MODULE DESCRIPTION | 2025-2026

Dams and Water Resources Engineering Department

TIKRIT UNIVERSITY

جامعة تكريت

Bachelor's degree (B.Sc.) – Dams and Water Resources Engineering

بكالوريوس - هندسة السدود والموارد المائية

MODULE DESCRIPTION

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Calculus I**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MATH-101**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Dams and Water Resources Department		**College**	College of Engineering	
Module Leader	Firas Hazem Jasim Mohammed		**e-mail**	Firas.arab@tu.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**		
Peer Reviewer Name	Prof. Dr. Raad Hoobi		**e-mail**	dr.raadhoobi@tu.edu.iq	
Scientific Committee Approval Date	01/11/2025		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims	An Overview of the derivatives, Integration, Indefinite integral, Integration by substitution, The definite integral, Evaluating definite integrals by substitution,

أهداف المادة الدراسية	Applications of the definite integral, Area between two curves, Volumes by slicing; disks and washers, Volumes by cylindrical shells, Length of a plane curve, and Area of a surface of revolution.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	It is expected from the student who passes this module learn the following topics: 1. An Overview of the derivatives. 2. Integration. 3. Indefinite integral. 4. Integration by substitution. 5. The definite integral. 6. Evaluating definite integrals by substitution. 7. Applications of the definite integral. 8. Area between two curves. 9. Volumes by slicing; disks and washers. 10. Volumes by cylindrical shells. 11. Length of a plane curve. 12. Area of a surface of revolution. 13. Graph of Hyperbolic Functions . 14. Derivatives and Integrals of Hyperbolic Functions. 15. Hopital's Rule.
Indicative Contents المحتويات الإرشادية	An Overview of the derivatives. [6 hr] Integration. [6 hr] Indefinite integral. [6 hr] Integration by substitution. [6 hr] The definite integral. [6 hr] Evaluating definite integrals by substitution. [6 hr] Applications of the definite integral. [6 hr] Area between two curves. [6 hr] Volumes by slicing; disks and washers. [6 hr] Volumes by cylindrical shells. [6 hr] Length of a plane curve. [6 hr] Area of a surface of revolution. [6 hr] Graph of Hyperbolic Functions. [6 hr] Derivatives and Integrals of Hyperbolic Functions. [6 hr] Hopital's Rule. [6 hr]
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 type of simple experiments involving some sampling activities that are interesting to the students.
Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا	

Structured SWL (h/sem)	63	**Structured SWL (h/w)**	4.2

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

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	0	0% (0)		
Summative assessment	**Midterm Exam**	2 hr	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	An Overview of the derivatives.
Week 2	Integration.
Week 3	Indefinite integral + (quiz 1)
Week 4	Integration by substitution + The definite integral.
Week 5	Monthly Exam 1
Week 6	Evaluating definite integrals by substitution
Week 7	Applications of the definite integral.
Week 8	Area between two curves + (quiz 2)
Week 9	Volumes by slicing; disks and washers.
Week 10	Volumes by cylindrical shells + (quiz 3)
Week 11	Length of a plane curve + Area of a surface of revolution.
Week 12	Monthly Exam 2
Week 13	Graph of Hyperbolic Functions .
Week 14	Derivatives and Integrals of Hyperbolic Functions.
Week 15	Hopital's Rule.
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	○ Calculus I By: Thomas	Yes
Recommended Texts	Calculus I By: Thomas 2018	No
Websites		

Grading Scheme
مخطط الدرجات

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

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

Module Information

معلومات المادة الدراسية					
Module Title	**Engineering Mechanics I**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ENG-101**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	DWRE		**College**	Engineering	
Module Leader	Abdullah Saeb Tais Jabr		**e-mail**	abdalla_saab@tu.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Saad Mawlood Saab Hassan Al-Nasiri		**e-mail**	Saadmm.saab@tu.edu.iq	
Peer Reviewer Name	Prof. Dr. Raad Hoobi		**e-mail**	dr.raadhoobi@tu.edu.iq	
Scientific Committee Approval Date	1/11/2025		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To develop problem solving skills and understanding of engineering mechanics (static) throughout the context of this course. 2. To understand the principles of engineering mechanics I like vector and non-vector quantities, units conversion. 3. This course also deals with force systems and their result. 4. To understand the basics of equilibrium of objects. 5. To understand force distribution in trusses and frames. 6. To perform force analysis using the joint method and the section method.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding vector and non-vector quantities, units conversion. 2. Understanding force system and their resultant. 3. Understanding the equilibrium. 4. Understanding forces in trusses and frames.
Indicative Contents المحتويات الإرشادية	• **Principles of statics [6 hr]** 1-basic concepts 2- vector and non-vector quantities 3- Units and their conversion • **Force systems and their result [24 hr]** 1-Force system 2- Analysis 3- Result of the converging forces 4- Moment force 5- Doubles 6- The result of non-converging forces • **Equilibrium [18 hr]** 1-concept of Equilibrium 2- free body diagram 3- Balance of parallel forces 4 - Equilibrium of bodies on which non-converging forces are applied • **Trusses and Frames [42 hr]** 1-Trusses A- Joints method B – Section method 2-Frames

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 homework assignments.

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

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes (Q)**	4	20% (20)	4, 6, 11, 14	LO #Q1: 1-2, Q2: 5-6, Q3: 7-9, Q4: 10-13
	Assignments (A)	4	20% (20)	3, 5, 10, 13	LO #A1: 1-2, A2: 5-6, A3: 7-9, A4: 10-13
	Projects / Lab.	-	-	-	-
	Report	-	-	-	-
Summative assessment	**Midterm Exam**	2 hr	10% (10)	8	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Principles of statics,** 1-basic concepts, 2- vector and non-vector quantities, 3- Units and their conversion
Week 2	**Force systems and their result.** 1-Force system, 2- Analysis,
Week 3	3- Result of the converging forces, 4- Moment force,
Week 4	5- Doubles, **Problem solving** + Quiz 1
Week 5	6- The result of non-converging forces
Week 6	**Equilibrium.** 1-concept of Equilibrium, 2- free body diagram, 3- Balance of parallel forces **+** Quiz 2
Week 7	4 - Equilibrium of bodies on which non-converging forces are applied
Week 8	**Mid-term Exam + introduction about Trusses and Frames**
Week 9	**Trusses and Frames.** 1-Trusses: A- Joints method part 1
Week 10	1-Trusses: A- Joints method part 2 + Quiz 3
Week 11	Trusses: B – Section method part 1
Week 12	Trusses: B – Section method part 2 + **Problem solving**
Week 13	2-Frames part 1
Week 14	2-Frames part 2 + Quiz 4
Week 15	**Problem solving**
Week 16	**Preparatory week before the final Exam – review or open session for general questions**

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	الميكانيك الهندسي – الجزء الأول – الاستاتيك. وزارة التعليم العالي والبحث العلمي.	Yes
Recommended Texts	Engineering Mechanics: Statics & Dynamics, 2022, 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 Information معلومات المادة الدراسية					
Module Title	**COMPUTER I**			**Module Delivery**	
Module Type	**S**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UOT-003**				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level	1		**Semester (s) offered**	1	
Administering Department	Dams and Water Resources Engineering		**College**	Engineering	
Module Leader	Ahmed Shihab Ahmed Mohammed Al-Jubouri		**e-mail**	ahmed.s.ahmed@tu.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	MSc in Water Resources	
Module Tutor			**e-mail**		
Peer Reviewer Name	Prof. Dr. Raad Hoobi		**e-mail**	dr.raadhoobi@tu.edu.iq	
Review Committee Approval	1/11/2025		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	-
Co-requisites module	None	**Semester**	-
Module Aims, Learning Outcomes, Indicative Contents and Brief Description أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر			
Module Aims أهداف المادة الدراسية	The aim of this module is to provide students with a comprehensive understanding of the key concepts and principles of computer science. Through the study of topics such as history, data representation, computer components, algorithms, programming languages, operating systems, applications, internet and networking, and cyber security, students will gain a broad understanding of the field of computer science and how it has evolved over time.		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Describe the historical development of computer science and its impact on society. 2. Understand the various methods of data representation and manipulation. 3. Identify the components of a computer and their functions. 4. Design and implement algorithms for a range of problems. 5. Understand the principles of programming languages and apply them to develop software.		

	6. Understand the structure and functions of operating systems. 7. Identify and analyze a range of applications of computer science. 8. Understand the principles of internet and networking technologies. 9. Identify and analyze various cybersecurity threats and methods of prevention.
Indicative Contents المحتويات الإرشادية	- History introduction: Evolution of computer science, pioneers and important milestones - Data representation: Binary numbers, hexadecimal, character sets, ASCII and Unicode - Computer components: CPU, memory, input/output devices, storage devices - Algorithms: Definition, representation, complexity, searching, sorting, optimization - Programming languages: Syntax, semantics, variables, functions, control structures, abstraction - Operating systems: Structure, file systems, process management, memory management - Applications: Databases, artificial intelligence, computer graphics, human-computer interaction - Internet and networking: Protocols, network architectures, security, privacy - Cybersecurity: Threats, attacks, prevention, detection, mitigation
Course Description	This course offers students a comprehensive exploration of the fundamental concepts and principles that underpin the field of computer science. By delving into various subjects including the historical development of computing, data representation, computer components, algorithms, programming languages, operating systems, applications, internet and networking, and cyber-security, students will develop a well-rounded understanding of the discipline. By examining the evolution of computer science over time, students will acquire a broad perspective on the field and its significance in contemporary society. Through a combination of theoretical knowledge and practical applications, this module equips students with the necessary foundation to pursue further studies or careers in computer science.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The module will use a range of learning and teaching strategies, including: - **Lectures**: To provide students with an overview of the main concepts and principles. - **Labs**: To provide students with hands-on experience of programming, algorithms, and data representation. - **Assignments and Quizzes**: To provide students with opportunities to apply their knowledge and skills to real-world problems and check their understanding.

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
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing 20** **Preparation for tests 10** **Home works 5**	12	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time (hr)	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	15% (15)	2, 4, 6, 8, 10	LO #1, 3, 5 and 6
	Assignments	1	11% (11)	5, 14	LO # 2, 4, 7 and 8
	Lab	14	14% (14)	Continuous	
Summative assessment	**Midterm Exam**	1.5	10% (10)	7	LO # 1-5
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	History introduction: Evolution of computer science, pioneers and important milestones
Week 2	Data representation: Binary numbers, hexadecimal, character sets, ASCII and Unicode
Week 3	Computer components: CPU, memory, input/output devices, storage devices
Week 4	Algorithms: Definition, representation, complexity, searching, sorting, optimization
Week 5	Programming languages I
Week 6	Programming languages II
Week 7	Midterm
Week 8	Operating systems I
Week 9	Operating systems II
Week 10	Applications I: Information Systems
Week 11	Applications II: artificial intelligence
Week 12	Applications III: computer graphics, human-computer interaction
Week 13	Networking
Week 14	Internet
Week 15	Cybersecurity: Threats, attacks, prevention, detection, mitigation
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Computer Operating System (e.g. Microsoft Windows)
Week 2	Lab 2: Document Processing I (e.g. Microsoft Word)
Week 3	Lab 3: Document Processing II (e.g. Microsoft Word)
Week 4	Lab 4: Data Processing I (e.g. Microsoft Excel)
Week 5	Lab 5: Data Processing II (e.g. Microsoft Excel)
Week 6	Lab 6: Presentation Slides I (e.g. Microsoft PowerPoint)
Week 7	Lab 7: Presentation Slides II (e.g. Microsoft PowerPoint)

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Computer Science Illuminated, by Dale, N and Lewis, J, 7th Ed, Jones & Bartlett Learning, 2020	No
Recommended Texts	-	-
Websites	-	

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

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

Module Information

معلومات المادة الدراسية

Module Title	**Engineering Drawing**	**Module Delivery**	
Module Type	**B**	☐ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ENG-102**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		
Module Level	1	**Semester of Delivery**	1
Administering Department	DWRE	**College**	COE
Module Leader	Sinan Noori Fayhan Mahmoud	**e-mail**	sinanalnajjar@tu.edu.iq
Module Leader's Acad. Title	Assistant Lecturer	**Module Leader's Qualification**	MSc in Water Resources
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Prof. Dr. Raad Hoobi	**e-mail**	dr.raadhoobi@tu.edu.iq
Scientific Committee Approval Date	01/11/2025	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The module aims to shed light on how to use one of the most important computer aided drawing software - AutoCAD software - reviewing the most important information that the users need to utilize the most common program vision, to produce and extract 2D and 3D drawings. Qualifying students of the Dams and Water Resources Engineering Department to use the AutoCAD software to competently and efficiently realize engineering drawings, and assist them in implementing the details of the designs required in their projects.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Distinguish how to use CAD programs to produce engineering drawings. 2. Benefit from AutoCAD software features to produce efficient drawings. 3. Acquire a knowledge to draw 2D drawings. 4. Acquire skill in modify 2D drawings. 5. Become competent in adding dimensions and text to the drawings. 6. Manage how to work with layers. 7. Accomplish printing the plans in an accurate geometric manner on paper. 8. Learn how to draw 3D drawings.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. - Introducing AutoCAD interface components, Types of Coordinate systems in AutoCAD, Drawing environment preparation Grid, Snap, Ortho [6 hrs] - Drawing commands: Line, Circle, Polygon, Rectangle, Point, Divide, Hatch, Text, Mtext [18 hrs] - Modify commands: Erase, Copy, Move, Mirror, Rotate, Scale, Offset, Rectangular and Polar Array, Stretch, Trim, Extend, Chamfer, Fillet, Explode [21 hrs] - Object Snap, Zoom, and Pan [6 hrs] - Layers and drawing element settings: Color, Linetype, Line Weight, Text Style [12 hrs] - Dimensions and measurements [6 hrs] - Printing and output [6 hrs] - Basics of 3D Drawings [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 type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction - AutoCAD program interface elements, Coordinate systems in the program, Drafting Settings: Grid, Snap, Ortho
Week 2	Drawing commands: Line, Circle
Week 3	Drawing commands: Polygon, Rectangle
Week 4	Modify tools: Erase, Copy, Move
Week 5	Modify tools: Mirror, Rotate, Scale
Week 6	Object Snap, View – Zoom, View - Pan
Week 7	Modify tools: Offset, Rectangular and Polar Array
Week 8	Modify tools: Stretch, Trim, Extend
Week 9	Drawing Commands: Point, Divide, Hatch
Week 10	Drawing Commands: Text, Mtext
Week 11	Modify tools: Chamfer, Fillet, Explode
Week 12	Layers and drawing element settings: Color, Line type, Line Weight, Text Style
Week 13	Dimensions and measurements
Week 14	Printing and output
Week 15	Basics of 3D Drawings
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Apply the command and materials that taken in the week #1 of the theoretical course.
Week 2	Lab 2: Apply the command and materials that taken in the week #2 of the theoretical course.
Week 3	Lab 3: Apply the command and materials that taken in the week #3 of the theoretical course.
Week 4	Lab 4: Apply the command and materials that taken in the week #4 of the theoretical course.
Week 5	Lab 5: Apply the command and materials that taken in the week #5 of the theoretical course.
Week 6	Lab 6: Apply the command and materials that taken in the week #6 of the theoretical course.
Week 7	Lab 7: Apply the command and materials that taken in the week #7 of the theoretical course.
Week 8	Lab 8: Apply the command and materials that taken in the week #8 of the theoretical course.
Week 9	Lab 9: Apply the command and materials that taken in the week #9 of the theoretical course.
Week 10	Lab 10: Apply the command and materials that taken in the week #10 of the theoretical course.
Week 11	Lab 11: Apply the command and materials that taken in the week #11 of the theoretical course.
Week 12	Lab 12: Apply the command and materials that taken in the week #12 of the theoretical course.
Week 13	Lab 13: Apply the command and materials that taken in the week #13 of the theoretical course.
Week 14	Lab 14: Apply the command and materials that taken in the week #14 of the theoretical course.
Week 15	Lab 15: Apply the command and materials that taken in the week #15 of the theoretical course.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Al-Allaf, Emad Hani, Architectural and Computer Aided Engineering Drawing, 2D Drawing Principles in AutoCAD®, 2018.	Yes
Recommended Texts		
Websites	https://www.mycadsite.com	

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

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

Module Information معلومات المادة الدراسية				
Module Title	**Introduction to Water Resources Engineering**		**Module Delivery**	
Module Type	**C**		☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWRE-101**			
ECTS Credits	**6**			
SWL (hr/sem)	**100**			
Module Level	1	**Semester of Delivery**	1	
Administering Department	**Dam and Water Resources Engineering (DWRE)**	**College**	**College of Engineering**	
Module Leader	Mohammed Faeq Yas Khudair	**e-mail**	mohamed_faiq@tu.edu.iq	
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	M. Ph.D. in Water Resources	
Module Tutor		**e-mail**		
Peer Reviewer Name	**Prof. Dr. Raad Hoobi**	**e-mail**	**dr.raadhoobi@tu.edu.iq**	
Scientific Committee Approval Date	**1/11/2025**	**Version Number**	**1.0**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Introducing students to the importance of water resources for human life and what is the primary role of the dams and water resources engineer in managing and developing these resources and ways to preserve them. 2. Introducing students to the basic principles of irrigation and drainage engineering, modern and ancient irrigation methods, and ways to preserve water wealth. 3. Introducing students to the basic principles of studying fluid flow in pipes and open channels and the most important methods used to measure and control it. 4. Introducing the student to the concept of the hydrological cycle, the movement of water above and below the surface of the earth, and the study of evaporation from the surface of the soil and the surface of free water and the effect of weather factors on it.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. The course helps the student to understand the content of the three disciplines of dams and water resources engineering (irrigation, drainage, hydrology, and hydraulics). 2. The course paves the way for students to study the properties of soil and the movement of water in it. 3. The course represents the starting line for the study of hydrology and the water cycle in nature and its distribution above and below the soil surface. 4. After completing this course, the student will be qualified to study the movement of water and other fluids in pipes and open channels and everything related to hydraulics.
Indicative Contents المحتويات الإرشادية	This course is considered one of the important courses for students of the Department of Dams and Water Resources Engineering, where the student is introduced to the most important principles of the branches of water resources (irrigation and drainage, hydraulics, hydrology). In addition to introducing the student to the most important water resources projects and hydraulic facilities in Iraq, where the course includes topics next: 1. Hydrological cycle (12hr). 2. Dams and reservoirs/Hydraulic Structures/Floods (12hr). 3. Methods for measuring flow in open channels and pipes (10hr). 4. Soil-water-plant relationship (12hr). 5. Consumptive use (8hr). 6. Irrigation methods (10hr). 7. Irrigation efficiency (8hr). 8. Water sources in Iraq (8hr). 9. Control and storage projects(8hr) 10. Executed large dams (6hr). 11. Irrigation projects in Iraq (6hr).

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in offering this course is to familiarize the student with the basic principles of the three branches (irrigation and drainage, hydraulics and hydrology) in the field of dams and water resources, to be an introduction that helps the student to delve deeper into the study of these disciplines in the next academic stages. At the same time, improving and expanding critical thinking skills, and introducing him to the importance of water resources in achieving a decent life for humanity. This is achieved through theoretical lectures, scientific reports, field visits, and interactive panel discussions.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 15 اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعياً	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	15% (10)	5, 10,13	LO #1, 2 and 3
	Assignments	3	15% (10)	3, 7,12	LO #1, 2 and 3
	Projects / Lab.	0	0% (10)		
	Report	1	10% (10)	13	LO #1, 2 and 3
Summative assessment	**Midterm Exam**	2 hr	10% (10)	8	LO #1and 2
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to the course, with an explanation of the curriculum vocabulary and scientific sources.
Week 2	Phases of the hydrological cycle/ Irrigation water sources/ Floods.
Week 3	Dams and reservoirs / Types of Water reservoirs.
Week 4	Types of dams /catchment area Classification of dams.
Week 5	Hydraulic Structures/ Methods for measuring flow in open channels and pipes.
Week 6	Volumetric Measurements for discharge Measurement/ Velocity-Area Method for discharge Measurement/ Hydraulic Structures for discharge Measurement
Week 7	Soil physical properties.
Week 8	Soil water forms/ Soil moisture content conventions/ Soil moisture content.
Week 9	irrigation efficiency/Water conduction efficiency/ water and consistency of distribution
Week 10	Surface irrigation/sprinkler irrigation/ drip irrigation.
Week 11	Estimation of water consumption/ Evapotranspiration/ yield coefficient.
Week 12	Water sources in Iraq.
Week 13	Control and storage projects.
Week 14	Executed large dams.
Week 15	Irrigation projects in Iraq**.**
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	Irrigation and drainage book in Iraq and the Arab world. Written by Dr. Najeeb Kharofa, Dr. Mahdi Al-Sahhaf, Dr. Wafiq Al-Khashab	Yes
Recommended Texts	On-farm irrigation systems engineering\by A.Y.Hachum, and H.I.Yasin. textbook- Mosul University,1992.	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 Information

معلومات المادة الدراسية

Module Title	**Human Rights and Democracy**		**Module Delivery**	
Module Type	**S**		☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UOT-004**			
ECTS Credits	**2**			
SWL (hr/sem)	**50**			
Module Level	1	**Semester of Delivery**	1	
Administering Department	DWRE	**College**	COE	
Module Leader	Abdulrahman Zeidan	**e-mail**	Abdrahman@tu.edu.iq	
Module Leader's Acad. Title	Assistant lecturer	**Module Leader's Qualification**	MS.c	
Module Tutor		**e-mail**		
Peer Reviewer Name	Prof. Dr. Raad Hoobi	**e-mail**	dr.raadhoobi@tu.edu.iq	
Scientific Committee Approval Date	1/11/2025	**Version Number**	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

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

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

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	When it comes to learning and teaching strategies for a human rights module, there are several approaches can be taken to enhance understanding and engagement. Here are some effective strategies: 1. Interactive Discussions: Encourage students to actively participate in discussions, debates, and group activities. This promotes critical thinking, allows for different perspectives to be shared, and fosters a deeper understanding of human rights issues. 2. Case Studies: Present real-life case studies that highlight human rights violations or achievements. Analyzing these cases helps students apply theoretical concepts to practical situations and develops their problem-solving skills. 3. Research Projects: Assign research projects on specific human rights topics or issues. This encourages independent learning, critical analysis, and the development of research skills. 4. Collaborative Learning: Foster collaboration among students through group projects or assignments. This encourages teamwork, peer learning, and the exchange of diverse perspectives. 5. Assessment Variety: Use a variety of assessment methods, including essays, presentations, debates, and quizzes, to assess students' understanding of human rights concepts and their ability to apply them to real-world situations.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

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

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

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	ضمانات حقوق الانسان وحمايتها وفقا للقانون الدولي والتشريع الوطني / نبيل عبد الرحمن ناصر الدين	No
Recommended Texts	الديمقراطية وحقوق الانسان / د. امير عبد العزيز	No
Websites		

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

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

Module Information معلومات المادة الدراسية					
Module Title	**Arabic Language I**			**Module Delivery**	
Module Type	**S**			**محاضرات نظرية**	
Module Code	**UOT-001**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	1		**Semester (s) offered**	1	
Min number of students			**Max number of students**	100	
Administering Department	Dams and water resources		**College**	Engineering	
Module Leader	Wasna Younis Abdullah		**e-mail**	Wasna.y.abdullah@tu.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	MSc	
Module Tutor	None		**e-mail**		
Peer Reviewer Name	Wasna Younis Abdullah		**e-mail**	Wasna.y.abdullah@tu.edu.iq	
Review Committee Approval	1/11/2025		**Version Number**	3.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	لا يوجد	**Semester**	2
Co-requisites module	لا يوجد	**Semester**	-
Module Aims, Learning Outcomes, Indicative Contents and Brief Description أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر			
Module Aims أهداف المادة الدراسية	1-تطوير المهارات اللغوية وحفظ بعض السور القرآنية وتعزيز حب اللغة لدى الطلبة. 2-فهم كيفية تطبيق القواعد اللغوية في الحياة اليومية، ومعرفة المصطلحات اللغوية في مجالات الهندسة والعلوم. 3-أهمية اللغة العربية في مجالات الحياة اليومية 4-استخدام القواعد اللغوية في كتابة التقارير والأبحاث العلمية بشكل صحيح. 5—تعزيز التعلم الذاتي والاستقلالية في التعلم وتشجيع الطلاب على أخذ مبادرة في تعلم اللغة العربية.		

