraulic grade lines.

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	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	102	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	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
Week 2	Types, state, and regimes of flow
Week 3	Kinds of open channel
Week 4	Channel geometry
Week 5	Velocity-distribution coefficients
Week 6	Pressure distribution in a channel section
Week 7	Effect of slope on pressure distribution
Week 8	Energy, and specific energy in open channel
Week 9	Critical flow
Week 10	Uniform flow
Week 11	Erodible channels
Week 12	Non erodible channels
Week 13	Best hydraulic section
Week 14	Determination of section dimensions.
Week 15	**review**
Week 16	**Final Exam**

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

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	**Text Book(s):open channel hydraulics - chow**	Yes
Recommended Texts		
Websites		

Grading Scheme

مخطط الدرجات

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

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

MODULE 21

Module Information معلومات المادة الدراسية					
Module Title	**Buildings Construction**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWE2308**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGII	**Semester of Delivery**		Four
Administering Department		DWE	**College**	ENG	
Module Leader	Dr.Aseel Madallah Mohammed		**e-mail**	Aseel.mohammed@uoanbar.edu.iq	
Module Leader's Acad. Title		Lecture	**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		01/06/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Understand the construction materials and equipment's used in the creation of buildings 2. Apply the principles of construction used in the buildings above ground level, the buildings below the level of the earth's surface and lining.
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. Apply engineering design to produce solutions and apply new knowledge resulted from studying of the buildings above ground level, the buildings below the level of the earth's surface and lining. 2. communicate effectively with a range of audiences throughout knowing the equipment's used in the creation of buildings by field visits to work sites. 3. Work as a team together to select and test the suitable construction building materials. 4. The student learns how to properly invest building materials in construction. 5. The student will be deal with the different implementation methods for the construction of buildings. 6. Developing the student's ability to dialogue and discuss the principles of building construction
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Principles of building construction</u> - Introduction – Stages of building construction, Buildings types, Building construction development. Earth works, Mechanical equpiments, Groundwater drainage, Earth fillings. [15 hrs] - Footing and foundations – Piles, Concrete works underwater. Masonry works, Forms, Beams ,Girder and columns. [15 hrs] <u>Part B – Building above and below ground level</u> - Water tanks, Dams, Retaining walls, Regulators , Culverts, Energy dissipation installations, Arches, Bridges, Damp proofing, Cladding works, Special constructions of hydraulic accumulators, Lining. [15 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module are : Increasing students' interest in the topic of the lesson, by including a new scientific item, or by enhancing the studied scientific item. Train students to discuss and learn about its rules, and encourage them to communicate with each other; To exchange or inquire about information

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	117	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	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.				
	Report	1	10% (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 – Stages of building construction, Buildings types, Building construction development
Week 2	Earth works
Week 3	Mechanical equpiments, Groundwater drainage, Earth fillings.
Week 4	Footing and foundations
Week 5	Piles, Concrete works underwater
Week 6	Girder and columns
Week 7	Water tanks
Week 8	Dams
Week 9	Retaining walls, Special constructions of hydraulic accumulators, Lining
Week 10	Regulators , Culverts
Week 11	Energy dissipation installations
Week 12	Arches
Week 13	Bridges
Week 14	Damp proofing
Week 15	Cladding works
Week 16	**Preparatory week before the final Exam**

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

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Building Construcions ,Artin Levon and Zuhair Sako	Yes
Recommended Texts	Building Construction ,Mohammed Abdullah	No
Websites	https://www.researchgate.net/publication/332899319_Construction_Of_Hydraulic_Structures_First_Edition_2018	

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 22

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Surveying II**			**Module Delivery**	
Module Type	**Basic Learning Activity**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWE2311**				
ECTS Credits	6				
SWL (hr/sem)	**150**				
Module Level		UGII	**Semester of Delivery**		Four
Administering Department		DWE	**College**	ENG	
Module Leader	Khamis N. Sayl		**e-mail**	knsayl@uoanbar.edu.iq	
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		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Engineering Surveying 1	**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 goals of this course are to enable students to: 1- Use basic mathematics skill in calculation in determining, measuring, and representing the land, three-dimensional objects, point-fields, and trajectories. 2. Assemble and interpret land and geographically related information. 3. Use that information for the planning and efficient administration of the land, the sea, and any structures thereon; and 4- Conduct research into the above practices and to develop them.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Compute area by using different types of area computation techniques. 2. Determine volumes of various types of material and determine of quantities of water discharged by streams and rivers, per unit of time. 3. Lay out different type of horizontal curve in the field with surveying equipment. 4. Determine the position of point using GPS. 5. The acquisition and use of spatial information from aerial and satellite imagery and administration of geographic information systems (GIS) 6. Apply different type of surveying equipment in hydrographic surveying.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – Measurements Theory - Measurements Theory – types of measurements, distances and angles, types of errors, types of quantities, . [6 hrs] - Leveling – types of leveling, differential leveling, reciprocal leveling, trigonometric leveling . [15 hrs] - Distance measurements, tapes kinds, errors of tapes, standard errors, temperature errors, sag errors, . [10 hrs] - Angles measurements, types of angles measurements, types of directions, . [6 hrs] - Revision problem classes [6 hrs] Part B – practical - Measurements Theory, tape measurements, leveling types, . [15 hrs] - Angles measurements . [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	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	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	Areas
Week 2	Areas
Week 3	Volumes
Week 4	Volumes
Week 5	Volumes
Week 6	Horizontal curves
Week 7	Horizontal curves.
Week 8	Global Position System (GPS)
Week 9	Global Position System (GPS)
Week 10	Basic principle of remote sensing
Week 11	Basic principle of remote sensing
Week 12	Introduction to Geographic Information System (GIS).
Week 13	Introduction to Geographic Information System (GIS).
Week 14	Hydrographic surveying.
Week 15	Hydrographic surveying.
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Total station
Week 2	Measuring distances using total station.
Week 3	Measuring area using total station
Week 4	Area computation (map)
Week 5	Total station application
Week 6	Volume computation using total station.
Week 7	Layout horizontal curve
Week 8	GPS application
Week 9	GPS application
Week 10	Type of remote sensing data.
Week 11	Type of remote sensing data.
Week 12	GIS program

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Elementry Surveying An Introduction to Geomatics by Charles D. Ghilani & Paul R. Wolf	Yes
Recommended Texts	Surveying	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 23

Module Information معلومات المادة الدراسية					
Module Title	**Strength of Materials**			**Module Delivery**	
Module Type	**Core**			☒ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☒ Seminar	
Module Code	**DWE3300**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGII	**Semester of Delivery**		Four
Administering Department		DWE	**College**	ENG	
Module Leader	Ahmed Dalaf Ahmed		**e-mail**	Ahme3ddalaf44@uoanbar.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		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Engineering Mechanics (Static)	**Semester**	2
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Understand concept of stress and strain. 2. Understand relation between stress and strain. 3. Ability to identify and solve statically indeterminate problems. 4. Ability to analyze stress conditions in beams under general loading conditions. 5. Ability to determine shear stress and shear flow in beams under transverse loading 6. Ability to transform stress 7. Ability to solve analysis and design problems related to material response to load.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. The students will understand concept of stress and strain. 2. The students will understand relation between stress and strain. 3. The students will be able to identify and solve statically indeterminate problems. 4. The students will able to analyze stress conditions in beams under general loading conditions. 5. The students will able to determine shear stress and shear flow in beams under transverse loading 6. Ability to transform stress 7. Ability to solve analysis and design problems related to material response to load.
Indicative Contents المحتويات الإرشادية	Chapter 1: Stress -Concept of stress. -Simple stress - Normal stress - Shearing stress. - Bearing stress -Thin-Walled Pressure Vessels. - Lab. (10 hurs) Chapter 2: Strain - Simple strain - Stress-Strain diagram and its properties - Working Stress, Allowable Stress, And Factor of Safety -Axial deformation -Biaxial deformation -Tri-axial deformation -Shear Deformation and Shear Strain Bulk Modulus of Elasticity or Modulus of Volume Expansion - Solved Problems in Poison's ratio. - Lab. (15 hrs) Chapter 3: Thermal Stresses -Introduction - Solved Problems in Thermal Stress. - Lab. (10 hrs) Chapter 4: Beams - Introduction. - Classification of Beams. - Types of Loading

	-Shear Force and Bending Moment Diagrams - Lab. (15 hrs) Chapter 5: Stresses In Beams - Flexure Formula. - Moment of inertia. - Bending moment stress distribution in beam. - Shearing stress distribution in beam. - Lab. (15 hrs) Chapter 6: Stress Transformation and Mohr's Circle - Transformation equation - Principal Stresses and Maximum Shearing Stress - Mohr's Circle. (10 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	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	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.	2	10% (10)	5 and 10	
	Report				
Summative assessment	Midterm Exam	2hr	20% (20)	8 and 12	LO #1 - #7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Concept of stress, Simple stress, Normal stress, Shearing stress, Bearing stress
Week 2	Thin-Walled Pressure Vessels.
Week 3	Simple strain, Stress-Strain diagram and its properties
Week 4	Working Stress, Allowable Stress, And Factor of Safety, Axial deformation
Week 5	Biaxial deformation, Tri-axial deformation
Week 6	Shear Deformation and Shear Strain Bulk Modulus of Elasticity or Modulus of Volume Expansion, Solved Problems in Poison's ratio.
Week 7	**Mid-term Exam1**
Week 8	Beams, Introduction, Classification of Beams,Types of Loading -Shear Force and Bending Moment Diagrams
Week 9	Shear Force and Bending Moment Diagrams1
Week 10	Shear Force and Bending Moment Diagrams2
Week 11	Stresses In Beams, Flexure Formula, Moment of inertia.
Week 12	**Mid-term Exam2** + Bending moment stress distribution in beam.
Week 13	Bending moment stress distribution in beam, Shearing stress distribution in beam..
Week 14	Stress Transformation and Mohr's Circle, Transformation equation, Principal Stresses and Maximum Shearing Stress
Week 15	Mohr's Circle.
Week 16	**Preparing to final exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Warren vissman , Introduction to hydrology, 5th ed, 2003.	No
Recommended Texts	- Ven Te Chow, Applied hydrology. - Em. Wilson, Engineering hydrology	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 24

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Hydrology**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**DWE3318**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGIII		**Semester of Delivery**	Five	
Administering Department	DWE		**College**	ENG	
Module Leader	Ammar Adham Ali		**e-mail**	Engammar2000@uoanbar.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	01/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To develop problem solving skills and understanding of hydrology application. 2. To understand and establish its relevance in civil engineering. 3. This is addressing issues related to water balance and developing hydrological calculation methods and accuracy. 4. To understand water expenditures and forecasting future water expenditures. 5. To determine the volume of reservoirs and simple hydraulic components.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. The students will learn hydrologic cycle, precipitation, streamflow measurements, return periods, aquifer and groundwater, design floods and their relationships to engineering designs. 2. The students will learn the basics of statistical theories, history of normal distribution and their applications in frequency analysis for hydraulic designs. 3. The students will learn the theory of water infiltration and evaporation and their effects on estimation of available water and flood analysis. 4. The students will learn theories of unit hydrograph and applications on flood forecast including peak discharge and time of peak occurrence. 5. The students will learn theories of flood routing including reservoir and channel routing in flood forecasting.
Indicative Contents المحتويات الإرشادية	Chapter 1: Introduction -The hydrology and hydrologic cycle, basic definitions. -Importance of the hydrologic cycle, Hydrology Definitions, - How The Hydrologic Process Works. - Water Utilization and production. - Catchment water balance and Water Budget Equation (10 hrs) Chapter 2: Precipitation - Types of precipitation (Frontal Precipitation, Convective Precipitation and Orographic Precipitation), Occurrence of Precipitation. - Rainfall, Measurement of Rainfall, Raingauges, Considerations in sitting a raingauge station include - Estimation of Missing Data. (15 hrs) Chapter 3: Abstract from Precipitation - Evaporation, Physics of Evaporation, Measurements of Evaporation. - Methods to Reduce Evaporation Losses. - Evapotranspiration, Measurements of Evapotranspiration. - Initial Loss, Interception, Depression Storage - Infiltration, Infiltration Capacity, Measuring of Infiltration, Φ and W–Indexes (15 hrs) Chapter 4: Stream Flow Measurements - Direct and indirect determination of stream discharge. - Measurements of Velocity. - Flow-Measurements (15 hrs) Chapter 5: Runoff - Runoff, Overland Flow, interflow. - Importance of Studying Runoff, Some Main Factors Affecting Runoff.

