



MODULE DESCRIPTION

وصف المادة الدراسية

Module Information					
معلومات المادة الدراسية					
Module Title	Construction Materials		Module Delivery		
Module Type	Core		☐ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☒ Practical ☒ Seminar		
Module Code	BCE 101				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		1			Semester of Delivery
Administering Department		BCE	College	TEMO	
Module Leader	Faris J. Thyab		e-mail	faris.j.thyab@ntu.edu.iq	
Module Leader's Acad. Title		Assistant Lecturer	Module Leader's Qualification		Master degree
Module Tutor	Faris J. Thyab		e-mail	faris.j.thyab@ntu.edu.iq	
Peer Reviewer Name			e-mail	E-mail	
Scientific Committee Approval Date		28/09/2025	Version Number	3.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	This course provides full knowledge about the construction materials properties, standards and laboratory tests.
Module Learning Outcomes	- Understanding the characteristics of different construction materials. - The ability of utilizing the proper construction material according to the type of structure.





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مخرجات التعلم للمادة الدراسية	- Understanding the installation methods of construction materials. - Understanding the standards specification of construction materials.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: - Enable students to identify the physical and mechanical properties of the common construction materials. - Improving the student ability of selecting the suitable material that qualifies the requirements of the desired work. - Enabling the students to work as a laboratory field tester. - Improving the students' skills enabling the establishment of a career based on the academic knowledge.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	- Lecture method using a whiteboard and a data show. - Forming working groups during the laboratory sessions to conduct the desired tests. - Preparation of seminars by students under the supervision of their lecturer. - Giving students assignments (H.W) to evaluate the students benefit from the lesson. - Conducting a scientific technical visit to an under construction visit - Forming groups to conduct a project during the course. - Attending online (web-based) sessions.

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





Module Evaluation					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	15% (15)	2,4,8 and 13	LO #1 - #2, LO #3 - #4,
	Assignments	2	5% (5)	2 and 13	LO #1 - #2, LO #3 - #4,
	Seminar	2	5% (5)	2 and 13	LO #2 - #3, LO #4 -
	Project	1	5% (5)	14	All
	Report	4	10% (10)	2,5,9 and 13	LO #1 - #4
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #2
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
Week 1	- Demonstrates knowledge of the Physical properties & standard specification for construction materials. - Ability to identify types of metallic materials, non-metallic materials.
Week 2	- Demonstrates knowledge of the Physical properties & standard specification for construction materials - Ability to identify types of metallic materials, non-metallic materials.
Week 3	Demonstrates Advantages & disadvantages of clay bricks
Week 4	- Identifying clay brick types of defects, Standard specification. - Correctly implement Continuity equation.
Week 5	- Demonstrates knowledge of the Sand-lime brick: Properties. - Conducts the Standard tests & monitor the specification.
Week 6	Demonstrates knowledge of the Glass bricks, Concrete bricks: Properties.





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	• Conducts the Standard tests & monitor the specification.
Week 7	• Recognition of laboratory Steady flow in pressure conduits; laminar and turbulent flow; critical flow. • Correctly execute general equation for conduit friction; friction for laminar flow; friction for turbulent flow; pipe roughness.
Week 8	• Ability to identify the Cellular concrete blocks: Properties. • Monitoring and conducting Standard tests & specification.
Week 9	• Demonstrates knowledge and Definition of the Building stone
Week 10	• Demonstrates the classification of the building stones. • Elaboration on the origin of building stones and their types
Week 11	• Demonstrates the uses and properties of the building stones.
Week 12	• Ability to identify the Bonding materials: Classification, Chemical composition, properties & uses of common bonding materials.
Week 13	• Monitoring and conducting Standard tests & specification (Cement mortar, Cement lime mortar, Gypsum). • Demonstration of dry wall installations and the advantages of using drywall
Week 14	• Demonstrates knowledge of the Types, Properties of flooring materials (Tiles & concrete flags)
Week 15	• Demonstrates knowledge standards tests & specification of flooring materials. • Classification of terrazzo and their production process
Week 16	Preparatory week before the final Exam





Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Recognition of laboratory, using of balances, and how to write report.
Week 2	Able to conduct and identify the Clay brick tests: • Size, shape and colour test. • Density.
Week 2	Able to conduct and identify the Clay brick tests: • Water absorption. • Compressive strength.
Week 4	Able to conduct and identify the Clay brick tests: • Efflorescence.
Week 5	Able to conduct and identify the Clay brick tests: • Hardness • Soundness test • Structure test
Week 6	Able to conduct and identify the Clay brick tests: • Analysis of soluble salts. • Apparent Porosity.
Week 7	Able to conduct and identify the Sand-lime brick tests: • Density. • Water absorption.
Week 8	Able to conduct and identify the Sand-lime brick tests: • Compressive strength.
Week 9	Able to conduct and identify the Concrete bricks & block tests: • Density • Size, shape and color test.
Week 10	Able to conduct and identify the Concrete bricks & block tests: • Absorption. • Compressive strength.
Week 11	Able to conduct and identify the Cellular concrete block tests: • Density • Specific gravity.
Week 12	Able to conduct and identify the Cellular concrete block tests: • Water Absorption. • Compressive strength.
Week 13	Able to conduct and identify the Cellular concrete block tests:





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	Flexural strength
Week 14	Able to conduct and identify terrazzo Tile tests: - Size, shape and dimension test. - Total absorption.
Week 15	Able to conduct and identify terrazzo Tile tests: - Face absorption - Modulus of rupture
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Construction materials reference book by John M. Cimbala.	No
Recommended Texts	Construction materials their nature and behavior	No
Websites	www.buildforless.co.uk	





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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.

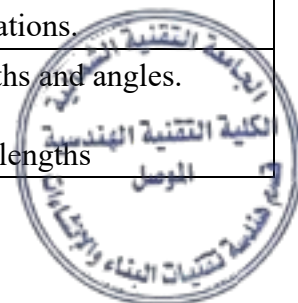




Module Information					
معلومات المادة الدراسية					
Module Title	Plane Surveying		Module Delivery		
Module Type	Core		☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☒ Practical ☐ Seminar		
Module Code	BCE 102				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	1	Semester of Delivery			1
Administering Department		BCE	College	TEMO	
Module Leader	Dr. Mohammed Adnan Basher		e-mail	mbasher@ntu.edu.iq	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		Ph.D.
Module Tutor	Dr. Mohammed Adnan Basher		e-mail	mbasher@ntu.edu.iq	
Peer Reviewer Name			e-mail	E-mail	
Scientific Committee Approval Date		28/09/2025	Version Number		3.0

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	- Understanding how to determine points, distances, and land areas. - Familiarity with surveying instruments related to the practical aspect. - Understanding the fundamentals of obstacles in field. - Understanding how to calculate the lengths of traverses. - Understanding the mathematical methods for calculations.
Module Learning Outcomes	- Recognize how to use tools in measurement of lengths and angles. - List the various method in measurement. - Summarize what is obstacles and how to avoid it in lengths





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مخرجات التعلم للمادة الدراسية	measurement. • Discuss the errors through the measurement of lengths. • Describe the environmental effects on errors of measurement. • Define the mathematical formula to determine the errors in measurement. • Discuss the theory of fixing traverses in field. • Discuss the various errors in lengths and angles in traverses. • Explain the mathematical formula to determine the area of traverse. • Identify the methods to determine the regular and irregular areas.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction to Surveying – Types of surveying, plane surveying, methods of survey and advantages of surveying. Points, Lengths and Angles – Set of points and lines, measurement of lines and angles, types of errors in measurement. Obstacles – Types of obstacles, measurement lines through obstacles. Traverses – Types of traverses, interior angles, lines and corrections Area Measurement – Area measurement, typical area, area formula, trapezoidal method, Simpson's method Area of Traverses – Area of traverse, graphical paper, triangle method





Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

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

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

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





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

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to surveying
Week 2	Set of points and straight lines
Week 3	Set of angles and curves
Week 4	Measurement of lines and angles
Week 5	Measurement of curves and errors in tape
Week 6	General view of obstacles
Week 7	Measurement of lines through obstacles
Week 8	Introduction to leveling
Week 9	Types of benchmarks
Week 10	Measurement of horizontal distance by level
Week 11	Error adjustment of level
Week 12	Area measurement
Week 13	Trapezoidal and Simpson's methods in area measurement
Week 14	Graphical paper and triangle methods in area measurement





Week 15	Examples on area measurement
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Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Introduction to survey
Week 2	Lab 2: Tools of measurement
Week 3	Lab 3: Obstacles
Week 4	Lab 4: Errors in measurement
Week 5	Lab 5: Fix in field: points, lines and angles
Week 6	Lab 6: Fix of traverse
Week 7	Lab 7: Area of traverse

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	N N Basak (2014). Surveying and Levelling. McGraw Hill Education. p. 542. ISBN 9789332901537	No
Recommended Texts	Brinker, Russell C; Minnick, Roy, eds. (1995). The Surveying Handbook. ISBN 978-1-4613-5858-9	No
Websites	https://www.youtube.com/watch?v=qgwBOVUFDAQ	





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Grading Scheme مخطط الدرجات				
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	F – Fail	راسب	(0-44)	Considerable amount of work required

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Module Information					
معلومات المادة الدراسية					
Module Title	ENGINEERING MECHANICS (STATIC)		Module Delivery		
Module Type	Core		☒ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar		
Module Code	BCE103				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		1	Semester of Delivery		1
Administering Department		BCE	College	TEMO	
Module Leader	Ahmed Mohammed Sami Al-Janabi		e-mail	ahmed.aljanabi@ntu.edu.iq	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		Ph.D.
Module Tutor			e-mail		
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date		28/09/2025	Version Number	3.0	

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	To give basic information about force vector, moment and vector algebra. To teach the basic principles of particle and rigid cismen balance in the plane and in space. To give basic information about the stability of ties and conveyor systems. To teach the calculation of bond forces, cages, frames and internal forces in cables.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this course, students will be able to: Explain and apply fundamental principles of engineering mechanics, including forces, moments, and equivalent force systems.