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- فهم القواعد اللغوية وعلامات الترقيم وحفظ السور القرآنية. 2-تطوير المحصلة اللغوية لدى الطلبة من خلال تعلم الشعر والقواعد اللغوية بشكل صحيح. 3-تغطية معظم المواضيع اللغوية التي يحتاجها المهندس في مسيرته العملية 4-التدرب على الحفظ والنطق الصحيح لبعض السور القرآنية بالإضافة إلى التدرب على قراءة الشعر العربي وتعلم واستخدام قواعد اللغة العربية 5- الممارسات المتكررة لشرح المادة النظرية واستخدام الآلات والوسائل الحديثة بشرح المادة مع ضمان ملائمة المادة النظرية للاحتياجات الواقعية
Indicative Contents المحتويات الإرشادية	يتضمن المحتوى الارشادي ما يأتي: 1- من سورة البقرة الآيات من 260-263(2 ساعة). 2- من الحديث النبوي الشريف (2 ساعة). 3- قصيدة عنترة بن شداد (2 ساعة). 4- الميزان الصرفي (2 ساعة). 5- الجموع في اللغة العربية (2 ساعة). 6- اسناد الفعل للضمائر (2 ساعة). 7- تصريف الأفعال (2ساعة). 8- الحروف الهجائية (2 ساعة). 9- احكام كتابة علامات الترقيم (2 ساعة). 10- أحكام كتابة الهمزة (2 ساعة). 11- المدارس المعجمية (2 ساعة). 12- معاني الألفاظ الغريبة في القرآن الكريم (2 ساعة). 13- منهج مدرستي العين والأساس (2 ساعة). **14-** من الأخطاء اللغوية الشائعة (2 ساعة).
Course Description	تهدف هذه المادة إلى تعريف الطلبة باللغة العربية بوصفها لسان العرب، ولغة سامية حيّة تميزت بنظام صوتي وصرفي ونحوي وتركيبي دقيق، وهي اللغة التي نزل بها القرآن الكريم ولا يُفهم على وجهه الصحيح إلا من خلالها. ويركز المقرر على تنمية مهارات الطلبة الأساسية في القراءة السليمة، والكتابة الصحيحة، وضبط قواعد الإملاء وعلامات الترقيم، إلى جانب التذوق الأدبي للنصوص القرآنية والشعرية المختارة من التراث القديم والحديث. كما يسعى المقرر إلى ربط الطالب بهويته اللغوية والثقافية، وتمكينه من توظيف العربية في حياته الجامعية والمهنية على نحو فعّال.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	ان استراتيجية التعلم هي أسلوب تعليمي يعتمد على إعادة تنظيم المعلومات وتكييفها بطريقة تمكن من الوصول إلى معلومات جديدة، وتتميز هذه الاستراتيجية بأنها تجعل الطالب نشطاً وايجابياً ودورنا يتمثل في دور الموجه والمرشد والمخطط وهذا يُمكّن من اكتشاف المعرفة بسلاسة من قبل الطلاب.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures 13** **In class tests 2**	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	20% (20)	3, 5, ,7, 9,11,13,	LO #1, 2,3,4,..... ,11
	Assignments (Homeworks)	6	15% (15)	2, 4, 6, 10,12,14	LO # 1, 2, 3, 4 ,.....,11
	Discussions	7	5% (5)	Continuous	
	Seminar	3	5%(5)		
Summative assessment	Midterm Exam	2	10% (10)	8	LO # 1-7
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	سورة البقرة من الآيات 260-263
Week 2	حديث نبوي شريف
Week 3	أبيات من قصيدة عنترة بن شداد
Week 4	الميزان الصرفي
Week 5	الجموع في العربية
Week 6	إسناد الفعل للضمائر
Week 7	تصريف الأفعال
Week 8	امتحان نصف الفصل
Week 9	الحروف الهجائية
Week 10	أحكام كتابة علامات الترقيم
Week 11	أحكام كتابة الهمزة
Week 12	المدارس المعجمية
Week 13	معاني الألفاظ الغريبة في القرآن الكريم
Week 14	منهج مدرستي العين والأساس
Week 15	من الأخطاء اللغوية الشائعة
Week 16	امتحان نهاية الفصل

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	اللغة العربية لأقسام غير الاختصاص	Yes
Recommended Texts	التفسير الوسيط أ.د. وهبة الزحيلي المنهاج في القواعد والإعراب: محمد الأنطاكي	No
Websites	N/A	

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

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

Module Information
معلومات المادة الدراسية

Module Title	**Calculus II**	**Module Delivery**	
Module Type	**B**	☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MATH-102**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		

Module Level	1	**Semester of Delivery**	2
Administering Department	Dams and Water Resources Department	**College**	College of Engineering
Module Leader	Firas Hazem Jasim Mohammed	**e-mail**	Firas.arab@tu.edu.iq
Module Leader's Acad. Title		**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Prof. Dr. Raad Hoobi	**e-mail**	dr.raadhoobi@tu.edu.iq
Scientific Committee Approval Date	1/11/2025	**Version Number**	1.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Math- 101	**Semester**	1
Co-requisites module	None	**Semester**	

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

Module Aims أهداف المادة الدراسية	Matrices and determinants, Transcendental Functions, Inverse Functions, Derivatives and integral of inverse trigonometric functions, Exponential and logarithmic functions, Derivatives and integrals involving logarithmic and exponential functions, Graphs and applications involving logarithmic and exponential functions, Hyperbolic functions, Hopital's Rule, An overview of integration methods: Trigonometric substitutions, Trigonometric integral, Integration by parts, Integrating rational functions by partial fractions, Numerical integration; Simpson's rule.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	It is expected from the student who passes this module learn the following topics: 1. Matrices and determinants. 2. Transcendental Functions. 3. Inverse Functions. 4. Derivatives and integral of inverse trigonometric functions. 5. Exponential and logarithmic functions. 6. Derivatives and integrals involving logarithmic and exponential functions. 7. Graphs and applications involving logarithmic and exponential functions. 8. Hyperbolic functions. 9. Hopital's Rule. 10. An overview of integration methods: 11. Trigonometric substitutions. 12. Trigonometric integral. 13. Integration by parts. 14. Integrating rational functions by partial fractions. 15. Numerical integration; Simpson's rule.
Indicative Contents المحتويات الإرشادية	Matrices and determinants. [6 hr] Transcendental Functions. [6 hr] Inverse Functions. [6 hr] Derivatives and integral of inverse trigonometric functions. [6 hr] Exponential and logarithmic functions. [6 hr] Derivatives and integrals involving logarithmic and exponential functions. [6 hr] Graphs and applications involving logarithmic and exponential functions. [6 hr] Hyperbolic functions. [6 hr] Hopital's Rule. [6 hr] An overview of integration methods: [6 hr] Trigonometric substitutions. [6 hr] Trigonometric integral. [6 hr] Integration by parts. [6 hr] Integrating rational functions by partial fractions. [6 hr] Numerical integration; Simpson's rule. [6 hr]

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 type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 15 اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	0	0% (0)	0	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	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	Matrices and determinants.
Week 2	Transcendental Functions.
Week 3	Inverse Functions.
Week 4	Derivatives and integral of inverse trigonometric functions + (quiz 1)
Week 5	Exponential and logarithmic functions.
Week 6	Derivatives and integrals involving logarithmic and exponential functions.
Week 7	Graphs and applications involving logarithmic and exponential functions+ Hyperbolic functions.
Week 8	Monthly Exam 1
Week 9	Hopital's Rule + (quiz 2)
Week 10	An overview of integration methods:
Week 11	Trigonometric substitutions + Trigonometric integral.
Week 12	Integration by parts + (quiz 1)
Week 13	Integrating rational functions by partial fractions.
Week 14	Monthly Exam 2
Week 15	Numerical integration; Simpson's rule.
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	Calculus I By: Thomas	Yes
Recommended Texts	Calculus I By: Thomas 2018	No
Websites		

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

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

Module Information معلومات المادة الدراسية					
Module Title	**Engineering mechanics II**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ENG-103**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	DWRE		**College**	Engineering	
Module Leader	Abdullah Saeb Tais Jabr		**e-mail**	abdalla_saab@tu.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Saad Mawlood Saab Hassan Al-Nasiri		**e-mail**	Saadmm.saab@tu.edu.iq	
Peer Reviewer Name	Prof. Dr. Raad Hoobi		**e-mail**	dr.raadhoobi@tu.edu.iq	
Scientific Committee Approval Date	1/11/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ENG- 101	**Semester**	1
Co-requisites module	None	**Semester**	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ENG- 101	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To develop problem solving skills and understanding of engineering mechanics (dynamic) throughout the context of this course. 2. To understand the principles of engineering mechanics II like friction principals and types. 3. This course also deals with Centers and Centers of Gravity of bodies. 4. To understand the basics of moment of Inertia. 5. To understand force distribution in trusses and frames. 6. To perform force analysis using the joint method and the section method.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding vector and non-vector quantities, units conversion. 2. Understanding force system and their resultant. 3. Understanding the equilibrium. 4. Understanding forces in trusses and frames.
Indicative Contents المحتويات الإرشادية	• **Friction** 1. The nature of friction 2. mechanical friction 3. Coefficient of Friction 4. Friction issues 5. Wedges 6. Frictional forces in the belts • **Centers and Centers of Gravity** 1. The importance of centers 2. Centers of spaces and lines 3. Determination of centers by integration 4. Centers of compound shapes • **Moment of Inertia** 1. Units of measurement and signals 2. The moment of polar inertia 3. swirl radius 4. The equation for transferring the moment of inertia 5. Moment of Inertia by Integration 6. The factorial of inertia 7. Maximum and minimum values of moment of inertia (Mohr circuit) • **Kinematics of Particles** 1. Rectilinear motion 2. Plane curvilinear motion 3. Circular motion • **Kinetics of particles** 1. Rectilinear motion 2. Dynamic friction • **Work and energy** 1. Equations 2. Work and energy applications 3. Power 4. Efficiency

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 homework assignments.

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	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.2
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 (Q)**	4	20% (20)	4, 6, 10, 14	LO #Q1: 1-3, Q2: 4-6, Q3: 8-10, Q4: 11-13
	Assignments (A)	4	20% (20)	3, 5, 10, 13	LO #A1: 1-2, A2: 5-6, A3: 7-9, A4: 10-13
	Projects / Lab.	-	-	-	-
	Report	-	-	-	-
Summative assessment	**Midterm Exam**	2 hr	10% (10)	8	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Friction:** The nature of friction, mechanical friction, Coefficient of Friction, Friction issues
Week 2	**Friction**: wedges, Frictional forces in the belts
Week 3	**Centers and Centers of Gravity:** The importance of centers, Centers of spaces and lines, Determination of centers by integration, Centers of compound shapes
Week 4	**Problem solving** + Quiz 1
Week 5	**Moment of Inertia:** Units of measurement and signals, The moment of polar inertia, swirl radius, The equation for transferring the moment of inertia,
Week 6	**Moment of Inertia:** Moment of Inertia by Integration, The factorial of inertia, Maximum and minimum values of moment of inertia (Mohr circuit) + Quiz 2
Week 7	**Problem solving**
Week 8	**Mid-term Exam** + **introduction Kinematics of Particles**
Week 9	**Kinematics of Particles:** Rectilinear motion, ,
Week 10	**Kinematics of Particles:** Plane curvilinear motion + Quiz 3
Week 11	Circular motion

Week 12	Dynamic friction + **Problem solving**
Week 13	**Work and energy:** Equations, Work and energy applications,
Week 14	Power, Efficiency + Quiz 4
Week 15	**Problem solving**
Week 16	**Preparatory week before the final Exam – review or open session for general questions**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	الميكانيك الهندسي – الجزء الثاني – الديناميك. وزارة التعليم العالي والبحث العلمي.	Yes
Recommended Texts	Engineering Mechanics: Statics & Dynamics, 2022, 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 Information معلومات المادة الدراسية					
Module Title	**Computer II**			**Module Delivery**	
Module Type	**Basic**				
Module Code	**UOT-031**				
ECTS Credits	**3**			**Theory** **Lab.**	
SWL (hr/sem)	**75**				
Module Level	1		**Semester (s) offered**		2
Min number of students	15		**Max number of students**		100
Administering Department	Dams and Water Resources Department		**College**	Engineering	
Module Leader	Ahmed Shihab Ahmed Mohammed Al-Jubouri		**e-mail**	ahmed.s.ahmed@tu.edu.iq	
Module Leader's Acad. Title	Assistant lecturer		**Module Leader's Qualification**		MSc
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Prof. Dr. Raad Hoobi		**e-mail**	r.raadhoobi@tu.edu.iq	
Review Committee Approval	01/11/2025		**Version Number**		1.0

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	UOT-003	**Semester**	1
Co-requisites module	None	**Semester**	-
Module Aims, Learning Outcomes, Indicative Contents and Brief Description أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر			
Module Aims أهداف المادة الدراسية	This course introduces fundamental computing principles and programming concepts. Students use the high-level programming language, MATLAB to develop and implement programs to solve. Engineering problems. Basic programming concepts covered include algorithm design, data types, flow control, functions, sorting, plotting, simulation, and numerical methods.		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this course, students will be able to: • Introduce vectors and matrices in MATLAB, • Apply basic concepts of Linear Algebra for vector and matrix operations, • Perform 2D and 3D plotting, • Formulate and solve systems of linear equations by Gaussian elimination and matrix inversion, • Write conditional statements and loops,		

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures 25** **In lab lecture 25** **Seminar 10** **Final Test 3**	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing 4** **Preparation for tests 4** **Home Works 4**	12	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	0.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

	• Write Scripts and functions in MATLAB, • Solve some engineering problems using MATLAB, • Apply the fundamental knowledge of mathematics, science & engineering, to solve real engineering problems (through case studies).
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Force Vectors (8 hrs) Force System Resultants (8 hrs) Equilibrium of a Rigid Body (8 hrs) Friction (8 hrs) Center of Gravity and Centroid (6 hrs) Moments of Inertia and virtual work (8 hrs) Structure (trusses and Frames) (10 hrs)
Course Description	The course covers the following topics: MATLAB environment and important commands. • Linear Algebra and matrix operations • Fundamental engineering computing and statistics • Save, load, display and fprint and other similar commands • Communication with Excel • 2D (normal, logarithmic and subplots) and 3D plotting • Solutions to systems of linear equations • Conditional statements (if statements, also any, all, find and other commands) • Loops (for and while loops) • MATLAB scripts and functions • Polynomials, including numerical and symbolic differentiation and integration (trapz, quadl, integral, int, diff and other commands) • Using MATLAB for simple and complicated engineering problems (applying Matlab to solve problems related to mechanical engineering problems; thermal/fluid and solid mechanics)
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The learning and teaching strategy is designed to: Carefully cover in lectures the necessary fundamental material and analytical techniques and demonstrate concepts with appropriate (and where possible practical) examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems.

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10, 12, 14	LO #1, 2, 3, and 4
	Assignments (Home Works)	5	10% (10)	2, 4, 6, 8, 10	LO # 1, 2, 3, 4, 5 and 6
	In Lab Application	15	20% (8)	Continuous	
Summative assessment	Midterm Exam	2	10% (10)	7	LO # 1-5
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
week1	Introduction to programming in MATLAB, Principles of MATLAB
Week 2	MATLAB environment and commands
Week 3	Linear Algebra and matrices
Week 4	Fundamental engineering computing
Week 5	Save, load, display and print commands
Week 6	Communication with Excel
Week 7	Midterm exam
Week 8	2D and 3D plotting
Week 9	Solutions to systems of linear equations
Week 10	Conditional statements
Week 11	Loops
Week 12	MATLAB scripts and functions
Week 13	Polynomials, including differentiation and integration
Week 14	Using MATLAB for simple engineering problems
Week 15	Control flow and operators
Week 16	Final Exam

Computer Applications (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Application on Principles of MATLAB
Week 2	Application on MATLAB environment and commands
Week 3	Application on Linear Algebra and matrices
Week 4	Application on Fundamental engineering computing
Week 5	Application on Save, load, display and print commands
Week 6	Application on Excel
Week 7	Application on 2D plotting
Week 8	Application on 3D plotting
Week 9	Application on linear equations
Week 10	Application on Conditional statements
Week 11	Application on Loops
Week 12	Application on MATLAB scripts and functions
Week 13	Application on Polynomials, differentiation and integration
Week 14	Application on using MATLAB for simple engineering problems
Week 15	Application on Control flow and operators

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	INTRODUCTION TO MATLAB FOR ENGINEERING STUDENTS, David Houcque Northwestern University, (version 1.2, August 2005)	Yes
Recommended Texts		
Websites	N/A	

Module Information معلومات المادة الدراسية					
Module Title	**CONSTRUCTION MATERIALS**			**Module Delivery**	
Module Type	**BASIC**			**Theory** **Lecture** **Tutorial** **Seminar**	
Module Code	**DWRE-102**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	1		**Semester (s) offered**	2	
Administering Department	Dams and Water Resources Department		**College**	Engineering	
Module Leader	Abdullah Saeb Tais Jabr		**e-mail**	abdalla_saab@tu.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name	Prof. Dr. Raad Hoobi		**e-mail**	dr.raadhoobi@tu.edu.iq	
Review Committee Approval			**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, Indicative Contents and Brief Description أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر	
Module Aims أهداف المادة الدراسية	To provide students with physical, mechanical, chemical, and mathematical tools and concepts for understanding construction materials.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On successful completion of this module, the learner will be able to: 1. Calculate standard any construction material properties and classify a type of sample. 2. Carry out laboratory tests for preliminary engineering assessment of construction material samples. 3. The ability to analyze and examine the raw materials involved in the manufacture of any construction . 4. Identify the extent to which construction materials conform to the approved specifications.
Indicative Contents المحتويات الإرشادية	تتضمن المحتويات الارشادية ما يلي: • Characteristics of construction materials and types of forces affecting them. How to calculate the stresses and strains of the material. (4 hours)

	• Clay bricks (classification of soils in terms of granular gradation and the most important clay minerals) (4 hours) • Stages of manufacturing clay bricks (forming, drying, and burning methods) (4 hours) • Engineering properties of clay bricks (4 hours) • Types of clay bricks (4 hours) • Other types of non-clay bricks (lime-sand bricks, concrete bricks, glass bricks) (6 hours) • Building blocks (stabilized soil blocks, concrete building blocks, thermos-stone blocks) (4 hours) • Types of binders (plaster) (4 hours) • Manufacturing of gypsum and its types according to the Iraqi and British specifications (6 hours) • Gypsum products and additives to gypsum (plaster uses) (4 hours) • Manufacturing and Properties of lime, and its uses in construction, properties of cement and lime (4 hours) • Types of Portland and non-Portland cement. (6 hours) • The effectiveness of pozzolana materials. (2) • The effectiveness of additives materials (4)
Course Description	• The aim of this course is to enable the student to: • - Describe factors that control the properties of construction materials. • - List methods of determining the properties of construction materials.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The learning and teaching strategy is designed to: Carefully cover the basic material in the lectures, apply the concepts through students conducting laboratory experiments, allowing students sufficient time to understand and comprehend the material by reading and applying a large number of carefully selected examinations, assigning students with homework and preparing reports for the examinations they take This is done for additional practice and familiarity and understanding of construction material details.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures** 30 **Lab** 30 **Exam** 3	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing** 30 **Preparation for tests** 22 **Reports** 10	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	12% (12)	4,6,8,10	1,2,3,4
	Assignments	3	6% (6)	8, 10, 12	1,2,3
	Seminars	3	6% (6)	Continuous	1,2,3,4,5,6,7
	Reports	4	16% (16)	Continuous	1,2,3,4
Summative assessment	**Midterm Exam**	2	10% (10)	7	LO # 1-3
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Classification of engineering materials and their properties
Week 2	Mechanical properties of the material (types of forces) hooks law, strain, stresses
Week 3	Exercises on the mechanical properties of matter
Week 4	Clay bricks (classification of soils in terms of granular gradation and the most important clay minerals)
Week 5	Stages of making clay bricks (forming, drying, and burning methods) and their properties
Week 6	Other types of non-clay bricks (lime-sand bricks, concrete bricks, glass bricks)
Week 7	Building blocks (stabilized soil blocks, concrete building blocks, thermo-stone blocks)
Week 8	Midterm exam
Week 9	Types of binders (plaster)
Week 10	Manufacturing of Gypsum and its types according to the Iraqi and British specifications
Week 11	Properties of lime, and its uses in construction, properties of cement and lime
Week 12	Types of Portland and non-Portland cement
Week 13	The effectiveness of pozzolana
Week 14	Types of additives and their function
Week 15	Usage of additives in construction materials
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week 1	Lab 1: Introduction to construction material testing, fundamental of writing report.
Week 2	Lab2: Test of shape, dimensions and type of the brick, such as being solid or hollow test
Week 3	Lab3: compressive strength of clay brick test
Week 4	Lab4: Water absorption clay brick test
Week 5	Lab5: fluorescence tests
Week 6	Lab6: Water absorption of concrete block test
Week 7	Lab7: Compressive strength of concrete block test
Week 8	Lab8: Shape and dimension of concrete block test
Week 9	Lab9: Midterm exam
Week 10	Lab10: Fineness of Gypsum Test
Week 11	Lab11: Consistency of Gypsum Test
Week 12	Lab12: Sitting Time of Gypsum Test
Week 13	Lab13: Compressive strength Test
Week 14	Lab 14: Density of Gypsum Test
Week 15	Final Exam

Module Information معلومات المادة الدراسية					
Module Title	**Analytical Chemistry**			**Module Delivery**	
Module Type	**B**			**Theory** **Lab.**	
Module Code	**DWRE-104**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	1		**Semester (s) offered**		2
Min number of students	15		**Max number of students**		100
Administering Department	Dams and Water Resources Department		**College**	Engineering	
Module Leader	Akram Khalaf Mohammed Jasim		**e-mail**	akram.mohammed@tu.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**		Ph.D. in Water Resources
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Prof. Dr. Raad Hoobi		**e-mail**	dr.raadhoobi@tu.edu.iq	
Review Committee Approval	01/11/2025		**Version Number**		1.0

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Environmental Chemistry (CHEM-101)	**Semester**	1
Co-requisites module	None	**Semester**	-
Module Aims, Learning Outcomes, Indicative Contents and Brief Description أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر			
Module Aims أهداف المادة الدراسية	1) Giving general information about chemicals and methods of dealing with them. 2) Explanation of methods of chemical analysis of chemical compounds. 3) Calculations of reactant and product quantities in chemical reactions. 4) Analysis and calculation of the amount of substances constituting chemical compounds. 5) Give detailed information about pH.		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1) Using both techniques and concepts in calculations related to chemicals. 2) Knowledge of quantitative and qualitative analysis methods 3) Analyzing chemical compounds and rocks and knowing the quality and quantity of each element. 4) Using mathematical methods to calculate the pH values.		
Indicative Contents	Indicative content includes the following.		

المحتويات الإرشادية	• Chemical reactions (6 hrs) • Chemical analysis (6 hrs) • Equilibrium of a Chemical reactions (6 hrs) • pH calculations (10 hr) • Exam (2 hr)
Course Description	Analytical chemistry is the study of elements and compounds in materials in the three cases solid, liquid, and gas, and knowing its percentages and quantities in the materials and knowing acidity or alkalinity of solutions and methods of its calculations.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The learning and teaching strategy is designed to: Carefully cover in lectures the necessary fundamental material and analytical techniques, and demonstrate concepts with appropriate (and where possible practical) examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures 30** **In Lab Lectures 45** **In class tests 3**	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing 40** **Preparation for tests 12** **Home Works 20**	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	15% (15)	5, 8,12	LO #1, 2, 3, and 4
	Assignments (Home Works)	5	10% (10)	2, 4, 6, 8, 10	LO # 1, 2, 3, 4, and 5
	Laboratory reports	15	15% (15)	Continuous	LO # 4
Summative assessment	**Midterm Exam**	2	10% (10)	7	LO # 1-5
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction of analytical chemistry, quantitative analysis, qualitative analysis
Week 2	Gravimetric calculations of chemical analysis
Week 3	Calculations involving concentrations of solutions, physical methods, Molar Methods, Equivalent Methods
Week 4	Dilution of solutions
Week 5	Analysis of samples by titration with standard solution
Week 6	Calculation of Oxidation – Reduction titration, Equilibrium reactions
Week 7	**Midterm Exam**
Week 8	Acid – base equilibrium and PH of solutions, Equilibrium constant
Week 9	Expression of equilibrium constant in acidic medium
Week 10	Expression of equilibrium constant in basic medium
Week 11	Calculation of pH of aqueous solution, Weak acid plus its salt
Week 12	Titration curves, Strong acid- strong base, Weak acid – strong base
Week 13	strong acid – weak base, weak acid – weak base
Week 14	Acid — Base indicator
Week 15	pH dilution
Week 16	**Final Exam**

Analytical chemistry (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Identifying laboratory chemicals, their conditions, risks, and the correct ways to identify them.
Week 2	Lab 2: Identifying laboratory equipment, names, and terms.
Week 3	Lab 3: Preparation & Standardization From solid
Week 4	Lab 4:Preparation & Standardization From solid, continue
Week 5	Lab 5: Preparation & Standardization From liquid
Week 6	Lab 6: Preparation & Standardization From liquid, continue
Week 7	Lab 7: Titration of Sodium Carbonate with Hydrochloric acid (Acid – Base Titration)
Week 8	Lab 8: Titration of Sodium Hydroxide with Hydrochloric acid (Acid – Base Titration)
Week 9	Lab 9: Titration of Mixture with Hydrochloric acid (Acid – Base Titration)
Week 10	Lab 10: Determine the concentration of a given base using a standard acid
Week 11	Lab 11: Determine the concentration of a given acid using a standard base
Week 12	Lab 12: Qualitative analysis
Week 13	Lab 13:pH determinations of acid and base
Week 14	Lab 14:pH determinations of salts
Week 15	Lab 15: pH dilution

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Analytical chemistry (Book)/ 7th Edition Gary D. Christian, Purnendu K. Dasgupta, Kevin A. Schug ISBN: 978-0-470-88757-8	Yes
Recommended Texts	General chemistry book	yes
Websites	N/A	

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Statistics**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWRE-103**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level		1	**Semester of Delivery**		2
Administering Department		Dams and Water Resources Department	**College**	ENG	
Module Leader	Firas Hazem Jasim Mohammed		**e-mail**	Firas.arab@tu.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	-----		**e-mail**	E-mail	
Peer Reviewer Name		Prof. Dr. Raad Hoobi	**e-mail**	dr.raadhoobi@tu.edu.iq	
Scientific Committee Approval Date		12/06/2023	**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The aim of this course is to introduce the students to the field of processes and practices of engineering statistics. Engineering statistics combines engineering and statistics using scientific methods to analyze data. This course will discuss some basic principles of engineering statistics, and introduces students to the fundamental concepts of Nature of statistical data and symbols, Viewing the data, Measures of central tendency, Measures of the mean, dispersion, and range. The average deviation, variance, coefficient of variation, binomial distribution, normal distribution, Principles of probability theory and hypothesis testing approach, Which is one of the most important topics in the field of making a decision to accept or reject the statistical hypothesis In addition to deal with the details of some statistical tests which include Chi square test, T-test and F-test, in addition to the Regression and correlation, the drawing method, the least squares method, the linear correlation. At the end of the course, students will have the necessary knowledge to conduct statistical analysis using statistical tests, determine the extent of data correlation, and have the ability to make a decision to accept or reject a statistical hypothesis, , and have the skills of analytical skills (analyze data collected in the field and examine the results) and Communication skills (prepare detailed reports that document their research methods and findings). This will be achieved through descriptive lectures with Preparing engineering statistics reporting and supervised tutorials.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. CLO-1: Recognize Nature of statistical data and symbols and distinguish among them. CLO-2: Ability to view Statistical data by tabling and drawing method. CLO-3: Ability to Measure Statistical criteria. CLO-4: learn how to analysis of random phenomena. CLO-5: learn how to interpretation of probabilities as relative frequencies. CLO-6: Derivation of the null and alternative hypotheses based on the statistical data. CLO-7: Gaining experience in decision-making to accept or reject null and alternative hypotheses CLO-8: Recognize different Statistical test and distinguish among them CLO-9: Apply the basic Engineering Statistics concepts to solve problems associated with Statistical test(Chi square test, T-test and F-test) CLO-10: Organizing the needed solution, drawing and calculation for the Regression and Correlation problems CLO-11:Preparing statistical reports, tabulating data and statistics, and providing appropriate solutions for two selected topics over the course period
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Introduction, Nature of statistical data, symbols and Measures</u> This part includes: Introduction, Nature of statistical data and symbols, Viewing the data, the table method, the drawing method. Measures of central tendency, the arithmetic mean, median, and mode Measures of the mean, dispersion, and range. The average deviation, variance, coefficient of variation. (20 hrs) <u>Part B – Principles of probability theory</u> This part includes: Principles of probability theory, conditional probability, Binomial distribution, and normal distribution. (16 hrs) **<u>Part C – Hypothesis Testing Approach& Statistical Tests</u>** This part includes: **Hypothesis Testing Approach**, statistical tests which include Z- test, Chi square test, F-test, Regression and correlation, the drawing method, the least squares method, the linear correlation. (24 hrs)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	This course has several components that include lectures, individual & group assignments, and e-learning platforms. Exercises involving the use of computer applications tools to understand the engineering statistical processes. The course will be taught in English in addition to the Arabic, and all mandatory assignments have to be submitted within the deadlines to be admitted to the exams.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 15 اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction, Nature of statistical data and symbols,
Week 2	Viewing the data, the table method, the drawing method.
Week 3	Measures of central tendency, the arithmetic mean, median, and mode
Week 4	Measures of the mean, dispersion, and range.
Week 5	The average deviation, variance, coefficient of variation.
Week 6	**Principles of probability theory**
Week 7	Mid-term Exam + conditional probability.
Week 8	Binomial distribution .
Week 9	normal distribution.
Week 10	**Hypothesis testing approach.**
Week 11	Statistical tests , Z- test.
Week 12	Chi square test .
Week 13	F-test .
Week 14	Regression and correlation .