	- Catchment Yield, Rainfall-Runoff Correlation. - SCS-CN Method of Estimating Runoff Volume, Rational Method. (20 hrs) Chapter 6: Hydrographs - Basic definitions, shape of a hydrograph, parts of hydrograph, hydrograph components. - Hydrograph analysis, Factors Affecting Flood Hydrograph. - Effective Rainfall. - Unit hydrograph, Synthetic hydrograph. (20 hrs) Chapter 7: Groundwater - Introduction, Basic Assumptions, Forms of Subsurface Water. - What is an Aquifer, Types of Aquifers, Aquifer Properties. - Flow through a confined aquifers and Unconfined Aquifers. - Equilibrium hydraulics. (25 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	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	102	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	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
	Assignments	2	10% (10)	2 and 12	LO #3, #4
	Projects / Lab.				
	Report				
Summative assessment	Midterm Exam	2hr	20% (20)	8 and 12	LO #1 - #5
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Application of Hydrology in Engineering & Hydrologic cycle
Week 2	Hydrologic cycle, return periods and water balance
Week 3	Precipitation, types of precipitation and stream flow measurements
Week 4	Estimation of missed data, checking data consistency & Rainfall frequency analysis
Week 5	Theory of frequency analysis for design storms and design floods.
Week 6	Measurement of evaporation and estimation of potential evaporation
Week 7	Infiltration, Factors affecting infiltration, Measurement and estimation of infiltration process
Week 8	**Mid-term Exam1**
Week 9	Hydrographs, Introduction and Unit Hydrographs
Week 10	Hydrograph application, Time Area Models and Synthetic Unit Hydrographs
Week 11	Flood routing: channel & reservoir routing
Week 12	**Mid-term Exam2** + Introduction to groundwater and Movement of ground water and Transmissibility.
Week 13	Applications of binominal distribution for defining the return period in engineering design.
Week 14	Normal distribution and its application and relationship to hydraulic designs.
Week 15	Statistical distributions and their applications in flood analysis.
Week 16	**Preparing to final exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Warren vissman , Introduction to hydrology, 5th ed, 2003.	No
Recommended Texts	- Ven Te Chow, Applied hydrology. - Em. Wilson, Engineering hydrology	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 25

Module Information معلومات المادة الدراسية					
Module Title	**Water Quality**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWE3313**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGIII		**Semester of Delivery**	Five	
Administering Department	DWE		**College**	ENG	
Module Leader	Majeed Mattar Ramal		**e-mail**	Majeed.mattar@uoanbar.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	M.Sc.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	DWE1205 Chemistry	**Semester**	1
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The objective of this course is to provide the student with sufficient water quality and pollution background. By this course, the student will be able to solve many engineering problems through applying the analytical methods in solving these problems. In addition to learn some important water laboratory tests.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. know the basics and importance of environment and water characteristics . 2. identify the ways in which humans influence aquatic systems and Identify the major types of water pollution and their effects on aquatic ecosystems 3. know the technological solutions to water resources related problems 4. assess / Evaluate quantitative results pertaining to changes in water quality and propose different methods to solve water quality problems. 5. know the wastewater reclamation ways to reduce water pollution 6. know standard water quality tests on a laboratory.
Indicative Contents المحتويات الإرشادية	Chapter 1: Introduction - Introduction, water needs , Water storage, water quality - Environmental engineering rules. Water quality characteristics, water quality parameters , Physical water quality , sources ,impacts ,standards , Water quality control .(10 hrs) Chapter 3: Water quality - Chemical water quality, & standards of water, Water Pollution Regulations , Ion Balance ,Alkalinity species, Softening (Lime-Soda Ash) , Biological water quality , BOD, COD, Radiation pollution , Water quality Index , (12 hrs) Chapter 5: Engineering Water quality Control - pollution system, spreading of pollutants , Types of pollutants, Surface water pollution , River Characteristics , The Oxygen sag Curve, Streeter –Pheleps Equations , Lake Characteristics, Overturns, Eutrophication, Groundwater pollution , - Self-purification, Dilution, Reaeration , (8 hrs) Chapter 6: Water reclamation - Water reclamation, Municipality water reuse, Municipality water characteristics , storm water reuse , Municipality water reuse, industrial wastewater characteristics, industrial wastewater reuse, wastewater reuse for agricultura (6 hrs) Chapter 7: Desalination - Desalination ,Salinity sources , , salinity measurements reuse saline water, desalination control, processes, separate water from solution , Distillation and evaporation, Multiple effect long tube multi-stage flash , Vapor compression humidification, freezing , Direct freezing, indirect freezing , hydrates, reverse osmosis, solvent extraction, processes , separate salts from solution, Hydrialysis, Osmosion, absorbtion. (6 hrs) Chapter 8: Sedimentation

	- Sedimentation control, Sedimentation control in rivers, Sedimentation control in lakes , probable life of reservoirs (6 hrs) Chapter 9 : Engineering control - Engineering control , eutrophication control , viruses bacteria algae control , thermal pollution control (6 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 and by experimental work on lab.

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

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction, water needs , Water storage, water quality Environmental engineering rules
Week 2	Water characteristics, water quality parameters , Physical water quality , sources ,impacts ,standards , control
Week 3	Chemical water quality, & standards of water, Water Pollution Regulations , Ion Balance ,Alkalinity species, Softening (Lime-Soda Ash) ,
Week 4	Biological water quality , BOD, COD, Radiation pollution
Week 5	, Water quality Index
Week 6	Pollution system, spreading of pollutants , Types of pollutants, Surface water pollution , River Characteristics
Week 7	The Oxygen sag Curve, Streeter –Pheleps Equations , Lake Characteristics, Overturns, Eutrophication, Groundwater pollution
Week 8	Self purification, Dilution, Reaeration , Water reclamation, Municipality water reuse, Municipality water characteristics,
Week 9	storm water reuse , Municipality water reuse, industrial wastewater characteristics, industrial wastewater reuse,
Week 10	wastewater reuse for agricultural, Desalination ,Salinity sources

Week 11	salinity measurements reuse saline water, desalination control, processes, separate water from solution , Distillation and evaporation, Multiple effect long tube multi-stage flash , Vapor compression .
Week 12	humidification, freezing , Direct freezing, indirect freezing , hydrates, reverse osmosis, solvent extraction, processes , separate salts from solution, Hydrialysis, Osmosion, absorbtion
Week 13	Sedimentation control, Sedimentation control in rivers, Sedimentation control in lakes , probable life of reservoirs
Week 14	Engineering control , eutrophication control
Week 15	viruses bacteria algae control , thermal pollution control
Week 16	**final exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Safety, Lab Check-in Mass and Volume Measurements
Week 2	Qualitative Analysis of Anions : Part I
Week 3	Qualitative Analysis of Anions : Part II
Week 4	The Empirical Formula of a Metal Oxide
Week 5	Volumetric Analysis: Standardization of Sodium Hydroxide and Determination of Molar Mass of an Acid
Week 6	Applications of Volumetric Analysis: Determination of Active Ingredients of Commercial Bleach and Vinegar.
Week 7	Evaluation of the Universal Gas Constant, R
Week 8	Heat of Formation of Magnesium Oxide
Week 9	UV/VIS Spectroscopy and Spectrophotometry
Week 10	Spectrophotometric Analysis of Aspirin
Week 11	Synthesis of Alum and Crystal Growth

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Principle of water quality control, TEBBUTT.	yes
Recommended Texts	''Environmental Engineering'' , Peavy.H.S and et al ,International Ed. , 1985	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 26

Module Information معلومات المادة الدراسية					
Module Title	**Soil Mechanics**			**Module Delivery**	
Module Type	**Core**			☒ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☒ Seminar	
Module Code	**DWE3319**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGIII		**Semester of Delivery**	Five	
Administering Department	DWE		**College**	ENG	
Module Leader	Ahmed Amin Jubair		**e-mail**	Jubair3a@uoanbar.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	DWE1303 Engineering Geology	**Semester**	3
Co-requisites module		**Semester**	4

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	This course provides an elementary introduction to Geotechnical Engineering, and provides the basic mechanics necessary for the detailed study of Geotechnical Engineering. This course aims to provide an understanding of: the nature of soils as engineering materials; common soil classification schemes; the importance of water in the soil and the effects of water movement; methods of predicting soil settlements, the stress-strain-strength response of soils, and earth pressures.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this course students will be able to: 1. Give an engineering classification of any piece of soil, and on this basis predict how it will perform as an engineering material. 2. Understand the principle of effective stress, and be able to apply this to calculate the stresses causing soil deformation. 3. Calculate quantities of water flowing through the ground, and understand the effects that water flow has on the soil. 4. Calculate the settlements, and rates of settlement, under structures of various shapes and sizes. 5. Explain the advantages and limitations of the different methods of settlement calculation. 6. Determine the strength parameters appropriate to a range of stability problems, and understand the difference between total and effective stress approaches. 7. Evaluate strength parameters from laboratory data. 8. Use a spreadsheet to analyze a geotechnical design problem.
Indicative Contents المحتويات الإرشادية	1. Introductory Concepts: a. Soil Formation b. Classification c. Terminology d. Compaction 2. Effective Stress Principle: a. Total stress b. Pore Water Pressure c. Excess Pore Water Pressure 3. Steady State Flow through Soils: a. Permeability b. Steady State Seepage c. Flow Nets 4. Analysis of Deformation and Settlement: a. The Consolidation Process b. Methods of Settlement Prediction c. Rate of Settlement Analysis 2. Soil Behaviour a. Soil Strength b. Stress-strain response 3. Earth Pressures:

	a. Rankine's method b. Coulomb's method

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	108	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	42	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**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.	2	10% (10)	2 and 12	LO #1, #2 and #10, #11
	Report				
Summative assessment	Midterm Exam	2hr	20% (20)	8 and 12	LO #1 - #7
	Final Exam	3hr	50% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction: Soil problems in civil engineering, Soil as a construction material, The solution of soil engineering problems.
Week 2	Definitions, The physical state of a soil sample , e in term of V, Ws, Gs
Week 3	Soil Texture, Soil Structure (Fabric), Consistency and Atterberg Limits, Particle size Distribution.
Week 4	Soil classification Systems. According to USCS, US standard.
Week 5	Soil classification Systems. According to AASHTO.
Week 6	Clay Mineral, Nature of water in clay, Exchangeable Ions. Thickness of the double layer.
Week 7	Fluid Flow in Soils, One dimensional flow, Hydraulic Gradient, Darcy's Law. Heads in Static Water, Seepage Force , Quick Condition (Boiling) Stresses in soil due to flow.
Week 8	**Mid-term Exam1**
Week 9	Two dimensional flows, Objectives, Laplace's Equation Solutions.
Week 10	Stresses within a Soil Mass, Geostatic Stresses, Added Stresses, Stresses due to surface Loading, The stress Isobar Diagrams. Vertical Stress and Principal Stresses induced by uniformly loaded circular area, rectangular area, strip load, and triangular strip load. Newmark's graphical, Approximate method.
Week 11	Terzghi's consolidation Theory (1925, Types of Drainage Conditions, types of u, secondary compression ,Secondary settlement , Consolidation Ratio, Average Consolidation Ratio