	2. Perform vector operations and analyze force systems in two and three dimensions. 3. Solve equilibrium problems for particles and rigid bodies in planar and spatial systems. 4. Determine centroids, centers of gravity, and moments of inertia for simple and composite bodies. 5. Analyze internal forces (axial force, shear force, bending moment) in beams, frames, and trusses. 6. Evaluate structural stability and support reactions under various loading conditions. 7. Analyze planar and spatial truss and cable systems using appropriate analytical methods. 8. Apply energy principles to assess equilibrium and stability of mechanical systems.
Indicative Contents المحتويات الإرشادية	Guideline Contents for Engineering Mechanics 1. Introduction and Basic Principles • Definition of engineering mechanics and its importance in engineering applications. • Fundamental concepts of forces, moments, and equivalent force systems. 2. Vectors and Forces • Introduction to vectors and basic operations (addition, subtraction, dot product, and cross product). • Force analysis in two and three dimensions. 3. Statics of Material Points • Equilibrium of particles in planes and space. • Practical applications of force equilibrium. 4. Rigid Bodies and Equivalent Force Systems • Definition and properties of rigid bodies. • Reduction of force systems to an equivalent force and moment. 5. Center of Gravity and Equilibrium of Rigid Bodies • Determination of the center of gravity and centroid. • Conditions and equations for rigid body equilibrium in two and three dimensions. 6. Internal Forces in Structural Elements • Analysis of internal forces in beams, trusses, and frames. • Determination of axial forces, shear forces, and bending moments. 7. Cross-Section Effects and Structural Stability





	• Effects of internal forces on structural members. • Stability analysis of supports and structural connections. 8. Plane and Space Lattice Systems • Analysis of planar and spatial truss systems. • Calculation of forces in truss members using the method of joints and sections. 9. Cables and Suspension Systems • Equilibrium analysis of cables and tension members. • Applications in suspension bridges and cable-supported structures. 10. Moment of Inertia and Structural Response • Calculation of moment of inertia for different cross-sections. • Application in beam bending and rotational motion. 11. Potential Energy and Stability • Concepts of potential energy in mechanical systems. • Stability criteria for mechanical structures and equilibrium conditions.
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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 a project work. Assessment of student learning will be thorough: Lecture & In-Class Activities, Preliminary & Further Study, Assignment (Homework) , Final Exam, Mid-Term Exam

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





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

Delivery Plan (Weekly Syllabus) المناهج الاسبوعي النظري	
	Material Covered
Weeks 1&2	- Demonstrates knowledge about the Introduction to mechanics, Force systems, Scalar & vector quantities, - Able to identify and apply the Parallelogram law, Triangle law, Forces & components.
Weeks 3&4	Able to identify and apply the Moment of a force , Varignon's theorem, and their Applications
Weeks 5&6	- Demonstrates knowledge of the Couples, - Able to identify Resolution of a force into a force & a couple.
Weeks 7&8	Demonstrates knowledge and correctly compute the Resultant of force systems, Resultant of concurrent force system, Resultant of parallel force system, Resultant of non-concurrent force system.
Weeks 9&10&11	Demonstrates knowledge, identify and correctly compute Equilibrium of force system, Free body diagram, Equilibrium of concurrent force system, Equilibrium of parallel force system, Equilibrium of non-concurrent force system.
Week 12	Demonstrates knowledge of the Types of beams, Supports, and loads, Equilibrium of beams.
Weeks 13&14,15	- Demonstrates knowledge of the Trusses - Able to analyses the trusses, method of Joint, method of section.





Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	"Vector Mechanics for Engineers: Statics" by F.P. Beer, E.R. Johnston, and D.F. Mazurek. "Engineering Mechanics: Statics & Dynamics" by R.C. Hibbeler.	NO
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
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Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
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Module Information					
معلومات المادة الدراسية					
Module Title	Engineering drawing and descriptive geometry		Module Delivery		
Module Type	Core		☐ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar		
Module Code	BCE104				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		1			Semester of Delivery
Administering Department		BCE	College	TEMO	
Module Leader	Faiza Ibrahim Muhammed		e-mail	FaizaIbrahim@ ntu.edu.iq	
Module Leader’s Acad. Title		Lecturer	Module Leader’s Qualification		Ph.D.
Module Tutor	Faiza Ibrahim Muhammed		e-mail		
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date		28/09/2025	Version Number	3.0	

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	statics and Strength of Materials	Semester	
Co-requisites module	Fluid Mechanics and Thermodynamics	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	By the end of this module, students will be able to: 1. Develop foundational skills in technical drawing and AutoCAD. 2. Apply principles of orthographic projection using first and third angle projection methods. 3. Construct and interpret isometric shapes and views. 4. Analyze and draw projections of points, straight lines, and plane surfaces on various reference planes including auxiliary planes. 5. Utilize AutoCAD tools effectively to create precise engineering drawings





Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of this module, students will be able to: 1. Identify and use AutoCAD drawing environment settings, including limits, grids, object snap, and view manipulation tools. 2. Construct 2D objects using AutoCAD drawing commands (line, polyline, polygon, rectangle, arc, circle, point, text). 3. Modify 2D drawings using editing tools (erase, copy, mirror, offset, move, rotate, trim, extend, explode). 4. Demonstrate the ability to draw isometric shapes using AutoCAD. 5. Explain the theory of projection including orthographic, central projection, and the use of horizontal and vertical projection planes. 6. Construct projections using first and third angle projection methods. 7. Analyze and draw the projection of a point and a straight line including horizontal trace, vertical trace, inclination angles (α and β), and true length. 8. Create projections of planes and lines on auxiliary planes. 9. Demonstrate competency in interpreting and producing multi-view projections for engineering communication
Indicative Contents المحتويات الإرشادية	The module begins with an introduction to the AutoCAD interface and its drawing environment, covering limits, grid, object snap, and view tools such as zoom and pan. Students will learn to use drawing commands (line, polyline, polygon, rectangle, arc, circle, point, and text) and modify them with standard editing tools. Subsequently, the module introduces isometric drawing techniques and the theory of projection, including orthographic, horizontal and vertical planes, and central projection concepts. Students will engage in drawing using both first and third angle projection methods, including creating single and triple-view projections. Later sections explore projection of points and lines, determination of horizontal and vertical traces, and computing true lengths with respect to inclination angles α and β. Students will then study projections onto auxiliary planes and deal with complex surface representations. Practical sessions align with theoretical content, and lab work includes structured exercises: AutoCAD setup, isometric drawing, first and third angle projections, point and line projection with traces, inclination analysis, and auxiliary plane applications. A mid-term exam and final assessment support the learning progression.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Engineering drawing is a vital communication tool used by engineers and designers to convey design ideas, measurements, and technical information. Given the precision and complexity required, learning and teaching this subject effectively requires a combination of theoretical understanding and practical



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	application. Here are strategies for both learners and educators to enhance the teaching and learning process. • Understanding Fundamentals First • Incremental Learning: Start Simple, Build Complexity • Use CAD Tools Early in Learning • Visualization and Spatial Awareness • Problem-Based Learning (PBL) • Feedback and Iterative Learning • Hands-on Projects and Workshops • Continuous Practice • Assessment through Practical Tests
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Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	32	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

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





Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Limits, grid, object snap, view menu (zoom, pan), Draw menu (line, poly line, polygon, rectangle, arc, circle, point, text)
Week 2	erase, copy, mirror offset, move, rotate, trim, extend, explode, perspective
Week 3&4	Draw the Isometric shape
Week 5	First and third angle projection method
Week 6	Draw the projection with the first angle projection method, Draw the projection with the third angle projection method
Week7&8	Drawing the three projections with the first angle, Drawing the three projections with the third angle projection method
Week 9	Mid-term Exam + Theory of Projection / Central of Projection, Orthographic, Horizontal and vertical projection planes, Auxiliary Plane. + Projection of the point
Week 10	Projection of Straight Line, Horizontal Trace, Vertical Trace
Week 11	Projection of Straight Line, Inclination Angles $\alpha + \beta$, True length.
Week12&13	Projection of Straight Line, Inclination of Straight Line to any plane / frontal line.
Week 14	The Plane Surface/ Auxiliary plane cases in space to horizontal and vertical planes
Week 15	Projection of point, straight line and plane to auxiliary planes

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1&2	Lab 1&2: Introduction to AutoCAD Instructions
Week 3&4	Lab 3&4 : Draw the Isometric shape
Week 6	Lab 6: First and third angle projection method
Week 7	Lab 7: Draw the projection with the first angle projection method





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Week 8	Lab 8: Drawing the three projections with the first angle,
Week 10	Lab 10: Projection of Straight Line, Horizontal Trace, Vertical Trace
Week 12&13	Lab 12&13: Projection of Straight Line, Inclination of Straight Line to any plane / frontal line.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	- Geometric and Engineering Drawing by K. Morling - Fundamentals of Engineering Drawing by Thomas E. French الهندسة الوصفية ليوسف نيقولا	Yes
Recommended Texts	A Text -Book of Engineering Drawing and Design by Sidney H. Wells	No
Websites		





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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.				