Week 15	the drawing method, the least squares method , the linear correlation.
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	Introduction to Statistics, Dr. Khasha Mahmoud Al-Rawi, College of Agriculture and Forestry, University of Mosul, 2nd Edition, 2000.	Yes
Recommended Texts	An Introduction to the Science of Statistics: From Theory to Implementation, Preliminary Edition, Joseph C. Watkins	no
Websites	https://www.infobooks.org/free-pdf-books/math/statistics/	

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

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

Module Information
معلومات المادة الدراسية

Module Title	**English Language I**		**Module Delivery**	
Module Type	**Support**		☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UOT 002**			
ECTS Credits	**2**			
SWL (hr/sem)	**50**			
Module Level	1	**Semester of Delivery**	2	
Administering Department	Dams and Water Resources Department	**College**	Engineering	
Module Leader	Firas Hazem Jasim Mohammed	**e-mail**	Firas.arab@tu.edu.iq	
Module Leader's Acad. Title		**Module Leader's Qualification**		
Module Tutor	Name (if available)	**e-mail**	E-mail	
Peer Reviewer Name	Prof. Dr. Raad Hoobi	**e-mail**	dr.raadhoobi@tu.edu.iq	
Scientific Committee Approval Date	1/11/2025	**Version Number**	1.0	

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. The main objective of this course is to emphasize the fundamental language skills of reading, writing, speaking, listening, thinking, viewing, and presenting. 2. The course includes studies of various literary genres: short story, novel, and non-fiction. 3. The course also helps students to improve their *English language grammar* and *reading* abilities, and becoming more effective use of grammar and natural self-expression in *English*.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. In this course the students will attain and enhance competence in the four modes of literacy: writing, speaking, reading and listening. 2. Students will heighten their awareness of correct usage of English grammar in writing and speaking. 3. Students will improve their speaking ability in English both in terms of fluency and comprehensibility. 4. Students will give oral presentations and receive feedback on their performance. 5. Students will increase their reading speed. 6. Students will improve their reading fluency skills through extensive reading. 7. Students will enlarge their vocabulary.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **<u>Part A – Grammars [20 hrs]</u>** **Basic Grammar in English:** [7 hrs] - Parts of speech. - Basic English Sentence Structure. - Pronouns. - Tenses. **Active and Passive Voice:** [5 hrs] - Active voice. - Passive voice. - Convert from active voice to passive voice and vice versa. **Comparative and Superlative:** [2 hrs] - Positive, comparative and superlative. **Conditional Sentences:** [2 hrs] - Conditional sentences. - If-clauses type I, II, III. **Dependent and Independent Clauses:** [2 hrs] **Simple, Compound, and Complex Sentences:** [2 hrs] **<u>Part B – Reading [15 hrs]</u>** - This section involves reading a variety of literary genres, including short stories, novels, and nonfiction. - Reading some of passages from IELTS books. **<u>Part C – Writing [15 hrs]</u>** - In this part, students will learn to write simple topics and subjects about graphics and figures related to mechanical engineering subjects. - Writing some of topics and essay from IELTS books.

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

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	10% (10)	4, 9, 12	LO #1, 2, 10 and 11
	Assignments	4	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.		0% (0)		
	Report	1	5% (5)	9	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	1hr	15% (15)	8	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	Parts of speech. Pronouns.
Week 2	Subject, Lexical verbs, Auxiliry verbs, Regular Verb, Irregular Verb.
Week 3	Recognizing Objects and Complements.
Week 4	Adverbials.
Week 5	Tenses.
Week 6	Tenses.
Week 7	Active voice.
Week 8	Passive voice.
Week 9	Convert from active voice to passive voice and vice versa.
Week 10	Positive, comparative and superlative.
Week 11	Conditional sentences, if-clauses type I, II, III.
Week 12	Reading some of passages from IELTS books.
Week 13	English reading practice for beginners.

Week 14	Writing some of passages from IELTS books.
Week 15	English writing practice for beginners.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: There are no laboratory experiments.
Week 2	Lab 1: There are no laboratory experiments.
Week 3	Lab 1: There are no laboratory experiments.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	➢ Ronald Carter and Michael McCarthy. **Cambridge grammar of English: A comprehensive guide**. Cambridge: Cambridge University Press, 2006. ➢ Rodney Huddleston, Geoffrey K. Pullum. **The Cambridge Grammar of the English Language**, 2002.	Yes
Recommended Texts	➢ **Collins Reading for IELTS** by Els Van Geyte, 2011.	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 is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is required.

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

Module Information

معلومات المادة الدراسية

Module Title	**Calculus III**	**Module Delivery**	
Module Type	**Basic learning activities**	☐ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MATH-201**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		
Module Level	2	**Semester of Delivery**	3
Administering Department	Dams and Water Recourses	**College**	Engineering
Module Leader	Saad Mawlood Saab Hassan Al-Nasiri	**e-mail**	Saadmm.saab@tu.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	Prof. Dr. Raad Hoobi	**e-mail**	dr.raadhoobi@tu.edu.iq
Scientific Committee Approval Date	1/11/2025	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	MATH-102	**Semester**	2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To develop problem solving skills and understanding of Polar coordinates system and its applications. 2. To understand Vectors and Geometry of Space, Scalar Product, Cross Product 3. This course deals with the basic concept of Partial Differentiation. 4. To understand Double Integrals and its applications. 5. To perform Infinite Sequences and Series analysis.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Discrimination between Polar coordinates system and cartesian coordinates system. 2. Learn how to calculate the area and curve length in Polar coordinates system. 3. Describe the vector components and the products between two vectors. 4. Identify Partial Differentiation and Second – Order Partial Differentiation. 5. Explanation the double integral. 6. Define the Infinite Sequences and Series.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Polar coordinates system, Graphing in polar coordinates system, Area in polar coordinates system, Curve length in polar coordinates system. [16 hrs] Vectors and Geometry of Space, Space coordinate and space vector, Scalar Product (Dot Product) and Applications (line equation in the plane), Cross Product (Vector Product) and Applications (the distance from appoint to a line in space) . [24 hrs] Partial Differentiation, Second – Order Partial Differentiation, The chain rule for partial derivatives. [24 hrs] Double Integrals and its applications, The methods of least squares, Infinite Sequences and Series. [24 hrs]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 15 اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	15% (15)	2, 6, 12	LO #1, 2, and 4
	Assignments	5	15% (15)	1, 4, 7,11, 14	LO # 3, 4, 5, 6 and 7
	Report	1	10% (10)	13	LO # 3 and 4
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-6
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Polar coordinates system, Graphing in polar coordinates system
Week 2	Area in polar coordinates system, Curve length in polar coordinates system
Week 3	Vectors and Geometry of Space, Space coordinate and space vector
Week 4	Scalar Product (Dot Product) and Applications (line equation in the plane)
Week 5	Cross Product (Vector Product) and Applications (the distance from appoint to a line in space)
Week 6	Plane Equation in space, Angles between planes
Week 7	Partial Differentiation, exercises
Week 8	Second – Order Partial Differentiation, exercises
Week 9	The chain rule for partial derivatives
Week 10	Directional Derivatives in the plane
Week 11	Tangent plane and normal line of surface
Week 12	Extreme (Maxima and Minima) values and Saddle points.
Week 13	Double Integrals and its applications
Week 14	The methods of least squares
Week 15	Infinite Sequences and Series
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	"Calculus". Ross L Finney and George B. Thomas. Copyright by Addison Wesley Publishing Company, 1990.	Yes
Recommended Texts	"THOMAS CALCULUS" George B. Thomas. Printed in the United States of America., 2014.	No
Websites		

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

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

Module Information
معلومات المادة الدراسية

Module Title	**Strength of Materials**	**Module Delivery**	
Module Type	**B**	☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWRE-201**		
ECTS Credits	**4**		
SWL (hr/sem)	**100**		
Module Level	2	**Semester of Delivery**	3
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Abdullah Saeb Tais Jabr	**e-mail**	Email: abdalla_saab@tu.edu.iq
Module Leader's Acad. Title	Assistant lecturer	**Module Leader's Qualification**	Ph.D
Module Tutor		**e-mail**	E-mail
Peer Reviewer Name	Prof. Dr. Raad Hoobi	**e-mail**	dr.raadhoobi@tu.edu.iq
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To develop problem solving skills and understanding of all types of forces. 2. To understand the effect of forces on all types of materials. 3. This course deals with the basic concept of simple stresses, shearing stresses, bearing stresses, statically indeterminate members, Torsion. Thin walled cylinders 4. This is the basic subject for all forces and stresses. 5. To understand Hooke law. 6. Shear and moment in beams. 7. Stresses in beams. 8. Deflection in beams.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize the effect of forces on all types of materials. 2. Insure that the structures used will be safe against the maximum internal effects that may be produced by any combination of loading. 3. Draw shear and moment diagrams. 4. Determine the stresses on beams. 5. Determine the deflection on beams. 6. Design the section of beams.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – Forces and stresses. simple stresses, shearing stresses, bearing stresses [15 hrs] Shearing stresses, bearing stresses. [15 hrs] Statically indeterminate members. [10 hrs] Torsion and thin walled cylinders. [15 hrs] Revision problem classes [6 hrs] Part B – Forces on beams. Shear and moment in beams. [15 hrs] Stresses in beams. [7 hrs] Deformation in beams. [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 type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 15 اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.47
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction
Week 2	Simple stresses
Week 3	Shearing stresses
Week 4	bearing stresses
Week 5	Statically indeterminate members
Week 6	Torsion
Week 7	thin walled cylinders
Week 8	Hooke law
Week 9	Poisson ratio
Week 10	Shear and moment in beams
Week 11	Shear and moment in beams
Week 12	Stresses in beams
Week 13	Stresses in beams
Week 14	Deformation in beams
Week 15	Deformation in beams
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Strength of Materials, Andrew Pytel&Ferdinand L Singer, 1980.	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 Information
معلومات المادة الدراسية

Module Title	**Fluid Mechanics 1**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWRE-202**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		

Module Level	2	**Semester of Delivery**	3
Administering Department	Dams and Water Resources	**College**	Engineering
Module Leader	Asmaa Abdul-Jabbar Jameel Mahdi	**e-mail**	Email: ms.asmaajameel@tu.edu.iq
Module Leader's Acad. Title	Prof.	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Prof. Dr. Raad Hoobi	**e-mail**	dr.raadhoobi@tu.edu.iq
Scientific Committee Approval Date	1/11/2025	**Version Number**	1.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The fluid mechanics is the basic subject for second-stage students in the dams and water resources engineering department that from this subject student will learn and practice to fluid properties (units and dimensions, Density, Specific weight. Viscosity, Surface tension, Capillarity. Fluid static (pressure–density–height relationships). Absolute pressure and gage pressure, types of pressure gages. Force on submerged plane surfaces. Force on submerged curved surfaces. Applied problem about gates, dams ……etc. Stability of submerged and floating bodies. This achieved by theoretical lecturers.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Learn and practice to fluid properties. 2. Learn the fundamental of pressure, (atmosphere, absolute and gauge) pressure. 3. Determine pressure in static fluid on vertical inclined and curved gates. 4. Determine stability of floating bodies and center of pressure.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction, Fluid properties – Units and Dimensions, Density, Specific weight, [15 hrs] Compressibility, Elasticity. Viscosity, Surface tension, Capillarity. [15 hrs] Fluid static (pressure–density–height relationships). [15 hrs] Absolute pressure and gage pressure,. types of pressure gages. [15 hrs] Force on submerged plane surfaces, Force on submerged curved surfaces, Applied problem about gates, dams ……etc. [15 hrs] Stability of submerged and floating bodies, [10 hrs] Application on Stability of submerged and floating bodies. [10 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 type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction
Week 2	Fluid properties – Units and Dimensions, Density, Specific weight,
Week 3	Compressibility, Elasticity. Viscosity, Surface tension, Capillarity
Week 4	Fluid static (pressure–density–height relationships).
Week 5	Fluid static (pressure–density–height relationships).
Week 6	Absolute pressure and gage pressure,. types of pressure gages
Week 7	Mid-term Exam
Week 8	Force on submerged plane surfaces.
Week 9	Force on submerged curved surfaces
Week 10	Applied problem about gates, dams ……etc.
Week 11	Applied problem about gates, dams ……etc.
Week 12	Stability of submerged and floating bodies.
Week 13	Applied problems on Stability of submerged and floating bodies
Week 14	Applied problems on Stability of submerged and floating bodies
Week 15	Applied problems on Stability of submerged and floating bodies
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1:Center of Pressure of Immersed Surface
Week 2	Lab 2:Bernoulli's equation
Week 3	Lab 3:Forces due to Jet Impact on Plates
Week 4	Lab 4:Reynolds Number in Pipe
Week 5	Lab 5: Reynolds Number in Pipe
Week 6	Lab 6: Flow Through Orifices
Week 7	Lab 7: Flow Through Orifices

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Elementary fluid mechanics By: Vinnard 6th ed. 1981	Yes
Recommended Texts	fluid mechanics by MERLE C. POTTER, DAVID C. WIGGERT 2008	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/fluid-mechanics	

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

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

Module Information
معلومات المادة الدراسية

Module Title	**Engineering Surveying I**	**Module Delivery**	
Module Type	**B**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWRE-203**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		
Module Level	2	**Semester of Delivery**	3
Administering Department	Dams and Water Resources Engineering	**College**	Engineering
Module Leader	Ahmed Shihab Ahmed Mohammed Al-Jubouri	**e-mail**	Email: ahmed.s.ahmed@tu.edu.iq
Module Leader's Acad. Title	Assistant Lecturer	**Module Leader's Qualification**	MSc in Water Resources
Module Tutor		**e-mail**	E-mail
Peer Reviewer Name	Prof. Dr. Raad Hoobi	**e-mail**	dr.raadhoobi@tu.edu.iq
Scientific Committee Approval Date	01/11/2025	**Version Number**	1.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Surveying I aims to teach students how to measure distances through obstacles, construction and adjustment of levels, Measurement a long straight line offset, Methods of locating a point or the types of coordinates, Systematic or accumulation errors for tape, Reciprocal leveling, Determine Contour Interval and Contour Line Values, determine the level of the sewer, and computation of area (regular and irregular figures) by using different methods.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After studying this course, the students should be able to: 1- To understand different types of survey. 2- To understand plane surveying instruments such as: tapes, levels. 3- To choose appropriate equipment for specific survey measurements. . 4-Interpret the disclosure and balancing in measurements. 5-To calculate areas using different methods 8- Contour mapping using different methods. 9- To determine the level of the sewer
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A: Surveying by tape Surveying by tape: Measurement a long straight line, Measurement a long straight line offset, How to draw a perpendicular on survey line when the point is on the line, How to draw a perpendicular from point out of the straight line, By cross staff, Optical square . Methods of locating a point or the types of coordinates, Rectangular coordinates, Focal coordinates, Angular coordinate, Polar coordinates [15 hrs] Systematic or accumulation errors: Correction of tape for standardization, Correction for slope, Correction for temperature, Correction for sag, Correction for pull or tension. [6 hrs] Obstacles : Those which can be measured a cross but cannot be seen a cross, Those which can be seen a cross but cannot be measured a cross, Those can neither be seen a cross nor be measured a cross. [12 hrs] Part B - Levelling Levelling : Level, Horizontal surface, Horizontal line, Bench mark (B.M) , Simple levelling, Procedure in levelling, Rise and fall method, Height of collimation method. [15 hrs] Cross-sections , contouring, Gridding or (The methods of squares), Radiating lines, Direct contouring. [6 hrs] Reciprocal leveling, Curvature and Refraction. [6 hrs] Sewer [6hrs] Areas , Mechanical integration – the planimeter, Areas enclosed by straight lines , and irregular figures. [9hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Learning and teaching strategies in surveying will be designed to engage students in the subject matter while equipping them with the necessary knowledge and skills. These will be encouraged students to participate in the learning process through activities that require them to apply their knowledge. This can be accomplished through problem-solving exercises, case studies, and fieldwork. Also, encourage students to work in groups to solve problems and complete projects. This approach promotes teamwork, communication, and critical thinking skills. Fieldwork will be Provided opportunities for students to engage in real-world surveying activities. This could involve conducting surveys, collecting data, and analyzing the results in the field.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 15 اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	7.5% (7.5)	5, 10	LO #1, 2, 8,9 and 10
	Assignments	2	7.5% (7.5)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	15% (15)	Continuous	All
	Report	7	5% (5)	3,4,5,6,7,9,10	LO # 2, 3,4, 6,10 and 10
Summative assessment	**Midterm Exam**	2 hr	15% (15)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction - Surveying by tape
Week 2	Methods of locating a point or the types of coordinates, Quiz No.1
Week 3	Systematic or accumulation errors
Week 4	Systematic or accumulation errors: Correction for sag, Correction for pull or tension
Week 5	Obstacles
Week 6	Levelling, Projection of building
Week 7	Mid-term Exam
Week 8	Procedure in levelling, Rise and fall method,
Week 9	Height of collimation method
Week 10	Cross-sections, Quiz No.2
Week 11	contouring, Gridding or (The methods of squares), Radiating lines, Direct contouring
Week 12	Reciprocal leveling,
Week 13	Curvature and Refraction, Sewer
Week 14	Sewer
Week 15	Areas , Mechanical integration – the planimeter, Areas enclosed by straight lines , and Irregular figures
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Create a straight line using tape
Week 2	Lab 2: Layout a building on graph paper
Week 3	Lab 3: cross section
Week 4	Lab 4: Level
Week 5	Lab 5: Profile levelling
Week 6	Lab 6: fly levelling
Week 7	Lab 7: cross section

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Surveying (A.Bannister & S.Raymond)	Yes
Recommended Texts	Surveying by (S.K.Hussin and M.SNagaraj)	No
Websites		

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

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

Module Information معلومات المادة الدراسية					
Module Title	**CONCRETE TECHNOLOGY**			**Module Delivery**	
Module Type	**BASIC**			محاضرات مختبر واجبات بيتية تقارير	
Module Code	**DWRE-204**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	2		**Semester (s) offered**	3	
Administering Department	Dams and Water Resources Engineering		**College**	Engineering	
Module Leader	Hafsa Ali Abdullah Ahmed		**e-mail**	Hafssa.Abdullah@tu.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	MSc in Structures	
Module Tutor			**e-mail**		
Peer Reviewer Name	Prof. Dr. Raad Hoobi		**e-mail**	dr.raadhoobi@tu.edu.iq	
Review Committee Approval			**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, Indicative Contents and Brief Description أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر			
Module Aims أهداف المادة الدراسية	To provide students with physical, mechanical, chemical, and mathematical tools and concepts for understanding concrete's engineering behavior and introduction to concrete mixes' engineering design.		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On successful completion of this module, the learner will be able to: 1. Calculate standard concrete properties and classify a concrete sample. 2. Carry out laboratory tests for preliminary engineering assessment of concrete samples. 3. Specify the essential features and requirements of concrete permeability. 4. Calculate stresses in concrete under various load conditions, and determine the shear strength.		

Indicative Contents المحتويات الإرشادية	تتضمن المحتويات الارشادية ما يلي: • Introduction on Cement (6 hours) • Manufacturing of Cement and its composition (6 hours) • Hydration of Cement (6 hours) • Aggregate, Classification of Aggregate, and properties of Aggregate (6 hours) • Sieve Analysis (6 hours) • Fresh Concrete, Workability of Concrete (6 hours) • Tests, & Factors affecting Workability (6 hours) • Segregation, Bleeding, & Compacting of Concrete (6 hours) • Mixing of concrete (6 hours) • Hardened Concrete & Factors affecting the strength of concrete (6 hours) • Curing of concrete (6 hours) • Design of concrete mix (6 hours) • Modulus of elasticity and poisons ratio, Volumetric changes, swelling, and shrinkage (6 hours) • Creep of concrete (6 hours) • Durability of concrete, the permeability of concrete, the resistance of concrete to sulfate salts, the effect of seawater, efflorescence, concreting in cold weather (6 hours)
Course Description	The aim of this course is to enable the student to: - Describe factors that control the properties of concrete. -List methods of determining the properties of concrete.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	تم تصميم استراتيجية التعلم والتدريس من أجل: تغطية المواد الأساسية بعناية في المحاضرات، وتطبيق المفاهيم من خلال قيام الطلبة بإجراء تجارب مختبرية بما يتيح للطلاب وقتًا كافيًا لفهم وإدراك المادة بالاطلاع والتطبيق لعدد كبير من الفحوصات المختارة بعناية، وتكليف الطلبة بواجبات بيتية واعداد تقارير خاصة بالفحوصات التي تم اجراءها للتمرين الاضافي والالمام بتفاصيل المواد الخرسانية وفهمها.

Student Workload (SWL) الحمل الدراسي للطالب				
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures 30** **In labrotary 30** **Seminars 3**		63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing 10** **Preparation for tests 15** **Reports 12**		37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.47
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل		100		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10, 12, 14	LO #1, 2, 3, and 4
	Assignments	6	18% (18)	2, 4, 6, 8, 10, 12	LO # 1, 2, 3, 4, 5 and 6
	Reports	3	12% (12)	Continuous	
Summative assessment	**Midterm Exam**	2	10% (10)	7	LO # 1-3
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	مقدمة عن السمنت، صناعة السمنت ومركباته
Week 2	أماهة السمنت، حجوم نواتج عملية الأماهة
Week 3	أنواع السمنت البورتلاندي
Week 4	الركام، تصنيف الركام، وخصائص الركام
Week 5	التحليل المنخلي
Week 6	الخرسانة الطرية وقوام الخرسانة
Week 7	Midterm exam
Week 8	قابلية تشغيل الخرسانة وطرق فحصها
Week 9	الأنعزال والنضح
Week 10	الخرسانة المتصلبة
Week 11	معالجة الخرسانة
Week 12	طريقة ACI لتصميم الخلطة الخرسانية
Week 13	الطريقة البريطانية لتصميم الخلطة الخرسانية
Week 14	المرونة، الأنكماش، والزحف
Week 15	ديمومة الخرسانة
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

Week 1	تجربة تعيين القوام القياسي لعجينة السمنت، تجربة تعيين زمن التجمد الأبتدائي والنهائي، تجربة تعيين مقاومة الأنضغاط للسمنت
Week 2	تجربة كيفية أخذ عينات الركام، تجربة التحليل المنخلي للركام
Week 3	تجربة تعيين الكثافة النسبية والأمتصاص للركام، تجربة تعيين الكثافة الكلية والفجوات للركام، تجربة تعيين الطين والمواد الناعمة الأخرى في الركام
Week 4	تجربة خلط وتحضير خرسانة طرية نموذجية في المختبر، تجربة فحص الهطول، تجربة عامل الرص، تجربة تعيين كثافة الخرسانة الطرية
Week 5	فحوصات الخرسانة المتصلبة تجربة تعيين مقاومة الأنضغاط لمكعبات الخرسانة
Week 6	تجربة تعيين مقاومة الشد غير المباشر لأسطوانات الخرسانة
Week 7	تعيين مقاومة الأنثناء لمواشير الخرسانة تجربة تعيين مقاومة الأنضغاط المعادلة لمقاومة أنضغاط مكعب بأستعمال أجزاء من مواشير مكسرة في فحص الأنثناء

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Concrete Technology by A.M. Neville. Concrete Technology by M. Nouri. Khalaf & Hana Abed Yousif.	Yes
Recommended Texts	1. Properties of concrete by M.A. Orchard. 2. Lea (2011) "The Chemistry of Cement and Concrete", Arnold. 3. N.H. Taylor. (1965) " Concrete Technology and Practice ", Angus and Robertson. 4. Building Research Establishment (1975)" Design of Normal Concrete Mixes. 5. B.W. Shacklock (1974) "Concrete Constituents and Mix Proportions", Cement and Concrete Associations.	No
Websites		

APPENDIX:

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	مقبول بقرار	(45-49)	More work is required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

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

Module Information معلومات المادة الدراسية					
Module Title	جرائم البعث في العراق **The Crimes of the Baath Regime in Iraq**			**Module Delivery**	
Module Type	**S**			محاضرات نظرية	
Module Code	**UOT005**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	2		**Semester (s) offered**	1	
Min number of students	15		**Max number of students**	100	
Administering Department	environment Engineering		**College**	Engineeeing	
Module Leader	Sabah Mahdi Salih		**e-mail**	sabahmahdi@tu.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	MSc	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Prof. Dr. Raad Hoobi		**e-mail**	dr.raadhoobi@tu.edu.iq	
Review Committee Approval	01/11/2025		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	لا يوجد	**Semester**	
Co-requisites module	لا يوجد	**Semester**	
Module Aims, Learning Outcomes, Indicative Contents and Brief Description أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر			
Module Aims أهداف المادة الدراسية	1-التعرف على جرائم الحزب والانتهاكات التي قام بها خلال فترة الحكم. 2- القدرة على فهم الاثار السلبية لهذا الحزب على الجانب النفسي والاجتماعي والثقافي لأفراد الشعب العراقي. 3- التعرف على التأثير السلبي على واقع البيئة العراقية.		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- التعرف على المصطلحات ذات الصلة بجرائم الجزب. 2- التعرف على اهم الاثار السلبية الذي تركها الحزب على واقع المجتمع العراقي في جميع مجالات الحياة.		