Week 12	**Mid-term Exam2** Shear strength of Soils, Coulomb Failure Criterion, Mohr-Coulomb Failure Envelop, Soil type according to shear Strength, Tests for Measuring shear strength parameter
Week 13	Direct Shear Test, Dilatancy, Triaxial Shear Test, Failure plane, Standard Types of Triaxial Tests.
Week 14	Drained and Undrained Loading, Shear Strength Parameter From CD, Consolidated-Undrained Test (CU), Pore Water Pressure in Undrained loading, Shear Strength Parameter From CU, Unconsolidated -Undrained Test, Unconfined Compression Test,.
Week 15	Stress Path, Mohr-Coulomb Failure envelop and KF-line Relationship between the Kf-line and the Mohr-Coulomb failure envelope.
Week 16	**Preparing to final exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Water content determination, Organic matter determination
Week 2	Density (unit weight) determination
Week 3	Specific gravity determination
Week 4	Grain size analysis (sieve and hydrometer analysis)
Week 5	Atterberg limits
Week 6	Permeability (hydraulic) constant and falling tests.
Week 7	Moisture-density relation (compaction) test
Week 8	Consolidation test
Week 9	Unconfined compression test
Week 10	Direct shear test
Week 11	Consolidated undrained (cu) test

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	- Braja M. Das, Principles of Geotechnical Engineering, 2nd Edition, Southren Illinois University at Carbondale. PWS-KENT Publishing Company Bosten. - T. William Lambe, and Robert V. Whitman, Soil Mechanics. Massachusetts Institute of Technology, 1969.	No
Recommended Texts	- Bolton M., A Guide to Soil Mechanics - Scott C.R. An Introduction to Soil Mechanics and Foundation Engineering - Smith G.N. Elements of Soil Mechanics. Budhu M. Soil Mechanics and Foundations	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 27

Module Information معلومات المادة الدراسية					
Module Title	**Theory of Structures**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWE3322**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGIII		**Semester of Delivery**	Five	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Zaid Al-Azzawi		**e-mail**	Zaid.kani@uoanbar.edu.iq	
Module Leader's Acad. Title	Assist. Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	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	DWE2314 Strength of materials	**Semester**	4
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 impart the principles of elastic structural analysis and behavior of indeterminate structures. 2. Ability to idealize and analyze statically determinate and indeterminate structures. 3. To enable the student to get a feeling of how real-life structures behave. 4. Familiarity with professional and contemporary issues.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. To understand analysis of indeterminate structures and adopt an appropriate structural analysis technique. 2. Determine response of structures by classical, iterative and matrix methods.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. - Introduction to structural analysis - Shear and moment diagrams of structures - Simple Trusses, Compound Trusses, and Complex Trusses - Influence lines and moving concentrated loads. - Deflection of determinate structures - Analysis of indeterminate structures- Consistent deformation - Analysis of indeterminate structures using Slope-Deflection Method.

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	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	102	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	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 and #2
	Assignments	7	10% (10)	2 and 12	LO #1 and #2
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	20% (20)	7	LO #1 and #2
	Final Exam	3hr	60% (60)	16	LO #1 and #2
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to structural analysis
Week 2	Determinacy and stability of structures
Week 3	Shear and moment diagrams of structures
Week 4	Shear and moment diagrams of structures
Week 5	Simple Trusses and Compound Trusses
Week 6	Complex Trusses OR Approximate Analysis of Structures
Week 7	Influence lines and moving concentrated loads
Week 8	Influence lines and moving concentrated loads
Week 9	Deflection of determinate structures
Week 10	Deflection of determinate structures
Week 11	Analysis of indeterminate structures- Consistent deformation method.
Week 12	Analysis of indeterminate structures- Consistent deformation method.
Week 13	Analysis of indeterminate structures using Slope-Deflection Method
Week 14	Analysis of indeterminate structures using Moment-Distribution Method
Week 15	Review
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	- Structural Analysis by R. C. Hibbeler- 8th edition.	Yes
Recommended Texts	- Theory of Structures by S.P. Timoshenko and D. H. Young - 2nd edition. - Theory of Structures by Yuang Yu Hsiegh. - Structural Analysis by Aslam Kassimali, 4th edition. - Structural and Stress Analysis by Dr. T.H.G Megson – 2nd edition, 2000.	No
Websites		

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

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

MODULE 28

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Management**			**Module Delivery**	
Module Type	**Core**			☒ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	**DWE3315**				
ECTS Credits	**6.00**				
SWL (hr/sem)	**150**				
Module Level	UGIII		**Semester of Delivery**	Five	
Administering Department	DWE		**College**	ENG	
Module Leader	Jumaa Awad Hemed AL-Somaydaii		**e-mail**	jah_eng@uoanbar.edu.iq	
Module Leader's Acad. Title	Assist. Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Asee H. Abdaljader		**e-mail**	aseel.abdulla67@uoanbar.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Inculcates the fundamental principles of construction planning and studies the key project management skills. 2. Learn how to effectively utilize technical, financial, and human resources in an engineering career. 3. Apply the knowledge of Engineering management basically: Planning, Organizing, Directing, and Controlling related to the Dams and Water Resources Engineering program.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	- To introduce concepts of projects formulation - To impart the idea about planning and scheduling of activities. - To introduce the concepts of resource planning, allocation, and control. - To provide a bird's eye view of optimization techniques
Indicative Contents المحتويات الإرشادية	1. Principles of engineering management, construction technology, and the construction industry 2. Planning and scheduling construction projects and methods of planning and scheduling projects: Gantt chart and activity priority charts 3. Program Evaluation & Review Technique (PERT) 4. Project Progress reporting 5. Line of Balance Applied to Construction 6. Work Breakdown Structure: techniques and tools 7. Earned Value Method 8. Major Construction Contract Types 9. Project Delivery Methods 10. Project Cost Control Systems 11. Value Engineering 12. Resource Planning& Allocation 13. Optimization techniques

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students to learn how to effectively utilize technical, financial, and human resources in their engineering career, and apply the knowledge of engineering management basically: Planning, Organizing, Directing, and Controlling related to the Dams and Water Resources Engineering program.

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

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	20% (20)	8 and 12	LO #1 - #7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Construction Technology and Construction
Week 2	Construction Industry
Week 3	Construction planning and scheduling
Week 4	Gantt chart and Activity Precedence Diagrams
Week 5	Program evaluation & review technique
Week 6	Progress reporting
Week 7	Line of Balance Applied to Construction
Week 8	Work Breakdown Structure
Week 9	Earned Value Method
Week 10	Major Construction Contract Types
Week 11	Project Delivery Methods
Week 12	Project Cost Control Systems
Week 13	Value Engineering
Week 14	Resource Planning& Allocation
Week 15	Optimization techniques
Week 16	**Preparing to final exam**

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

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Daniel W. Halpin Purdue University, Bolivar A. Senior Colorado State University, Construction Management, John Wiley & Sons, Inc. 4th ed., 2011	No
Recommended Texts	Clifford J. Schexnayder, Richard E. Mayo, Construction Management Fundamentals, McGraw-Hill, 2nd ed., 2008.	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 29

Module Information معلومات المادة الدراسية					
Module Title	**Groundwater Hydrology**			**Module Delivery**	
Module Type	**Core**			☒ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☒ Seminar	
Module Code	**DWE3338**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGIII		**Semester of Delivery**	Six	
Administering Department	DWE		**College**	ENG	
Module Leader	Ammar Adham Ali		**e-mail**	Engammar2000@uoanbar.edu.iq	
Module Leader's Acad. Title	Assist. Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Mohammed Falah Allawi		**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	DWE3318 Engineering hydrology	**Semester**	5
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To develop problem solving skills and understanding of groundwater hydrology application. 2. To understand and estimate the available water quantity. 3. This course deals with the basic concept of groundwater hydrology. 4. This is addressing issues related to water balance and developing hydrological calculation methods and accuracy. 5. To understand water expenditures and forecasting future water expenditures. 6. To determine the volume of reservoirs, aquifers and hydraulics wells.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Preparing and analyzing hydrological data for groundwater and using them in solving practical problems 2. Calculation of the water budget 3. Researching the types of wells and methods of extraction for water 4. Hydrological forecasting analysis of water levels and expenditures 5. Explains the processes such as the fall, the seep, and the infiltration, and their interactions. 6. It works to solve problems such as drought and the strategy of preventing it or extracting groundwater in an economical way. 7. He uses his practical experience, if any, in comparison with the theoretical results of analysis, design and finding the solution.
Indicative Contents المحتويات الإرشادية	Chapter 1: Introduction -The hydrologic cycle, basic definitions. -Importance of groundwater, Groundwater Hydrology Definitions, What Groundwater Scientists Do -Water supply, Water resources management -Analysis of groundwater resources (10 hrs) Chapter 2: Aquifer Basics - Basic definitions: (aquifers, Aquitard, Aquiclude, Aquifuge Unsaturated zone and saturated zone) -Confining Beds and Covers, Confined Aquifers, Unconfined Aquifers. (15 hrs) Chapter 3: Properties - Basic definitions: (Soil Texture, Soil as a Phase System, Porosity, Porosity and Effective Porosity, Void Ratio, Particle Density, Bulk Density) -Water Content, Volumetric Water Content, Degree of Saturation. -Aquifer General Properties, Permeability, Hydraulic Conductivity, Homogeneous Aquifers, Heterogeneity. - Transmissivity, Storage Coefficient in Aquifers (confined and unconfined aquifers) (15 hrs) Chapter 4: Darcy Law - Hydraulic Head, Hydraulic Gradient, Hydraulic Gradient and Flow Direction. -Darcy's Law, Velocity, Validity of Darcy's Law. (15 hrs) Chapter 5: Groundwater Steady Flow