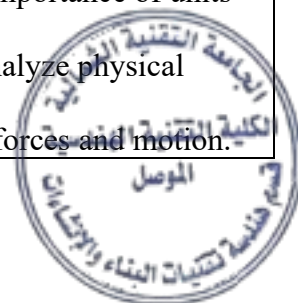




Module Information					
معلومات المادة الدراسية					
Module Title	Engineering Physics		Module Delivery		
Module Type	Support		☒ Tutorial ☐ Lecture ☒ Lab ☒ Theory ☐ Practical ☒ Seminar		
Module Code	BCE105				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level		1			Semester of Delivery
Administering Department		BEC	College	TEMO	
Module Leader	Dr. Inas Sameer Mahmood		e-mail	inasaldabag@ntu.edu.iq	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		Ph.D.
Module Tutor	Dr. Inas Sameer Mahmood		e-mail	inasaldabag@ntu.edu.iq	
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date		28/09/2025	Version Number		3.0

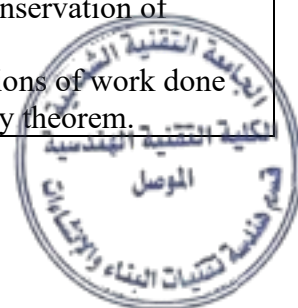
Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The objectives of this module are to provide students with a comprehensive understanding of fundamental concepts in physics, emphasizing the following key areas: 1. Understand the basic principles of physics and the importance of units and measurements. 2. Apply concepts of linear and rotational motion to analyze physical phenomena. 3. Utilize Newton's laws to solve problems involving forces and motion.





	4. Develop skills in calculating work, kinetic energy, potential energy, momentum, impulse, and collisions. 5. Understand the principles of conservation of energy and momentum. 6. Prepare students for examinations through review and problem-solving sessions. 7.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this module, students will be able to: 1. Identify and convert between different units of measurement and understand the significance of uncertainty and significant figures. 2. Analyze and compute two-dimensional and three-dimensional motion using appropriate equations. 3. Apply Newton's laws to real-world scenarios and solve related problems. 4. Calculate work, kinetic energy, potential energy, and demonstrate an understanding of energy conservation. 5. Compute momentum, impulse, and analyze collisions in one and two dimensions. 6. Describe and calculate rotational motion in rigid bodies, including rotational kinematics and dynamics. 7. Review and consolidate knowledge in preparation for final examinations, demonstrating problem-solving skills.
Indicative Contents المحتويات الإرشادية	1. Scope of Physics I: Overview of physics and its applications. 2. Units and Conversions: Fundamental and derived units, unit conversions, and the importance of significant figures. 3. Uncertainty and Significant Figures: Understanding measurement uncertainties and how to represent them in calculations. 4. Linear Motion: Concepts of distance, speed, velocity, acceleration, and the equations of motion. 5. 2-D and 3-D Motion: Analyzing motion in two and three dimensions using vector components. 6. Newton's Laws: Introduction to Newton's laws of motion and their applications. 7. Applications of Newton's Laws: Problem-solving involving forces, friction, tension, and other applications of Newton's laws. 8. Circular and Rotational Motion: Calculations involving angular displacement, angular velocity, angular acceleration, and rotational dynamics. 9. Rotational Kinematics: Concepts and equations governing the motion of rotating objects. 10. Momentum: Linear momentum, Force, Impulse, conservation of momentum, Elastic and Inelastic Collisions 11. Work and Kinetic Energy: Definition and calculations of work done by forces, kinetic energy, power and the work-energy theorem.



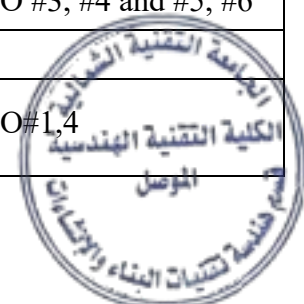


	12. Potential Energy and Conservation of Energy: Calculating gravitational potential energy and understanding energy conservation principles. 13. Preparatory Week Before the Final Exam: Review sessions and problem- solving workshops to prepare for final assessments.
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Interactive Lectures Hands-on Experiments and Simulations Problem-Based Learning (PBL) Exercises and Group Discussions Homework Review and Feedback Technology-Enhanced Learning Assessment and Reflection

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

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	15% (15)	5,8,11 and 12	LO #1, #2 and #5, #6
	Class Work	2	10% (10)	4 and 9	
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #5, #6
	Seminar	1	5%(5)		
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO#1,4





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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Scope of Physics I, Units, Physical Quantities and Vectors
Week 2	Units and conversions, Uncertainty and Significant Figures
Week 3	Linear Motion
Week 4	compute 2-D and 3-D Motion
Week 5	Newton's Law
Week 6	Applications of Newton's Law
Week 7	Circular and Rotational Motion: Calculations angular displacement, angular velocity
Week 8	Circular and Rotational Motion: Calculations angular acceleration, and rotational dynamics
Week 9	Calculation of the Rotational Kinematics
Week 10	Review and solutions of the homework
Week 11	Calculation of the Momentum: Linear momentum, Force, Impulse, conservation of momentum, Elastic and Inelastic Collisions
Week 12	Work and Kinetic Energy: Definition and calculations of work done by forces, kinetic energy
Week 13	Work and Kinetic Energy: Definition and calculations of power and the work-energy theorem
Week 14	Calculation of the Potential Energy and Conservation of Energy
Week 15	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"Conceptual Physics" by Paul G. Hewitt.	Yes
Recommended Texts	"University Physics" by Young and Freedman.	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	





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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.





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HUMAN RIGHTS and DEMOCRACY					
حقوق الانسان والديمقراطية					
Module Title	Human Rights and Democracy			Module Delivery	
Module Type	Basic			☒ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	NTU 100				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level		1	Semester of Deliver		2
Administering Department		BEC	College	TEMO	
Module Leader	Abdulkareem Zuhair		e-mail	Abdzuhair93@uomosul.edu.iq	
Module Leader's Acad. Title		Assist Lecturer	Module Leader's Qualification		Master
Module Tutor			e-mail		
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date		28/09/2025	Version Number	3.0	

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	- Increase the student's knowledge of the theoretical conceptual aspect and the historical development of human rights and democracy. - Develop the student's analytical and critical skills regarding the reality and future of human rights and democracy. - Train the student on the importance of active participation in public life, such as promoting respect for the principles of human rights and actively participating in political and cultural life. - Enable students to understand the importance of education and its role in spreading the culture of human rights and democracy in building a civilized society based on good governance, which is fundamentally characterized by faith in human rights, education on them, and active participation in governance through free and fair elections.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this course, students will be able to: 1. Define the concept, objectives, and characteristics of human rights and trace their historical development from ancient civilizations to modern frameworks. 2. Analyze human rights in divine religions, with emphasis on human rights in Islam, and compare them with contemporary international standards. 3. Examine the international and regional recognition of human rights, including major conventions and charters. 4. Distinguish between categories of human rights (civil, political, economic, social, cultural, and solidarity rights). 5. Evaluate the status of human rights in Iraqi constitutions and the gap between theory and practice. 6. Analyze national guarantees for the protection of human rights, including constitutional oversight, media freedom, and NGOs. 7. Assess international and regional mechanisms for human rights protection, including the role of the United Nations and regional organizations. 8. Explain the concept and evolution of democracy and analyze its relationship with human rights and democratic transitions. 9. Critically evaluate the strengths and criticisms of democratic systems in different global contexts.





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Indicative Contents المحتويات الإرشادية	- Human rights: Definition and objectives. - Human rights in ancient civilizations, especially the civilization of Mesopotamia. - Guarantees for respecting and protecting human rights at the international level: - The role of the United Nations and its specialized agencies in providing guarantees. - The role of regional organizations (Arab League, European Union, African Union, Organization of American States, ASEAN). - The role of international and regional non-governmental organizations and public opinion in respecting and protecting human rights. - The term democracy: Its origin, significance, and history. - Democratic systems in the world / Democracy in the Third World / The challenges facing Arab countries in democratic transition.
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

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





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

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
Week 1	حقوق الإنسان ، تعريفها ، أهدافها
Week 2	حقوق الإنسان في الحضارات القديمة وخصوصا حضارة وادي الرافدين
Week 3	حقوق الإنسان في الشرائع السماوية مع التركيز على حقوق الانسان في الاسلام
Week 4	حقوق الإنسان في التاريخ المعاصر والحديث : الاعتراف الدولي بحقوق الإنسان منذ الحرب العالمية الأولى وعصبة الامم المتحدة
Week 5	الاعتراف الاقليمي بحقوق الإنسان : الاتفاقية الاوربية لحقوق الانسان 1950 ، الاتفاقية الامريكية لحقوق الانسان 1969 ، الميثاق الافريقي لحقوق الانسان 1981 ، الميثاق العربي لحقوق الانسان 1994
Week 6	حقوق الإنسان الحديثة : الحقائق في التنمية ، الحق في البيئة النظيفة ، الحق في التضامن ، الحق في الدين حقوق الانسان ، المنظمات الوطنية لحقوق الانسان
Week 7	حقوق الإنسان في الدساتير العراقية بين النظرية والواقع
Week 8	Mid-term Exam
Week 9	حقوق الإنسان الاقتصادية والاجتماعية والثقافية وحقوق الانسان المدنية والسياسية
Week 10	حقوق الإنسان الحديثة : الحقائق في التنمية ، الحق في البيئة النظيفة ، الحق في التضامن ، الحق في الدين
Week 11	ضمانات احترام وحماية حقوق الإنسان على الصعيد الوطني ، الضمانات في الدستور والقوانين
Week 12	الضمانات في الرقابة الدستورية ، الضمانات في حرية الصحافة والرأي العام ، دور المنظمات غير الحكومية في احترام وحماية حقوق الانسان
Week 13	ضمانات احترام وحماية حقوق الإنسان على الصعيد الدولي : دور الأمم المتحدة ووكالاتها المتخصصة في توفير الضمانات



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	- دور المنظمات الإقليمية (الجامعة العربية ، الاتحاد الأوروبي ، الاتحاد الافريقي ، منظمة الدول الأمريكية ، منظمة آسيان) - دور المنظمات الدولية الإقليمية غير الحكومية والرأي العام في احترام وحماية حقوق الإنسان
Week 11	مصطلح الديمقراطية ، نشأته ، دلالاته ، تاريخ الديمقراطية.
Week 12	الإسلام والديمقراطية ومساوئ الحكم الاستبدادي .
Week 13	الانتقادات الموجهة للديمقراطية، ومحاسن النظام الديمقراطي .
Week 14	الأنظمة الديمقراطية في العالم/الديمقراطية في العالم الثالث/ المشاكل التي تواجه البلدان العربية في التحول الديمقراطي
Week 15	Preparatory week before the final Exam

Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	حقوق الإنسان والديمقراطية للدكتور محمد عابد الجابري 2006	Yes
Recommended Texts	حقوق الإنسان والديمقراطية اعداد أ.م.د. غسان كريم مجذاب و أ.م. امجد زين العابدين طعمة للعام 2018	No
Websites	” طرق وتعليم وثقافة حقوق الانسان ” ، منشور على شبكة المعلومات الدولية (الانترنت) على الموقع الالكتروني http://ghrorg-learning.blogspot.com	

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

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.