Indicative Contents المحتويات الإرشادية	يتضمن المحتوى الارشادي مايأتي: 1- انتهاكات الحقوق والحريات (8 ساعات). 2- التأثير على الميدان النفسي والاجتماعي (2ساعة). 3- التأثير على الميدان الثقافي والدين والدولة وعسكرة المجتمع (2ساعة). 4- اثر القمع على البيئة والسكان (3) ساعات
Course Description	جرائم حزب البعث: هي الجرائم التي ارتكبها الحزب بأبناء الشعب العراقي والتي ادت الى اثار سلبية على المستوى النفسي والاجتماعي والثقافي والاقتصادي والبيئي وعسكرة المجتمع .
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	تم وضع استراتيجية التعلم والتعليم من اجل ان يحصل الطالب على معلومات كاملة تغطي المنهج الدراسي المعد للمادة ولكي تتحقق الغاية الاساسية للمنهج الذي ينصب نحو المام وادراك الطالب بالجرائم والاثار السلبية التي قام بها الحزب على نسيج المجتمع العراقي ، والاطلاع على الانتهاكات والتجاوزات التي حصلت اثناء فترة الحكم من اجل منع تكرار تلك التجربة مستقبلا.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures** 30 **In class tests** **3**	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	20% (20)	3, 5, ,7, 9,11,13,	LO #1, 2,3,4,..... ,11
	Assignments (Homeworks)	6	15% (15)	2, 4, 6, 10,12,14	LO # 1, 2, 3, 4 ,.....,11
	Discussions	7	5% (5)	Continuous	
Summative assessment	**Midterm Exam**	2	10% (10)	8	LO # 1-7
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	نبذة وصفية عن الانظمة السياسية في العراق من عام 1921-2003
Week 2	انتهاكات النظام البعثي للحقوق والحريات العامة
Week 3	اثر سلوكيات النظام البعثي في المجتمع
Week 4	اثر المرحلة الانتقالية في محاربة السياسة الاستبدادية
Week 5	الميدان النفسي
Week 6	الميدان الاجتماعي
Week 7	الدين والدولة
Week 8	امتحان نصف الفصل
Week 9	الثقافة والاعلام وعسكرة المجتمع
Week 10	استعمال الاسلحة المحرمة دوليا والتلوث البيئي
Week 11	سياسة الارض المحروقة
Week 12	تجفيف الاهوار
Week 13	المقابر الجماعية وتدمير دور العبادة
Week 14	امثلة واقعية عن جرائم الحزب من واقع المجتمع العراقي
Week 15	مراجعة لمحتويات المادة
Week 16	امتحان نهاية الفصل

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	**منهاج معتمد من الوزارة**	Yes
Recommended Texts		No
Websites	N/A	

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

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

Module Information
معلومات المادة الدراسية

Module Title	**اللغة العربيةII**	**Module Delivery**	
Module Type	**S**	**محاضرات نظرية**	
Module Code	**UOT-011**		
ECTS Credits	**2**		
SWL (hr/sem)	**50**		

Module Level	2	**Semester (s) offered**	3
Min number of students	15	**Max number of students**	100
Administering Department	Dams and Water Resources Engineering	**College**	Engineeeing
Module Leader	Wasna younis Abdullah	**e-mail**	Wasna.y.abdullah@tu.edu.iq
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	MSc
Module Tutor	None	**e-mail**	
Peer Reviewer Name	Prof. Dr. Raad Hoobi	**e-mail**	dr.raadhoobi@tu.edu.iq
Review Committee Approval	01/11/2025	**Version Number**	1.0

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	لا يوجد	**Semester**	
Co-requisites module	لا يوجد	**Semester**	

Module Aims, Learning Outcomes, Indicative Contents and Brief Description
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر

Module Aims أهداف المادة الدراسية	1-تطوير المهارات اللغوية وحفظ بعض السور القرآنية وتعزيز حب اللغة لدى الطلبة. 2-فهم كيفية تطبيق القواعد اللغوية في الحياة اليومية، ومعرفة المصطلحات اللغوية في مجالات الهندسة والعلوم. 3-أهمية اللغة العربية في مجالات الحياة اليومية 4-استخدام القواعد اللغوية في كتابة التقارير والأبحاث العلمية بشكل صحيح. 5—تعزيز التعلم الذاتي والاستقلالية في التعلم وتشجيع الطلاب على أخذ مبادرة في تعلم اللغة العربية.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- فهم القواعد اللغوية وعلامات الترقيم وحفظ السور القرآنية. 2-تطوير المحصلة اللغوية لدى الطلبة من خلال تعلم الشعر والقواعد اللغوية بشكل صحيح. 3-تغطية معظم المواضيع اللغوية التي يحتاجها المهندس في مسيرته العملية 4-التدرب على الحفظ والنطق الصحيح لبعض السور القرآنية بالإضافة إلى التدرب على قراءة الشعر العربي وتعلم واستخدام قواعد اللغة العربية 5- الممارسات المتكررة لشرح المادة النظرية واستخدام الآلات والوسائل الحديثة بشرح المادة مع ضمان ملائمة المادة النظرية للاحتياجات الواقعية

Indicative Contents المحتويات الإرشادية	يتضمن المحتوى الارشادي مايأتي: 1-سورة الضحى (3 ساعة). 2-قصة ذي القرنين (3 ساعات). 3-قصة النبي موسى عليه الصلاة والسلام مع سيدنا الخضر (4 ساعات). 4-معلقة عمرو بن كلثوم (4 ساعات). 5-قصيدة المتنبي شعب بوان (4 ساعات). 5-قصيدة محمد مهدي الجواهري يا دجلة الخير) (4ساعات). 6-أنواع الهمزات (4 ساعات). 7-علامات الترقيم (4 ساعات).
Course Description	اللغة العربية: هي ما نطق به العرب، أو هي لغتهم، وهي اللغة السامية التي حفظت وجودها، وهي لغة عالمية وإنسانية حية تتميز بنظام صوتي وصرفي ونحوي وتركيبي، ولألفاظها مدلولات مختلفة، فهي اللسان الذي تكلمه العرب، ونزل به القرآن الكريم الذي لا يمكن فهمه إلا من خلال فهم اللغة العربية.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	ان استراتيجية التعلم هي أسلوب تعليمي يعتد على إعادة تنظيم المعلومات وتكييفها بطريقة تمكن من الوصول إلى معلومات جديدة، وتتميز هذه الاستراتيجية بأنها تجعل الطالب نشطاً وايجابياً ودورنا يتمثل في دور الموجه والمرشد والمخطط وهذا يُمكّن من اكتشاف المعرفة بسلاسة من قبل الطلاب.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures 30** **Exam 3**	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library 5** **Home works 12**	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	3, 5, ,7, 9,11,13,	LO #1,2,3,4,5,6,7
	Assignments (Homeworks)	3	15% (15)	2, 4, 6, 10,12,14	LO # 1,2,3,4,5,6,7
	Home works	2	6% (6)	Continuous	1,2,3,4
	Seminars	3	9% (9)	Continuous	2,4
Summative assessment	**Midterm Exam**	2	10% (10)	8	LO # 1-7
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	معروف الرصافي
Week 2	الإمام الشافعي
Week 3	أحمد شوقي
Week 4	سورة البينة
Week 5	سورة الأعلى
Week 6	سورة طه
Week 7	المبتدأ والخبر
Week 8	**امتحان نصف الفصل**
Week 9	اللام الشمسية واللام القمرية
Week 10	العدد والمعدود
Week 11	الممنوع من الصرف
Week 12	ظن وأخواتها
Week 13	أدوات الشرط
Week 14	الضاد والظاء
Week 15	النواسخ الفعلية والحرفية
Week 16	امتحان نهاية الفصل

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	اللغة العربية لأقسام غير الاختصاص	Yes
Recommended Texts	التفسير الوسيط أ.د. وهبة الزحيلي المنهاج في القواعد والإعراب: محمد الأنطاكي	No
Websites	N/A	

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

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

Module Information
معلومات المادة الدراسية

Module Title	**Calculus IV**	**Module Delivery**	
Module Type	**Basic learning activities**		☐ **Theory**
Module Code	**MATH-202**		☒ **Lecture**
ECTS Credits	**6**		☐ **Lab**
SWL (hr/sem)	**150**		☒ **Tutorial**
			☐ **Practical**
			☐ **Seminar**

Module Level	2	**Semester of Delivery**	4
Administering Department	Dams and Water Recourses	**College**	Engineering
Module Leader	Firas Hazem Jasim Mohammed	**e-mail**	Firas.arab@tu.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		**e-mail**	
Scientific Committee Approval Date	1/11/2025	**Version Number**	1.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	**MATH-201**	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	6. To develop problem solving skills and understanding of Polar coordinates system and its applications. 7. To understand Vectors and Geometry of Space, Scalar Product, Cross Product 8. This course deals with the basic concept of Partial Differentiation. 9. To understand Double Integrals and its applications. 10. To perform Infinite Sequences and Series analysis.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	7. Discrimination between Polar coordinates system and cartesian coordinates system. 8. Learn how to calculate the area and curve length in Polar coordinates system. 9. Describe the vector components and the products between two vectors. 10. Identify Partial Differentiation and Second – Order Partial Differentiation. 11. Explanation the double integral. 12. Define the Infinite Sequences and Series.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Polar coordinates system, Graphing in polar coordinates system, Area in polar coordinates system, Curve length in polar coordinates system. [16 hrs] Vectors and Geometry of Space, Space coordinate and space vector, Scalar Product (Dot Product) and Applications (line equation in the plane), Cross Product (Vector Product) and Applications (the distance from appoint to a line in space) . [24 hrs] Partial Differentiation, Second – Order Partial Differentiation, The chain rule for partial derivatives. [24 hrs] Double Integrals and its applications, The methods of least squares, Infinite Sequences and Series. [24 hrs]

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

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

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	15% (15)	2, 6, 12	LO #1, 2, and 4
	Assignments	5	15% (15)	1, 4, 7,11, 14	LO # 3, 4, 5, 6 and 7
	Report	1	10% (10)	13	LO # 3 and 4
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-6
	Final Exam	2hr	50% (50)	16	All

Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Functions of Several Variables
Week 2	Partial Differentiation (Part I)
Week 3	Partial Differentiation (Part II) — Exercises
Week 4	Second-Order Partial Differentiation (Part I)
Week 5	Second-Order Partial Differentiation (Part II) — Exercises
Week 6	The Chain Rule for Partial Derivatives
Week 7	Directional Derivatives and the Gradient Vector
Week 8	Tangent Plane and Normal Line to a Surface
Week 9	Extreme (Maxima and Minima) Values (Part I)
Week 10	Extreme Values (Part II) and Saddle Points
Week 11	Double Integrals (Part I)
Week 12	Double Integrals (Part II) — Applications
Week 13	The Method of Least Squares (Part I)
Week 14	The Method of Least Squares (Part II) and Infinite Sequences
Week 15	Applications

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	"Calculus". Ross L Finney and George B. Thomas. Copyright by Addison Wesley Publishing Company, 1990.	Yes
Recommended Texts	"THOMAS CALCULUS" George B. Thomas. Printed in the United States of America., 2014.	No
Websites		

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

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

Module Information معلومات المادة الدراسية					
Module Title	**Fluid Mechanics II**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWRE-205**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		2	**Semester of Delivery**		4
Administering Department		Dams and Water Resources	**College**	Engineering	
Module Leader	Asmaa Abdul-Jabbar Jameel Mahdi		**e-mail**	Email: ms.asmaajameel@tu.edu.iq Professor	
Module Leader's Acad. Title		Prof.	**Module Leader's Qualification**		Ph.D. in Water Resource
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Prof. Dr. Raad Hoobi	**e-mail**	Dr.raadhoobi@tu.edu.iq	
Scientific Committee Approval Date		1/11/2025	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	DWRE-202	**Semester**	3
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 fluid mechanics is the basic subject for second-stage students in the dams and water resources engineering department that from this subject student will learn and practice to velocity and acceleration of water flow. Conservation of mass: the continuity equation. One two three-dimensional flow, steady and unsteady flow. One dimensional flow Euler's equation, Bernoulli's equation determination and Application of Bernoulli's equation (Venturi meter, orifice and sluice gate). Momentum equation determination and application.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Learn and practice to velocity measurements of water flow and calculated. 2. Learn and practice to discharge measurements of water flow and calculated. 3. Learn the conservation of mass: the continuity equation. 4. Determine discharge using Bernoulli's equation 5. Determine momentum by applying momentum equation. 6. Apply of Bernoulli's and momentum equations on doing experiments in hydraulic laboratory.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction, [15 hrs] Fluid kinematics [15 hrs] Types of fluid flow [15 hrs] Types of flow lines [15 hrs] Conservation of mass continuity equation [15 hrs] Types of head or energy of a flow in motion [10 hrs] Bernoulli's equation [10 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 type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction
Week 2	Fluid kinematics
Week 3	Types of fluid flow
Week 4	Types of flow lines
Week 5	Conservation of mass continuity equation
Week 6	Continuity equation
Week 7	Mid-term Exam
Week 8	Types of head or energy of a flow in motion
Week 9	Bernoulli's equation
Week 10	Application of Bernoulli's equation
Week 11	Tutorials and problem solve
Week 12	Pumps in the Bernoulli Equation
Week 13	The impulse-momentum equation
Week 14	Applied problems on Bernoulli's equation
Week 15	Applied problems on Pumps in the Bernoulli Equation and momentum
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Discharge Measurements in Pipes by Orifice Meter
Week 2	Lab 2: Discharge Measurements in Pipes by Venturi Meter
Week 3	Lab 3: Friction Factor in Pipes
Week 4	Lab 4: Discharge Measurement in Open Channel by Weirs
Week 5	Lab 5: Discharge Measurement in Open Channel by Weirs
Week 6	Lab 6: Hydraulic Jump in open channel
Week 7	Lab 7: Hydraulic Jump in open channel

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Elementary fluid mechanics By: Vinnard 6th ed. 1981	Yes
Recommended Texts	fluid mechanics by MERLE C. POTTER, DAVID C. WIGGERT 2008	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/fluid-mechanics	

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

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

Module Information

معلومات المادة الدراسية

Module Title	**Engineering Surveying II**		**Module Delivery**	
Module Type	**B**		☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWRE-206**			
ECTS Credits	**6**			
SWL (hr/sem)	**150**			
Module Level	2	**Semester of Delivery**	4	
Administering Department	Dams and Water Resources Engineering	**College**	Engineering	
Module Leader	Ahmed Shihab Ahmed Mohammed Al-Jubouri	**e-mail**	Email: ahmed.s.ahmed@tu.edu.iq	
Module Leader's Acad. Title	Asst. lecturer.	**Module Leader's Qualification**	MSc in Water Resources	
Module Tutor		**e-mail**	E-mail	
Peer Reviewer Name	Prof. Dr. Raad Hoobi	**e-mail**	dr.raadhoobi@tu.edu.iq	
Scientific Committee Approval Date	01/11/2025	**Version Number**	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	DWRE-203	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Surveying II aims to teach students how to calculate the earthworks and reservoir volumes from contour maps, bearing of lines, designation of bearing, theodolite, construction and adjustment of the theodolite, measurement of angles, traverse surveys and their adjustment, tachometer, and total station.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On successful completion of this course students will be able to: 1- To understand different types of survey (i). 2-To calculate areas using different methods(i) 3-To calculate volumes using different methods(i) 4- To determine and choose the appropriate method for calculating earthwork volumes (iii) 5- To use plane surveying instruments such as: Theodolite, Tachometry and Total station (iii) 6- To choose appropriate equipment for specific survey measurements (iii).
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A: Area and Volumes Introduction, Irregular figures, Give and take lines, Counting squares, Trapezoidal Rule, Simpson Rule (for odd number) [12 hrs] Volumes Earthwork calculation, Volumes from cross-sections, Sections level a cross (one level section), Sections with a cross fall (two level section),Sections part in cut and part in fill, Section of variable levels (three level section), Multi-level section Computation of volumes, mean areas, end areas, Prismoidal formula, The volume of a pyramid, The Volume of wedge, [15 hrs] Simpson's Rule for Volumes, Volumes from spot levels or (volume of Borrow), Volume from contour lines [9 hrs] Part B – Theodolite and Tachometry, and Totalstation Bearing, Designation of Bearings, whole circle system, Quadrantal system, Deflection angle, Fore and Back Bearings , Calculation of bearings from angles, Calculation of deflection angles from included angles. [18 hrs] The theodolite and traverse surveying, Traverse computations, Latitudes and departure, Closing error, Graphical adjustment, bowditch's rule, Transit rule, Distribution of the angular error [15 hrs] Tachometry, Optical principles, Determine the stadia interval factor [15 hrs] Total station [6hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Learning and teaching strategies in surveying will be designed to engage students in the subject matter while equipping them with the necessary knowledge and skills. These will be encouraged students to participate in the learning process through activities that require them to apply their knowledge. This can be accomplished through problem-solving exercises, case studies, and fieldwork. Also, encourage students to work in groups to solve problems and complete projects. This approach promotes teamwork, communication, and critical thinking skills. Fieldwork will be Provided opportunities for students to engage in real-world surveying activities. This could involve conducting surveys, collecting data, and analyzing the results in the field.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 15 اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	7.5% (7.5)	5, 10	LO #1, 2, 8,9 and 10
	Assignments	2	7.5% (7.5)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	15% (15)	Continuous	All
	Report	7	5% (5)	3,4,5,6,7,9,10	LO # 2, 3,4, 6,10 and 10
Summative assessment	**Midterm Exam**	2 hr	15% (15)	8	LO # 1-8
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction, Irregular figures, Give and take lines, Counting squares.
Week 2	Counting squares, Trapezoidal Rule, Simpson Rule (for odd number),Quiz No.1
Week 3	Volumes Earthwork calculation, Volumes from cross-sections, Sections level a cross (one level section), Sections with a cross fall (two level section).
Week 4	Sections part in cut and part in fill, Section of variable levels (three level section), Multi-level section
Week 5	Computation of volumes, mean areas, end areas, Prismoidal formula.
Week 6	The volume of a pyramid, The Volume of wedge.
Week 7	Simpson's Rule for Volumes, Volumes from spot levels or (volume of Borrow), Volume from contour lines
Week 8	Mid-term Exam, Bearing, Designation of Bearings,
Week 9	Deflection angle, Fore and Back Bearings. Calculation of bearings from angles,
Week 10	Calculation of deflection angles from included angles, Quiz No.2
Week 11	The theodolite and traverse surveying, Traverse computations, Latitudes and departure.
Week 12	Closing error, Graphical adjustment, bowditch's rule, Transit rule, Distribution of the angular error
Week 13	Tachometry, Optical principles, Determine the stadia interval factor
Week 14	Tachometry, Optical principles , Total station
Week 15	Total station
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Planimeter
Week 2	Lab 2: Contour mapping using the surfer software
Week 3	Lab 3: Theodolite
Week 4	Lab 4: Layout a building on graph paper using Theodolite.
Week 5	Lab 5: Traverse surveying
Week 6	Lab 6: Measure distances using Tachometry.
Week 7	Lab 7: Total station

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Surveying (A.Bannister & S.Raymond)	Yes
Recommended Texts	Surveying by (S.K.Hussin and M.SNagaraj)	No
Websites		

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

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

Module Information

معلومات المادة الدراسية

Module Title	**Water Quality and Pollution**	**Module Delivery**	
Module Type	**C**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWRE-207**		
ECTS Credits	**5**		
SWL (hr/sem)	**125**		
Module Level	2	**Semester of Delivery**	4
Administering Department	Dams and Water Resources Engineering	**College**	Engineering
Module Leader	Mohammed Faeq Yas Khudair	**e-mail**	Email: mohamed_faiq@tu.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	E-mail
Peer Reviewer Name	Prof. Dr. Raad Hoobi	**e-mail**	dr.raadhoobi@tu.edu.iq
Scientific Committee Approval Date	01/11/2025	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The aims of this topic 1. To gain an understanding of the environment and the different types of environmental pollution. 2. To understand the quantitative and qualitative distribution of water in the world and the hydrological cycle of water from a quantity perspective. 3. To learn about the properties of water sources and how they can become polluted. 4. To understand the impact of engineering projects on water quality and self-purification. 5. To study the effect of decomposition rate (decomposition constant) on the amount of oxygen required in the process of waste decomposition. 6. To analyze the effect of the quality and quantity of wastewater entering and leaving a lake. 7. To study the deficit of oxygen in the water and the processes of reaeration and deoxygenation. 8. To investigate the effect of wastewater on rivers and the different types of pollution that can occur. 9. To understand the impact of detergents on water pollution. 10. To study the different types of pollution that can affect rivers and their ecosystems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completion of this course, the student will: 1. Be able to describe the chemical compositions of natural waters and understand the reasons behind their variations. 2. Have knowledge of the main sources of water pollution and the different types of pollutants. 3. Be able to calculate the changes in dissolved oxygen, oxygen deficit, and Biological Oxygen Demand (BoD) along the riverbed due to wastewater. 4. Be able to compute the impact of the quality and quantity of wastewater entering and leaving a lake. 5. Be able to identify the different types of pollution that can affect rivers. 6. Understand the properties of water sources and how they can become polluted. 7. Be able to identify the criteria for drinking water acceptability and describe the processes used to treat water for public water supply.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction to Environment. [4 hrs] Hydrological Cycle of water from quantity sides. [4 hrs] Properties of water sources, how water sources polluted. Effect of engineering project on water quality and self-purification. [8 hrs] Effect of decomposition rate (decomposition constant) on the amount of oxygen required in the process of waste decomposition. [12 hrs] Calculate the change of dissolved oxygen, deficit oxygen and BoD along the riverbed due to wastewater. [12 hrs] Effect of the quality and quantity of wastewater entering and leaving the lake. [6 hrs] Seasonal inversion in lakes, Effect of detergents on the pollution of the water. [6hrs] Study the type of pollution on the river, Wastewater treatment. [8hr]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	To ensure effective learning of water quality and pollution, the teaching strategies employed should be engaging and equip students with the relevant knowledge and skills. This can be achieved through problem-solving exercises, case studies, and fieldwork. Collaborative learning in groups promotes teamwork, communication, and critical thinking skills. Regular feedback and reflection help students identify areas for improvement and consolidate their learning. Case studies are also useful in illustrating the impact of water pollution on different environments and ecosystems and emphasize the importance of protecting water resources. By utilizing these strategies, students can gain a deeper understanding of water quality and pollution, and develop the skills necessary to become effective professionals in this field.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 15 اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	7.5% (7.5)	5, 10	LO #1, 2, 8,9 and 10
	Assignments	2	7.5% (7.5)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	15% (15)	Continuous	All
	Report	5	5% (5)	3,4,5,6,7,9	LO # 2, 3,4, 6,10 and 10
Summative assessment	**Midterm Exam**	2 hr	15% (15)	8	LO # 1-8
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Environment
Week 2	Hydrological Cycle of water from quantity sides. Quiz No.1
Week 3	Properties of water sources, how water sources polluted.
Week 4	Effect of engineering project on water quality and self-purification.
Week 5	Effect of decomposition rate (decomposition constant) on the amount of oxygen required in the process of waste decomposition
Week 6	Effect of decomposition rate (decomposition constant) on the amount of oxygen required in the process of waste decomposition
Week 7	Calculate the change of dissolved oxygen along the riverbed due to wastewater.
Week 8	Mid-term Exam
Week 9	Calculate the change of deficit oxygen along the riverbed due to wastewater.
Week 10	Calculate the change of BoD along the riverbed due to wastewater, Quiz No.2
Week 11	Effect of the quality and quantity of wastewater entering and leaving the lake.
Week 12	Effect of the quality and quantity of wastewater entering and leaving the lake.
Week 13	Seasonal inversion in lakes, Effect of detergents on the pollution of the water
Week 14	Study the type of pollution on the river.
Week 15	Wastewater treatment.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Solids, Dissolved and Suspended solids, and total solids
Week 2	Lab 2: Turbidity
Week 3	Lab 3: PH-value.
Week 4	Lab 4: Electrical Conductivity.
Week 5	Lab 5: Dissolved Oxygen
Week 6	Lab 6: Hardness

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	○ د. طارق احمد محمود " علم و تكنولوجيا البيئة " كتاب منهجي لمادة هندسة البيئة – جامعة الموصل –كلية الهندسة.	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 Information معلومات المادة الدراسية					
Module Title	**ENGINEERING GEOLOGY** **جيولوجيا هندسية**			**Module Delivery**	
Module Type	**BASIC**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWRE-208**				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level	2		**Semester (s) offered**	4	
Administering Department	Dams and Water Resources Engineering		**College**	Engineeeing	
Module Leader	Dr. Aodai A. Ismail		**e-mail**	dr.aodai@tu.edu.iq	
Module Leader's Acad. Title	Instructor		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name	Prof. Dr. Raad Hoobi		**e-mail**	dr.raadhoobi@tu.edu.iq	
Review Committee Approval			**Version Number**		

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	
Module Aims, Learning Outcomes, Indicative Contents and Brief Description أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر			
Module Aims أهداف المادة الدراسية	تهدف المادة الدراسية الى مساعدة الطالب بالتعرف على مادة الجيولوجيا الهندسية من حيث دورها وتأثيرها في تحسين المواد. والاطلاع على دورها في الأعمال المدنية والتعدينية. مع بيان للطرق العملية للتعرف على المشاكل الهندسية للترب الصخور وطرق معالجتها. التعرف على الخرائط الهندسية واستعمالاتها.		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. التعرف على الجيولوجيا الهندسية، اهدافها ومجالات عملها. 2. دور وتأثير الجيولوجيا الهندسية في تحسين مواد الأرض 3. الاطلاع على دور الجيولوجيا الهندسية في الأعمال المدنية والتعدينية 4. التعرف على المشاكل الهندسية للتربة والصخور وطرق معالجتها. 5. التعرف على الخرائط الهندسية، انواعها، انظمة رسمها وتصنيفها.		