	- Applications/ Confined Aquifers and Unconfined Aquifers. - Unconfined Aquifers with Recharge. -Hydrologic budget and groundwater sources. (20 hrs) Chapter 6: Groundwater wells - Basic definitions: (Well Components, Well Casing, Well Screen, Gravel Packing, Grouts) - Well Drawdown, Cone of Depression. - Yield and Specific Capacity. (20 hrs) Chapter 7: Well Hydraulics - Steady State Analysis (Confined Aquifers) - Basic Assumptions, Steady versus Transient. - Steady Radial Flow to a Well in Confined Aquifers. - Steady State Analysis (Unconfined Aquifers). - Unsteady State Analysis (25 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	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	102	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	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 #4, #5
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.				
	Report				
Summative assessment	Midterm Exam	2hr	20% (20)	8 and 12	LO #1 - #7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction: The hydrologic cycle, Importance of groundwater, Groundwater Hydrology Definitions.
Week 2	Water supply, Water resources management, Analysis of groundwater resources.
Week 3	Basic definitions: (aquifers, Aquitard, Aquiclude, Aquifuge Unsaturated zone and saturated zone)
Week 4	Confining Beds and Covers, Confined Aquifers, Unconfined Aquifers.
Week 5	Basic definitions: (Soil Texture, Soil as a Phase System, Porosity, Porosity and Effective Porosity, Void Ratio, Particle Density, Bulk Density)
Week 6	Water Content, Volumetric Water Content, Degree of Saturation, Aquifer General Properties, Permeability, Hydraulic Conductivity, Homogeneous Aquifers, Heterogeneity.
Week 7	Transmissivity, Storage Coefficient in Aquifers (confined and unconfined aquifers)
Week 8	**Mid-term Exam1**
Week 9	Hydraulic Head, Hydraulic Gradient, Hydraulic Gradient and Flow Direction
Week 10	Darcy's Law, Velocity, Validity of Darcy's Law.
Week 11	Applications/ Confined Aquifers and Unconfined Aquifers, Unconfined Aquifers with Recharge.
Week 12	**Mid-term Exam2** + Hydrologic budget and groundwater sources.
Week 13	Basic definitions: (Well Components, Well Casing, Well Screen, Gravel Packing, Grouts)
Week 14	Well Drawdown, Cone of Depression, Yield and Specific Capacity.
Week 15	Steady State Analysis (Confined Aquifers), Basic Assumptions, Steady versus Transient.
Week 16	Steady Radial Flow to a Well in Confined Aquifers, Steady State Analysis (Unconfined Aquifers). Unsteady State Analysis

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Ground water hydrology	No
Recommended Texts	Foundation Design – Principles and Practice, Third Edition, by Donald P. Coduto, 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 30

Module Information معلومات المادة الدراسية					
Module Title	**Water Resources Planning and Management**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWE3331**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	**UGIII**		**Semester of Delivery**	Six	
Administering Department	DWE		**College**	ENG	
Module Leader	Prof. Dr. Sadeq Oleiwi Sulaiman Dr. Mohammed Falah Allawi		**e-mail**	sadek.soliman@uoanbar.edu.iq mohammed.falah@uoanabr.edu.iq	
Module Leader's Acad. Title	Prof. Dr. Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Prof. Dr. Sadeq Oleiwi Sulaiman Dr. Mohammed Falah Allawi		**e-mail**	sadek.soliman@uoanbar.edu.iq mohammed.falah@uoanabr.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. This course will provide the student an introduction to the planning, design, and operation of water resources systems using mathematical optimization methods and models. The student will learn to apply basic economic analysis (engineering economic and microeconomic analysis) and operations research techniques (linear, nonlinear, and dynamic programming, and combinational optimization) and will apply them to various surface and ground water resource allocation problems. 2. Be able to develop and solve various types of optimization models of water resources planning and management problems. 3. Understand the advantages and limitations of various types of modeling methods and algorithms. 4. Understand and appreciate how models have been and can be used in planning and management decision-making processes. 5. Understand and critically evaluate literature in water resources systems engineering.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Students should - Be able to develop and solve various types of water resources planning and management (WRPM) models. - Understand the advantages and limitations of modeling methods and algorithms used in WRPM. - Understand and appreciate how models can be used in WRPM. - Understand and critically evaluate literature in WRPM.
Indicative Contents المحتويات الإرشادية	Planning and management issues: - Institutional objectives and constraints - Identification and evaluation of alternatives - Advantages and limitations of modeling - Application of models, solution methods

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

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

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Integer Programming: The Transportation Algorithm
Week 2	Northwest Corner with Modified Distribution method
Week 3	Tutorials
Week 4	Vogel's method
Week 5	Tutorials
Week 6	Quiz
Week 7	Assignment Problem
Week 8	Tutorials
Week 9	Quiz
Week 10	Non-linear programming without constraints
Week 11	Tutorials
Week 12	Quiz
Week 13	Non-linear programming with constraints
Week 14	Tutorials
Week 15	Quiz
Week 16	**Preparatory week before the final Exam**

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

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	**Loucks D.P. and Beek E.V. (2005) Water Resources Systems Planning and Management. UNESCO**	Yes
Recommended Texts		
Websites	https://unesdoc.unesco.org/ark:/48223/pf0000143430	

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 31

Module Information معلومات المادة الدراسية					
Module Title	**Hydraulic Structures**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWE3321**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGIII	**Semester of Delivery**		Six
Administering Department		DWE	**College**	ENG	
Module Leader	Dr. Mohammed Falah Allawi		**e-mail**	Mohammed.falah@uoanabr.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	Dr. Mohammed Falah Allawi		**e-mail**	Mohammed.falah@uoanabr.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To develop an understanding of the principles of using hydraulic structures as flow measurement structures. 2. To develop an understanding of the principles of design of different hydraulic structures (weirs, culverts, intake and outwork structures spillways, and energy dissipation. 3. This course deals with the basic concept of hydraulic structures.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of successful completion of this course, the student will be able to: 1. Ability to identify the types of hydraulic structures. 2. Ability to identify the principals of design in hydraulic structures. 3. Ability to identify the energy and specific energy in open channel. 4. Ability to analyze the problems of regulators and weirs flow and design open channel. 5. Ability to solve analysis and design problems related to bed material. The student will be able to design the culverts. 6. The student will be able to determine the up-lift pressure under the hydraulic structures.
Indicative Contents المحتويات الإرشادية	- Introduction, Principles of Hydraulic Systems Analysis, Classification of Structures for Flow Control, Design of floors by bligh theory, Design of floors by lianas theory. (15 hrs). - Introduction of Channel Regulating Structures (weirs, barrages, sluice gates, etc.), - Quiz with resolve problems and discussion weirs, weirs (Tutorial (examples), Design of sluice gates. (15 hrs). - Channel Intake and Outlet (Diversion) Structures, Flow Measurement Structures, Dam Spillways and Outlet Works, Energy Dissipation Structures, Design of sittling basin, Culverts. (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	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	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
Week 2	Principles of Hydraulic Systems Analysis
Week 3	Classification of Structures for Flow Control
Week 4	Design of floors by bligh theory
Week 5	Design of floors by lianas theory
Week 6	Introduction of Channel Regulating Structures (weirs, barrages, sluice gates, etc.)
Week 7	Quiz with resolve problems and discussion
Week 8	weirs
Week 9	weirs (Tutorial (examples)
Week 10	Design of sluice gates
Week 11	Channel Intake and Outlet (Diversion) Structures
Week 12	Flow Measurement Structures
Week 13	Dam Spillways and Outlet Works
Week 14	Energy Dissipation Structures
Week 15	Design of sittling basin
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction
Week 2	Lab 2: Discharge Estimation
Week 3	Lab 3: Seepage Estimation
Week 4	Lab 4: Head Pressure Calculation
Week 5	Lab 5: Hydraulic Jump
Week 6	Lab 6: Water Depth Calculation
Week 7	Lab 7: Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	**Textbook(s): open channel hydraulics - chow**	Yes
Recommended Texts	**Hydraulic Structures: Fourth Edition**	Yes
Websites	https://heidarpour.iut.ac.ir/sites/heidarpour.iut.ac.ir/files/u32/open-chow.pdf http://www.khuisf.ac.ir/Dorsapax/Data/Sub_118/File/Hydraulic%20Structures_4th%20edition_.pdf	

Grading Scheme

مخطط الدرجات

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

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

MODULE 32

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Numerical Methods**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWE3214**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGIII	**Semester of Delivery**		six
Administering Department		Type Dept. Code	**College**		Type College Code
Module Leader	Zaid Al-Azzawi		**e-mail**		Zaid.kani@uoanbar.edu.iq
Module Leader's Acad. Title		Assist. Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**		E-mail
Peer Reviewer Name		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		**Semester**	
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1- To understand numerical methods and how they apply to Dams and Water Resources Engineering. 2- To apply the knowledge of these methods to solve practical problems with MATLAB.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Be aware of the mathematical background for the different numerical methods introduced in the course. 2. Understand the different numerical methods to solve the algebraic equations and to solve system of linear equations. 3. Understand the different numerical methods for interpolation, differentiation, integration. 4. Using appropriate numerical methods to determine approximate solutions to ordinary and partial differential equations. 5. Understand how numerical methods afford a mean to generate solutions in a manner that can be implemented on digital computers. 6. Use the built-in functions in MATLAB and EXCEL in addition to acquiring basic knowledge in creating MATLAB functions for solving numerical engineering problems. 7. Work on multidisciplinary projects.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction to Numerical Analysis Part-I: Basic Tools Unit-1: Error Analysis • Measuring Errors • Sources of Error • Consistency, Order, Smoothness and Convergence (5 hours) Unit-2: Roots of equations (Nonlinear Equations) (10hrs) • Bisection Method • False-Position Method (Optional) • Newton-Raphson Method • Secant Method (Optional) Unit-3: Simultaneous Linear algebraic Equations (10hrs) • Direct Methods - Review of Determinants and Matrices - Cramer's Rule - Gauss-Elimination method (simple and partial pivoting methods) - Gauss-Jordan Method - Matrix Inversion method • Indirect (Iterative) Method - Jacobi Method - Gauss-Seidel Method

	- Successive Over-Relaxation Method Unit-4: Numerical Differentiation and Integration (10hrs) - Numerical differentiation using difference method - Numerical Integration, Trapezoid and Simpson's Rules - Extrapolation of Errors Unit-5: Interpolation and Curve Fitting (10hrs) - Direct Fit Polynomial - Least Squares Method - Logarithmic regression (Optional) - Exponential regression (Optional) - Linear interpolation , Quadratic Interpolation - Lagrange Interpolation (Optional) - Newton Divided Difference Interpolation (Optional) Part-II: Numerical Solutions of Ordinary Differential Equations Unit-6: Initial Value Problem (10hrs) - Euler's Method - Runge-Kutta 2nd - Runge-Kutta 4th - Higher Order Equations Unit-7: Boundary Value Problem (10hrs) - Equilibrium (Finite Difference) Method Part-III: Numerical Solutions of Partial Differential Equations Unit-8: PDEs (10hrs) - Elliptic Equations - Parabolic Equations - Hi-parabolic Equations - Advanced Application (Case Studies based on each department interests).