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Module Information					
معلومات المادة الدراسية					
Module Title	English language		Module Delivery		
Module Type	Basic		☒ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☒ Seminar		
Module Code	NTU 101				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level		1	Semester of Deliver		1
Administering Department		PM	College	TEMO	
Module Leader	Sundus Falah Mohammed		e-mail	sundus.falah@ntu.edu.iq	
Module Leader’s Acad. Title		Assist. Lecturer	Module Leader’s Qualification		M. Linguistics and English Language Teaching
Module Tutor	Name (if available)		e-mail	E-mail	
Peer Reviewer Name		Name	e-mail	E-mail	
Scientific Committee Approval Date		28/09/2025	Version Number	3.0	

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	- To develop problem solving skills mainly speaking, reading, writing and listening skills and to understand the English language as a foreign language through the application of many techniques. - To understand the general principles of the English language.





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	- This course deals with the basic concepts of learning the main rules of English grammar and English vocabularies. - This is the basic subject for writing and speaking English well. - To understand how to build a correct English sentence.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this course, students will be able to: Use main and auxiliary verbs, possessive pronouns, and subject pronouns correctly in sentences. Form affirmative, negative, and interrogative sentences to exchange personal information and social expressions. Apply adjectives and articles correctly within sentence structures. Construct and differentiate present simple sentences (I/we/you/they and he/she forms) and use adverbs of frequency appropriately. Use question words, demonstrative pronouns, prepositions, and there is/there are accurately in context. Construct simple past tense sentences, including regular and irregular verbs, in affirmative, negative, and interrogative forms. Use modal verbs (can/can't) and appropriate adverbs to express ability, requests, offers, and past time references. Differentiate and apply present continuous and future forms, and distinguish them from present simple structures.
Indicative Contents المحتويات الإرشادية	- An introduction to the importance of English language learning and the role it plays in social communication. - An application of various tenses like present and past tenses. - Demonstrating many main concepts including (offers, requests, future plants, personal expressions and tenses). - Using many skills to learn English like listening, reading, writing and speaking skills, moreover; presenting different examples to elaborate any concept or structure.





Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in this module is associated with the communicative approach which will be applied to develop students' skills to learn English and to enable students to use English in communication, therefore, using authentic materials in the class is so necessary. This approach is important to encourage students' participation in the class and to highlight their motivation in learning English, while at the same time refining and expanding their interactions and skills to achieve at least more success.

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

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





Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Unit one: Hello Am/are/is. my/your This is with practice in work
Week 2	Unit two: Your world He/she/they, his/her Questions
Week 3	Unit three: All about you Personal information/ social expressions
Week 4	Unit four: Family and friends Possessive adjectives/ possessive 's Have/has , adjective + noun
Week 5	Unit five: The way i live Present simple I/we/you/they An/a , adjective + noun
Week 6	Unit six: Every day Present simple he/she Negatives and questions, adverbs of frequency
Week 7	Unit seven: My favorites Question words, pronouns, this/that
Week 8	Unit eight: Where I live There is/ are, prepositions
Week 9	Unit nine: Times past Was/ were born, past simple and irregular verbs
Week 10	Unit ten: We had a great time Past simple, regular and irregular Questions, negatives, ago
Week 11	Unit eleven: I can do that! Can/can't, adverbs, requests





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Week 12	Unit twelve: Please and thank you I'd like, some and any Like and would like
Week 13	Unit thirteen: Here and now Present continuous Present simple and present continuous
Week 14	Unit fourteen: It's time to go! Future plans, writing email and information letter
Week 15	Revision
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	John and liz Soar. (New Headway Beginner) 4th edition. Oxford: Oxford University Press.	Yes
Recommended Texts		No
Websites		





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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.





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Module Information					
معلومات المادة الدراسية					
Module Title	Building Materials		Module Delivery		
Module Type	Core		☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☒ Practical ☒ Seminar		
Module Code	BCE 106				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		1			Semester of Delivery
Administering Department		BCE	College	TEMO	
Module Leader	Jasim Mohammed Abed		e-mail	jasimabd@ntu.edu.iq	
Module Leader's Acad. Title		Assistant Lecturer	Module Leader's Qualification		Master degree
Module Tutor	Faris J. Thyab		e-mail	faris.j.thyab@ntu.edu.iq	
Peer Reviewer Name		Name	e-mail	E-mail	
Scientific Committee Approval Date		28/09/2025	Version Number		3.0

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 course provides teaching students the properties of construction materials, their standard specifications, & their related standard tests.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	- Understanding the characteristics of different building materials. - The ability of utilizing the proper building material according to the type of structure. - Understanding the installation methods of building materials. - Understanding the standards specification of building materials.



	Understanding the physical and mechanical properties of building materials.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: - Enable students to identify the physical and mechanical properties of the common building materials. - Improving the student ability of selecting the suitable material that qualifies the requirements of the desired work. - Enabling the students to work as a laboratory field tester. - Improving the students' skills enabling the establishment of a career based on the academic knowledge. Total Hours = 149 (Time table hrs x 15 weeks)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	- Lecture method using a whiteboard and a data show. - Forming working groups during the laboratory sessions to conduct the desired tests. - Preparation of seminars by students under the supervision of their lecturer. - Giving students assignments (H.W) to evaluate the students benefit from the lesson. - Conducting a scientific technical visit to an under construction visit - Forming groups to conduct a project during the course. - Attending online (web-based) sessions.

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





Module Evaluation					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	15% (15)	5,8,11 and 12	LO #1 - #2, LO #3 - #4,
	Assignments	2	5% (5)	4 and 8	
	Seminar	2	5%(5)	5 and 9	
	Project	1	5% (5)	14	LO #2 - #3, LO #4 -
	Report	4	10% (10)	5,8,11 and 12	LO #1 - #3, LO #4 -5
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Demonstrates knowledge of the Water proofing materials:
Week 2	Classification, (Liquid, Rigid & semi-rigid water proofing materials), Types & uses.
Week 3	Demonstrates knowledge of the Polymers: Definition, Classification, Chemical composition, Uses.
Week 4	- Demonstrates knowledge of the Epoxy: Definition, Properties, Types & uses. - Show the ability of epoxy in producing high quality terrazzo
Week 5	Demonstrates knowledge of the Steel: Composition & classification, Properties, Uses & standard tests.
Week 6	Demonstrates knowledge of the Metallic materials (nonferrous): Classification & use.
Week 7	- Demonstrates knowledge of the Timber (wood): Classification, Properties, Seasoning, Types of defect - Conducts Standard test





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	Highlights the interior design aspect of using wood.
Week 8	Demonstrates knowledge of the Insulating materials: Types, Properties.
Week 9	Demonstrates knowledge of the Acoustical materials: Types, Properties.
Week 10	Demonstrates knowledge of the Protective coating (paints): Composition, Types
Week 11	Demonstrates knowledge of the Glass: Classification, Properties, and Uses.
Week 12	Demonstrates knowledge of the Bituminous materials
Week 13	(Asphalt): Sources & type, Chemical composition, Properties, Uses & conducts tests.
Week 14	Demonstrates knowledge of the Types, Properties of flooring materials (Tiles & concrete flags)
Week 15	Demonstrates knowledge of the Plastics: Properties & classification.
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Identifies and reads Standard specification for gypsum.
Week 2	Able to conduct and identify the Bonding materials (gypsum) tests: Fineness.
Week 3	Able to conduct and identify the Bonding materials (gypsum) tests: Standard consistency.
Week 4	Able to conduct and identify the Bonding materials (gypsum) tests: Time of setting of gypsum.
Week 5	Able to conduct and identify the Bonding materials (gypsum) tests: Compressive strength
Week 6	Able to conduct and identify the Bonding materials (gypsum) tests: Flexural strength of gypsum
Week 7	Able to conduct and identify the stone: - Density. - Compressive strength.
Week 8	Able to conduct and identify the stone: - Water absorption. - Specific gravity.
Week 9	Able to conduct and identify wood: Compressive strength





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Week 10	Able to conduct and identify wood: Flexural strength	
Week 11	Able to conduct and identify wood: Water absorption	
Week 12	Able to conduct and identify wood: Fuel absorption	
Week 13	Able to conduct and identify wood: - Density - Specific gravity	
Week 14	Able to conduct and identify steel: Tensile strength	
Week 15	Able to conduct and identify water proofing	
Week 16	Preparatory week before the final Exam	
Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Construction materials their nature and behavior	No
Recommended Texts	A textbook of building construction	No
Websites	www.buildforless.co.uk	





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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	Surveying 1		Module Delivery	
Module Type	Core		☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☒ Practical ☐ Seminar	
Module Code	BCE 107			
ECTS Credits	5			
SWL (hr/sem)	125			
Module Level		1		
Administering Department		BCE	College	TEMO
Module Leader	Dr. Mohammed Adnan Basher		e-mail	E-mail
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification	Ph.D.
Module Tutor	Dr. Mohammed Adnan Basher		e-mail	mbasher@ntu.edu.iq
Peer Reviewer Name		Name	e-mail	E-mail
Scientific Committee Approval Date		28/09/2025	Version Number	3.0

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

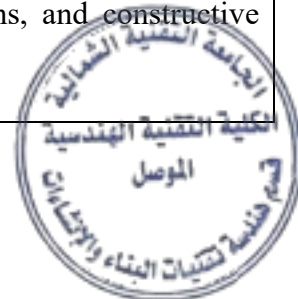
Module Aims, Learning Outcomes and Indicative Contents	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	- Understanding how to determine level of points, horizontal distances, and elevations of points. - Familiarity with surveying instruments related to the practical aspect. - Understanding how to draw contour map. - Understanding how to sketch cross sections and profiles of construction. - Understanding the mathematical methods of cut and fill volumes.





Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Recognize how to use tools in measurement of leveling. • List the various method in measurement. • Summarize what is slope areas and how to level that area. • Discuss the errors through the leveling. • Describe the environmental effects on leveling. • Define the method to draw contour lines. • Discuss the theory of fixing traverses using contour maps. • Define profiles and cross sections of construction. • Explain the mathematical formula to determine volumes using contour maps. • Identify the methods to determine volumes of cut and fill.
Indicative Contents المحتويات الإرشادية	• Introduction to Leveling (Local and Global Levels, Leveling Instruments) • Field Leveling Skills (Benchmarks, Procedures, Leveling Tables) • Error Adjustment and Special Field Conditions (Obstacles, Slopes, Closed Leveling) • Profiles and Cross Sections (Types and Drawing Methods) • Contour Maps (Contour Lines, Traverse Fixing, Volume Estimation) • Cut and Fill Calculations (Level Ground and Contour-Based Methods) • Volume Computation Methods (End Area Method, Prismoidal Method)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Teaching and Learning Strategies: • Active Learning: Hands-on field exercises and group problem-solving. • Experiential Learning: Real-life site visits and case studies. • Problem-Based Learning: Real-world engineering problems and solution development. • Technology-Enhanced Learning: Use of software and virtual simulations. • Collaborative Learning: Team-based projects and peer discussions. • Inquiry-Based Learning: Encouraging questions, hypothesis testing, and experiments. • Assessment and Feedback: Quizzes, presentations, and constructive feedback on practical work.





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

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	15% (15)	5,8,11 and 12	LO #1, #3, #5, #7
	Class Work	2	10% (10)	3 and 8	LO #2, #4 and #6, #8
	Assignments	2	5% (5)	4 and 9	LO #3, #4 and #6, #10
	Report	4	10% (10)	5,8,11 and 12	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	Prismoidal Method
Week 2	Leveling in slope area
Week 3	Contour lines
Week 4	Area of traverse using contour map
Week 5	Profiles of construction
Week 6	Cross sections of construction
Week 7	Area of cross section





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Week 8	Cut and fill on level
Week 9	Cut and fill using contour maps
Week 10	Volume of cut and fill End area method
Week 11	Types of traverses
Week 12	Interior angles and lines in traverses
Week 13	Angle correction in traverses
Week 14	Introduction to Coordinate
Week 15	Measurement of coordinate

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Introduction to leveling
Week 2	Lab 2: Fix the leveling instrument
Week 3-4	Lab 3: Leveling in field
Week 5-6	Lab 4: Contour lines
Week 7-8	Lab 5: Contour maps
Week 9-10	Lab 6: Profiles and cross sections
Week 11-12	Lab 7: Volume of cut and fill
Week 13	Lab 8: Fix of traverse
Week 14-15	Lab 9: Area of traverse

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	N N Basak (2014). Surveying and Levelling. McGraw Hill Education. p. 542. ISBN 9789332901537	No
Recommended Texts	Brinker, Russell C; Minnick, Roy, eds. (1995). The Surveying Handbook. ISBN 978-1-4613-5858-9	No
Websites	https://www.youtube.com/watch?v=qgwBOVUFDAQ	





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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	Engineering Geology		Module Delivery		
Module Type	Support		☒ Theory ☒ Lecture ☐ Tutorial ☐ Practical ☒ Seminar		
Module Code	BCE108				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level	1	Semester of Delivery			2
Administering Department		BCE	College	TEMO	
Module Leader	Enas Hisham Mohammed		e-mail	enas.alhayali@ntu.edu.iq	
Module Leader's Acad. Title		Assistant lecturer	Module Leader's Qualification		Msc.
Module Tutor	Enas Hisham Mohammed		e-mail	enas.alhayali@ntu.edu.iq	
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date		28/09/2025	Version Number		3.0

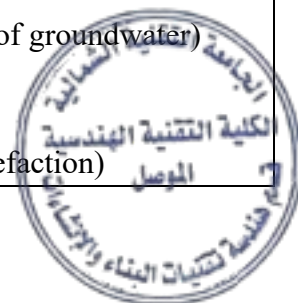
Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Understanding geological phenomena: providing students with a comprehensive knowledge of various geological processes that affect the environment, such as erosion, weathering, earthquakes, landslides, and others. 2. Geological risk assessment: enabling students to identify and evaluate potential geological hazards at engineering project sites, such as landslides, groundwater seepage, and earthquake effects.





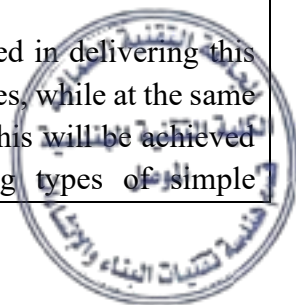
	3. Selection of suitable sites: help students to choose the most suitable sites for engineering projects, taking into account geological factors that may affect the performance of these projects. 4. Design of engineering facilities: provide students with the necessary knowledge to design engineering facilities so that they are able to withstand changing geological conditions.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this course, students will be able to: 1. Explain major geological processes (weathering, erosion, earthquakes, landslides) and evaluate their impact on engineering infrastructure. 2. Identify and classify soils and rocks based on their physical and mechanical properties. 3. Analyze the behavior of soils and rocks under applied loads using fundamental geotechnical principles. 4. Explain groundwater flow mechanisms and assess their influence on soil stability and engineering structures. 5. Interpret and analyze geological maps to extract relevant geological and engineering information. 6. Describe common geotechnical investigation methods including drilling, sampling, and in-situ testing techniques. 7. Evaluate laboratory and field test results to determine soil and rock engineering properties. 8. Relate geological and geotechnical data to engineering decision-making in foundation and infrastructure design.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Geological Processes: • Weathering and erosion • Mass movements (landslides, rockfalls) • Earthquakes and seismic hazards • Volcanic activity • Fluvial and coastal processes • Geotechnical Properties of Soils and Rocks: • Soil classification (e.g., Unified Soil Classification System) • Soil properties (e.g., permeability, compressibility, shear strength) • Rock properties (e.g., strength, durability, weathering susceptibility) • In-situ testing (e.g., standard penetration test, cone penetration test) • Laboratory testing (e.g., particle size analysis, Atterberg limits) • Groundwater: • Hydrogeology (occurrence, movement, and quality of groundwater) • Well drilling and testing • Groundwater contamination and remediation • Groundwater-related hazards (e.g., subsidence, liquefaction)





	• Site Investigation and Exploration: • Geological mapping and remote sensing • Geophysical surveys (e.g., seismic, electrical resistivity) • Drilling and sampling techniques • Borehole logging and interpretation • Foundation Engineering: • Shallow foundations (e.g., footings, slabs) • Deep foundations (e.g., piles, caissons) • Settlement analysis • Bearing capacity evaluation • Slope Stability: • Stability analysis (e.g., limit equilibrium methods) • Slope stabilization techniques (e.g., retaining walls, buttresses) • Landslide hazard assessment and mitigation • Geotechnical Hazards and Risk Assessment: • Earthquake engineering • Liquefaction • Slope instability • Subsidence • Karst hazards • Coastal erosion • Environmental Geotechnics: • Contaminated sites • Waste disposal • Remediation techniques • Sustainability in geotechnical engineering • Computational Geotechnics: • Numerical modeling (e.g., finite element analysis, finite difference method) • Computer-aided design and analysis
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple





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	experiments involving some sampling activities that are interesting to the students.
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Student Workload (SWL)			
الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	27	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	75		

Module Evaluation					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	15% (15)	5,8,11 and 12	LO #2, #4,6 and #8,
	Class Work	2	10% (10)	5 and 7	LO #3,5
	Assignments	2	10% (10)	2 and 12	LO #6, #7
	Seminars	2	5% (5)	3 and 12	LO #1 - #4
Summative assessment	Midterm Exam	1hr	10% (10)	7	LO #1 - #4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Define Geology and Important of geology.
Week 2	Define rocks
Week 3	Types of rocks (Sedimentary, Igneous, and Metamorphic rocks)





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Week 4	Clay minerals (Kaolinite group, Montmorillonite group, Illite group)
Week 5	Surface water (define and types of surface water), Ground water (define permeability and wells)
Week 6	Dams (Types of dams and loads on dams)
Week 7	Site investigation (define site investigation, types of sampling and reports)
Week 8	Types of boring (Rotary drilling, wash boring, Auger boring, Percussion drilling)
Week 9	Mass movement (Types of mass movement, Causes of mass movement)
Week 10	Creep (Define soil creep, Causes of soil creep , and How to stop soil creep)
Week 11	Tunnels (Classification of tunnels, Shape of tunnels, and Method of tunnel construction)
Week 12	Folds (Meaning of folds, Classification of fold, and define fold systems)
Week 13	Faults (Define of fault, and Types of fault)
Week 14	Weathering (Physical, Biological and Chemical weathering)
Week 15	Soil (Clay soil, and sand soil, Peat soil, Silt soil Loam soil and Physical characteristics of soil)
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Engineering book by F. G. Bell	No
Recommended Texts	Engineering geology principles and practice by M. H. de Freitas	No
Websites	https://www.sciencedirect.com/journal/engineering-geology	