Indicative Contents المحتويات الإرشادية	تتضمن المحتويات الارشادية مايلي: • تعاريف الأرض ومكوناتها (2 ساعة) • التاريخ الجيولوجي الحفر (2 ساعة) • التجوية وتكوين التربة (2 ساعة) • ميكانيك الصخور والتربة (4 ساعة) • الطرق الجيوفيزيائية (2 ساعة) • كفاءة الطرق الجيوفيزيائية (2 ساعة) • اختيار الموقع التحري الفلزي (2 ساعة) • التحري الجيوكيميائي (2 ساعة) • التلوث الصناعي (2 ساعة) • دراسة التصحر الجبال والثلوج (2 ساعة) • الترب الكلسية والجبسية (2 ساعة) • الخرائط (4 ساعة) • التطبيقات الهندسية (2 ساعة)
Course Description	تهدف المادة الدراسية لإعطاء الطالب معلومات تفصيلية عن الجيولوجيا الهندسية ومكوناتها والمفاهيم الاساسية المتعلقة بها والخرائط الجيولوجية وتدريب الطلبة على كيفية رسمها وقراءتها وفهمها.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	تم تصميم استراتيجية التعلم والتدريس من أجل: تغطية المواد الأساسية بعناية في المحاضرات، وتطبيق المفاهيم بما يتيح للطلاب وقتًا كافيًا لفهم وإدراك المادة بالاطلاع والتطبيق لعدد كبير من النماذج والامثلة المختارة بعناية، وتكليف الطلبة بواجبات بيتية للتمرين الاضافي.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures 30** **Lab 30** **In class tests 3** **Seminars**	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing 5** **Preparation for tests 2** **Home works 5**	12	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	0.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10, 12, 14	LO #1, 2, 3, and 4
	Assignments	6	18% (18)	2, 4, 6, 8, 10, 12	LO # 1, 2, 3, 4, 5 and 6
	Seminars	3	12% (12)	Continuous	
Summative assessment	**Midterm Exam**	2	10% (10)	7	LO # 1-3
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	تعاريف الأرض ومكوناتها
Week 2	التاريخ الجيولوجي الحفر
Week 3	التجوية وتكوين التربة
Week 4	ميكانيك الصخور والتربة
Week 5	ميكانيك الصخور والتربة
Week 6	ميكانيك الصخور والتربة
Week 7	**Seminar**
Week 8	الطرق الجيوفيزيائية
Week 9	كفاءة الطرق الجيوفيزيائية
Week 10	اختيار الموقع التحري الفلزي
Week 11	التحري الجيوكيميائي التلوث الصناعي
Week 12	دراسة التصحر الجبال والثلوج
Week 13	الترب الكلسية والجبسية
Week 14	لتطبيقات الهندسية
Week 15	**Seminar**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	يتم تغطية المنهج بالمرسم
Week 1	البلورات
Week 2	المعادن
Week 3	الصخور
Week 4	الخصائص البصرية
Week 5	الخصائص الفيزيائية
Week 6	المسح الجيولوجي
Week 7	ميكانيك الصخور
Week 8	ميكانيك التربة
Week 9	**Seminar**
Week 10	الجيولوجيا التركيبية
Week 11	الخرائط الطبوغرافية
Week 12	الخرائط الجيولوجية
Week 13	المقاطع الطبوغرافية
Week 14	**Seminar**
Week 15	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	الجيولوجيا الهندسية وميكانيك الصخور1980. تاليف ن. دنكان . ترجمة كنانة محمد ثابت, محمد علاء الدين, زهير رمو.	Yes
Recommended Texts	• اساسيات الجيولوجيا 2009. د.ميشيل كامل. • خواص المواد الهندسية . صالح امين, وليد محمد, طالب حسين. • موسوعة اعلام الجيولوجيين في العراق 2015. احمد جدوع رضا الهيتي. • تجارب مختبر الجيولوجيا وميكانيك التربة 2018. خالد غسان.	Yes
Websites		

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

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

Module Information معلومات المادة الدراسية					
Module Title	**Ethics and Leader Skills**			**Module Delivery**	
Module Type	**Suplement**			**Lecture** **Tutorial**	
Module Code	**UOT-011**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	2		**Semester (s) offered**	4	
Min number of students	15		**Max number of students**	100	
Administering Department	Dams and Water Resources Engineering		**College**	Engineering	
Module Leader	Maysoun Abdullah Mansour Salman		**e-mail**	dr.maysoonabdullah@tu.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	PhD	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Prof. Dr. Raad Hoobi		**e-mail**	dr.raadhoobi@tu.edu.iq	
Review Committee Approval	01/11/2025		**Version Number**	1.0	

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

Module Aims, Learning Outcomes, Indicative Contents and Brief Description أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر	
Module Aims أهداف المادة الدراسية	1- تمكين الطلبة من خلق الوعي بأخلاقية مهنة الهندسة. 2- تمكين الطلبة من خلق الوعي لغرس القيم الاجتماعية والولاء. 3- تمكين الطلبة من خلق الوعي حول تقدير واحترام حقوق الاخرين.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- تعلم الطالب لقواعد الاخلاق في تنظيم السلوك العام لأعضاء مهنة الهندسة. 2- تعلم الطالب للمفهوم العام لأخلاقيات مهنة الهندسة. 3- تعلم الطالب لأهمية العمل في حياة الانسان. 4- تعلم الطالب للواح والأنظمة والتشريعات الخاصة بالمهنة. 5- تعلم الطالب لتاريخ المدونات الهندسية.
Indicative Contents المحتويات الإرشادية	المحتويات الارشادية: ● مقدمة عامة، مبادئ اخلاقيات مهنة الهندسة، كلمات الدلالة والمصادر. (3 ساعات) ● مفهوم اخلاقيات المهنة، أهمية اخلاق المهنة في الحياة، أهمية العمل في حياة الانسان. (9 ساعات) ● المقومات العامة لأخلاقيات المهنة. (9 ساعات) ● مدونات قواعد السلوك. (3 ساعات)

	• مدونات اخلاقيات مهنة الهندسة. (3 ساعات) • قواعد واخلاقيات ممارسة مهنة الهندسة. (3 ساعات) • الحياة المهنية للمهندي وعلاقاته المختلفة. (3 ساعات) • القوانين والتشريعات التي تضبط السلوك العام لأخلاقيات المهنة. (9 ساعات)
Course Description	يتناول الفصل الدراسي; مبادئ اخلاقيات مهنة الهندسة مفهوم اخلاقيات المهنة، أهمية اخلاق المهنة في الحياة، أهمية العمل في حياة الانسان، المقومات العامة لأخلاقيات المهنة، مدونات واخلاقيات مهنة الهندسة، قواعد واخلاقيات ممارسة مهنة الهندسة، الحياة المهنية للمهندس وعلاقاته المختلفة والقوانين والتشريعات التي تضبط السلوك العام لأخلاقيات المهنة.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	تم تصميم استراتيجية التعلم والتدريس من أجل; تغطية المحاضرات الضرورية بعناية للمواد الأساسية والتقنيات التحليلية الضرورية وإظهار المفاهيم بأمثلة مناسبة (حيث أمكن ذلك عمليا")، اتاحة الوقت الكافي للطلاب لممارسة التقنيات باستخدام عدد كبير من المشكلات التعليمية المختارة بعناية.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures 30** **In class tests 3**	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing 7** **Preparation for tests 7** **Home Works 3**	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية					
		Time (hr)	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	20% (10)	4, 5, 6,8, 10, 12	LO #3, 4, 6
	Assignments (Home Works)	5	20% (10)	continuous	LO # 2, 4, 6, 8, 10, 12 and 13
Summative assessment	**Midterm Exam**	2	10% (10)	8	LO # 1-6
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	مقدمة عامة، مبادئ اخلاقيات مهنة الهندسة، كلمات الدلالة والمصادر.
Week 2	مفهوم اخلاقيات المهنة، أهمية اخلاق المهنة في الحياة، أهمية العمل في حياة الانسان.
Week 3	مفهوم اخلاقيات المهنة، أهمية اخلاق المهنة في الحياة، أهمية العمل في حياة الانسان.
Week 4	مفهوم اخلاقيات المهنة، أهمية اخلاق المهنة في الحياة، أهمية العمل في حياة الانسان.
Week 5	المقومات العامة لأخلاقيات المهنة.
Week 6	المقومات العامة لأخلاقيات المهنة.
Week 7	المقومات العامة لأخلاقيات المهنة.
Week 8	**Midterm exam**
Week 9	مدونات قواعد السلوك.
Week 10	مدونات اخلاقيات مهنة الهندسة.
Week 11	قواعد واخلاقيات ممارسة مهنة الهندسة.
Week 12	الحياة المهنية للمهندي وعلاقاته المختلفة.
Week 13	القوانين والتشريعات التي تضبط السلوك العام لأخلاقيات المهنة.
Week 14	القوانين والتشريعات التي تضبط السلوك العام لأخلاقيات المهنة.
Week 15	القوانين والتشريعات التي تضبط السلوك العام لأخلاقيات المهنة.
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	"قواعد وأخلاقيات ممارسة مهنة الهندسة، الاستاذ المهندس الدكتور نبيل عبد الرزاق جاسم، دار ومكتبة البشائر للطباعة والنشر والتوزيع، بيروت-لبنان، 2013.	Yes
Recommended Texts	1-An introduction to Ethics and its Relevance to the Profession of Engineering, Dr. N. Karunakaran.	No

Module Information
معلومات المادة الدراسية

Module Title	**English Language II**		**Module Delivery**	
Module Type	**Support**		☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UOT-021**			
ECTS Credits	**2**			
SWL (hr/sem)	**50**			
Module Level	2	**Semester of Delivery**	4	
Administering Department	Dams and Water Resources	**College**	Engineering	
Module Leader	Firas Hazem Jasim Mohammed	**e-mail**	Email: Firas.arab@tu.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	Prof. Dr. Raad Hoobi	**e-mail**	dr.raadhoobi@tu.edu.iq	
Scientific Committee Approval Date	1/11/2025	**Version Number**	1.0	

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

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

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

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

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 3, 8 and 10
	Assignments	2	10% (10)	3, 12	LO # 5, 6,11 and 12
	Projects / Lab.				
	Report	1	20% (20)	14	LO # 1-10
Summative assessment	**Midterm Exam**				
	Final Exam	3hr	60% (60)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Overview of Academic Essays Independent, Dependent, and Integrated essays Structure of academic essays
Week 2	Structure of academic essays
Week 3	Topic sentence and thesis statement Identifying topic sentence and thesis statement of academic essays.
Week 4	Main Ideas: Identifying the main Ideas of academic essays.
Week 5	Supporting Details: Identifying the supporting details
Week 6	Essay outlines: Building Essay outlines using idea maps
Week 7	Essay Questions: Responding to essay questions by making personal notes
Week 8	Topic Sentence ：Writing a thesis statement or topic sentence using personal thoughts.
Week 9	Personal Thoughts: Using personal thoughts to express main ideas and supporting details in response to an essay question.
Week 10	Idea Map Creation: Building an idea map of an essay question.
Week 11	Transition words and sentence starters Increasing the fluency, coherence, and smooth transition of thoughts using sentence starters and transition words.
Week 12	Writing the Introduction: Combining the thesis statement and main ideas together to build the introduction paragraph.
Week 13	Writing the Conclusion
Week 14	Introduction to dependent writing tasks
Week 15	**Final Exam**

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

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

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

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

Module Information

معلومات المادة الدراسية

Module Title	**Engineering Analysis**	**Module Delivery**	
Module Type	**B**	☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MATH-301**		
ECTS Credits	**4**		
SWL (hr/sem)	**100**		
Module Level	3	**Semester of Delivery**	5
Administering Department	Dams and water resources Department	**College**	College of Engineering
Module Leader	Akram Khalaf Mohammed Jasim	**e-mail**	akram.mohammed@tu.edu.iq
Module Leader's Acad. Title	lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	
Peer Reviewer Name	Prof. Dr. Raad Hoobi	**e-mail**	dr.raadhoobi@tu.edu.iq
Scientific Committee Approval Date	01/11/2025	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To introduce students to the concept of differential equations and their significance in engineering and scientific applications. 2. To provide students with the necessary skills to solve first order differential equations using separation of variables, and to classify them as homogeneous, non-homogeneous, exact and non-exact D.E's. 3. To teach students how to solve linear and non-linear first order differential equations, as well as higher order differential equations. 4. To familiarize students with the solution of second and higher order linear differential equations, with both constant and variable coefficients, and to teach them how to apply the variation of parameters method. 5. To provide students with an understanding of simultaneous linear differential equations and their applications in engineering. 6. To equip students with the ability to analyze physical and engineering problems by setting up and solving differential equations. 7. To impart an understanding of Laplace transforms and how they can be used for the solution of differential equations. 8. Overall, this course aims to provide a thorough understanding of differential equations and their use in various engineering and scientific applications. By the end of this module, students should be able to solve a variety of differential equations, both analytically and numerically, and apply this knowledge to real-world problems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On successful completion of this course students will be able to: 1. Define differential equations and classify them based on their degree, order, and formation. 2. Solve first-order differential equations using separation of variables. 3. Analyze and solve homogeneous, non-homogeneous, exact, and non-exact differential equations. 4. Classify differential equations as linear or non-linear and solve linear first-order differential equations. 5. Solve higher-order differential equations of varying degrees. 6. Solve second- and higher-order linear differential equations using the characteristic equation and general solutions. 7. Solve second- and higher-order linear differential equations with constant coefficients. 8. Solve second- and higher-order linear differential equations with variation of parameters. 9. Solve a system of linear differential equations using matrix methods. 10. Apply first-order differential equations to physical and engineering problems. 11. Utilize second-order differential equations to solve physical and engineering problems. 12. Apply second-order differential equations to model physical systems in various engineering applications. 13. Derive solutions for second-order differential equations in a specific engineering domain. 14. Use Laplace transforms to solve differential equations, including finding solutions from initial and boundary conditions.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Definition, Forming, Order and Degree of Differential Equation [4hr] 2. Solution of the first order D.E Separation of variables [4hr] 3. Homogeneous, non-homogeneous, Exact and not exact D.E [4hr] 4- Linear and nonlinear first order D.E 5. First order and higher degree D.E [4hr] 6. Solution of second and higher order linear D.E [4hr] 7. Solution of second and higher order linear D.E with constant coefficient 8. Solution of second and higher order linear D.E with variation of parameter [4hr] 9. Simultaneous linear D.E [4hr] 10. Physical and engineering application on first order D.E [8hr] 11. Physical and engineering application on second order D.E [8hr] 12. Laplace TransformDerivative of Newton forward and backward differences [8hr]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 15 اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.47
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Defintion, Forming,Order and Degree of Differential Equation
Week 2	Solution of the first order D.E.Separation of variables
Week 3	Homogeneous, non-homogeneous Exact and not exact D.E
Week 4	Linear and nonlinear first order D.E
Week 5	First order and higher degree D.E
Week 6	Solution of second and higher order linear D.E
Week 7	Solution of second and higher order linear D.E with constant coefficient
Week 8	Solution of second and higher order linear D.E with variation of parameter
Week 9	Simultaneous linear D.E
Week 10	Physical and engineering application on first order D.E
Week 11	Physical and engineering application on first order D.E
Week 12	Physical and engineering application on second order D.E Physical and engineering application on second order D.E
Week 13	Physical and engineering application on second order D.E Physical and engineering application on second order D.E
Week 14	Laplace Transform
Week 15	Laplace Transform
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	• Theory and Problems of Differential Equations	Yes
Recommended Texts	• By Frank Ayres, JR,PhD • Advanced Engineering Mathematics By Dass	No
Websites		

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

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

Module Information

معلومات المادة الدراسية

Module Title	**Structural Analysis**	**Module Delivery**	
Module Type	B	☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWRE-301**		
ECTS Credits	**5**		
SWL (hr/sem)	**125**		
Module Level	3	**Semester of Delivery**	5
Administering Department	Dam and water resources	**College**	Engineering
Module Leader	Abdullah Saeb Tais Jabr	**e-mail**	abdalla_saab@tu.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	Prof. Dr. Raad Hoobi	**e-mail**	dr.raadhoobi@tu.rdu.iq
Scientific Committee Approval Date	1/11/2025	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Study the basic principles for structures. 2. Analyze the statically determinate structures. 3. Determine the elastic deformations of the statically determinate structures by using different methods. 4. Solve the indeterminate statically structures by using different methods.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Find out stability and determinacy of structures, 2. Analyze the statically determinate structures 3. Evaluate the elastic deformation of structures by virtual work (unit load) method 4. Evaluate the elastic deformation of structures by Castigliano`s first theorem method 5. Analyze the statically indeterminate structures by consistent deformation method 6. Analyze the statically indeterminate beams and frames by least work method 7. Analyze the statically indeterminate beams and frames by slope-deflection method 8. Analyze the statically indeterminate beams and frames by moment distribution method
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – Determinate Structures Stability and determinacy of structures, Analysis of the statically determinate structures. [4 hrs] The elastic deformation of beams by virtual work (unit load) method, The elastic deformation of frames by virtual work (unit load) method. [4 hrs] The elastic deformation of trusses by virtual work (unit load) method. [4 hrs] The elastic deformation of beams by Castigliano`s first theorem method, The elastic deformation of frames by Castigliano`s first theorem method. [4 hrs] The elastic deformation of trusses by Castigliano`s first theorem method. [4 hrs]  Part B - Indeterminate Structures Analysis the statically indeterminate beams by method of consistent deformation, Analysis the statically indeterminate frames by method of consistent deformation [4 hrs] The elastic deformation of trusses by Castigliano`s first theorem method. [4 hrs] Analysis the statically indeterminate beams by consistent deformation method [4 hrs] Analysis the statically indeterminate frames by consistent deformation method [4 hrs] Analysis the statically indeterminate beams by least work method [4 hrs] Analysis the statically indeterminate frames by least work method [4 hrs] Analysis the statically indeterminate beams by slope-deflection method [4 hrs] Analysis the statically indeterminate frames by slope-deflection method method [4 hrs] Analysis the statically indeterminate beams by moment distribution method [4 hrs] Analysis the statically indeterminate frames by moment distribution method [4 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 involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 15 اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	5% (5)	11	LO #5 and 6
	Assignments	2	5% (5)	5, 14	LO # 3-8
Summative assessment	**Midterm Exam**	2	30% (30)	6, 15	LO # 1-4 and 5-8
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Stability and determinacy of structures, Analysis of the statically determinate structures
Week 2	The elastic deformation of beams by virtual work (unit load) method, The elastic deformation of frames by virtual work (unit load) method
Week 3	The elastic deformation of trusses by virtual work (unit load) method
Week 4	The elastic deformation of beams by Castigliano`s first theorem method, The elastic deformation of frames by Castigliano`s first theorem method
Week 5	The elastic deformation of trusses by Castigliano`s first theorem method
Week 6	Exam I
Week 7	Analysis the statically indeterminate beams by method of consistent deformation, Analysis the statically indeterminate frames by method of consistent deformation
Week 8	Analysis the statically indeterminate trusses by method of consistent deformation
Week 9	Analysis the statically indeterminate beams by least work method
Week 10	Analysis the statically indeterminate frames by least work method
Week 11	Analysis the statically indeterminate beams by slope-deflection method
Week 12	Analysis the statically indeterminate frames by slope-deflection method
Week 13	Analysis the statically indeterminate beams by moment distribution method
Week 14	Analysis the statically indeterminate frames by moment distribution method
Week 15	Exam II
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Non
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 Theory of Structures, YUAN-YU HSIEH, PRETICE-HALL, 1980.	Yes
Recommended Texts	Hibbeler R. C. (2012). Structural analysis (8th ed.). Pearson/Prentice Hall.	No

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

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

Module Information
معلومات المادة الدراسية

Module Title	**Soil Mechanics I**	**Module Delivery**	
Module Type	**B**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**DWRE-302**		
ECTS Credits	**5**		
SWL (hr/sem)	**125**		

Module Level	**3**	**Semester of Delivery**	**5**
Administering Department	Dam and water resources	**College**	Engineering
Module Leader	Firas Hazem Jasim Mohammed	**e-mail**	Firas.arab@tu.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	
Peer Reviewer Name	Prof. Dr. Raad Hoobi	**e-mail**	dr.raadhoobi@tu.edu.iq
Scientific Committee Approval Date	1/11/2025	**Version Number**	1.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The course aims to provide students with the necessary background information about soil mechanics. The course aims to: 1- Provide students with a fundamental understanding of the principle of soil mechanics, soils' properties, states, behavior, and mechanics. 2- Give students training on solving problems by applying the theories and principles in soil mechanics. 3- Solve problems based on phase relationships, and soil classification according to various international classification systems and determine the suitability of soils for engineering purposes. 4- Understand the principles of soil mechanics and it is application: Flow of water through the soil, permeability, seepage. The principle of effective stress and its implications. Consolidation and calculate elastic and consolidation settlements. 5- Understand the soil improvement and stabilization techniques.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On successful completion of this course, students will be able to: 1. Understand and implement the basic fundamentals of soil behavior. 2. Ability to solve problems related to soil mechanics, especially stress distribution, soil stabilization, water flow, and soil settlement. 3. Use modern soil mechanics equipment and soil investigation procedures. 4. Gain the ability to how to write professional, clear, concise technical reports. 5. Being able to identify and manage field problems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1-Part A-Introduction and physical properties Introduction, physical properties of soil, moisture content, density, void ratio, porosity and saturation, Atterberg limits and soil classification. [22 hrs] Revision problem classes [6 hrs] 2- Part B- Permeability and seepage Permeability, seepage flow net construction, seepage through and under dams, seepage forces, and piping. [22 hrs] Revision problem classes [6 hrs] 3- Part C- Soil Stresses The concept of total and effective stress and pore water pressure. [10 hrs] Revision problem classes [4 hrs] 4- Part D- Compressibility of the soil Consolidation of soils, measurement of the consolidation of cohesive soils in the laboratory, theoretical consideration of amount and rate of settlement. [15 hrs] Revision problem classes [6 hrs] 5- Part E- Soil stabilization Soil improvement and stabilization techniques. [10 hrs] Revision problem classes [4 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	A combination of theoretical classes and laboratory practical classes On completion of this course, the student will be able to: 1. Demonstrate ability to explain the multiphase nature of soils and to derive quantities relating to the volumes and masses of the different phases of a soil 2. Describe the ability to apply the effective stress concept to solve elementary geotechnical problems 3. Determine and classify soils. 4. Establish skills in soil permeability and compaction measurement and skills in the solution of seepage-related problems. 5. Developing the student's ability to make decisions in the field.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 15 اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	10% (10)	3,7, 10	LO # 1 and 2
	Assignments	3	10% (10)	4,8, 11	LO # 2 and 4
	Lab	1	10% (10)	Continuous	LO # 3 and 5
	Report	11	10% (10)	Every week	LO # 4 and 5
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO # 1, 2 and 3
	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 soil engineering
Week 2	Physico–mechanical properties of soil
Week 3	Soil classification
Week 4	Soil classification
Week 5	Permeability & seepage flow in soils
Week 6	Permeability & seepage flow in soils
Week 7	Permeability & seepage flow in soils
Week 8	Permeability & seepage flow in soils
Week 9	Stresses within soil mass (Internals Stresses)
Week 10	Stresses within soil mass (External Stresses)
Week 11	Consolidation and Compressibility of the soil
Week 12	Consolidation and Compressibility of the soil
Week 13	Consolidation and Compressibility of the soil
Week 14	Soil Stabilization
Week 15	Soil Stabilization
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction, and Visiting the Lab.
Week 2	Water content estimation and physical properties of the soil.
Week 3	Specific gravity of the soil.
Week 4-5	Grain size distribution of the soil.
Week 6-7	Atterberg limits
Week 8	Chemical tests of the soil.
Week 9-10-11	Consolidation test explanation and training.
Week 12	Swelling test.
Week 13	Collapse test.
Week 14	Compaction test.
Week 15	Field density test.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. "Principles of Geotechnical Engineering",(2007), Braja M. Das, 5th edition 2002, copyright by Wadsworth Group/United Stated. 2. "Principal of Soil Mechanic", (1991), Mohammed O. AL-Asho, (Book language in Arabic).	Yes
Recommended Texts	1. "Elements of Soil Mechanics", (1988), G. N. Smith and Ion G. N. Smith, USA. 2. "Problem Solving in Soil Mechanics", (2003), A. Aysen, Swets & Zeitlinger B.V	No
Websites	No	

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

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

Module Information

معلومات المادة الدراسية

Module Title	**Engineering Hydrology I**		**Module Delivery**	
Module Type	**Core**		☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWRE-303**			
ECTS Credits	**6**			
SWL (hr/sem)	**150**			
Module Level	3	**Semester of Delivery**	5	
Administering Department	Dams and Water Resources	**College**	Engineering	
Module Leader	Mohammed Faeq Yas Khudair	**e-mail**	mohamed_faiq@tu.edu.iq	
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	PhD	
Module Tutor		**e-mail**		
Peer Reviewer Name	Prof. Dr. Raad Hoobi	**e-mail**	dr.raadhoobi@tu.edu.iq	
Scientific Committee Approval Date	1/11/2025	**Version Number**	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Surface Water hydrology is essential for third-stage dams and water resources engineering students in order to • Provides an introduction to hydrological processes; measurements and modelling. It focuses on practical applications of hydrology • Quantify the hydrologic processes and integrate them into hydrologic design procedures. • know and understand the basic principles and equations used for surface water hydrology, and the main characteristics of the different types of hydrologic simulators.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Overview of essential concepts encountered in hydrological systems. • Developing a sound understanding of concepts as well as a strong foundation for their application to real-world, in-the-field problem solving. • Acquisition of knowledge by learning new concepts, and properties and characteristics of water and surface water in specific • Cognitive skills through thinking, problem solving and use of experimental work and inferences • Numerical skills through application of knowledge in basic mathematics and supply issues. • Student becomes responsible for their own learning through solution of assignments, laboratory exercises and report writing • Solving problems in hydrology and making decisions about hydrologic issues that involve uncertainty in data /incomplete data, and the variability of natural materials.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Fundamentals of Surface Water Hydrology. (6hrs) • Meteorological data (Humidity, temperature, radiation and wind). (6hrs) • Precipitation. (6hrs) • Evaporation and transpiration. (6hrs) • Infiltration and percolation. (7hrs) • Hydrograph .(8hrs) • Rainfall-Runoff process (Surface water runoff). (8hrs) • Design Flood estimations. (8hrs) • Flood routing. (8hrs) • Modelling Watershed Hydrology. (8hrs)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The essential strategy of this module is to motivate students to • Use real-world data to develop a water budget for unfamiliar basins. • Identify interconnections in hydrological systems and predict changes. • Predictions of hydrological terms influencing the hydrological cycle. • Collection of data, analysis and interpretation.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 15 اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**First monthly Exam**	2 hr	15% (15)	8	#1, 2, 3 and 4
	Second monthly Exam	2hr	15% (15)	15	# 5, 6 and 7
Summative assessment	**Class work**	2 hr	10% (10)	5,7,9,10,12, 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	Hydrological definition, The hydrological cycle, Global Water Balance The water balance equation or the hydrological equation Google earth software
Week 2	Engineering applications of hydrology, Typical failure factors for hydraulic installations Google earth software
Week 3	Climate elements: Introduction, Temperatures, solar radiation Evaporation, moisture, Atmospheric pressure, and wind. Google earth software
Week 4	Precipitation: Forms of precipitation, Precipitation measurement, Precipitation measuring grid, Initialize the information, Check the smoothness of records, Precipitation measurement methods, The hectograph Global mapper software
Week 5	Precipitation losses: The loss from the rainfall, Evaporation process, Evaporation gauges, Evaporation stations Global mapper software
Week 6	Empirical evapotranspiration equations, Analytical methods for estimating evapotranspiration. Global mapper software
Week 7	Runoff: Factors affecting the value or volume of surface runoff, Division of surface runoff WMS software
Week 8	**First Monthly Exam**

Week 9	Hydrograph, The flow characteristics of the streams Empirical equations, Flow Curve Characteristics – Sustainability, Cumulative (mass) flow curve. WMS software
Week 10	Calculation of storage volume, Calculations of an accepted order WMS software
Week 11	Hydrograph: Introduction, Factors affecting flood hydrograph, Hydrograph Components, Separation of the hydrograph, effecting rainfall WMS software
Week 12	Standard hydrograph, Derivation of the standard hydrograph Standard hydrographs of different durations, The uses, and limitations of the standard hydrograph. WMS software
Week 13	Flood routing Microsoft Excel
Week 14	Reservoir routing- channel routing Microsoft Excel
Week 15	**Second monthly exam.**
Week 16	**The preparatory week before the Final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Ward, Roy C., and Mark Robinson. *Principles of hydrology*. Vol. 367. London: McGraw-Hill, 1975.	Yes
Recommended Texts	Raghunath, H. M. (2006). *Hydrology: principles, analysis and design*. New Age International. Hiscock, K. M., & Bense, V. F. (2014). *Hydrogeology: principles and practice*. John Wiley & Sons.	Yes
Websites	https://www.youtube.com/watch?v=bOkzVV9VLRI https://www.ldeo.columbia.edu/~martins/hydro/syl_p.html	