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

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction
Week 2	Determinants and Matrices
Week 3	Systems of Linear Algebraic Equations
Week 4	Systems of Linear Algebraic Equations

Week 5	Interpolation and Curve fitting
Week 6	Numerical Differentiation and Integration
Week 7	One-Dimensional Initial Value Problem
Week 8	One-Dimensional Initial Value Problem
Week 9	One-Dimensional Initial Value Problem
Week 10	One-Dimensional Initial Value Problem
Week 11	One-Dimensional Initial Value Problem
Week 12	Partial Differential Equations
Week 13	Partial Differential Equations
Week 14	Partial Differential Equations
Week 15	Partial Differential Equations
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Introduction to MATLAB
Week 2	Lab 2: Vector and Matrix
Week 3	Lab 3: Eigenvalues and Eigenvectors
Week 4	Lab 4: Polynomials
Week 5	Lab 5: Approximation of a function
Week 6	Lab 6: 2D interpolations
Week 7	Lab 7: Numerical differentiation
Week 8	Lab 8: Taylor series
Week 9	Lab 9: Numerical integration
Week 10	Lab 10: Numerical Solution of Differential Equations
Week 11	Lab 10: Partial Differential Equations

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Numerical Methods for Engineers, S. C. Chapra and R. P Canale, McGraw-Hill, 6th edition 2010.	Yes
Recommended Texts	Numerical Methods for Engineers and Scientists by Joe D. Hoffman, 2nd Edition. Lectures on Numerical Analysis by Dennis Deturck and Herbert S. Wilf.	No

	Numerical Analysis Using MATLAB® and Excel® by Steven T. Karris, 3rd Edition. Numerical Methods in Engineering with MATLAB® by Jaan Kiusalaas. Engineering Analysis- Interactive Methods and Programs with FORTRAN, QuickBasic, MATLAB, and Mathematica by Y. C. Pao.	
Websites	MATLAB	

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 33

Module Information معلومات المادة الدراسية					
Module Title	**Sanitary Engineering**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWE3320**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGIII	**Semester of Delivery**		Six
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Yasir Abdulmajeed Mohammed Arkan Dhari Jalal		**e-mail**	aniyaser@uoanbar.edu.iq	
Module Leader's Acad. Title		Assist Prof.	**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		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	DWE3313 Water Quality	**Semester**	Five
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To know the basics, importance, and methods of water supply. 2. To study the various sources and properties of water. 3. To understand the various methods of conveyance of water. 4. To learn the objectives and methods of water treatment and to study the features and function of different water treatment units. 5. To study the various sources and characteristics of water. 6. To qualify water demand and population forecasting. 7. To understand the properties and the design criteria of the conventional water treatment plant (WTP).
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Apply math and science principles in the design and analysis process. 2. Analyze and interpret data to obtain design properties. 3. Design major drinking water ,storm water and wastewater networks and treatment units according to environmental basic. 4. Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors. 5. The graduate is able to collect and process data, information and knowledge to answer specific questions or generate new conceptual models and hypotheses. The graduate evaluates these models and hypotheses using the appropriate experimental, mathematical and statistical approaches. 6. The graduate recognizes ethical issues, considers multiple points of view, and uses critical ethical reasoning to determine the appropriate behavior to follow. The graduate thus demonstrates a high level of integrity and a positive work ethic combined with a thorough understanding of the ethical implications and obligations associated with the practice of engineering. 7. Conduct external research for design and creation of design tools.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The student will learn about water supply , drinking water , drinking water requirements , water quality. then go into storm water and its characteristics, storm water network design .

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	102	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	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	5% (5)	4 and8	LO #2, #3 and #7, #8
	Assignments	2	5% (5)	6 and 10	LO #4, #6 and #9, #11
	Projects / Lab.	-	-	-	-
	Report	1	10% (10)	14	LO #4, #8 and #10, #13
Summative assessment	**Midterm Exam**	2/2hr	20% (20)	7 and13	LO #5 - #9
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction of Sanitary Engineering
Week 2	Basics of Sanitary and Environmental Engineering
Week 3	Sources of water, the amount of water and sewage
Week 4	Water collection

Week 5	First Mid Term Exam
Week 6	Surface water
Week 7	Water consumption
Week 8	Pumping
Week 9	Second Mid Term Exam
Week 10	Water treatment(coagulation)
Week 11	Water treatment (flocculation)
Week 12	Water treatment (sedimentation)
Week 13	Water treatment (sedimentation)
Week 14	Water treatment(filtration)
Week 15	Water treatment(disinfection)

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Water Supply And Sewerage, E.W.Steel & Terence J .Mcghee , Fifth Edition	Yes

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 34

Module Information معلومات المادة الدراسية					
Module Title	**Irrigation and Drainage Engineering**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWE4326**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGVI		**Semester of Delivery**	Seven	
Administering Department	DWE		**College**	ENG	
Module Leader	Dr. Ibtihal A. Mawlood		**e-mail**	Ibtihal.maoloud@uoanbar.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	01/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	To take up the basic concepts of irrigation and construction of various hydraulic structures. To introduce students to basic concepts of water, plants, their interactions, as well as irrigation and drainage systems design, planning and management. The structures involved the elementary hydraulic design of different structures and the concepts of maintenance shall also form part. To develop analytical skills relevant to the areas mentioned above, particularly the design of irrigation and drainage projects
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On the completion of the course, one should be able to understand: Concepts of irrigation and different hydraulic structures. How to estimate the quantity of water required by crops. Be able to plan and design irrigation projects. Design channels and other irrigation structures required for irrigation, drainage, soil conservation, flood control and other water-management projects
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Introduction: Necessity of irrigation- scope of irrigation engineering- benefits and ill effects of irrigation-irrigation development in India- types of irrigation systems, Soil-water plant relationship: Classification of soil water- soil moisture contents- depth of soil water available to plants permanent and ultimate wilting point 2. Water requirements of crops: Depth of water applied during irrigation- Duty of water and delta improvement of duty command area and intensity of irrigation consumptive use of water and evapotranspiration irrigation efficiencies- assessment of irrigation water 3. Methods of Irrigation: Classification- choice of method of irrigation- surface and subsurface irrigation methods, Sprinkler and Drip Irrigation 4. Design of Irrigation Channel: Alignment- canal capacity- losses- FSL of canal- design of canal in alluvial soil and non alluvial soils- Kennedy's silt theory- Lacey's regime theory- balancing depth- use of Garrets diagrams and Lacey's Regime diagrams- lining of irrigation channels- design of lined canal drainage behind lining. Water logging: Causes, Measures: surface and sub-surface drains, land reclamation 5. Diversion head works: Types- selection of the suitable site for the diversion headwork components of diversion headwork- Causes of failure of structure on pervious foundation- Khosla's theory- Design of concrete sloping glacis weir 6. Cross drainage works: Types- selection of suitable type of CD works- aqueduct and Syphon aqueduct determination of maximum flood discharge and waterway for drain, fluming of canal- uplift pressure on underside of barrel roof and at the floor of the culvert- design of bank connections 7. Canal regulation works:

	Canal fall- necessity and location- types of falls- Cross regulator and distributory head regulator- their functions, Silt control devices, Canal escapes- types of escapes.

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

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

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)		
	Assignments	2	10% (10)		
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	20% (20)		
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction: Necessity of irrigation- scope of irrigation engineering- benefits and ill effects of irrigation-irrigation development in India- types of irrigation systems
Week 2	Soil-water plant relationship: Classification of soil water- soil moisture contents- depth of soil water available to plants permanent and ultimate wilting point
Week 3	Water requirements of crops: Depth of water applied during irrigation- Duty of water and delta improvement of duty command area and intensity of irrigation consumptive use of water and evapotranspiration irrigation efficiencies- assessment of irrigation water
Week 4	**Midterm Exam -1**
Week 5	Methods of Irrigation: Classification- choice of method of irrigation- surface and subsurface irrigation methods, Sprinkler and Drip Irrigation.
Week 6	Design of Irrigation Channel: Alignment- canal capacity- losses- FSL of canal- design of canal in alluvial soil and non alluvial soils- Kennedy's silt theory- Lacey's regime theory- balancing depth- use of Garrets diagrams and Lacey's Regime diagrams
Week 7	lining of irrigation channels- design of lined canal drainage behind lining. Water logging: Causes, Measures: surface and sub-surface drains, land reclamation
Week 8	**Midterm Exam -2**
Week 9	Diversion head works: Types- selection of the suitable site for the diversion headwork components of diversion headwork-
Week 10	Causes of failure of structure on pervious foundation- Khosla's theory- Design of concrete sloping glacis weir
Week 11	Cross drainage works: Types- selection of suitable type of CD works- aqueduct and Syphon aqueduct determination of maximum flood discharge and waterway for drain
Week 12	fluming of canal- uplift pressure on underside of barrel roof and at the floor of the culvert- design of bank connections
Week 13	**Midterm Exam -3**
Week 14	. Canal regulation works: Canal fall- necessity and location- types of falls- Cross regulator and distributary head regulator-
Week 15	their functions, Silt control devices, Canal escapes- types of escapes
Week 16	**Preparatory week before the final Exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Modi, P.N., Irrigation Water Resources and Water Power Engineering, Standard Book House, New Delhi	No, but available online
Recommended Texts	Sharma, R.K., Text book of Irrigation Engineering and Hydraulic Structures, Oxford and IBK Publishing House, New Delhi.	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 35

Module Information معلومات المادة الدراسية					
Module Title	**Design of Dams**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWE4327**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGVI		**Semester of Delivery**	Seven	
Administering Department	DWE		**College**	ENG	
Module Leader	Dr. Ammar H. Kamel & Dr. Rafid S.Rashid		**e-mail**	E-mail	
Module Leader's Acad. Title	Professor & Assis. Prof.		**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	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Hydraulic Structure	**Semester**	six
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 impart the principles of analysis, design, and behavior of dam and hydraulic structures belong to it.