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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 (DYNAMICS)			Module Delivery	
Module Type	Core			☒ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	BCE 109				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		1	Semester of Delivery		
Administering Department		BCE	College	TEMO	
Module Leader	Mohammed Hatim		e-mail		
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		Ph.D.
Module Tutor	Mohammed Hatim		e-mail		
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date		28/09/2025	Version Number		3.0

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	- Understanding Kinematics of Particles and Rigid Bodies: - Analyze the motion of particles and rigid bodies in various coordinate systems (rectilinear, curvilinear, polar, etc.). - Solve problems involving velocity and acceleration in different dimensions. - Applying Newton's Second Law of Motion:





	• Develop the ability to apply Newton's second law to analyze forces and motion in dynamic systems. • Understand the relationship between forces and acceleration in different mechanical systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Comprehend and Analyze Kinematics of Particles and Rigid Bodies: • Demonstrate an understanding of the kinematics of particles and rigid bodies in various coordinate systems (rectilinear, curvilinear, etc.). • Accurately calculate displacement, velocity, and acceleration in both 2D and 3D motion. • Apply Newton's Laws to Dynamic Systems: • Effectively apply Newton's second law to analyze forces, accelerations, and motion in both translational and rotational systems. • Solve problems involving the dynamic equilibrium of particles and rigid bodies under the influence of external forces.
Indicative Contents المحتويات الإرشادية	• Frame Analysis - Analysis of frames using method of members - Internal forces in structural members • Friction - Theory of friction - Types of friction - Angle of friction - Wedges and practical applications • Centroids - Centroids of lines and areas - Centroids by integration - Centroids of composite areas - Engineering applications • Moment of Inertia - Area moment of inertia - Polar moment of inertia - Radius of gyration - Parallel axis (transfer) theorem - Composite areas - Product of inertia - Inclined axes - Mohr's circle for moment of inertia • Principles of Dynamics - Kinematics and kinetics - Motion of a particle • Kinetics of Particles - Fundamental equations of kinetics - Effective force on a particle - Rectilinear translation - Motion with constant acceleration





	- Free falling bodies • Dynamic Equilibrium - Kinetics of rectilinear translation (particle analysis) - Dynamic equilibrium in translation (rigid body analysis)
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lecture & In-Class Activities, Preliminary & Further Study, Assignment (Homework) group Work, Final Exam, Mid-Term Exam and short Exam.

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

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





Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
1,2,3	Demonstrates knowledge and conducts the frames Analysis (method of members)
4,5	- Demonstrates knowledge Friction, Theory of friction, Types of friction, Wedges, Applications - Computes Angle of friction
6,7,8	Computes Centroids of areas & lines, Centroids by integration, Centroids of composite areas, Applications.
9	Computes Moment of inertia , Polar moment of inertia , Radius of gyration , Transfer formula for moment of inertia , Moment of inertia for composite areas , Product of inertia , Moment of inertia with respect to inclined axes , Mohr` circle for moment of inertia .
10,11	- Demonstrates knowledge of the Principles of dynamics, Kinematics & kinetics, Motion of a particle, - Able to apply Fundamental Equations of kinetics for a particle, Effective force on a particle.
12,13	Demonstrates knowledge of the Rectilinear translation, Rectilinear motion with constant acceleration, Free falling bodies.
14,15	Demonstrates knowledge of the Kinetics of rectilinear translation (Analysis as a particle), Dynamic Equilibrium in translation (Analysis as a rigid body).

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Engineering Mechanics: Dynamics – J.L. Meriam & L.G. Kraige Engineering Mechanics: Dynamics – R.C. Hibbeler	Yes
Recommended Texts	Vector Mechanics for Engineers: Dynamics – Beer, Johnston, Mazurek & Cornwell	
Websites		





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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	Calculus1		Module Delivery		
Module Type	Core		☒ theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar		
Module Code	BCE110				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		1			Semester of Delivery
Administering Department		BCE	College	TEMO	
Module Leader	Raghad zidan		e-mail	Raghad.zidan@ntu.edu.iq	
Module Leader’s Acad. Title		Assist. Lecturer	Module Leader’s Qualification		Master
Module Tutor			e-mail		
Peer Reviewer Name		Name	e-mail		
Scientific Committee Approval Date		28/09/2025	Version Number	3.0	

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	By the end of this module, students will be able to: 1. Understand and apply fundamental concepts of functions, graphs, transformations, and trigonometry. 2. Analyze limits and continuity, and evaluate them in various forms including finite, infinite, and at infinity. 3. Apply differentiation techniques to various types of functions including trigonometric, exponential, and logarithmic functions. 4. Solve problems using the chain rule, implicit differentiation, and higher-order derivatives.





	5. Utilize derivative concepts in real-world applications such as optimization, motion, and curve sketching. 6. Perform integration using basic and advanced techniques for trigonometric, inverse trigonometric, exponential, and logarithmic functions. 7. Apply integration in calculating areas under and between curves, and in determining volumes of solids. 8. Understand the fundamentals of matrices and apply matrix operations to solve linear systems. 9. Use techniques such as matrix inversion and Cramer's Rule in solving systems of equations. 10. Compute eigenvalues and eigenvectors and understand their significance in linear transformations.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of this module, students will be able to: • Represent and analyze functions and their transformations graphically and algebraically, including trigonometric and inverse functions. • Evaluate limits and assess continuity for different types of functions. • Differentiate elementary and composite functions using rules such as the chain rule and implicit differentiation. • Calculate and interpret higher-order derivatives in the context of real-life applications. • Apply derivative concepts to solve problems involving motion, optimization, and graphical analysis. • Integrate a wide range of functions and apply integration rules effectively. • Solve definite integrals and use integration in applications such as area under curves, area between curves, and volume of solids. • Perform matrix operations including addition, multiplication, and finding the inverse of a matrix. • Solve systems of linear equations using inverse matrices and Cramer's Rule. • Calculate eigenvalues and eigenvectors and explain their relevance in mathematical modeling and transformations.
Indicative Contents المحتويات الإرشادية	The module begins with a review of foundational mathematical concepts including functions, graphs, transformations, and trigonometry. Students will also revisit trigonometric functions and their graphs, as well as inverse functions. Following this, the course introduces the concept of limits, including finite, infinite, and one-sided limits, and explores continuity and its implications in calculus. Students will then progress to differentiation, covering basic differentiation rules and extending to trigonometric, exponential, and logarithmic functions. Advanced techniques including the chain rule, implicit differentiation, and higher-order derivatives are also introduced.



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	Applications of derivatives are studied in depth, including motion, optimization, and sketching graphs using derivative tests. Integration is then introduced, beginning with basic rules and progressing to the integration of trigonometric, inverse trigonometric, exponential, and logarithmic functions. Practical applications such as calculating the area under and between curves and determining volume using integrals are emphasized. In the final part of the module, linear algebra is introduced with a focus on matrices. Topics include matrix operations, solving systems of linear equations using the inverse matrix and Cramer's Rule, and the calculation and interpretation of eigenvalues and eigenvectors. The final week is reserved for review and preparation for the final examination.
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Explanation using various modern presentation tools. Lecture method and use of interactive whiteboard. Forming discussion groups during lectures. Thinking questions such as what, how, when, and why. Homework assignments that require self-explanations in causal ways.

Student Workload (SWL) الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	62	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	150		





Module Evaluation					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	15% (15)	5,8,11 and 12	LO #1, #2 and #9, #10
	Class Work	2	15% (15)	2 and 12	LO #3, #4 and #6, #7
	Assignments	2	10% (10)	3 and 7	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	Review: Functions, Graphs, transformations, Trigonometry
Week 2	Trigonometric Function & Graphs – Inverse Function
Week 3	Limit (finite, infinite, and at infinity) and Continuity
Week 4	Derivatives: Differentiation & Basic Rules
Week 5	Derivatives of all Functions (Trig, Exponential & Logarithmic)
Week 6	Chain rule – Implicit Differentiation – Higher Order Derivatives
Week 7	Applications of Derivatives
Week 8	Integration: Differentiation & Basic Rules
Week 9	Integration of Trigonometric Functions & Inverse Trigonometric Functions
Week 10	Integration of Exponential and Logarithmic Functions
Week 11	Applications of Integration: Area under/between curves & Volume
Week 12	Matrices
Week 13	Solving Linear Systems Using the Inverse of a Matrix, Cramer's Rule
Week 14	Eigenvalues and Eigenvectors
Week 15	Preparatory week before the final Exam
Week 16	Review: Functions, Graphs, transformations, Trigonometry





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Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Calculus I, Paul Dawkins, 2007	Yes
Recommended Texts	Calculus: Early Transcendentals – James Stewart Thomas' Calculus – George B. Thomas, Maurice Weir Calculus – Larson & Edwards	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.

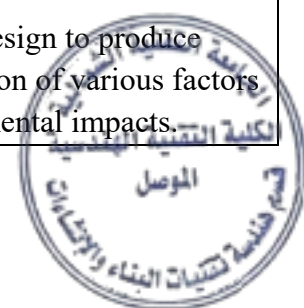




Module Information					
معلومات المادة الدراسية					
Module Title	Computer		Module Delivery		
Module Type	Core		☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☒ Practical ☒ Seminar		
Module Code	NTU 102				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level		1			Semester of Delivery
Administering Department		BCE	College	TEMO	
Module Leader	Ekhlās N. Alansari		e-mail		
Module Leader’s Acad. Title		Assist. Lecturer	Module Leader’s Qualification		Master
Module Tutor			e-mail	ekhlaasmohammed@ntu.edu.iq	
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date		28/09/2025	Version Number		3.0

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	- Teaching computer principles in civil engineering equips students with the ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics - Computer principles aid in applying engineering design to produce solutions that meet specified needs with consideration of various factors such as public health, safety, welfare, and environmental impacts.