Grading Scheme
مخطط الدرجات

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

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Module Information

معلومات المادة الدراسية

Module Title	**Open Channels Hydraulics**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWRE-304**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		
Module Level	3	**Semester of Delivery**	5
Administering Department	Dams and Water Resources	**College**	Engineering
Module Leader	Ruqayya Abdul-Hussein Jumaa Al-Tikriti	**e-mail**	ms.ruqiyaabed@tu.edu.iq
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	MSc
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Prof. Dr. Raad Hoobi	**e-mail**	dr.raadhoobi@tu.edu.iq
Scientific Committee Approval Date	1/11/2025	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	On successful completion of this course students will be able to: 1. Recognize the common physical phenomenon of flow in open channel 2. Classify the type of flow and the properties for each type, with the common empirical equations 3. Define the specific energy of the flow in open channel and connect that with practical cases that happen in reality 4. Route the curve of surface water profile when there is a structure in open channel 5. Recognize the main typed of pumps used in water resources engineering and how the connect each other and define the main requirements to design the right one
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize types of open channel and the theoretical equation related to each. 2. Understand the flow variables affected to design an open channel. 3. Summarize the energy of flow and how move with flow. 4. Discuss the usage of closed channel and how to design, and compute the energy dissipated 5. Describe the phenomenon “hydraulic jump” and indicate its danger when care does not take to deal with it on a structure like dam 6. Define the critical depth, subcritical flow and super critical flow and indicate when and where they happen in reality 7. Identify the raise or decrease in water level due to change in channels and compute the effect of back water curve 8. Discuss the requirements and limitation to design a weir and its usage 9. Discuss types to compute discharge from a weir and correct the readings 10. Explain the time consumed to empty a reservoir by weir or notch. 11. Identify the main view and characteristic of using a software related to open channel (HEC-RAS).
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Analyzing the flow in open channel</u> Defining the main variables affected on the flow of open channel and learn the right theoretical way to deal with each case, such as Manning equation and Chezy equation in trapezoidal channel or rectangular, classify the channel, learn the consideration of hydraulic radius and Manning coefficient, study hydraulic jump, energy dissipated. [20 hrs] <u>Part B – Designing an Open Channel</u> Design a channel with best hydraulic section, design a channel in different shapes, design a channel with critical flow, design a channel affected by back water curve, design a weir to empty a reservoir, correct its variables, design a structures to measure the discharge in an irregular open channel or natural. [48 hrs] <u>Part C – Software</u> Apply the principles of flow in open channel with different structures in case of steady or unsteady flow in an application relevant to channel (HEC-RAS). [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, class works and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 15 اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	15% (10)	4, 8, 12	LO #1, 2, 10 and 11
	Assignments	5	15% (15)	2,4,6,8,10	LO # 3, 4, 6 and 7
	Projects / Lab.	0	-	-	-
	Report	-	-	-	-
	Monthly exam	2	20% (20)	6,13	all
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-6
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Open channel, types and classifications.
Week 2	Uniform flow, Chezy and Manning equations.
Week 3	Best hydraulic cross section
Week 4	Consecration of hydraulic radius and Manning coefficient
Week 5	Specific energy and critical depth.
Week 6	Critical depth with humps or contractions
Week 7	Hydraulic jump
Week 8	Varied flow
Week 9	water surface profile
Week 10	Weirs and notches
Week 11	Empirical Formulae for Discharge Over Rectangular Weir
Week 12	Time Required to empty a Reservoir or a Tank with Rectangular and Triangular Weirs or Notches
Week 13	Measurement of Flow of Irregular Channels
Week 14	Software: HEC-RAS, steady flow in channels
Week 15	Software: HEC-RAS, unsteady flow in channels
Week 16	**Preparatory week before the final Exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Vennard, J.K., 1963. Elementary fluid mechanics. 4th edition.	Yes
Recommended Texts	Rajput, R.K., 2004. *A textbook of fluid mechanics and hydraulic machines*. S. Chand Publishing.	No
Websites	https://www.coursera.org/browse/physical-science-and-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
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Module Information معلومات المادة الدراسية					
Module Title	**Engineering Economy and Management**			**Module Delivery**	
Module Type	**BASIC**			**Theory** **Lecture** **Tutorial** **Practical** **Seminar**	
Module Code	**DWRE-305**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	3	**Semester (s) offered**	5		
Administering Department	Dams and Water Resources Engineering	**College**	Engineering		
Module Leader	Dr. Maysoon Abdullah Mansor	**e-mail**	dr.maysoonabdullah@tu.edu.iq		
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.		
Module Tutor		**e-mail**			
Peer Reviewer Name	Prof. Dr. Raad Hoobi	**e-mail**	dr.raadhoobi@tu.edu.iq		
Review Committee Approval	01/11/2025	**Version Number**	1.0		

Relation with Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**None**	**Semester**	-
Co-requisites module	None	**Semester**	-
Module Aims, Learning Outcomes, Indicative Contents and Brief Description أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر			
Module Aims أهداف المادة الدراسية	Enable students to develop a comprehensive understanding of the special methodology in construction management, project planning and scheduling, and to reach the best possible settlement of resources within the limits of time, cost, and resource availability. In addition to project financial planning, cash flow forecasting, economic comparisons, selection of the optimal alternative, and calculating depreciation in various ways.		
Module Learning Outcomes	1. The student learns about the most important means and methods of construction management and how to plan and schedule projects and reach the best allocation of resources.		

مخرجات التعلم للمادة الدراسية	2. The student will be able to plan and schedule projects and settle resources. 3. The student will be able to find the project time, find the critical path and critical events, and update the time of the construction project activities 4. The student learns how to plan the financial for the project and forecast the cash flow 5. The student learns how to evaluate alternatives, make economic comparisons, and how to calculate extinction in different ways. 6. The student will be able to conduct financial planning and forecast the cash flow of the project. 7. The student will be able to make economic comparisons, choose the optimal alternative, and link the information to the engineering reality.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • The construction industry, Management functions and elements (4hrs) • Construction project scheduling and planning (22hrs) • Forecasting, Crushed, Resources Programming (10 hrs) • Engineering Economics, Time factor and its impact on capital, Depreciation • (24 hrs) • Economic Comparisons of Alternatives: (10 hrs)
Course Description	This course aims to establish basic knowledge of time and financial scheduling by presenting and applying scheduling methods, resource allocation and crushed program, in addition to analyzing the time factor and its impact on capital, methods of calculating depreciation, conducting economic comparisons, and acquiring decision-making skills in choosing the optimal alternative.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The learning and teaching **strategy** is designed to: Carefully cover in lectures the necessary fundamental material and analytical techniques, and demonstrate concepts with appropriate (and where possible practical) examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems.

Student Workload (SWL) الحمل الدراسي للطالب				
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures** **In class tests** **Seminars**	**40** 5 3	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing** **Preparation for tests** **Home works**	 **30** **15** **7**	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.47
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل		100		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10, 12, 14	LO #1, 2, and 3
	Assignments	6	18% (18)	2, 4, 6, 8, 10, 12	LO # 1, 2, 3, 4, 5 ,6 and 7
	Seminars	3	12% (12)	Continuous	
Summative assessment	Midterm Exam	2	10% (10)	7	LO # 1-4
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction - The construction industry , Management functions and elements.
Week 2	Construction project scheduling and planning : Network Analysis Technique
Week 3	Updating in Arrow Diagram ,Time grid method
Week 4	Program Evaluation Review Technique (PERT) , -Line of balance
Week 5	Crushed Program
Week 6	Resource programming
Week 7	Midterm exam
Week 8	Cash Flow Forecasting
Week 9	Engineering Economics: - Supply and Demand- Break Even Point
Week 10	Principles of the feasibility study
Week 11	Time factor and its impact on capital: - Simple &Compound Interest ,Nominal and Effective Interest Rate , Inflation
Week 12	Depreciation: Straight Line Method, Declining Balance Method, Sum of the years Digits, Sinking Fond method,
Week 13	Economic Comparisons of Alternatives: Present Worth Method, Internal Rate of Return Method, Annual Worth Method, : -Future Worth Method, and Benefit / Cost Ratio
Week 14	Engineering Ethics: Why Study Engineering Ethics, Professionalism and Codes of Ethics , Understanding Ethical Problems
Week 15	Engineering Ethics: Ethical Problem-Solving Techniques , Risk, Safety, and Accidents, The Rights and Responsibilities of Engineers
Week 16	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Principles of Construction Management by:Roy Pilcher. 1992Publisher: Pearson ISBN-10: 0070940274 ,ISBN-13 : 978-0070940277 2. Engineering Economy by De Garms . 1988.Edition 8th Publisher: Collier Macmillan, ISBN-10 :0023286342: ISBN-13 :978-0023286346 3.Engineering Ethics: Concepts and Cases, Fourth Edition Charles E. Harris, Michael S. Pritchard, and Michael J. RabinLibrary of Congress Control Number: 2008924940, ISBN-13: 978-0-495-50279-1 ISBN-10: 0-495-50279-0 Wadsworth10 Davis Drive Belmont, CA 94002-3098 USA 4. Engineering Ethics by CHARLES B. FLEDDERMANN, Fourth Edition Library of Congress Cataloging-in-Publication Data	Yes
Recommended Texts	1.Modren Construction Management by: F.Harris , 2001Edition 5th Publisher: Wiley-Blackwell ISBN-10632055138, ISBN-13 : 978-0632055135 2.Construction planning ,Equipment and Methods , by Robert L. Peurifoy, 2018. 3.Critical Path Method in Construction Practice by: Antil ,1990	No
Websites	www.Pathways.cu.edu.eg	

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

Module Information
معلومات المادة الدراسية

Module Title	**Numerical Analysis**	**Module Delivery**	
Module Type	**B**	☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MATH-302**		
ECTS Credits	**4**		
SWL (hr/sem)	**100**		
Module Level	3	**Semester of Delivery**	6
Administering Department	Dams and water resources Department	**College**	College of Engineering
Module Leader	Akram Khalaf Mohammed Jasim	**e-mail**	akram.mohammed@tu.edu.iq
Module Leader's Acad. Title	lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	
Peer Reviewer Name	Prof. Dr. Raad Hoobi	**e-mail**	dr.raadhoobi@tu.edu.iq
Scientific Committee Approval Date	01/11/2025	**Version Number**	1.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The primary aims of this course are to: 1. Familiarize students with numerical methods for solving complex mathematical problems, including numerical integration, differentiation, and the solutions of differential equations. 2. Equip students with the skills necessary to obtain accurate numerical solutions to mathematical problems that cannot be solved analytically. Students will develop the ability to analyze and minimize errors and approximations inherent in these methods. 3. Educate students about common sources of error and approximation in numerical methods, including truncation error, rounding error, and discretization error. 4. Provide students with mastery over the techniques for solving equations in one variable, including the bisection method, secant method, Newton-Raphson method, and fixed-point iteration method. After taking the course. 5. Allow students to develop a deep understanding of the available methods for solving simultaneous equations, such as Gaussian elimination, LU decomposition, Gauss-Seidel method, and Jacobi method, and their underlying principles.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On successful completion of this course students will be able to: 1. The objectives of studying this module are to make the students familiarise with the ways of solving complicated mathematical problems numerically. (i) 2. Obtaining numerical solutions to problems of mathematics. (ii) 3. Describing and understanding of the several errors and approximation in numerical methods. (iii) 4. The understanding of several available Solutions of Equations in One Variable. (ii) 5. The explaining and understanding of the several available methods to Solve the simultaneous equations. (iii)
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Numerical Methods: Iteration and graphical method [5hr] Newton-Raphson's method and False position method [5hr] Taylor's series and Euler's method [5hr] Runge's -Kutta method [5hr] Indeterminate weight method and Integration method [5hr] Interpolation: Greagory Newton forward interpolation method [5hr] Gauss-Guadpruter method [5hr] Defintion, Forming, Order and Degree of Difference equations [10hr] Solution of Difference equations [5hr] Gauss, Jacopi's and Gauss-seidel method [5hr] Central differences [5hr] Derivative of Newton forward and backward differences [5hr]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 15 اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Numerical Methods: Iteration and graphical method
Week 2	Newton-Raphson's method and False position method
Week 3	Taylor's series and Euler's method
Week 4	Runge's -Kutta method
Week 5	Indeterminate weight method and Integration method
Week 6	Interpolation:Greagory Newton forward interpolation method
Week 7	Gauss-Guadpruter method
Week 8	Defintion, Forming,Order and Degree of Difference equations
Week 9	Defintion, Forming,Order and Degree of Difference equations
Week 10	Solution of Difference equations
Week 11	Gauss, Jacopi's and Gauss-seidel method
Week 12	Central differences
Week 13	Central differences
Week 14	Derivative of Newton forward and backward differences
Week 15	Derivative of Newton forward and backward differences
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	• Numerical Analysis	Yes
Recommended Texts	• Numerical Analysis By Dass	No
Websites		

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

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

Module Information

معلومات المادة الدراسية

Module Title	**Concrete Design**	**Module Delivery**	
Module Type	**B**	☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**DWRE-306**		
ECTS Credits	**5**		
SWL (hr/sem)	**125**		
Module Level	3	**Semester of Delivery**	6
Administering Department	Dam and water resources	**College**	Engineering
Module Leader	Hosam Abdullah Daham	**e-mail**	hosam@tu.edu.iq
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	
Peer Reviewer Name	Prof. Dr. Raad Hoobi	**e-mail**	dr.raadhoobi@tu.edu.iq
Scientific Committee Approval Date	1/11/2023	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	i. To understand concrete characteristics. ii. To understand safety and serviceability factors. iii. To understand the crack and uncrack concrete behavior. iv. To understand and apply engineering principles, science and mathematics to solve engineering problems. v. To understand the code provisions and enrich the design skills
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of this course the student shall be able to assess the: 1. Mechanical properties of concrete, and reinforcements, (i) 2. Safety and serviceability provision, (ii) 3. Behavior of reinforced concrete at working and ultimate loads, (iii) 4. Analysis and Design of simple beams and slabs by working stress method, (iv, v) 5. Analysis and Design of simple beams and slabs by ultimate strength design method, (iv, v) 6. Analysis and design of T beam, Doubly reinforced beam and continuous beams by Ultimate strength design method (USD), (iv, v) 7. Shear strength in beams and design of shear reinforcement, (iv, v) 8. Behavior of reinforced concrete columns, (iv, v) 9. Analysis and Design of short columns, (iv, v) 10. Analysis and Design of flat slab, (iv, v) 11. Analysis and design of flat slab with drop panels, (iv, v) 12. Analysis and Design of footings, (iv, v) 13. Analysis and design of Two-way slab and beams, (iv, v) 14. Procuration for seismic resistance moment frames, (v)
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction; syllabus; Advantages and Disadvantages of Reinforced Concrete as a Structural Material; Mechanical properties of concrete; steel. Concrete and steel grading; design philosophy; Loading types. **[6hrs]** Introduction, Flexural Analysis of Beams (working): Cracking Moment; Elastic Stresses—Concrete Cracked **[6hrs]** Introduction, Flexural Analysis of Beams (Ultimate): Ultimate Moment; Yield Stresses **[6hrs]** Strength Analysis of Beams According to ACI Code: Design Methods; Strains in Flexural Members; Balanced Sections, Tension-Controlled Sections, and Compression-Controlled. **[6hrs]** Design of Rectangular Beams and One-Way Slabs: Load Factors; Design of Rectangular Beams; One-Way Slabs **[6hrs]** Analysis and Design of T Beams and Doubly Reinforced Beams: T Beams; Design of Doubly Reinforced Beams (positive and Negative Moment design); L-Shaped Beams **[6hrs]** Shear and Diagonal Tension: Shear Stresses in Concrete Beams; Design for Shear. **[6hrs]** Introduction to columns, Flexural Analysis of short columns (under axial loads), Load carrying capacity of short columns, ties design. **[6hrs]** Short column under axial and bending actions, Interaction diagram (m-p curves). **[6hrs]** Design of short columns subjected to bending and axial loads according to ACI Code: Design Methods **[6hrs]** Design of flat slab with and without drop panels: Load Factors **[6hrs]** Design of Rectangular Beams and two-Way Slabs **[6hrs]** Design of footings, single, continuous and mat footings **[6hr]** Procuration for seismic resistance moment frames **[6hrs]** Design and analysis real case structures using computer software **[6hrs]**

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Power point presentation and multimedia tools are used in classrooms; Examples and problems will be solved and illustrated on the classroom board; Tutorials are also organized to establish a closer contact with students. Students are encouraged to use the Internet to search for various topics, including contents of similar courses offered elsewhere. MS Excel software is used for preparing projects. Students can reach the teaching material, solved problems, data sheets, past exam papers etc. on the allocated Web site. The instructor will be happy to answer questions related to course content via email. Complex technical questions should be addressed in tutorial, during office hours, or by appointment. Emails must come from official University email addresses. The instructor will not respond to outside email addresses.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 15 اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time /Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	4, 9	LO #1- 7 and #8- 12
	Assignments	2	10% (10)	2, 12	LO # 4 and # 10
	Projects / Lab.	1	5% (5)	Continuous	All
	Report	3	15% (15)	4,8,12	LO # 4,8 and 12
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3hr	50% (50)	16	LO # 1-13
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction; syllabus; Advantages and Disadvantages of Reinforced Concrete as a Structural Material; Mechanical properties of concrete; steel. Concrete and steel grading; design philosophy; Loading types.
Week 2	Introduction, Flexural Analysis of Beams (working): Cracking Moment; Elastic Stresses—Concrete Cracked
Week 3	Introduction, Flexural Analysis of Beams (Ultimate): Ultimate Moment; Yield Stresses
Week 4	Strength Analysis of Beams According to ACI Code: Design Methods; Strains in Flexural Members; Balanced Sections, Tension-Controlled Sections, and Compression-Controlled.
Week 5	Design of Rectangular Beams and One-Way Slabs: Load Factors; Design of Rectangular Beams; One-Way Slabs
Week 6	Analysis and Design of T Beams and Doubly Reinforced Beams: T Beams; Design of Doubly Reinforced Beams (positive and Negative Moment design); L-Shaped Beams
Week 7	Shear and Diagonal Tension: Shear Stresses in Concrete Beams; Design for Shear.
Week 8	Introduction to columns, Flexural Analysis of short columns (under axial loads), Load carrying capacity of short columns, ties design.
Week 9	Short column under axial and bending actions, Interaction diagram (m-p curves).
Week 10	Design of short columns subjected to bending and axial loads according to ACI Code: Design Methods
Week 11	Design of flat slab with and without drop panels: Load Factors
Week 12	Design of Rectangular Beams and two-Way Slabs
Week 13	Design of footings, single, continuous and mat footings
Week 14	Procuration for seismic resistance moment frames
Week 15	Design and analysis real case structures using computer software
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Non
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	○ Jack M., Russell B. (**2012**) "DESIGN OF REINFORCED CONCRETE", nine Edition, Wiley, ISBN: 978-1-118-12984-5, USA. (can be downloaded from the Course web page).	Yes
Recommended Texts	○ Gillesania, D.I.T. "FUNDAMENTALS OF CONCRETE DESIGN". Phils. DIT Gillesania, 2003. (can be downloaded from the Course web page).	yes
Websites	Google Classroom	

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

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

Module Information معلومات المادة الدراسية					
Module Title	**Soil Mechanics II**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**DWRE-307**				
ECTS Credits	**5.00**				
SWL (hr/sem)	**125**				
Module Level	**3**		**Semester of Delivery**	**6**	
Administering Department	Dam and water resources		**College**	Engineering	
Module Leader	Firas Hazem Jasim Mohammed		**e-mail**	Firas.arab@tu.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Mazin Ali Hussein Ahmed		**e-mail**	mr.mazinali@tu.edu.iq	
Peer Reviewer Name	Prof. Dr. Raad Hoobi		**e-mail**	dr.raadhoobi@tu.edu.iq	
Scientific Committee Approval Date	1/11/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**DWRE-302**	**Semester**	5
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1- The course aims to give students the knowledge to understand the theory of shear strength of the soil. 2- The issue of engineering soil problems and how to improve the soil to raise its bearing capacity, reduce subsidence, and avoid the problems of swelling and fallout, and the effects of gypsum and saline soils will also be discussed. 3- to understand the concept of lateral earth pressures of soils and retaining wall. 4-To develop problem-solving skills and understanding of foundation engineering theory through the application of techniques. To provide students with exposure to systematic methods for designing foundations. 5-To discuss and evaluate the feasibility of foundation solutions to different types of soil conditions considering the time effect on soil behavior. 6- To understand the structural design of different types of shallow foundations. 7-To Calculate the ultimate pile capacity in the sand and in clay. To calculate the ultimate pile capacity of group piles and assess pile group efficiency. To estimate settlement of single and group piles.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the shear strength behavior of the soil and find the shear parameters which are important in the calculation of the bearing capacity of the soil. 2. Calculate the lateral earth pressure and the lateral force that is applied on the retaining walls which is essential for designing the retaining walls and for the factor of safety against failure. 3. Use modern soil mechanics equipment and soil investigation procedures. 4. Gain the ability to how to write professional, clear, concise technical reports. 5. Design different types of shallow foundations structurally. Calculate the bearing capacity of shallow foundations erected on clays and sands. Calculate bearing capacity of shallow foundations subjected to moment 6. Understand the structural design of foundations. 7. Calculate the ultimate pile capacity in the sand. Calculate ultimate pile capacity in soils. Calculate single and group pile settlements.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. - <u>Part A- Soil investigation</u> Introduction to the foundation engineering, and soil investigation methods and preparation of the investigation reports.[10] Revision problem classes [2 hrs] - <u>Part B -Shear strength of the soil</u> Shear strength theory, parameters of the shear strength, failure mechanism, plane of failure, stresses on the planes in soil, Mohr's circle and Mohr's envelope of failure, laboratory and field shear strength tests.[12] Revision problem classes [6 hrs] <u>- Part C – Bearing capacity of shallow foundations</u> Type of foundations, bearing capacity equations (Terzaghi equation, Hansen equation, Meyerhof equation, Vesic equation), bearing capacity of foundation on sand, bearing capacity of foundation on clay, bearing capacity of foundation subjected to moment. [12 hrs] Revision problem classes with problem-solution discussions [6 hrs] <u>- Part D – Design of earth retaining structures</u> Estimation the lateral earth pressure, Design of gravity retaining walls, design of cantilevered retaining walls, overturning stability, sliding stability, bearing capacity of retaining walls [12 hrs] Design problem-solution discussions [6 hrs]

	- Part E – Deep foundation: Ultimate pile capacity Type of deep foundations, ultimate pile capacity in sand, ultimate pile capacity in clay, pile capacity of group piles, group pile efficiently [10 hrs] Revision problem classes with problem-solution discussions [2 hrs] -Part F – Structural design of shallow foundations Types of foundations, structural design of spread footing, structural design of continuous footing, structural design of combined footing, structural design of trapezoidal and strap footings, structural design of raft foundations. [10 hrs] Design problems [2 hrs]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction and general information.
Week 2	Soil investigation and description.
Week 3	Shear strength of the soil.
Week 4	Shear strength of the soil.
Week 5	Shear strength of the soil.
Week 6	Bearing capacity of the soil.
Week 7	Bearing capacity of the soil.
Week 8	Bearing capacity of the soil.
Week 9	Lateral earth pressure of the soil.
Week 10	Lateral earth pressure of the soil.
Week 11	Retaining walls.
Week 12	Deep foundation.
Week 13	Deep foundation.
Week 14	Foundation structural design.
Week 15	Foundation structural design.
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to laboratory
Week 2	Unconfined compression test
Week 3-4	Direct shear test- explain and training
Week 5-6-7	Triaxial shear test- explain and training
Week 8-9	Vane shear test.
Week 10-11	Standard penetration test.
Week 12-13	Cone penetration test.
Week 14-15	Plate load bearing test.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. "Principles of Geotechnical Engineering",(2004), Braja M. Das, 5th edition 2002, copyright by Wadsworth Group/United Stated. 2. "Principal of Soil Mechanic", (1991), Mohammed O. AL-Asho, (Book language in Arabic). 3- الشكرجي ، يوسف والمحمدي، نوري، " هندسة الأسس " ، جامعة بغداد ،الطبعة الاولى، 1985.	Yes
Recommended Texts	1. " Elements of Soil Mechanics", (1988), G. N. Smith and Ion G. N. Smith, USA. 2. " Problem Solving in Soil Mechanics", (2003), A. Aysen, Swets & Zeitlinger B.V. 3. Bowles, J.E., P.E., S.E., ″ Foundation Analyses and Design ″, The McGraw-Hill Companies, Inc, 5th ed., *2006*. 4. Peak, R. B., Hanson, W. E. and Thorburn, T.H., ″Foundation Engineering ″, John Wiley and Sons, 2nd ed., 1974 5. Das, B. M., ″Principle of Foundation Engineering ″, Thomson Books/Cole, California State University, Sacramento, 5th ed., 2004. 6. Das, B. M., & Sivakugan, N.,″ Principles of foundation engineering ″, Cengage learning, 2018.	No
Websites	No	

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

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

Module Information

معلومات المادة الدراسية

Module Title	**Engineering Hydrology II**	**Module Delivery**	
Module Type	**B**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWRE--308**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		

Module Level	3	**Semester of Delivery**	6
Administering Department	Dams and Water Resources	**College**	Engineering
Module Leader	Mohammed Faeq Yas Khudair	**e-mail**	mohamed_faiq@tu.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	PhD
Module Tutor		**e-mail**	
Peer Reviewer Name	Prof. Dr. Raad Hoobi	**e-mail**	dr.raadhoobi@tu.edu.iq
Scientific Committee Approval Date	1/11/2025	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	DWRE-303	**Semester**	5
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Groundwater hydrology is essential for third-stage dams and water resources engineering students in order to • identify the properties of artesian wells and describe the conditions under which they form; • explain the difference between porosity and permeability; • list and describe the properties of aquifers that control the movement and storage of groundwater; • use Darcy's Law to explain the roles of aquifer properties and driving forces in governing the rate of groundwater flow; • apply the concept of hydraulic head to draw flowlines on maps and cross sections; • interpret the current and historical balance between groundwater recharge and water extraction from well hydrographs;
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Overview of essential concepts encountered in hydrological systems. • An ability to distinguish, identify, define , formulate and solve engineering problems by appling principles of engineering scince and mathmatics. • Learning role of groundwater flow modelling within hydrogeology and consequently water resources management • Learning the mathematical basis of groundwater flow models (Darcy's law, conservation of mass/energy) and solve issue associated with the treatment of wells • The key components of groundwater flow models and the typical workflow of groundwater flow modelling, with emphasis on application using software.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • General introduction - groundwater cycle. (4hrs) • Groundwater aquifers in Iraq . (4hrs) • Definitions and terms. (4hrs) • Groundwater movement laws. (6hrs) • The steady state of flow in wells. (4hrs) • Unsteady flow condition. (6hrs) • overlapping wells. (6hrs) • The imaginary well theory. (4hrs) • Pumping check. (4hrs) • Well drilling. (4hrs) • Flow network and groundwater mapping. (6hrs) • The relationship of rainfall with the groundwater level and data documentation. (4hrs)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The essential strategy of this module is to motivate students about applying theory of groundwater occurrence and movement; groundwater extraction, replenishment, and protection; knowing the underlying principles of methods applied to groundwater exploration and pumping tests; building numerical models for groundwater flow. Ability to use software for simulating Groundwater.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 15 اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**First monthly Exam**	2 hr	15% (15)	7	#1, 2, 3 and 4
	Second monthly Exam	2hr	15% (15)	15	# 5, 6 and 7
Summative assessment	**Class work**	2 hr	10% (10)	3,5,7,10,13	All
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	General introduction - What is Groundwater? Groundwater and the Water Cycle Groundwater aquifers in Iraq: Importance of Groundwater, Groundwater Scenario: Global Perspectives Global Mapper software.
Week 2	Definitions and terms: Aquifer Properties, Types of Aquifers, Confined aquifer Unconfined aquifer, Leaky aquifer, Perched Aquifers Properties of Aquifers, Porosity, Specific yield, Coefficient of permeability Global Mapper software.
Week 3	Groundwater movement laws: Darcy's Law, Hydraulic Conductivity, Transmissibility Excel Coding.
Week 4	The steady state of flow in wells: Analysis of Steady Groundwater Flow, Steady Flow in Confined Aquifers
Week 5	- Steady Flow in Unconfined Aquifers ,Steady Unconfined Flow without Recharge or Evapotranspiration Excel Coding
Week 6	Equations of Motion, Confined Groundwater Flow Confined Groundwater Flow between Two water Bodies, Unconfined Flow by Dupit's Assumption
Week 7	First monthly exam
Week8	Hydraulics of Wells, Drawdown in Wells, Steady Flow into a Well Confined Flow-Unconfined Excel Coding
Week 9	Flow- Functions of Wells, Classification of Water Wells, Open Wells-Tube wells
Week 10	The imaginary well theory.