	2. To enable the student how to choose the suitable type of dams and how to select the perfect site to construct the dam. 3. Familiarity with professional and contemporary issues.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. The basics and consideration of dam design. 2. Understanding of the principles of hydrology for design. 3. Gain tools for planning, analysis and design for different types of dams, 4. Knowledge of dam materials and construction techniques: Students should acquire knowledge about different dam materials and construction techniques. 5. Safety considerations and risk assessment: Students should learn about safety considerations in dam design. 6. Communication and teamwork: Students should develop effective communication and teamwork skills, as dam design projects often require collaboration with professionals from various disciplines.
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	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction: Important Terms for The main Parts of Dam, Planning Consideration, Classification of Dams and Factors Governing Selection Site of Dams.
Week 2	Flood Hydrology for Design Purposes
Week 3	Estimation of design flood
Week 4	Gravity Dams - I
Week 5	Gravity Dams - II
Week 6	Concrete Arch Dams - I
Week 7	Exam2
Week 8	Concrete Arch Dams - II
Week 9	Buttress Dams
Week 10	Earth Dams - I
Week 11	Earth Dams – II and Rock fill
Week 12	Exam2
Week 13	Spillways (introduction & types of Spillway)
Week 14	Spillway design consideration -I
Week 15	Spillway design consideration -II
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	**Hydraulic Structures,** P. Novak, A.I.B. Moffat and C. Nallur School of Civil Engineering and Geosciences, University of Newcastle upon Tyne, UK And R. Narayanan	No
Recommended Texts	Formerly Department of Civil and Structural Engineering, UIST, University of Manchester, UK Fourth edition published 2007 by Taylor & Francis	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 36

Module Information معلومات المادة الدراسية					
Module Title	**Ethics and Leader Skills**			**Module Delivery**	
Module Type	**Basic Learning Activities**			☐ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**DWE4106**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level		UG IV	**Semester of Delivery**		Seven
Administering Department		DWE	**College**	ENG	
Module Leader	Nabeel S. Mahmood		**e-mail**	nabeelshm@uoanbar.edu.iq	
Module Leader's Acad. Title		Assist. Professor	**Module Leader's Qualification**		PhD
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Non	**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 graduate has outstanding leadership and administration skills that can be utilized to manage his/her workplace effectively. 2- The graduate is aware of the modern styles of leadership and administration skills. 3- The graduate is aware of the ethical issues in the engineering practice.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Following completion of this course, students will be able to: - Explain the basic concepts of leadership. - Build power and influence. - Add value to their sphere of influence - Give and receive feedback, actively listen, provide supportive communication, and coach and counsel their team members. - Identify and confront ethical issues in engineering practice
Indicative Contents المحتويات الإرشادية	1. Introduction to leadership - Leadership definition - Can one person make a difference? - Why is leadership important for engineers? - Are leaders born or made? - Personality assessment. (10 hr) 2. Leadership and management styles - Command leadership vs. servant leadership - Characteristics of servant leader - Management styles - Leader or manger? - The outstanding leader competencies (20 hr) 3. Effective team leadership - What is team - Why work in teams? - Different types of teams - Team roles - Role of team leader (15 hr) 4. Practical Implementation - Time management (first things first) - Project related activities - Conducting Effective Meetings - Giving effective feedback - Recognition and reward (10 hr) 5. Communication - Communication types - Thoughts emotion and communication (head, heart and hands) - What influences our communication - Damaging communication habits - Connecting with others

	- Peer communication assessment (15 hr) 6. Leadership and management styles - Management styles - Attributes of the engineering leader - Modern leadership - Characteristics of servant leader - Command leadership vs. servant leadership (15 hr) 7. Professional Ethics - Definition - Origins - Principles (10 hr) 8. Introduction to Engineering Ethics - Professional Codes of Ethics (10 hr) 9. Ethical Issues in Engineering Practice - 1 -Safety Considerations - 2- The Role of Good Design - Sustainable design and design for all - Safety and risk in Design - 3- Environmental Ethics (10 hr) 10. Steps in Confronting Moral Dilemmas 11. Case Studies a.Denver International Airport (DIA) b.Space shuttle Challenger accident: c.The Aberdeen Three d.The Failure of the Teton Dam **(10 hr)**

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering 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	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**50**		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to leadership Leadership definition
Week 2	Why is leadership important for engineers? Are leaders born or made?
Week 3	Personality assessment

Week 4	Leadership and management styles Management styles Attributes of the engineering leader
Week 5	Modern leadership Characteristics of servant leader Command leadership vs. servant leadership
Week 6	Effective team leadership What is team Why work in teams? Different types of teams Role of team leader
Week 7	Practical Implementation Time management (first things first) Project related activities
Week 8	Midterm Exam
Week 9	Conducting Effective Meetings Giving effective feedback Recognition and reward
Week 10	Communication Communication types Thoughts emotion and communication (head, heart and hands) What influences our communication Damaging communication habits Connecting with others Peer communication assessment
Week 11	Leadership and management styles Management styles Attributes of the engineering leader Modern leadership Characteristics of servant leader Command leadership vs. servant leadership
Week 12	Introduction to Engineering Ethics Professional Codes of Ethics
Week 13	Ethical Issues in Engineering Practice 1 -Safety Considerations 2- The Role of Good Design A- Sustainable design and design for all B- Safety and risk in Design 3- Environmental Ethics
Week 14	Steps in Confronting Moral Dilemmas Case Studies a. Denver International Airport (DIA) b. Space shuttle Challenger accident:

Week 15	Case Studies a. Denver International Airport (DIA) b. Space shuttle Challenger accident:
Week 16	Preparing to final exam

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	- Benator, Barry and Thumann, Albert "Project Management and Leadership Skills for Engineering and Construction Projects." 2003, The Fairmont Press, Inc., USA - Fleddermann, C. B. (2012). Engineering Ethics. Upper Saddle River, NJ: Prentice Hall.	No
Recommended Texts	مدونة اخلاقيات ممارسة المهنة الهندسية- نقابة المهندسين العراقية	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 37

Module Information معلومات المادة الدراسية					
Module Title	**Environmental Engineering**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWE4323**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGIV	**Semester of Delivery**		Seven
Administering Department		DWE	**College**		ENG
Module Leader	Arkan Dhari Jalal Yasir Abdulmajeed Mohammed		**e-mail**		arkan.dhari@uoanbar.edu.iq
Module Leader's Acad. Title		Assist Prof.	**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		01/06/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Identify the quantity, quality, types and characterization of wastewater generated 2. To understand the properties and the design criteria of the conventional wastewater treatment plant (WWTP). 3. To learn the objectives and methods of sewage treatment and to study the features and function of different primary treatment units. 4. To study the features and function of different secondary treatment units. 5. To learn the objectives and methods of sewage disposal. 6. To learn the objectives and methods of sludge treatment.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Apply math and science principles in the design and analysis process. 2. Analyze and interpret data to obtain design properties. 3. Design major drinking water, storm water and wastewater networks and treatment units according to environmental basic. 4. Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors. 5. The graduate is able to collect and process data, information and knowledge to answer specific questions or generate new conceptual models and hypotheses. The graduate evaluates these models and hypotheses using the appropriate experimental, mathematical and statistical approaches. 6. The graduate recognizes ethical issues, considers multiple points of view, and uses critical ethical reasoning to determine the appropriate behavior to follow. The graduate thus demonstrates a high level of integrity and a positive work ethic combined with a thorough understanding of the ethical implications and obligations associated with the practice of engineering. 7. Conduct external research for design and creation of design tools.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The student will learn about wastewater and their characteristics, wastewater treatment, methods, processes, primary, biological, tertiary and advanced treatment, activated sludge processes, extended aeration processes.

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

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	5% (5)	4 and8	LO #2, #3 and #7, #8
	Assignments	2	5% (5)	6 and 10	LO #4, #6 and #9, #11
	Projects / Lab.	-	10% (10)	-	-
	Report	-	-	-	-
Summative assessment	**Midterm Exam**	2/2hr	20% (20)	7 and13	LO #4 - #9
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Wastewater treatment objective
Week 2	Sanitary sewage flow estimation
Week 3	Characteristics and composition of sewage
Week 4	First Mid Term Exam

Week 5	Sewerage system
Week 6	Types and method of wastewater treatment
Week 7	Primary treatment - Screens
Week 8	Grit chamber
Week 9	Second Mid Term Exam
Week 10	Primary sedimentation tanks
Week 11	Secondary Treatment of Sewage
Week 12	Biological treatment (activated sludge)
Week 13	Biological treatment (activated sludge)
Week 14	Sludge treatment
Week 15	Advanced treatment

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Experiment No.1: Determination of Suspended solids and Total Dissolved Solids
Week 2	Experiment No.2: Determination of Turbidity
Week 3	Experiment No.3: Determination of pH
Week 4	Experiment No.4: Jar Test
Week 5	Experiment No.5: Determination of Chlorides
Week 6	Experiment No.6: Determination of Hardness
Week 7	Experiment No.7: Determination of COD

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Water Supply And Sewerage , E.W.Steel & Terence J .Mcghee , Fifth Edition	Yes

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 38

Module Information معلومات المادة الدراسية					
Module Title	**Senior Design Project I**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☒ **Practical** ☒**Seminar**	
Module Code	**DWE4329**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	UGIV		**Semester of Delivery**	Seven	
Administering Department	DWE		**College**	ENG	
Module Leader	Ayad S. Aadi		**e-mail**	ayad_saeed@uoanbar.edu.iq	
Module Leader's Acad. Title	Assist. Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name	Aseel H. Abdaljader		**e-mail**	aseel.abdulla67@uoanbar.edu.iq	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Provide the student who is nearing completion of BSc. degree in Dam and water resources engineering with the opportunity to do research and/or a scholarly literature review on a contemporary issue in counseling or a related area that is of specific interest to them. 2. Provide the student with a learning experience that is individualized and supervised by a staff member of the Dam and water resources engineering department who has expertise and/or interest in the study area selected for research by the capstone project student and supervisor. 3. Provide the student with an integrated learning experience in which coursework taken throughout the study program is synthesized and culminates in the completion of a final project that shows graduate-level research, writing, and skills. 4. Provide the student with a public spot for presenting the final capstone project. It is expected the student will acquire a sense of confidence and comfort with presenting professional work in public. 5. Provide the student with an opportunity to show their professionalism.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Ability to understand the significance of the work and project outcomes. 2. Ability to apply Dam and water resources engineering principles to propose engineering solutions to the project problem. 3. Ability to perform a literature review and data collection. 4. Ability to use engineering software to conduct engineering design as well as to analyze data. 5. Ability to present results with analysis, interpretation, sample calculation, error, and trend analysis. 6. Ability to comprehend professional and ethical responsibilities. 7. Ability to identify the impact of engineering solutions: global, economic, environmental, and societal. 8. Ability to function as a team member and as well as a leader in the project group. 9. Ability to communicate effectively between clients and team members. 10. Commitment to the general contexts for writing the project, especially if formats are available in this regard, and the ability to summarize the project from the final report and the directives of the supervisor and the instructions of the projects committee PC. 11. The ability to present what has been done in a scientific and practical manner and to answer the examination committee's inquiries convincingly as one team.
Indicative Contents المحتويات الإرشادية	1. Faculty members will submit the senior design project proposal forms to projects committee PC in the department. 2. The proposal forms will be presented to the scientific committee by the coordinator of Projects consultants PC for checking/modification and approval. 3. Faculty members whose proposals need modifications will be contacted by the coordinator of Projects consultants. 4. All approved proposals will be made available to all students in the 7th sem. without the names of the supervisors.