	• Learning computer principles helps students effectively communicate with diverse audiences, a vital skill for successful engineering professionals. • Teaching computer principles encourages graduates to engage in lifelong learning through professional training, independent inquiry, and acquiring new knowledge as needed to meet career goals and contribute creative ideas to their profession • Computer education in civil engineering emphasizes recognizing ethical and professional responsibilities in engineering situations, fostering informed judgments considering global, economic,.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Understanding computer hardware components and their functions. • Windows: Proficiency in using the Windows operating system • The student will be able to use the word program such as creating tables in and inserting images into diagrams • The student will be able to use the EXCEL program such as writing functions, preparing tables and inserting charts • The student will be able to create a presentation that includes a number of Slides, using images, tables, diagrams, changing colors Influences • The student will get acquainted with the global network (the internet) and deal with it ,Search and create email
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A - Computer fundamentals</u> Definition of computer- Parts of computer- Devices related to computer, Software and hardware, Windows- Able to use the following items: Start menu, desktop, taskbar , mouse applications, My computer , My documents , drivers , folders , files , cut , copy <u>Part B -Microsoft Word</u> Introduction to Microsoft Word and the Interface, Text Formatting and Tables , Page Layout and References <u>Part C- Excel Microsoft</u> Excel Fundamentals and Data Entry, Formulas and Functions, Charts and Data Analysis <u>Part D -PowerPoint Microsoft</u> Introduction to PowerPoint and Basic Features, Enhancing Your Presentations , Advanced Techniques and Best Practices <u>Part E –Internet</u> Introduction to the World of the Internet, Search Engines, Create an email account





Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Lecture: Introduce new concepts and demonstrate techniques. Hands-on Activities: Provide guided practice for students to apply what they've learned. Group Work: Encourage collaboration and problem-solving through group activities. Q&A: Facilitate discussion and address student questions
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

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

Module Evaluation

تقييم المادة الدراسية

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





Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري والعملية

	Material Covered
Week 1	Computer fundamentals / Definition of computer- Parts of computer- Devices related to computer
Week 2	Computer fundamentals/ Software and hardware
Week 3	Computer fundamentals/ Windows- Able to use the following items: Start menu, desktop, taskbar , mouse applications, My computer , My documents , drivers , folders , files , cut , copy ,
Week 4	Microsoft Word / Introduction to Microsoft Word and the Interface
Week 5	Microsoft Word/ Text Formatting and Tables
Week 6	Microsoft Word/ Page Layout and References
Week 7	Excel Microsoft / Excel Fundamentals and Data Entry
Week 8	Excel Microsoft / Formulas and Functions
Week 9	Excel Microsoft/ Charts and Data Analysis
Week 10	PowerPoint Microsoft / Introduction to PowerPoint and Basic Features
Week 11	PowerPoint Microsoft /Enhancing Your Presentations
Week 12	PowerPoint Microsoft / Advanced Techniques and Best Practices
Week 13	Internet/Introduction to the World of the Internet
Week 14	Internet/ Search Engines
Week 15	Internet/ Create an email account
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Computer fundamentals / Definition of computer- Parts of computer- Devices related to computer
Week 2	Computer fundamentals/ Software and hardware
Week 3	Computer fundamentals/ Windows- Able to use the following items: Start menu, desktop, taskbar , mouse applications, My computer, My documents , drivers , folders , files , cut , copy ,
Week 4	Microsoft Word / Introduction to Microsoft Word and the Interface
Week 5	Microsoft Word/ Text Formatting and Tables





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Week 6	Microsoft Word/ Page Layout and References
Week 7	Excel Microsoft / Excel Fundamentals and Data Entry
Week 8	Excel Microsoft / Formulas and Functions
Week 9	Excel Microsoft/ Charts and Data Analysis
Week 10	PowerPoint Microsoft / Introduction to PowerPoint and Basic Features
Week 11	PowerPoint Microsoft /Enhancing Your Presentations
Week 12	PowerPoint Microsoft / Advanced Techniques and Best Practices
Week 13	Internet/Introduction to the World of the Internet
Week 14	Internet/ Search Engines
Week 15	Internet/ Create an email account
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Principles of Computer Security, Fourth Edition 4th Edition	Yes
Recommended Texts		
Websites	- Microsoft Learn: https://www.google.com/url?sa=E&source=gmail&q=https://learn.microsoft.com/ - Office Support: https://www.google.com/url?sa=E&source=gmail&q=https://support.microsoft.com/office - Official Microsoft Channel https://www.youtube.com/microsoft	





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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	Arabic Language		Module Delivery		
Module Type	Basic		✓ Theory ✓ Lecture Lab Tutorial Practical ✓ Seminar		
Module Code	NTU 103				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level	1		Semester of Delivery	2	
Administering Department	BCE		College	TEMO	
Module Leader	Dr. Eesha I. Mohammed		e-mail	aysha.ibrahim@ntu.edu.iq	
Module Leader's Acad. Title		Assist. Prof.	Module Leader's Qualification		PHD
Module Tutor	None		e-mail	None	
Peer Reviewer Name		None	e-mail	None	
Review Committee Approval		28/09/2025	Version Number		3.0

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	ينشأ الطالب على حب اللغة العربية لغة القرآن الكريم. التعرف على مواطن الجمال في اللغة العربية وأدائها، وأن يكتسب الطالب القدرة على دراسة فروع اللغة العربية. تعريف الطالب بالفاظ اللغة العربية الصحيحة وتراكيبها وأساليبها السليمة بطريقة مشوقة وجذابة. أن يستغل الطالب وقت فراغه بالقراءة والاطلاع والرجوع إلى المكتبة. تمكين الطالب من القراءة الصحيحة، وأن يكتسب القدرة على استعمال اللغة استعمالاً صحيحاً في الاتصال مع الآخرين؛ كالسرعة وجودة الإلقاء وحسن التعبير، وتعويد حسن الاستماع لما يسمع مما يبسر له أموره ويعينه على قضاء حوائجه. تنمية الذوق الأدبي لدى الطالب حتى يدرك النواحي الجمالية في أساليب الكلام ومعانيه وصوره. تعويد الطالب التعبيرات السليمة الواضحة عن أفكاره وما يقع تحت حواسه نطقاً وكتابة وحسن استخدام علامات الترقيم. تنمية قدرة ومهارة الطالب الإملائية والخطية بحيث يستطيع الكتابة الصحيحة من جميع النواحي. إيقاظ وعي الطالب لإدراك شرف الكلمة وتوجيهه؛ للمحافظة على طهارتها ونقاها حتى لا تستعمل إلا في الخير. مساعدة الطالب على فهم التراكيب المعقدة والأساليب الغامضة.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. معرفة القواعد النحوية والصرفية. 2. التعريف بأبرز المصنفات اللغوية والأدبية. 3. تحديد المشكلات اللغوية والأدبية لدى الدارسين. 4. القراءة المعاصرة للنصوص اللغوية والأدبية. 5. قراءة النصوص الأدبية وكتابتها وفق المعايير النحوية والصرفية. 6. تعزيز الثقة بالنفس والجرأة والفصاحة. 7. المنافسة والتميز في سوق العمل.



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Indicative Contents المحتويات الإرشادية	❖ مقدمة عن الأخطاء اللغوية التاء المربوطة والتاء المفتوحة ❖ تطبيقات الأخطاء اللغوية الشائعة وأقسام الكلام ❖ همزة الوصل والقطع والهمزة المتوسطة والمتطرفة قواعد كتابة الالف الممدودة والمقصورة ❖ الحروف الشمسية والقمرية والضاد والطاء ❖ المشاكل والمعوقات ونقاشات
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- تبسيط المعلومات وتنظيمها 2- تسهيل عملية استرجاع المعلومات 3- ربط المفاهيم الجديدة بالمكتسبات السابقة 4- إيجاد العلاقة بين المفاهيم 5- تسهيل تذكر المعارف والمعلومات

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

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	15% (15)	5,8,11 and 12	LO #1, 2, 10 and 11
	Class Work	2	10% (5)	3 and 8	
	Assignments	2	10% (10)	5 and 10	All
	Seminars	2	5% (5)	4 and 13	
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3 hr	50% (60)	16	All
Total assessment			100% (100 Marks)		





Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	مقدمة عن الأخطاء اللغوية
Week 2	التاء المربوطة والتاء المفتوحة
Week 3	همزة الوصل والقطع
Week 4	الهمزة المتوسطة والمتطرفة
Week 5	قواعد كتابة الالف الممدودة والمقصورة
Week 6	الحروف الشمسية والقمرية
Week 7	الضاد والطاء
Week 8	العدد
Week 9	المفاعيل
Week 10	أقسام الكلام
Week 11	معاني حروف الجر
Week 12	تطبيقات الأخطاء اللغوية الشائعة
Week 13	النون والتنوين
Week 14	مقدمة عن الأخطاء اللغوية
Week 15	الامتحان النهائي

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	الكامل في اللغة والادب لأبي عباس المبرد	Yes
Recommended Texts	أخطاء لغوية شائعة لخالد بن هلال بن ناصر العبري	No
Websites	https://www.eshamel.net https://www.ektebsa7.com	





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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	Concrete Technology I		Module Delivery		
Module Type	Core		☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☒ Practical ☐ Seminar		
Module Code	BCE 201				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		2			Semester of Delivery
Administering Department		BCE	College	TEMO	
Module Leader	Eethar Thanon Dawood		e-mail	eethardawood@nth.edu.iq	
Module Leader's Acad. Title		Professor	Module Leader's Qualification		Ph.D.
Module Tutor	Mafaz Hani Abdullah		e-mail	mafaz.hani@ntu.edu.iq	
Peer Reviewer Name		-	e-mail	-	
Scientific Committee Approval Date		28/09/2025	Version Number		3.0

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	By the end of this component, students will be able to: - Understand the historical development and basic composition of concrete. - Identify and describe the functions of concrete constituents including cement, aggregates, water, and admixtures. - Demonstrate understanding of the chemistry and manufacturing process of Portland cement and other types. - Classify various types of cement and explain their appropriate applications.