	GMS software
Week 11	Pumping check. Well flow near aquifer boundaries-Well flow near an Impermeable boundaries - Multiple Well System- GMS software GMS software
Week 12	Flow network and groundwater mapping. GMS software
Week13	Well drilling- penetration speed, diameter of the bit, depth of the hole and level of vibration. GMS software
Week 14	The relationship of rainfall with the groundwater level and data documentation. GMS software
Week 15	**Second monthly exam .**
Week 16	**The preparatory week before the Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Groundwater hydrology (2005) by Todd,D.K., Mays, L. W. Wiley	Yes
Recommended Texts	Groundwater hydrology-Conceptual and computational Models (2003)by K.R.Rushton published by Wiley	Yes
Websites	https://ocw.mit.edu/courses/1-72-groundwater-hydrology-fall-2005/ https://ocw.mit.edu/courses/1-72-groundwater-hydrology-fall-2005/pages/lecture-notes/	

Grading Scheme

مخطط الدرجات

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

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

Module Information

معلومات المادة الدراسية

Module Title	**Irrigation Engineering and Practices**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**DWRE-309**		
ECTS Credits	**5**		
SWL (hr/sem)	**125**		
Module Level	3	**Semester of Delivery**	6
Administering Department	Dam and water resources	**College**	Engineering
Module Leader	Mohammed Faeq Yas Khudair	**e-mail**	mohamed_faiq@tu.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	E-mail
Peer Reviewer Name	Prof. Dr. Raad Hoobi	**e-mail**	dr.raadhoobi@tu.edu.iq
Scientific Committee Approval Date	1/11/2025	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To understand Irrigation – world wide 2. To understand Sources and storage of Irrigation water 3. To understand the Basic soil-water relations 4. To understand the Flow of water onto and through soils. 5. To understand the Measurement of soil moisture. 6. To understand the Irrigation water conveyance.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how to efficient use of water. 2. Securing the plant against short-term droughts. 3. Giving students a simple idea about irrigation methods. 4. Learn about the most important sources of irrigation water and methods of storing it. 5. Identify ways to reduce evaporation from reservoirs. 6. Finding solutions to the problems of Water voracious plants. 7. Taking an idea of the safe discharges from underground irrigation tanks. 8. Study the basic relationships between soil and water. 9. Learn about the most important methods of measuring soil moisture. 10. Study of the flow of water in and through the soil. 11. Identify the problems of salinity in soil and water.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – irrigation principal</u> - Irrigation in the world - irrigation since ancient times - dry areas in the world - definition of irrigation - precipitation - flood water - ground water [5 hrs] - The Future of Growth and Expansion in Irrigation - Fields of Irrigation Science - Irrigation Economics [2 hrs] - Irrigation water sources and storage - rainfall on valleys - studies of water resources - surveys in snowy areas and their benefits - surface reservoirs- Small dams - sedimentation (accumulation of sediments) in reservoirs - reduction of evaporation losses - problems of aquatic (aquatic plants) - industrial rain or sowing of clouds - development of river pumping Transferring. [5 hrs] - Saline water to fresh water - Importance of ground water (groundwater) - Feeding or recharging aquifers - Safe disposal of underground irrigation tanks Feasibility of groundwater development - changes in groundwater storage - groundwater studies and research. [5 hrs] - Revision problem classes [2 hrs] <u>Part B – irrigation practices</u> - Fundamentals - Soil and soil basic relationships - soil texture - soil structure (soil construction) - specific gravity (real weight) - specific weight- Pore space - leaching - soil water input - permeability - soil depth - plant food compounds - soluble excess salts- Surface tension - Tensile stresses (tension compressors) - Soil moisture stress - Soil moisture content - Soil water classification and availability (availability). [6 hrs] - Fill the available ground water tank - the natural properties represented by the soil- Soil moisture measurement - Drilling of soil for soil samples - Soil resistance for penetration - Appearance and texture of soil as evidence of moisture content- Determination of moisture content of soil by weight method - Exploitation of electrical properties of porous mold - Tensiometers - Neutron method for soil moisture measurement - Thermal properties - Error in sample. [6 hrs] - Flow of water in and through soil - Energy in flowing water - Bases to measure pressure energies in saturated soil - Measuring soil permeability- Characteristics of soil water input (absorption) - Constant pressure permeability meter - Variable

	pressure permeability meter - Input rate measurement (soil absorption of water) - Precipitation and movement of soil water during irrigation - Asymmetric and non-homogeneous soil in all directions-. [6 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Through this course, we try to help the student to understand the foundations of the irrigation process by learning everything related to irrigation water sources, and methods of ancient and modern irrigation, as well as linking the relationship between soil and water, and how water moves over and through the soil, while giving the student examples of all this from reality, with reference to The major irrigation projects in the city and the country and the irrigation methods used in each of them.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 15 اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Irrigation in the world - irrigation since ancient times - dry areas in the world - definition of irrigation - precipitation - flood water - ground water
Week 2	The Future of Growth and Expansion in Irrigation - Fields of Irrigation Science - Irrigation Economics
Week 3	Irrigation water sources and storage - rainfall on valleys - studies of water resources - surveys in snowy areas and their benefits - surface reservoirs
Week 4	Small dams - sedimentation (accumulation of sediments) in reservoirs - reduction of evaporation losses - problems of aquatic (aquatic plants) - industrial rain or sowing of clouds - development of river pumping
Week 5	Transferring saline water to fresh water - Importance of ground water (groundwater) - Feeding or recharging aquifers - Safe disposal of underground irrigation tanks
Week 6	Feasibility of groundwater development - changes in groundwater storage - groundwater studies and research
Week 7	Soil and soil basic relationships - soil texture - soil structure (soil construction) - specific gravity (real weight) - specific weight
Week 8	Pore space - leaching - soil water input - permeability - soil depth - plant food compounds - soluble excess salts
Week 9	Surface tension - Tensile stresses (tension compressors) - Soil moisture stress - Soil moisture content - Soil water classification and availability (availability)
Week 10	Fill the available ground water tank - the natural properties represented by the soil
Week 11	Soil moisture measurement - Drilling of soil for soil samples - Soil resistance for penetration - Appearance and texture of soil as evidence of moisture content
Week 12	Determination of moisture content of soil by weight method - Exploitation of electrical properties of porous mold - Tensiometers - Neutron method for soil moisture measurement - Thermal properties - Error in sample
Week 13	Flow of water in and through soil - Energy in flowing water - Bases to measure pressure energies in saturated soil - Measuring soil permeability
Week 14	Characteristics of soil water input (absorption) - Constant pressure permeability meter - Variable pressure permeability meter - Input rate measurement (soil absorption of water) - Precipitation and movement of soil water during irrigation - Asymmetric and non-homogeneous soil in all directions -
Week 15	Salinity problem in soil - Climate and salinity - Sources of soluble salts and their accumulation - Use of salt water in irrigation - Criteria for irrigation water validity
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Non
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	- Irrigation principles and practices , by V.E. Hansen ,O.W.Israelsen and G.F. Stringham, fourth edition, john wiley and sons., 1980.	Yes
Recommended Texts	-Design manual for irrigation &drainage- ministry of irrigation-Iraq (pencol)	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 Information معلومات المادة الدراسية					
Module Title	**Hydraulics of pipeline systems**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWRE-310**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level		3	**Semester of Delivery**		6
Administering Department		Dams and Water Resources	**College**	Engineering	
Module Leader	Asmaa Abdul Jabbar Jamel Mahdi		**e-mail**	Email: ms.asmaajameel@tu.edu.iq	
Module Leader's Acad. Title		Prof.	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Prof, Dr. Raad Hoobi	**e-mail**	dr.raadhoobi@tu.edu.iq	
Scientific Committee Approval Date		1/11/2025	**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	This module aims to provide undergraduate students with fundamental knowledge and applied skills for the hydraulic analysis and preliminary design of pressurized pipeline systems and simple distribution networks. Emphasis is placed on steady-state flow, pressure distribution, diameter selection using head loss/velocity criteria, and the role of pipeline appurtenances.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Formulate continuity and energy relationships for pipeline systems. 2. Construct and interpret Hydraulic Grade Line (HGL) and Energy Grade Line (EGL). 3. Evaluate acceptable flow velocities and head loss in long pipeline systems. 4. Select appropriate pipeline diameters based on hydraulic criteria. 5. Analyze steady-state flow distribution in simple branching/looped networks. 6. Identify low-pressure zones, stagnation pockets, and operational problems. 7. Recommend appropriate placement of pipeline appurtenances (valves, air release). 8. Assess roughness aging effects and basic calibration concepts.
Indicative Contents المحتويات الإرشادية	• Introduction to pipeline transmission and distribution systems • Governing equations: continuity and energy balance • Pipeline profile and terrain effects • Hydraulic Grade Line (HGL) and Energy Grade Line (EGL) • Velocity limitations and acceptable design ranges • Head loss buildup along long pipelines (application-based) • Diameter selection using trial refinement • Simple branching network analysis (node balance concept) • Basic loop network behavior (qualitative) • Roughness and aging considerations • Low-pressure pocket identification and remedies • Placement and function of pipeline appurtenances • Pressure zones and operational characteristics • Leak signature and pressure–leakage relation • System performance evaluation (service pressure criteria)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Lectures using board derivations & visual aids • Guided problem-solving tutorials • Short applied assignments from real pipeline systems • Group discussion on case studies • Spreadsheet-based simple network balancing • Continuous formative feedback

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Course introduction, pipeline system types
Week 2	Governing equations: continuity & system energy
Week 3	Pipeline profile, topography effect
Week 4	Hydraulic Grade Line (HGL) introduction
Week 5	Energy Grade Line (EGL) & pressure interpretation
Week 6	Acceptable velocity ranges & velocity constraints
Week 7	Headloss buildup in long pipelines
Week 8	**Midterm Exam**
Week 9	Diameter selection
Week 10	Simple branching network behavior
Week 11	Intro to looped network balancing
Week 12	Roughness aging & calibration concepts
Week 13	Operational issues: air pockets & dead ends
Week 14	Pipeline appurtenances & placement logic
Week 15	System performance evaluation & pressure criteria
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	Larock, B. E., Jeppson, R. W., & Watters, G. Z. ***Hydraulics of Pipeline Systems.*** **CRC Press.**	No
Recommended Texts	Wurbs, R. A., & James, W. P. (2002). ***Water Resources Engineering.***	No
Websites		

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

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

Module Information معلومات المادة الدراسية					
Module Title	**Hydraulic Structures I**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**DWRE-401**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	4		**Semester of Delivery**	7	
Administering Department	DWRE		**College**	COE	
Module Leader	Raad Hoobi Irzooki		**e-mail**	dr.raadhoobi@tu.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	Prof. Dr. Raad Hoobi		**e-mail**	dr.raadhoobi@tu.edu.iq	
Scientific Committee Approval Date	01/11/2025		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To understand and classify the hydraulic structures and their uses. 2. To understand the behavior of water seepage under hydraulic structures and develop the ability to compute the creep line and uplift pressure using different methods. 3. To perform the design steps of some types of stilling basin structures. 4. To understand the water diversion works and perform the head and cross regulator design steps.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Classify the hydraulic structures and their uses, 2. Recognize problems accompanying water seepage under the hydraulic structures, 3. Apply the basic concepts of engineering to calculate seepage and uplift pressure under different hydraulic structures, 4. Develop and solve design problems and analyze the data to evaluate the feasibility of components of some types of stilling basin and head and cross regulator, 5. Evaluate and analyze the safety of the head and cross regulator, 6. Demonstrate the ability to lead and productively participate in group situations by assigning multidisciplinary design projects for some hydraulic structures.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Introduction of the hydraulic structures. • Some theories for estimating the uplift pressure and piping phenomena in hydraulic structures - Bligh's theory, - Lane's theory, - Khosla's theory, and - Flow net analysis. [25 hrs] • Protection works of approaches for the horizontal floor. [5 hrs] • Introduction of a hydraulic jump, its types, efficiency, length, position, and tailwater conditions. [5 hrs] • Stilling basins. - Introduction - Design of R.S.Varshney stilling basin - Design of SAF stilling basin, and - U.S.B.R II stilling basin. [15 hrs] • Cross regulator and head regulator. - Introduction and design steps of the cross regulator and head regulator. - Design example - Apply example [25 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary strategy that will be adopted in delivering this module is to encourage students' participation in classes, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials, and practical designing of the hydraulic structures. Power point presentations and boards are used in the classroom. Examples and problems will be solved and illustrated on the classroom board. Tutorials are also organized to establish closer contact with students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 15 اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Subject topics- Introduction of types of hydraulic structures
Week 2	Uplift pressure – Bligh theory – applied example
Week 3	Lane theory– applied example – Flow net analysis
Week 4	Khosla's theory – exit gradient.
Week 5	Applied example using Khosla's theory
Week 6	Protection works of approaches for horizontal floor
Week 7	Mid-term Exam + Hydraulic jump- types of tailwater condition and drawing of hydraulic jump
Week 8	Stilling basins - R.S.Varshney stilling basin - applied example
Week 9	SAF stilling basin - applied example
Week 10	U.S.B.R II stilling basin - applied example
Week 11	Introduction and design steps of the cross regulator and head regulator
Week 12	Design and apply the example of the cross and head regulator
Week 13	Continue a design and apply the example of the cross and head regulator
Week 14	Continue a design and apply the example of the cross and head regulator
Week 15	Continue a design and apply the example of the cross and head regulator + General Revision
Week 16	**A preparatory week before the Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	none
Week 2	none
Week 3	none
Week 4	none
Week 5	none
Week 6	none
Week 7	none

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Varshney, R.S., Gupta, S. C., Gupta, R. L., (1979) "*Theory & design of irrigation structures*". Nem Chand & Bros; Roorkee, India.	Yes
Recommended Texts	1. Asawa, G. L. (2008) "*Irrigation and Water Resources Engineering*" New Age International(P) Limited, Publishers. 2. Chanson, Hubert., (2004) "*The Hydraulics of Open Channel Flow: An Introduction*" Elsevier. 3. Chow, Ven te., (1959) "*Open Channels Hydraulics*" Mc Graw Hill.	No

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

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

Module Information معلومات المادة الدراسية					
Module Title	**Foundations Engineering**			**Module Delivery**	
Module Type	**BASIC**			**Theory** **Lecture** **Tutorial** **Practical** **Seminar**	
Module Code	**DWRE-402**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	4		**Semester (s) offered**	7	
Administering Department	Dams and water resources Engineering		**College**	Engineering	
Module Leader	Lamyaa Najah Sunoudi		**e-mail**	dr.lamyaanajah@tu.edu.iq	
Module Leader's Acad. Title	Asst. Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name	Prof. Dr. Raad Hoobi		**e-mail**	dr.raadhoobi@tu.edu.iq	
Review Committee Approval			**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, Indicative Contents and Brief Description أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر	
Module Aims أهداف المادة الدراسية	Foundation engineers aim to comprehend the behavior of soil and its interaction with structures by performing a suitable geotechnical site investigation. This includes studying soil properties, such as strength, stiffness, compressibility, and permeability, to assess their influence on foundation design. Foundation engineers assess the bearing capacity of soil, which refers to its ability to support the applied loads from a structure without excessive settlement or failure. The aim is to ensure that the foundation has an adequate bearing capacity to safely support the structure's loads. Estimate the settlement occurs when a foundation undergoes vertical displacement due to soil compression or consolidation. Foundation engineers aim to minimize and control settlement through proper foundation design, including selecting appropriate foundation types, distributing loads, and considering soil improvement techniques.
Module Learning	1- Ability to perform geotechnical site investigations.

Outcomes مخرجات التعلم للمادة الدراسية	2- Assessing the bearing capacity of soil to ensure that the foundation has an adequate bearing capacity to safely support the structure's loads. 3- Students can be able to analyze and evaluate the performance of foundations, including assessing settlement, stability, and bearing capacity issues. 4- Students can develop problem-solving and critical thinking skills to identify, analyze, and solve geotechnical engineering problems related to foundation design. 5- Students can be able to effectively communicate their ideas, design solutions, and analysis results through written reports, drawings, and oral presentations. They should also develop the ability to work collaboratively in multidisciplinary teams.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Site investigations (20 hrs) • Bearing capacity (30 hrs) • Stresses in soil mass (10 hrs) • Settlement of buildings (28 hrs)
Course Description	Foundation Engineering-I, are provided to deal with soil exploration method to investigate the underground soil physical and mechanical properties and conducting field tests. Calculating the bearing capacity of soil by various methods, estimating stress distribution through soil media to estimate all components of settlements that may occur due to loading coming from superstructure
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Clearly communicate the module's learning outcomes and objectives to students at the beginning. This will provide them with a clear understanding of what they are expected to learn and achieve throughout the module. Incorporate active learning strategies to engage students actively in the learning process. This can include group discussions, problem-solving activities, case studies, and interactive simulations. Encourage students to actively participate and apply their knowledge to real-world scenarios. Visual representations can help students grasp complex concepts and make connections between theory and practical applications. Incorporate real-world examples and case studies of foundation engineering projects to demonstrate the application of theoretical concepts.

Student Workload (SWL) الحمل الدراسي للطالب				
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures** **45** **Tutorial** **15** **Final Exam** **3**		63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing** **40** **Preparation for tests** **20** **Home works** **12**		62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل		150		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	3, 7, 11, 14	LO #1, 2, and 3
	Assignments	6	18% (18)	2, 4, 6, , 9, 13	LO # 1, 2, 3 and 4
	Case study reports	4	12% (12)	Continuous	
Summative assessment	**Midterm Exam**	1.5	10% (10)	8	LO # 1-2
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Site investigation –Purpose, Planning, Boring.
Week 2	Site investigation – number and depth of Boreholes.
Week 3	Site investigation –disturbance in samples
Week 4	Site investigation –in situ tests
Week 5	Bearing Capacity - modes of failure, bearing capacity classification, factor of safety in design of foundation, bearing capacity requirements, factors affecting bearing capacity
Week 6	Bearing Capacity - methods of determining bearing capacity, which equations to use?
Week 7	Bearing Capacity - effect of soil compressibility (local shear failure), footings with inclined or eccentric loads.
Week 8	Midterm exam
Week 9	Bearing Capacity - effect of water table on bearing capacity, bearing capacity for footings on layered soils, Skempton's bearing capacity equation
Week 10	Bearing Capacity - design charts for footings on sand and non-plastic silt, bearing capacity of footings on slopes, foundation on rock
Week 11	Stresses in soil mass- definitions, contact pressure, stress increase due to different loading, point load, 2:1 approximation method, uniformly loaded line of finite length, uniformly loaded strip area.
Week 12	Stresses in soil mass- triangular loaded strip area, uniformly loaded circular area, uniformly loaded rectangular or square area, triangular load of limited length, embankment loading, any shape loaded area (Newmark chart):
Week 13	Settlement of buildings- types of settlement, tilting of foundations, limiting values of settlement parameters, components of total settlement, methods of computing immediate settlement
Week 14	Settlement of buildings- immediate settlement based on the theory of elasticity, Schmertmann's method (1978), Bjerrum's method for average settlement of layered clay soil, primary consolidation settlement, compression index C_c method:
Week 15	Settlement of buildings- Skempton – Bjerrum modification for 3-dimentional consolidation, secondary consolidation settlement, degree or rate of settlement
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Bowles, J.E., 1996. Foundation analysis and design. McGraw-Hill.	Yes
Recommended Texts	Das, B.M., 2017. Shallow foundations: bearing capacity and settlement. CRC press.	Yes

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

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

Module Information
معلومات المادة الدراسية

Module Title	**Methods of Construction and Estimation**	**Module Delivery**	
Module Type	**B**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWRE-403**		
ECTS Credits	**4**		
SWL (hr/sem)	**100**		

Module Level	4	**Semester of Delivery**	2
Administering Department	DWRE	**College**	ENGINEERING
Module Leader	Maysoun Abdullah Mansour Salman	**e-mail**	dr.maysoonabdullah@tu.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	Prof. Dr. Raad Hoobi	**e-mail**	dr.raadhoobi@tu.edu.iq
Scientific Committee Approval Date	01/11/2025	**Version Number**	1.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Enabling students to develop a comprehensive understanding of the value engineering methodology, types of contracts, how to deal and the interrelationship between engineering contracts, referral methods, how to find the costs of owning and operating engineering equipment, the physical factors affecting the work of equipment, determining the productivity of some construction equipment, the productivity of concrete, how to design molds and Introducing students to the most important ethical problems that threaten their work and ways to solve them in addition to the following: 1. Learn the basics of estimation and its types. 2. To understand the constructional paragraphs of the facilities. 3. Studying the various methods used to estimate the quantities of materials used in construction. 4. To learn how to calculate works cost. 5. This course deals with clarifying the basic concepts of Analysis Reinforced of slabs and beams. 6. Learn the basics of structural drawing. 7. Learn the basics of designing and reading engineering plans
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Introducing the student to the engineering equipment and the factors affecting it, and calculating the costs of owning and operating. 2. Introducing the student to the physiologic factors that affect the work of engineering equipment. 3. Introducing the student to the trailers, their specifications and method of work. 4. Excavation and Foundations stripe and raft calculations. 5. Wall building works and estimation of Block, bricks and stone. 6. Identify the wooden template. 7. Analysis Reinforced of slabs and beams. 8. Calculation of the amount of concrete. 9. Design and Draw (Map of house+ foundation map+ section in wall). 10. Design and Draw (home electrical network). 11. Design and Draw (home sewage networks). 12. Design and Draw (the Electrical network in house). 13. Design and Analysis of Finishing works
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction to Estimation and Specifications, Estimation types definitions, Introduction of Structural drawing [7 hrs]. Excavation of stripe and raft foundation [8 hrs]. Estimation of (cement, sand, gravel) for stripe and raft foundation, Estimation of steel reinforced, Estimation of steel reinforced for stripe and raft foundation [20hrs]. walls building works and estimation of materials, stone building, Bricks building, Block building [20 hrs]. Estimation of materials for wood form types [8 hrs] Estimation of materials for reinforced of slab, Reinforced of beams, Estimation of materials for finishing works [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 type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.47
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Value Engineering
Week 2	Engineering contracts, Referral methods
Week 3	Classification of engineering equipment
Week 4	Owning and operating costs
Week 5	Physical factors affecting engineering equipment , Compactors
Week 6	Physical factors affecting engineering equipment
Week 7	Mid-term Exam
Week 8	Introduction to Estimation and Materials Specification.
Week 9	Excavation of Foundations,
Week 10	Excavation of stripe and raft foundation
Week 11	Estimation of (cement, sand, gravel) for stripe and raft foundation
Week 12	Estimation of steel reinforced
Week 13	Estimation of steel reinforced for stripe and raft foundation
Week 14	Reinforced of beams
Week 15	Estimation of materials for finishing works
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction; syllabus; Draw (house plan).
Week 2	Lab 2: drawing (View).
Week 3	Lab 3: drawing (Foundations map).
Week 4	Lab 4: Drawing (the wall section).
Week 5	Lab 5: Drawing (windows and doors)
Week 6	Lab 6: Drawing (stair ways plan).
Week 7	Lab 7: Drawing (reinforced of stair).
Week 8	Lab 8: Drawing (slabs).
Week 9	Lab 9: Drawing (beams).
Week 10	Lab 10: Drawing (sewer network).
Week 11	Lab 11: Drawing (Water Supply network).
Week 12	Lab 12: Drawing (electrical network)
Week 13	Lab 13: Drawing (isometric)
Week 14	Lab 14: Drawing (architectural facade)
Week 15	Lab 15: Drawing (interior design)

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	VANZIRANI, V.N., CHANDOLA, S.P. "Civil Engineering Estimating and Costing ". first edition, 1982	Yes
Recommended Texts	Civil Engineering and Costing, S.P. Mahajan, 624. 1042, M214.	No
Websites	https://www.scribd.com/doc/263166656	

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

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

Module Information

معلومات المادة الدراسية

Module Title	**Drainage Engineering and Practices**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWRE-404**		
ECTS Credits	**4**		
SWL (hr/sem)	**100**		
Module Level	4	**Semester of Delivery**	7
Administering Department	Dams and water resources Engineering	**College**	Engineering
Module Leader	Maysoun Abdullah Mansour Salman	**e-mail**	dr.maysoonabdullah@tu.edu.iq
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	-----	**e-mail**	-----
Peer Reviewer Name	Prof. Dr. Raad Hoobi	**e-mail**	dr.raadhoobi@tu.edu.iq
Scientific Committee Approval Date	01/11/2025	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To introduce the students to the agricultural drainage required to enhance the field production, and to create a balance among water, air, and salts contents in the soil. 2. To learn general principles of groundwater hydraulics such as Darcy's law, Dupuit-Forchheimer method, and groundwater flow in layered soils. 3. To manage and reclaim the saline soils by leaching 4. To investigate drainage projects. 5. To evaluate soil hydraulic conductivity in field and in laboratory. 6. To understand different types of drainage systems and their planning. 7. To design the cross-section of surface and subsurface drains. 8. To choose the proper distance between drains. 9. To understand the vertical drainage. 10. To maintain drainage systems. 11. To understand the effect of drainage on environment.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The Drainage Engineering course teaches students a lot of useful things in designing and understanding drainage networks. After completing this course, students are supposed to be familiar with the following points: 1. Definition of drainage, its purpose, evidence and benefits, as well as an overview of the history of drainage in Iraq. 2. Learn the basics of groundwater movement by studying Darcy's law, Laplace's equation, and Dupuis-Forchheimer's equation. 3. Learn about the reclamation of saline soils, salts removal, and the requirements for leaching them. 4. Learn the exploratory and design investigations of drainage projects. 5. Studying the various methods used to estimate the hydraulic conductivity of soils in the laboratory and field. 6. Identifying the different drainage systems through their types, planning their locations and depths, and designing filters. 7. Learn the basics of designing surface (open) and subsurface (covered) drainage sections. 8. Designing the distances between the drains in the case of stable and unstable flow. 9. Identifying the vertical drainage (drainage wells). 10. Learn drainage maintenance. 11. The relationship between drainage and environmental pollution.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: <u>General introduction on drainage of agricultural lands</u> Definition of drainage, purpose of drainage, evidences of drainage problems, drainage benefits, drainage in Iraq, and sources of excess water in soil. [5 hrs] <u>Principles of groundwater hydraulics</u> Introduction, Law of energy conservation, groundwater potential, Darcy's law, Law of mass conservation, Laplace's equation, and Dupuit-Forchheimer equation. [10 hrs] <u>Reclamation of saline soils</u> The origin and nature of saline soils, Factors helping to increase the concentration of salts in agricultural soils, distribution and movement of salts in soil, the critical depth of groundwater, classification of saline soils, reclamation methods of saline soils, and soil leaching and leaching requirements. [10 hrs] <u>Drainage projects' investigations</u> Exploratory investigations, design investigations, and groundwater investigations. [5 hrs] <u>Estimation of soil hydraulic conductivity</u> Introduction, laboratory methods of soil hydraulic conductivity estimation, and field methods of soil hydraulic conductivity estimation. [10 hrs] <u>Drainage systems</u>