	5. Students form in groups of 2 to 3 members or more according to the specificity or comprehensiveness of the project. 6. Each student group will choose three projects from the list of approved proposals in their preferred order. While selecting the project, students should consider the prerequisite courses. If the prerequisite courses are not taken yet, the project will not be considered during the allocation process, The Coordinator of Projects consultants collects the students' choices and will make an initial allocation. 7. The PC Coordinator will present the initial allocation list to the project committee PC for approval. 8. In case one project is chosen by more than one group, selection will be applied based on the 5 & 6 semesters grades of students. 9. Approving by the PC and the head of the department, the allocation list will be published to all students and faculty members.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is to encourage students to have the opportunity to demonstrate that they can indeed meet the levels of performance expected of a professional engineer and take individual responsibility for the timely completion of a major engineering project under the supervision by supervisors, as well as demonstrate a professional level of preparation and planning, achievement, testing, and documentation, which is a common way to determine whether a student is ready to graduate.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	22	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Student progress	1	40%(40)	13	All
	Format of project report	1	10%(10)	14	10
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**				
	Final Exam	1	50%(50)	15	11
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Preparing and installing the project plan
Week 2	Collecting information and literature related to the project
Week 3	Preparation of materials and software used in the project
Week 4	Submission of progress tracking form to projects consultants
Week 5	Laboratory work, examinations or/and preparation of spreadsheets
Week 6	Laboratory work, examinations or/and preparation of spreadsheets
Week 7	Laboratory work, examinations or/and preparation of spreadsheets and results
Week 8	Submission of progress tracking form to projects consultants
Week 9	Writing and arranging the first part of the project and amending it as directed by the supervisor
Week 10	Writing and arranging the first part of the project and amending it as directed by the supervisor
Week 11	Writing and arranging the first part of the project and amending it as directed by the supervisor
Week 12	Submission of progress tracking form to projects consultants
Week 13	First draft report submitted to the supervisor and receiving comments from supervisor(s)
Week 14	Report submission to projects consultants for checking format adherence and receiving comments from projects consultants
Week 15	**Final Submission of revised report**
Week 16	**Senior design project I presentation**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Review and prepare the materials or software that will be used in the research
Week 2	Review and prepare the materials or software that will be used in the research
Week 3	Implementation of the practical part and according to the specificity of the project
Week 4	Implementation of the practical part and according to the specificity of the project
Week 5	Implementation of the practical part and according to the specificity of the project
Week 6	Implementation of the practical part and according to the specificity of the project
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Depends on the subject and specificity of the project	
Recommended Texts	Depends on the subject and specificity of the project	
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 39

Module Information معلومات المادة الدراسية					
Module Title	**Reinforced Concrete Design**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWE3324**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGIV	**Semester of Delivery**		Seven
Administering Department		DWE	**College**	Engineering College	
Module Leader	Dr. Muhannad Aldosary		**e-mail**	Muhannad_dosary@uoanabr.edu.iq	
Module Leader's Acad. Title		senior lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	Dr. Ayad Saied		**e-mail**		
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		**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The goals of this course are to enable students to understand: analyze and design of R.C. Beams. Short column analysis and design, analysis and design of two way slabs, Direct design method of two way slabs, Equivalent frame method of two way slabs, Design of water tank and retaining wall.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of successful completion of this course, the student will be able to: - analyze and design of R.C. Beams. - analyze and design short column. - Design two-way slabs using the direct design and Equivalent Frame method, - Design of water tank and retaining wall.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Chapter one Introduction to reinforced concrete analysis and design of R.C. Beams, - [20 hrs] Chapter Two Analysis and design of Reinforced Concrete Columns (Uniaxial Bending Design), Reinforced Concrete Columns (interaction diagrams, analysis and design of Reinforced Concrete Columns (Biaxial Bending) [10 hrs] Chapter Three Design of TWO-WAY SLABS, Design of two way slab using code coefficient method (simplified method) [15 hrs] Chapter Four Design of TWO-WAY SLABS, Design of two way slab using Moment Distribution by direct design method (DDM) : [15 hrs] Chapter Five Design of water Tank [20 hrs] Chapter Six Design of retaining wall, [10 hrs]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Reinforced concrete engineering courses require effective learning and teaching strategies to ensure students develop a strong understanding of complex concepts and their practical applications. The range of strategies that can enhance the learning experience for students in concrete engineering courses. These strategies include lecture-based teaching, practical applications, problem-solving assignments, group work and discussions, technology integration, assessments and feedback, continuous learning, and encouraging self-directed learning. By incorporating these strategies, educators can create an engaging and comprehensive learning environment that equips students with the knowledge, skills, and critical thinking abilities necessary for success.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.0
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	10% (10)	3, 6,10,14	LO #1, 3,5, and 7
	Assignments	2	5% (5)	2, 12	LO # 4 and 7
	Projects / Lab.	1			
	Report	1	5% (5)	13	LO # 2,6 and 7
Summative assessment	**Midterm Exam**	2 hr	20% (20)	7	LO # 1-7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Analysis of R.C. Beam
Week 2	Design of R.C. Beam
Week 3	Design of R.C. T- Beam
Week 4	Reinforced Concrete Columns (Uniaxial Bending Design)
Week 5	Reinforced Concrete Columns (interaction diagrams)
Week 6	Reinforced Concrete Columns (Biaxial Bending)
Week 7	Reinforced Concrete Columns (Biaxial Bending)
Week 8	Mid-term Exam
Week 9	Design of TWO-WAY SLABS
Week 10	Learn the analysis and design of Two –way slabs
Week 11	Design of Water Tank
Week 12	Application for Design water tank
Week 13	Design of Retaining wall
Week 14	Learn the of analysis and design of Retaining wall

Week 15	Development Length of Deformed Bars
Week 16	**Preparatory week before the final Exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Arthur H. Nilson, David Darwin, Charles W. Dolan, Design of Concrete Structures, McGraw-Hill, 14th ed., 2004.	Yes
Recommended Texts		
Websites	https://www.uoanbar.edu.iq/Bank-Section.php	

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 40

Module Information معلومات المادة الدراسية					
Module Title	**Methods of Construction and Estimation**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWE4330**				
ECTS Credits	**6.00**				
SWL (hr/sem)	**150**				
Module Level	UGIV		**Semester of Delivery**	Eight	
Administering Department	DWE		**College**	ENG	
Module Leader	Jumaa Awad Hemed AL-Somaydaii		**e-mail**	jah_eng@uoanbar.edu.iq	
Module Leader's Acad. Title	Assist. Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Asee H. Abdaljader		**e-mail**	aseel.abdulla67@uoanbar.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Definition of construction methods used in the construction sites. 2. Teaching the methods and concepts of calculating the different quantities of the structural vertebrae, the specifications of the structural materials, the appropriate estimating methods for calculating them, and calculating the different geometric shapes. 3. Calculating the quantities of different items in construction projects, the proportions of materials used, and analyzing the quantities to their original resources. 4. Converting quantities into bills of quantities and bids for projects, and how to deal with documents for projects.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Students shall have a reasonable knowledge about the various construction procedures for sub to super structure. 2. Students shall have a reasonable knowledge about the equipment needed for construction of various types of structures from foundation to super structure. 3. Students shall be able to estimate the material quantities, prepare a bill of quantities, make specifications and prepare tender documents. 4. Students should also be able to prepare value estimates.
Indicative Contents المحتويات الإرشادية	1. Introduction to construction methods and types of Estimating. 2. Tables of quantities and units used. 3. Main activities in the construction project. 4. Principles of calculating the quantities of excavation and filling for canals and earthworks: earth excavation works: digging and filling 5. Calculation of quantities of concrete items and molds. 6. Analysis of quantities of construction finishing works for buildings 7. Building and construction equipment 8. Soil grouting work 9. Estimating labor, materials, and equipment 10. Profit margins, overheads, and cost sections 11. Engineering specifications for construction works 12. Preparing reports and bills of quantities

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students to learn the various construction techniques, practices, and equipment needed for different types of construction activities. It also covers the various aspects of estimating of quantities of items of works involved in buildings, water supply and sanitary works, and irrigation works, the rate analysis, valuation of properties and preparation of reports for estimation of various items.

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

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	20% (20)	8 and 12	LO #1 - #7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	An Introduction to construction methods and Types of Estimating
Week 2	Tables of quantities and units used
Week 3	Dividing the construction project into the main activities
Week 4	Calculate the quantities of excavation and filling for buildings
Week 5	Calculation of quantities of concrete items and molds
Week 6	Analysis of quantities of construction work
Week 7	**Monthly exam**
Week 8	Finishing works for buildings and analyzing the amount of finishing work
Week 9	Earth excavation works: digging and filling
Week 10	Building and construction equipment
Week 11	Estimating labor, materials, and equipment
Week 12	Profit margins, overheads, and cost sections
Week 13	Engineering specifications for construction works
Week 14	Preparing reports and bills of quantities
Week 15	Soil grouting work
Week 16	**Preparing to final exam**

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

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• Estimating and costing in civil engineering by:b.n.dutta 2012 • Civil estimating. Costing and voluation	No
Recommended Texts	• Quantity surveying for building and civil eng.works:byp.lbhasin and s.chand new delhi • Civil estimating and costing :a.k.upadhyay 2010	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 41

Module Information معلومات المادة الدراسية					
Module Title	**Safety and Operation of Dams**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**DWE4334**				
ECTS Credits	6				
SWL (hr/sem)	**150**				
Module Level		UGIV	**Semester of Delivery**		Eight
Administering Department		DWE	**College**	Engineering	
Module Leader	Dr. Ammar Hatam Kamil		**e-mail**	ammar.kamel@uoanbar.edu.iq	
Module Leader's Acad. Title		Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Dr. Basheer Khalil Al-Hadeethi		**e-mail**	Ba81sheer@uoanbar.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/6/2023	**Version Number**	1	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite modules	Design of Dams	**Semester**	7
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To develop problem solving skills and understanding of Dams operation application and safety of dams. 2. To understand and establish its relevance in civil engineering. 3. This is addressing issues related to water balance and developing hydraulic calculation methods and accuracy. 4. To determine the volume of reservoirs, reservoir Yield and simple hydraulic components.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. The student will know the basics, and consideration of dam operation. 2. The student will develop an understanding of the principles of selection of reservoirs capacity. 3. Students will gain tools for planning, and analysis reservoir storage and types of reservoirs, 4. Students will gain tools for Monitoring of dam operation 5. The student will know the main reasons of Dam failure 6. The student will know the basics tests for the maintenance of the dam
Indicative Contents المحتويات الإرشادية	*1.* Spillways *2.* Dam outlet works, *3.* Energy dissipation of Dams *4.* Introduction of Reservoirs, *5.* Types of Reservoirs, *6.* Zones of Storage, *7.* Reservoir Yield *8.* Selection of Capacity for a River Reservoir, *9.* Monitoring of dam operation, *10.* Dam safety (instrumentation and surveillance) *11.* Emergency Operation Plan *12.* Dam failure *13.* Sustainable management of reservoirs

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, seminars and multi daily tests.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	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.				
	Report				
Summative assessment	**Midterm Exam**	2hr	20% (20)	7 and 12	LO #1 - #7
	Final Exam	3hr	60% (60)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Overflow Spillway: Ogee Spillway, Design of Ogee Spillway,
Week 2	Tutorial
Week 3	Side-Channel Spillway, Design Criteria. Flow Profile Analysis for Side-Channel Spillway: Chute Spillway: General Specification: Chute Sidewalls
Week 4	Tutorial
Week 5	Shaft Spillway, Siphon Spillway: Siphon Behavior.
Week 6	Tutorial
Week 7	**Mid-term Exam1**
Week 8	Outlet Work: Functions of outlet works: Sluiceways: Hydraulics of Outlet Works:
Week 9	Energy Dissipation below Spillways: Characteristics of a Hydraulic Jump: Hydraulic Jump as an Energy Dissipater: Length of Hydraulic Jump:
Week 10	Jump High Curve (JHC): Tail water rating curve: Location of a Hydraulic Jump:
Week 11	Stilling Basins: Types of Stilling Basin:
Week 12	Tutorial
Week 13	Dams Operation: Reservoirs: Types of Reservoirs: Zones of Storage: Reservoir Yield:
Week 14	Reservoir Mass Curve and Storage: Tutorial
Week 15	**Mid-term Exam2**

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

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Robert J. Houghtalen , Hydraulic Engineering System	yes
Recommended Texts	- R. E. Featherstone, Civil Engineering Hydraulics - Em. Wilson, Engineering hydrology	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 42

Module Information معلومات المادة الدراسية					
Module Title	**Foundation Engineering**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**DWE3328**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGVI		**Semester of Delivery**	Eight	
Administering Department	DWE		**College**	ENG	
Module Leader	Ahmed Amin Jubair		**e-mail**	Jubair3a@uoanbar.edu.iq	
Module Leader's Acad. Title	Lec.		**Module Leader's Qualification**	Master	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Soil Mechanics	**Semester**	5
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	At the end of this course students should be able to: A. Apply knowledge of mathematics science and A mathematics, science, engineering. B. Design a system, component, or process to meet desired needs. C. Identify, formulates, and solves engineering problems. D. Know up-to-date issues. E. Use the techniques, skills, and modern engineering tools necessary for engineering practice.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Objectives of this course is to teach the student how to: 1. understand site investigation report. 2. evaluate the ultimate and allowable bearing capacity of different soil strata for shallow foundation. 3. estimate the settlement for shallow foundation, including immediate and consolidation settlement. 4. evaluate lateral earth pressures (at rest, active, passive) behind the retaining walls. 5. evaluating allowable bearing capacity of single pile (deep foundation) and estimating its elastic settlement. 6. do some computer applications
Indicative Contents المحتويات الإرشادية	This course begins with - review to soil mechanics and. - introduction to subsurface exploration. - Then it covers bearing capacity of shallow foundation, stress distribution, and foundation settlement. - Then it moves to lateral earth pressure and, retaining structures. - This course ends with an introduction to the pile foundation system. It includes computer applications

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	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	102	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	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.				
	Report				
Summative assessment	**Midterm Exam**	2hr	20% (20)	8 and 12	LO #1 - #7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Subsurface Exploration(Number , depth, and layout under dams and other structures)
Week 2	Introduction to Subsurface Exploration of dams. Introduction to Subsurface Exploration (field tests under all type of dams and other structures).

Week 3	Shallow Foundation: Ultimate Bearing Capacity
Week 4	Shallow Foundation: Ultimate Bearing Capacity of Special Cases for layered strata.
Week 5	Shallow Foundation: Ultimate Bearing Capacity of Special Cases for footing near the slop of dams.
Week 6	Shallow Foundation: Settlement.
Week 7	Combined and Mat Foundation
Week 8	**Mid-term Exam1**
Week 9	Lateral Earth Pressure
Week 10	Retaining Walls
Week 11	Sheet Pile (Simplified method)
Week 12	**Mid-term Exam2**
Week 13	Sheet Pile (Net lateral pressure method)
Week 14	Deep Foundation: Pile Foundation
Week 15	Pile Foundation test.
Week 16	**Preparing to final exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	
Week 2	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Principles of Foundation Engineering, Braja M. Das, Sixth Edition, PWS-KENT, 2007.	No
Recommended Texts	Foundation Analysis and Design,Joseph E. Bowles, Fifth Edition, McGraw-Hill, Inc., 1997.	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 43

Module Information معلومات المادة الدراسية					
Module Title	**Senior Design Project- II**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☒ **Practical** ☒**Seminar**	
Module Code	**DWE4335**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGIV	**Semester of Delivery**		Eight
Administering Department		DWE	**College**	ENG	
Module Leader	Ayad S. Aadi		**e-mail**	ayad_saeed@uoanbar.edu.iq	
Module Leader's Acad. Title		Assist. Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name		Ibtihal A. Mawlood	**e-mail**	Ibtihal.maoloud@uoanbar.edu.iq	
Scientific Committee Approval Date		01/06/2023	**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Senior Design I	**Semester**	7
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Provide the student who is nearing completion of BSc. degree in Dam and water resources engineering with the opportunity to do research and/or a scholarly literature review on a contemporary issue in counseling or a related area that is of specific interest to them. 2. Provide the student with a learning experience that is individualized and supervised by a staff member of the Dam and water resources engineering department who has particular expertise and/or interest in the study area selected for research by the capstone project student and supervisor. 3. Provide the student with an integrated learning experience in which coursework taken throughout the study program is synthesized and culminates in the completion of a final project that shows graduate-level research, writing, and skills. 4. Provide the student with a public spot for presenting the final capstone project. It is expected the student will acquire a sense of confidence and comfort with presenting professional work in public. 5. Provide the student with an opportunity to show their professionalism.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Ability to understand the significance of the work and project outcomes. 2. Ability to apply Dam and water resources engineering principles to propose engineering solutions to the project problem. 3. Ability to perform a literature review and data collection. 4. Ability to use engineering software to conduct engineering design as well as to analyze data. 5. Ability to present results with analysis, interpretation, sample calculation, error, and trend analysis. 6. Ability to comprehend professional and ethical responsibilities. 7. Ability to identify the impact of engineering solutions: global, economic, environmental, and societal. 8. Ability to function as a team member and as well as a leader in the project group. 9. Ability to communicate effectively between clients and team members. 10. Commitment to the general contexts for writing the project, especially if formats are available in this regard, and the ability to summarize the project from the final report and the directives of the supervisor and the instructions of the projects committee PC. 11. The ability to present what has been done in a scientific and practical manner and to answer the examination committee's inquiries convincingly as one team.
Indicative Contents المحتويات الإرشادية	1. Project design review 2. Prototyping 3. Construction and assembly 4. Cost estimates 5. Demonstration and presentation of project 6. Final report, including user's manual of completed system

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students to have the opportunity to demonstrate that they can indeed meet the levels of performance expected of a professional engineer and take individual responsibility for the timely completion of a major engineering project under the supervision by supervisors, as well as demonstrate a professional level of preparation and planning, achievement, testing, and documentation, which is a common way to determine whether a student is ready to graduate.

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

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	Student progress	1	35%(35)	12	All
	Format of project report	1	15%(15)	13	10
	Poster submission and presentation	1	10%(10)	14	All
	Report				
Summative assessment	**Midterm Exam**				
	Final Exam	1	50%(50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Seminar of Senior Design 1
Week 2	Writing and arranging the Second part of the project and amending it as directed by discussion committee in Seminar
Week 3	Submission of progress tracking form to projects consultants
Week 4	Laboratory work, examinations or/and preparation of spreadsheets
Week 5	Laboratory work, examinations or/and preparation of spreadsheets
Week 6	Laboratory work, examinations or/and preparation of spreadsheets
Week 7	Laboratory work, examinations or/and preparation of spreadsheets
Week 8	Submission of progress tracking form to projects consultants
Week 9	Writing and arranging the Second part of the project and amending it as directed by the supervisor
Week 10	Writing and arranging the Second part of the project and amending it as directed by the supervisor
Week 11	Writing and arranging the Second part of the project and amending it as directed by the supervisor
Week 12	Submission of progress tracking form to projects consultants
Week 13	Draft report submitted to the supervisor and receiving comments from supervisor(s)
Week 14	Poster submission to projects consultants for checking format adherence and receiving comments from projects consultants
Week 15	**Final Submission of revised report**
Week 16	**Senior design project I presentation**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Review and prepare the materials or software that will be used in the research
Week 2	Review and prepare the materials or software that will be used in the research
Week 3	Implementation of the practical part and according to the specificity of the project
Week 4	Implementation of the practical part and according to the specificity of the project
Week 5	Implementation of the practical part and according to the specificity of the project
Week 6	Implementation of the practical part and according to the specificity of the project
Week 7	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Depends on the subject and specificity of the project	
Recommended Texts	Depends on the subject and specificity of the project	
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 44

Module Information معلومات المادة الدراسية					
Module Title	**Pipe Networks**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	DWE4332				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGVI		**Semester of Delivery**	Eight	
Administering Department	DWE		**College**	ENG	
Module Leader	Yasir Abdulmajeed Mohammed		**e-mail**	aniyaser@uoanbar.edu.iq	
Module Leader's Acad. Title	Assist Prof.		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**	aniyaser@uoanbar.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives	1. Developing the skills to design, analyze, and optimize pipe networks for various applications, such as water distribution, gas transmission, and oil pipelines.

أهداف المادة الدراسية	2. Learning about the different types of pipes, valves, pumps, and fittings used in pipe networks and their selection criteria. 3. Familiarizing oneself with relevant codes, standards, and regulations related to pipe networks engineering. 4. Enhancing communication and collaboration skills to work effectively in multidisciplinary teams on pipe network projects. 5. Learning about the latest technologies and innovations in pipe networks engineering and their potential applications. 6. Developing critical thinking and problem-solving skills to address complex engineering challenges in pipe network projects. 7. Understanding the importance of safety and risk management in pipe network projects and how to incorporate them into the design and operation of pipe networks.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	At the conclusion of this course, each student will be able to do the following: - Define fundamental principles and concepts of engineering hydraulic systems. - Explain water flow in hydraulic structures. - Identify the importance and the role of water pressure and pressure forces in hydraulic systems including the effects of surface friction. - Develop methods of analysis of fluid flow in pipelines and pumped distribution networks for urban areas - Analyze flow in closed pipes, and design pipes including the selection of sizes. - Use techniques and graphs for the analysis of system performance and characteristics.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. 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	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	102	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	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.				
	Report				
Summative assessment	**Midterm Exam**	2hr	20% (20)	8 and 12	LO #1 - #7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Pipes Networks Engineering
Week 2	Basic concepts of fluid mechanics, including pressure, flow rate, and friction losses
Week 3	Historical development of pipes networks; Types of pipes and their characteristics
Week 4	Pipe Network Analysis and Design; Pipe network analysis using network theory and hydraulic models and design considerations for pipe networks.
Week 5	Pipe Network Components and Materials
Week 6	Pipe sizing and pump stations
Week 7	Pipe sizing and pump stations continued
Week 8	**Mid-term Exam1**
Week 9	Types of valves, pumps, and fittings used in pipe networks and their selection criteria
Week 10	Characteristics and properties of different pipe materials, such as steel, copper, plastic, and concrete - Application of relevant codes, standards, and regulations in pipe network design
Week 11	Storm Water and Wastewater Sewerage
Week 12	Environmental and Social Impacts of Pipe Networks - Assessment of environmental and social impacts of pipe network projects - Strategies for minimizing environmental and social impacts, such as land use planning and community engagement.
Week 13	**Mid-term Exam2**
Week 14	Introduction to EPANET software pipelines design
Week 15	Introduction to SewerCad software pipelines design
Week 16	**Preparing to final exam**

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

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Water Supply And Sewerage , E.W.Steel & Terence J .Mcghee , Fifth Edition	yes
Recommended Texts		
Websites		

Grading Scheme

مخطط الدرجات

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

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