	Introduction, types of drainage networks, planning drains' positions, patterns of drainage network distribution, drain depths, accompanying works to subsurface drainage network, and filters (envelopes). [5 hrs] Design of drains' sections Introduction, drainage coefficient, design of open drains' sections, and design of pipe drains diameters. [5 hrs] Spacing between drains Introduction, equations used in specifying drains' spacing, equations based on steady-state flow condition, and equations based on unsteady-state flow condition. [15 hrs] Vertical drainage (drainage wells) Introduction, types of drainage wells, advantages of vertical drainage, disadvantages of vertical drainage, groundwater flow towards drainage walls, and overlapping among drainage wells. [5 hrs] Drains' maintenance Introduction, maintenance of open drains, maintenance of buried drains, and maintenance of drainage wells. Drainage and water pollution Introduction, effect of return water on domestic water uses, effect of return water on industrial water uses, effect of return water on fish water life, effect of return water on entertainment water uses, and methods of return water controlling. [5 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 some challenging problems to motivate students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 15 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	3.47
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**General introduction on drainage of agricultural lands:** Definition of drainage, purpose of drainage, evidences of drainage problems, drainage benefits, drainage in Iraq, and sources of excess water in soil.
Weeks 2-3	**Principles of groundwater hydraulics:** Introduction, Law of energy conservation, groundwater potential, Darcy's law, Law of mass conservation, Laplace's equation, and Dupuit-Forchheimer equation.
Weeks 4-5	**Reclamation of saline soils:** The origin and nature of saline soils, Factors helping to increase the concentration of salts in agricultural soils, distribution and movement of salts in soil, the critical depth of groundwater, classification of saline soils, reclamation methods of saline soils, and soil leaching and leaching requirements.
Week 6	**Drainage projects' investigations:** Exploratory investigations, design investigations, and groundwater investigations.
Weeks 7-8	**Estimation of soil hydraulic conductivity:** Introduction, laboratory methods of soil hydraulic conductivity estimation, and field methods of soil hydraulic conductivity estimation.
Week 9	**Drainage systems:** Introduction, types of drainage networks, planning drains' positions, patterns of drainage network distribution, drain depths, accompanying works to subsurface drainage network, and filters (envelopes).
Week 10	**Design of drains' sections:** Introduction, drainage coefficient, design of open drains' sections, and design of pipe drains diameters.
Weeks 11-13	**Spacing between drains:** Introduction, equations used in specifying drains' spacing, equations based on steady-state flow condition, and equations based on unsteady-state flow condition.
Week 14	**Vertical drainage (drainage wells):** Introduction, types of drainage wells, advantages of vertical drainage, disadvantages of vertical drainage, groundwater flow towards drainage walls, and overlapping among drainage wells.
Week 15	**Drains' maintenance:** Introduction, maintenance of open drains, maintenance of buried drains, and maintenance of drainage wells. **Drainage and water pollution:** Introduction, effect of return water on domestic water uses, effect of return water on industrial water uses, effect of return water on fish water life, effect of return water on entertainment water uses, and methods of return water controlling.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 5	Lab 1: Laboratory estimation of soil hydraulic conductivity
Week 13	Lab 2: Training on a software of computing drain spacing

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	هندسة البزل، د. عبد الستار يونس الدباغ، أنغام عز الدين علي (1992). Drainage Engineering, James N. Luthin (1973).	Yes
Recommended Texts	البزل، د. محسن محارب عواد اللامي، د. علاء صالح عبد الجبار الجنابي (1991). Irrigation and drainage engineering, Peter Waller, Muluneh Yitayew (2016).	No
Websites	http://ecoursesonline.iasri.res.in/course/view.php?id=550	

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

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

Module Information

معلومات المادة الدراسية

Module Title	**Graduation Project I**		**Module Delivery**	
Module Type	**C**		☐ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☒ **Seminar**	
Module Code	**DWRE-405**			
ECTS Credits	**6**			
SWL (hr/sem)	**150**			
Module Level	4	**Semester of Delivery**	7	
Administering Department	Dams and water resources Engineering	**College**	Engineering	
Module Leader		**e-mail**		
Module Leader's Acad. Title		**Module Leader's Qualification**		
Module Tutor		**e-mail**		
Peer Reviewer Name	Prof. Dr. Raad Hoobi	**e-mail**	dr.raadhoobi@tu.edu.iq	
Scientific Committee Approval Date	1/11/2025	**Version Number**	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The purpose of the Graduation Project is to assure/ascertain that the students have acquired the skills, knowledge, and concepts necessary to perform well when they leave the university. Each student will use educational tools to broaden his/her knowledge about a particular, self-selected topic. Students are also expected to show how proficient they are in solving real-world problems with certain constraints for the outcome-based evaluation by the review board.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On successful completion of this course, students will be able to: LO1. Understand and apply the fundamentals of engineering-design practices and procedures LO 2. Participate in teamwork activities. LO 3. Implement the techniques of oral and written presentations. LO 4. Identify an engineering problem and assess alternative solutions. LO 5. Apply project management fundamentals. LO 6. Understand the ethics of the engineering profession and water resources engineering issues. LO 7. Interact with industry and related non-governmental organizations.
Indicative Contents المحتويات الإرشادية	The graduation project will be a meaningful experience that provides a student with the opportunity for in-depth learning about a selected topic. The purpose of the project is to assure that the student is able to apply, analyze, synthesize, and evaluate information and communicate significant knowledge and understanding through a presentation. The project will be under the guidance and direction of the dept. faculty/administrators and will be assessed by an evaluation team.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Technical Report - Literature Review and Analysis - Project Problem Formulation and Solutions (Goals) - Report Organization - According to the template of the department Methodology and Procedures - Design - Implementation - Testing Individual Student Evaluation - Individual Contribution - Oral Presentation - Team Work Individual Student Evaluation by the Supervisor - Individual Contribution - Student Commitment - Team Work.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 15 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	102	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6.8
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	**Supervisor evaluation**		40%(50)		All
Summative assessment					
	Presentation	2hr	50% (50)	16	All
Total assessment			100% (100)Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Research Plan
Week 2	Data collection
Week 3	Previous Works
Week 4	Study the Problem
Week 5	Propose Solutions
Week 6	Analysis of Proposed Solutions
Week 7	Design the Proposed Solution
Week 8	Solutions Application
Week 9	Make the Required Measurements
Week 10	Analysis of the Results
Week 11	Design Reconsideration
Week 12	Project Testing and begin writing
Week 13	Project Writing
Week 14	Project report submission
Week 15	Presentation to the review board and oral examination

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Graduation project writing instructions template تعليمات كتابة مشروع التخرج	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 Information
معلومات المادة الدراسية

Module Title	**Hydraulic Structures II**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**DWRE-406**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		
Module Level	4	**Semester of Delivery**	8
Administering Department	Dams and water resources Engineering	**College**	Engineering
Module Leader	Raad Hoobi Irzooki	**e-mail**	dr.raadhoobi@tu.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	Prof. Dr. Raad Hoobi	**e-mail**	dr.raadhoobi@tu.edu.iq
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	DWRE 401	**Semester**	7
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To understand the canal headwork, and its use, and perform barrage design steps. 2. To understand the importance of using channel transitions and develop the ability to design a transition. 3. To ability to design a syphon structure (as a sample of cross drainage works). 4. To understand and ability to design some hydraulic structures (culverts and Sharda-type falls).
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize the common methods of calculating seepage and uplift pressure under different hydraulic structures, 2. Apply the basic concepts of engineering to design the required hydraulic structures' floor thickness, 3. Formulate preliminary hydraulic design steps for some hydraulic structures, 4. Develop and solve design problems and analyze the data to evaluate the feasibility of components of the canal Head works (barrage types), some types of flow transition, cross drainage works, and culverts, 5. Evaluate and analyze the safety of the canal Head works structure (barrage types) and culvert, 6. Demonstrate the ability to lead and productively participate in group situations via assigning multidisciplinary design projects for some of the hydraulic structures.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Canal Headworks (barrage types) - Introduction. - Defining the components of the barrage - Design steps of the undersluice, other barrages, and side main canal. [35 hrs] • Transitions - Introduction of transitions (R.S Chaturvedi's, Mitra's, and Hind's transitions). - Design of transitions (Hind's transitions). [10 hrs]. • Cross drainage works. - Syphon design. [10 hrs]. • Culvert. - Introduction and design example of the culvert. [10 hrs]. • Design of canal falls (Sharda-type fall). [10 hrs].

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary strategy that will be adopted in delivering this module is to encourage students' participation in classes, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials, and practical designing of the hydraulic structures. Power point presentations and boards are used in the classroom. Examples and problems will be solved and illustrated on the classroom board. Tutorials are also organized to establish closer contact with students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 15 اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Design of canal Head works (barrage types)
Week 2	Design of under sluice
Week 3	Design of other barrage
Week 4	Design of head regulator
Week 5	Design and apply the example of the barrage
Week 6	Continue a design and apply the example of the barrage
Week 7	Continue a design and apply the example of the barrage
Week 8	Mid-term Exam + Transitions: introduction of some types of flow transition.
Week 9	Design and applied the example of transition
Week 10	Cross drainage works – Syphon design
Week 11	Design and apply the example of syphon
Week 12	Introduction of culverts.
Week 13	Design and apply the example of culverts.
Week 14	Introduction of Sharda-type fall
Week 15	Design and apply the example of a Sharda-type fall
Week 16	**A preparatory week before the Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	none
Week 2	none
Week 3	none
Week 4	none
Week 5	none
Week 6	none
Week 7	none

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Varshney, R.S., Gupta, S. C., Gupta, R. L., (1979) "*Theory & design of irrigation structures*". Nem Chand & Bros; Roorkee, India.	Yes
Recommended Texts	4. Asawa, G. L. (2008) "*Irrigation and Water Resources Engineering*" New Age International(P) Limited, Publishers. 5. Chanson, Hubert., (2004) "*The Hydraulics of Open Channel Flow: An Introduction*" Elsevier. 6. Chow, Ven te., (1959) "*Open Channels Hydraulics*" Mc Graw Hill. 7. Schall, J.D., Thompson, p. L., Zeryes, S. M., Kilgore, R. T., and Morris, J. L. (2012) "*Hydraulic design of Highway culverts* " (Report No . FHWA – HIF – 12 – 026 HD55).	No

Grading Scheme

مخطط الدرجات

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

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

Module Information

معلومات المادة الدراسية

Module Title	**Rivers Engineering**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWRE-407**		
ECTS Credits	**5**		
SWL (hr/sem)	**125**		
Module Level	4	**Semester of Delivery**	8
Administering Department	Dams and Water Resources	**College**	Engineering
Module Leader	Asmaa Abdul Jabbar Jamel Mahdi	**e-mail**	Email: ms.asmaajameel@tu.edu.iq
Module Leader's Acad. Title	Prof.	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Prof. Dr. Raad Hoobi	**e-mail**	dr.raadhoobi@tu.edu.iq
Scientific Committee Approval Date	1/11/2025	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	This module aims to introduce students to the fundamental principles governing water flow in natural rivers, including flow resistance, velocity distribution, sediment interaction concepts, channel morphology, bank stability, and river response to hydraulic and environmental conditions.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand basic hydraulic behavior of natural river flows. 2. Describe flow velocity distribution in open natural channels. 3. Explain flow resistance and factors influencing roughness. 4. Identify river cross-sectional geometry and its hydraulic implications. 5. Interpret longitudinal river profiles and energy slopes. 6. Distinguish between basic river plan form types and their behaviors. 7. Recognize mechanisms of riverbank instability. 8. Understand the conceptual basics of sediment motion initiation. 9. Evaluate how floods alter channel shape and behavior.
Indicative Contents المحتويات الإرشادية	• Introduction to fluvial systems • Basic open-channel hydraulics review • Natural channel geometry: width, depth, hydraulic radius • Velocity distribution in river cross-sections • Flow resistance and roughness concepts (Manning qualitatively) • Shear stress concept (qualitative) • Sediment grain properties (size, shape, density) • Initiation of motion (Shields concept – conceptual) • River plan forms: straight, meandering, braided (why they form) • Bank erosion fundamentals • Longitudinal profiles & energy gradients • Flood flow behavior in rivers • River response to discharge & sediment variation

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Explanatory board lectures with diagrams • Concept-focused tutorials (without heavy math) • Visual imagery (aerial photos, river patterns) • Short case-study discussions • Video observation of flume behavior • Guided conceptual problem solving • Field morphology interpretation (photos/maps)

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 15 اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to river engineering
Week 2	Components of river systems & watershed influence
Week 3	Review of open-channel flow fundamentals
Week 4	Velocity distribution in natural rivers
Week 5	Flow resistance & roughness factors
Week 6	Shear stress concept (beginners' understanding)
Week 7	**Midterm Exam**
Week 8	Sediment properties and basic initiation of motion
Week 9	Bedload vs suspended load (qualitative)
Week 10	River cross-sections & hydraulic efficiency
Week 11	Longitudinal profile & energy slope
Week 12	Planform types: straight, meandering, braided
Week 13	Fundamentals of bank erosion
Week 14	River response to floods
Week 15	Case studies & conceptual problem solving
Week 16	Final revision and feedback

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	Julien, P.Y. *River Mechanics.* Cambridge University Press.	No
Recommended Texts	Chang, H.H.*Fluvial Processes in River Engineering.* Wiley.	No
Websites		

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

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

Module Information معلومات المادة الدراسية					
Module Title	**Dams and Reservoirs Engineering**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWRE-408**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level		4	**Semester of Delivery**		8
Administering Department		Dams and water resources Engineering	**College**	Engineering	
Module Leader	Wissam Sameer Mohammed Ali		**e-mail**	wisam.s.mohammed@tu.edu.iq	
Module Leader's Acad. Title		Assist Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name		Prof. Dr. Raad Hoobi	**e-mail**	dr.raadhoobi@tu.edu.iq	
Scientific Committee Approval Date		01/11/2025	**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. An ability to specify the storage zones of a reservoir. (i) 2. An ability to estimate the reservoir storage capacity. (i) 3. An ability to estimate the probable life of the reservoir. (i) 4. An ability to specify the type of dam according to the conditions of valley. (i) 5. Formulate a preliminary design of an earth dam base on the chosen type. (ii) 6. An ability to specify the valley problems that considered during constructing an earth dam and ability to find solutions for these problems. (i), (ii) 7. An ability to identify the solutions for the problems that may be appear in an earth dam during operation of reservoir. (iii)
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Specify the storage zones of a reservoir. 2. Draw the storage-surface area-elevation curve for a reservoir. 3. Estimate the reservoir storage capacity. 4. Estimate the live storage. 5. Estimate the dead storage. 6. Estimate the Flood storage. 7. Estimate the probable life of the reservoir. 8. Rout the outflow hydrograph if the inflow hydrograph was known using level pool routing. 9. Estimate the economical height of a dam. 10. Estimate the types of earth dams. 11. Learn the modes of failure in earth dams. 12. Design of the Earth Dams. 13. Control the seepage through the body of the earth dam and its foundation. 14. Estimate the stability of slopes in an earth dam.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction to Dams Engineering, Storage Works, Hydrological Aspects, Geological Investigations, Reservoir Site Selection, Storage Zones of a Reservoir, Storage-Surface Area-Elevation, Volume of Storage Calculation Method. [4 hrs] Reservoir Storage Capacity Estimation, Live Storage Mass Curve Method, Tabulation Method, Hydrograph method, Sequent Peaks Analysis, Optimization Analysis. [8 hrs] Reservoir Sedimentation, Factors Effecting Sedimentation of Reservoir, Suspended Load Calculation {Discharge- Sediment Load Relationship, The probable life of the reservoir. [4 hrs] Flood Routing, Level Pool Routing. [8 hrs] Reservoir Flood Storage Capacity Estimation, Economical Height of a Dam, Classification of dams, Factors governing the selection of a particular type of dam. [8 hrs] Earth and Rock fill Dams (Rolled fill dam), Earth and Rock fill Dams (Foundation for earth dams, Suit available materials), Earth and Rock fill Dams (Modes of failure in earth dams). [8 hrs] Earth and Rock fill Dams (Seepage through the body of the dam), Earth and Rock fill Dams (Design Consideration of an Earth Dams). [4 hrs]

	Earth and Rock Fill Dams (SEEPAGE CONTROL A-Seepage Control through the body of the Dam), Earth and Rock fill Dams (SEEPAGE CONTROL B- Seepage Control Through the Foundation). [8 hrs] Earth and Rock fill Dams (Location of a phreatic line), Earth and Rock fill Dams (Stability of Slopes), Earth and Rock fill Dams (Pore Water Pressure). [8 hrs]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

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

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	15% (10)	5, 12	LO #1, 2, 3, 4, and 5 LO # 6, 7, 8, 9, 10, 11 and 12
	Assignments	3	15% (10)	3, 6, 10, 12	LO # 4, 5, 7, 8, and 12,
	Report	1	10% (10)	13	All
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO # 1-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Dams Engineering, Storage Works, Hydrological Aspects, Geological Investigations, Reservoir Site Selection, Storage Zones of a Reservoir, Storage-Surface Area-Elevation, Volume of Storage Calculation Method.
Week 2	Reservoir Storage Capacity Estimation, Live Storage Mass Curve Method, Tabulation Method,
Week 3	Hydrograph method, Sequent Peaks Analysis, Optimization Analysis
Week 4	Reservoir Sedimentation, Factors Effecting Sedimentation of Reservoir, Suspended Load Calculation {Discharge- Sediment Load Relationship, The probable life of the reservoir
Week 5	Flood Routing, Level Pool Routing
Week 6	Midterm Exam
Week 7	Reservoir Flood Storage Capacity Estimation, Economical Height of a Dam, Classification of dams
Week 8	Factors governing the selection of a particular type of dam
Week 9	Earth and Rock fill Dams (Rolled fill dam), Earth and Rock fill Dams (Foundation for earth dams, Suit available materials)
Week 10	Earth and Rock fill Dams (Modes of failure in earth dams)
Week 11	Earth and Rock fill Dams (Seepage through the body of the dam), Earth and Rock fill Dams (Design Consideration of an Earth Dams)
Week 12	Earth and Rock Fill Dams (SEEPAGE CONTROL A-Seepage Control through the body of the Dam)
Week 13	Earth and Rock fill Dams (SEEPAGE CONTROL B- Seepage Control Through the Foundation)
Week 14	Earth and Rock fill Dams (Location of a phreatic line)
Week 15	Earth and Rock fill Dams (Stability of Slopes), Earth and Rock fill Dams (Pore Water Pressure)
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	1. Hydraulics of Dams and Reservoirs, By: Fuat Senturk, Water Resources Publications, Colorado, U.S.A.,1994. 2. Theory and Design of Irrigation Structures, Vol. II, By: R. S. Varshney, S. C. Gupta and R. L. Gupta, Nem Chand & Bros, Roorkee (U.P.), India,1982. 3. Earth-Rock Dams, Engineering Problems of Design and Construction, By: J. L. Sherard, R. J. Woodward, S. F. Gizienske and W. A. Clevenger, John Wiley and Sons, Inc., New York, 1963. 4. Engineering for Dams, By: W. P. Greager, J. D. Justin and J. Hinds, In three Volumes, John Wiley and Sons, Inc., New York, 1961.	No
Recommended Texts	Loucks, D. P., Van Beek, E., Stedinger, J. R., Dijkman, J. P., and Villars, M. T. (2005). Water Resources Systems Planning and Management: An Introduction to Methods, Models and Applications. Paris, UNESCO.	No
Websites	https://www.youtube.com/channel/UCq1v13fN72524RRtY0mMC9A	

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

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

Module Information معلومات المادة الدراسية					
Module Title	**Sanitary Engineering**			**Module Delivery**	
Module Type	**CORE**			**Theory** **Lecture** **Tutorial** **Practical** **Seminar**	
Module Code	**DWRE-409**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	4		**Semester (s) offered**	8	
Administering Department	Dams and water resources Engineering		**College**	Engineering	
Module Leader	Safa Ibrahim Hassan Ali		**e-mail**	safaa.i.hassan@tu.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor			**e-mail**		
Peer Reviewer Name	Prof. Dr. Raad Hoobi		**e-mail**	dr.raadhoobi@tu.edu.iq	
Review Committee Approval	1/11/2025		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	
Module Aims, Learning Outcomes, Indicative Contents and Brief Description أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر			
Module Aims أهداف المادة الدراسية	1. The course aims to introduce students to the basics of designing and evaluating wastewater networks and their accessories, such as the types of pipes used. 2. Introduce students to the sources of sewage water, runoff in sewage pipes, and what are the accessories of sewage networks 3. Teaching students the basics of designing storm networks and their accessories. 4. Teaching the student to calculate the amounts of rain water.		
Module Learning Outcomes	1. The learner will be able to design a sewage networks system in addition to knowing the accessories of the network and everything related to the works of its two sites. 2. Knowing the details of the storm networks system and rainfall calculations, in addition to the network accessories and everything related to its site engineering		

مخرجات التعلم للمادة الدراسية	works. 3. Design of lift stations as well as design of waterways for buildings
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Undergraduate Review (4 hrs) • Fundamentals of sewage network design (20 hrs) • Case studies and evaluate sewage network (15 hrs) • Fundamentals of storm network design (20 hrs) • Case studies and evaluate storm network (11 hrs)
Course Description	This course aims to form the basic knowledge for designing and evaluating infrastructure networks (sewage network system and storm network system). The presentation of the course begins with studying the methods of collecting water for the two networks, calculating their quantities, and then using the results in designing the network, in addition to studying the international standards for these networks. Networks evaluation (sewage network system and storm network system) and ways to fix it were also discussed
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The learning and teaching **strategy** is designed to: Carefully cover in lectures the necessary fundamental material and analytical techniques, and demonstrate concepts with appropriate (and where possible practical) examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures 50** **In class tests 10** **Seminars 3**	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing 17** **Preparation for tests 10** **Home works 10**	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	5% (5)	4, 7, 10, 12, 14	All
	Assignments	6	10% (10)	6, 8, 10, 12	All
	Seminars	3	10% (10)	Continuous	
Summative assessment	**Midterm Exam**	2	10% (10)	7	All
	Laboratory	3	15% (15)	continuous	
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction
Week 2	Types and Characterizes of Wastewater
Week 3	Sewer pipes
Week 4	Estimate the amount of sewage
Week 5	Estimate the amount of sewage by using population
Week 6	Design of Sanitary Sewers system
Week 7	Midterm exam
Week 8	Design of Storm Sewers
Week 9	Rainfall Investigations
Week 10	The ground and underground survey
Week 11	Layout of the system
Week 12	Rainfall equation, factors and amount of rainfall water
Week 13	Design of inlet system and pipe system
Week 14	Design of pipe and manhole
Week 15	The profile
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction about wastewater and storm
Week 2	Lab 2: How to write report
Week 3	Lab 3: Sample collection method for wastewater and rainwater
Week 4	Lab 4: Sample collection method for storm water
Week 5	Lab 5: Temperature and PH-Value
Week 6	Lab 6: Turbidity
Week 7	Lab 7: color, Taste and Odor
Week 8	Lab 8: Determination of Total Solids
Week 9	Lab 9: Volatile Solid
Week 10	Lab 10: Non-Volatile Solid
Week 11	Lab 11: Organic compound
Week 12	Lab 12: Solids and Density
Week 13	Lab 13: Dissolved Solid D.S
Week 14	Lab 14: Suspended Solid S.S
Week 15	Lab 15: Oils and Fats
Week 16	Lab 16: Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Water Supply and Sewage, by E.W. Steel, and T.G. McGhee. 1979 A Guide to selection of cost-effective wastewater treatment system by Mc kinney R. E.; United Stats Environmental j.; 1975	Yes
Recommended Texts	Haestad Methods S. Rocky Durrans. STORMWATER CONVEYANCE MODELING AND DESIGN. Bentley Institute Press, 2007	No
Websites		

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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

Module Information

معلومات المادة الدراسية

Module Title	**Graduation Project II**	**Module Delivery**	
Module Type	**C**	☐ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☒ **Seminar**	
Module Code	**DWRE-410**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		
Module Level	4	**Semester of Delivery**	8
Administering Department	Dams and water resources Engineering	**College**	Engineering
Module Leader		**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor		**e-mail**	
Peer Reviewer Name	Prof. Dr. Raad Hoobi	**e-mail**	Dr.raadhoobi@tu.edu.iq
Scientific Committee Approval Date	1/11/2025	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The purpose of the Graduation Project is to assure/ascertain that the students have acquired the skills, knowledge, and concepts necessary to perform well when they leave the university. Each student will use educational tools to broaden his/her knowledge about a particular, self-selected topic. Students are also expected to show how proficient they are in solving real-world problems with certain constraints for the outcome-based evaluation by the review board.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On successful completion of this course, students will be able to: LO1. Understand and apply the fundamentals of engineering-design practices and procedures LO 2. Participate in teamwork activities. LO 3. Implement the techniques of oral and written presentations. LO 4. Identify an engineering problem and assess alternative solutions. LO 5. Apply project management fundamentals. LO 6. Understand the ethics of the engineering profession and water resources engineering issues. LO 7. Interact with industry and related non-governmental organizations.
Indicative Contents المحتويات الإرشادية	The graduation project will be a meaningful experience that provides a student with the opportunity for in-depth learning about a selected topic. The purpose of the project is to assure that the student is able to apply, analyze, synthesize, and evaluate information and communicate significant knowledge and understanding through a presentation. The project will be under the guidance and direction of the dept. faculty/administrators and will be assessed by an evaluation team.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Technical Report - Literature Review and Analysis - Project Problem Formulation and Solutions (Goals) - Report Organization - According to the template of the department Methodology and Procedures - Design - Implementation - Testing Individual Student Evaluation - Individual Contribution - Oral Presentation - Team Work Individual Student Evaluation by the Supervisor - Individual Contribution - Student Commitment - Team Work.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 15 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	102	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6.8
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	**Supervisor evaluation**		40%(50)		All
Summative assessment					
	Presentation	2hr	50% (50)	16	All
Total assessment			100% (100)Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Research Plan
Week 2	Data collection
Week 3	Previous Works
Week 4	Study the Problem
Week 5	Propose Solutions
Week 6	Analysis of Proposed Solutions
Week 7	Design the Proposed Solution
Week 8	Solutions Application
Week 9	Make the Required Measurements
Week 10	Analysis of the Results
Week 11	Design Reconsideration
Week 12	Project Testing and begin writing
Week 13	Project Writing
Week 14	Project report submission
Week 15	Presentation to the review board and oral examination

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Graduation project writing instructions template تعليمات كتابة مشروع التخرج	No
Recommended Texts		No
Websites		

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