	• Evaluate aggregate properties through theoretical understanding and practical analysis. • Assess the role and classification of chemical and mineral admixtures used in concrete. • Understand the effects of material properties on concrete performance and durability.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completing this component, students will be able to: 1. Explain the history, composition, and general properties of ordinary concrete. 2. Describe the manufacturing process, chemical components, and physical behavior of Portland cement. 3. Identify different types of cement and match them with their functional uses. 4. Analyze the properties and types of aggregates and their influence on concrete performance. 5. Perform practical tests on aggregates, including grading and moisture content analysis. 6. Explain the role of water in mixing and curing, and its quality considerations. 7. Identify and describe the functions of various admixtures, including pozzolanic materials and water-proofing agents.
Indicative Contents المحتويات الإرشادية	The course content should be structured as follows: - Overview of concrete history, composition, and properties. - Introduction to concrete ingredients: cement, aggregates, water, admixtures. - Functions of paste and aggregates in concrete. - Portland cement: chemical composition, hydration reactions, manufacturing, and properties. - Classification of cements: OPC, modified, rapid-hardening, low-heat, sulfate-resisting, pozzolanic, slag, fly ash, aluminous, white, hydrophobic, waterproof, etc. - Aggregate properties: shape, texture, specific gravity, porosity, absorption, moisture. - Grading and sieve analysis; fineness modulus; gap grading. - Harmful substances in aggregates and reactions (alkali-silica, alkali-carbonate). - Storage and handling of aggregates. - Water for mixing and curing: quality and standards. - Admixtures: purpose and types (chemical, mineral, pozzolanic, water reducers, accelerators, retarders, plasticizers, curing agents, etc.).





Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	To achieve the intended learning outcomes for this unit, the following strategies will be used: • Theoretical Lectures: Core knowledge about cement chemistry, aggregate properties, and admixtures will be delivered using structured lectures supported with diagrams and animations. • Laboratory Exercises: Students will conduct standard experiments such as sieve analysis, aggregate moisture determination, and cement fineness testing to bridge theory with practice. • Material Samples and Demonstrations: Real samples of different types of cement, aggregates, and admixtures will be used in class demonstrations to deepen material familiarity. • Case-Based Learning: Industry-relevant cases involving cement selection, aggregate compatibility, and admixture choice will be used to develop problem-solving skills. • Conceptual Mapping and Charts: Visual tools will be integrated to help students map material relationships and their impact on concrete performance. • Formative Assessments and Discussions: Weekly quizzes and peer-discussion sessions will reinforce core concepts and allow early feedback.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
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	4	15% (15)	5,8,11 and 12	LO #1, #2 and 7
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #5, #6



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	Project / Lab.	10	5% (5)	3 and 9	All
	Report	4	10% (10)	5,8,11 and 12	LO #5, #7
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Demonstrates knowledge about concrete, history of concrete, concrete ingredients, composition of concrete; functions of the paste and aggregate; general properties of ordinary concretes.
Week 2	Demonstrates knowledge about concrete – making materials – Portland Cement; basic constituents of cement; chemical formulas and processes.
Week 3	Correctly implement manufacture of Portland cement; chemical analysis of Portland cement; major compounds in Portland cement. Identify the influence of composition upon characteristics of Portland cement.
Week 4	Correctly implement manufacture of Portland cement; chemical analysis of Portland cement; major compounds in Portland cement. Identify the influence of composition upon characteristics of Portland cement.
Week 5	Able to identify types of Portland cement: Ordinary; Modified; Rapid hardening; low heat; Sulphate resisting. Other types: High-early strength; pozzolana – cement and pozzolana; Slag cement; Blast – Furnace slag; masonry cement ; Expansive cement ; Aluminous cement ; White Portland ; Fly ash ; Anti – bacterial ; Hydrophobic cement ; Waterproof cement ; Natural cement .
Week 6	Able to identify types of Portland cement: Ordinary; Modified; Rapid hardening; low heat; Sulphate resisting. Other types: High-early strength; pozzolana – cement and pozzolana; Slag cement; Blast – Furnace slag; masonry cement ; Expansive cement ; Aluminous cement ; White Portland ; Fly ash ; Anti – bacterial ; Hydrophobic cement ; Waterproof cement ; Natural cement .
Week 7	Able to identify types of Portland cement: Ordinary; Modified; Rapid hardening; low heat; Sulphate resisting. Other types: High-early strength; pozzolana – cement and pozzolana; Slag cement; Blast – Furnace slag; masonry cement ; Expansive cement ; Aluminous cement ; White Portland ; Fly ash ; Anti – bacterial ; Hydrophobic cement ; Waterproof cement ; Natural cement .





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Week 8	Demonstrates knowledge about concrete aggregates: Preliminary remarks; general characteristics; data needed for proportioning mixtures; sampling aggregate; particle shape and texture; bond of aggregates; specific gravity; unit weight and voids; porosity and absorption, moisture content
Week 9	Mid term exam
Week 10	Demonstrates knowledge about gradation; sieve analysis; maximum size of aggregates; fineness modulus.
Week 11	Correctly execute practical grading; gap – graded aggregates; oversize and undersize; all – in aggregates; bulking of sand; soundness of aggregates
Week 12	Demonstrates knowledge about Handling and storing aggregates; Deleterious substances: organic impurities; alkali – aggregates reaction; alkali – carbonate reaction; thermal properties of aggregates. Demonstrates knowledge about water and identify Mixing and Curing water on concrete
Week 13	Demonstrates knowledge about Handling and storing aggregates; Deleterious substances: organic impurities; alkali – aggregates reaction; alkali – carbonate reaction; thermal properties of aggregates. Demonstrates knowledge about water and identify Mixing and Curing water on concrete
Week 14	Demonstrates knowledge about admixtures: Admixtures, the purpose of admixtures, chemical and mineral admixtures. Accelerators: Retarders; Water – Reducing Admixture; super plasticizers; Workability admixtures; Air –entraining Admixtures; Expansion –producing Admixtures; Pozzolanic materials; Bonding admixtures; Curing aids; Water Proofers; Colouring agents ; Surface hardeners
Week 15	Demonstrates knowledge about admixtures: Admixtures, the purpose of admixtures, chemical and mineral admixtures. Accelerators: Retarders; Water – Reducing Admixture; super plasticizers; Workability admixtures; Air –entraining Admixtures; Expansion –producing Admixtures; Pozzolanic materials; Bonding admixtures; Curing aids; Water Proofers; Colouring agents ; Surface hardeners

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Measuring of consistency of cement.
Week 2	Lab 2: Measuring of fineness of cement by sieves and Blaine
Week 3	Lab 3: Measuring of setting time of cement
Week 4	Lab 4: Measuring of Soundness and specific gravity of cement.
Week 5	Lab 5: Measuring of compressive strength of cement mortar
Week 6	Lab 6: Measuring of flexural strength of cement mortar
Week 7	Lab 7: Methods of strength activity index of cementitious materials.





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Week 8	Lab 8: Method of sampling for fine and coarse aggregate
Week 9	Mid-term exam
Week 10	Lab 10: Determination of sieve analysis for fine aggregate
Week 11	Lab 11: Determination of sieve analysis for coarse aggregate
Week 12	Lab 12: Determination of specific gravity for coarse aggregate
Week 13	Lab 13: Determination of specific gravity for fine aggregate
Week 14	Lab 14: Measuring of Unit weight of fine and coarse aggregate
Week 15	Lab 15: Determination of materials finer than 0.075 mm in fine and coarse aggregate.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Properties of concrete, Nivelle, 2011	No
Recommended Texts	ASTM, Standard, 2020	Yes
Websites	https://www.astm.org/products-services/bos.html	





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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	Core		☒ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	BCE 202			
ECTS Credits	5			
SWL (hr/sem)	125			
Module Level	2	Semester of Delivery		
Administering Department		BCE	College	TEMO
Module Leader	Majid Ali Dhahir		e-mail	Majid.algburi@ntu.edu.iq
Module Leader's Acad. Title			Module Leader's Qualification	Ph.D.
Module Tutor			e-mail	E-mail
Peer Reviewer Name		Name	e-mail	E-mail
Scientific Committee Approval Date		28/09/2025	Version Number	3.0

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	• Deepen understanding of fundamental principles of material strength: The course aims to enable students to understand and analyze the behavior of materials under different forces. • Develop the ability to analyze engineering systems: The course aims to enhance students' ability to analyze and design structural systems that meet strength and stiffness requirements. • Stress and Strain Analysis: The course teaches students how to calculate the stresses and strains experienced by materials due to applied forces.



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	- Enhance engineering thinking: Students are trained to think logically and systematically to solve engineering problems related to material strength. - Link theoretical concepts with practical applications: The course links theoretical material strength principles with practical solutions in engineering applications
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	- know the relations between externally applied loads and their internal effects on bodies (Strains, Deformations, and Stresses). - Define Stresses in Beams - Derivation of flexure formulas, Economic sections, Unsymmetrical beams, Analysis of flexure action, Formula for horizontal shear stress.. - Discuss and draw free body diagrams and moment-curvature diagrams. - Explain the concept of Beams Deflections
Indicative Contents المحتويات الإرشادية	Torsion - Torsion of Circular Shafts - Compatibility Equilibrium - Torsion formulas - Power transmission - Statically indeterminate problems

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	- Lectures using various modern presentation tools. - Interactive whiteboard lectures. - Discussion groups during lectures to stimulate thinking and analysis. - Asking students a set of reflective questions during lectures that include words like "What," "How," "When," and "Why." - Assigning homework that requires problem-solving and reasoning

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
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	4	15% (15)	5,8,11 and 12	LO #1 - #4
	Class Work	2	15% (15)	2 and 12	LO #3 - #5
	Assignments	2	10% (10)	3 and 8	
Summative assessment	Midterm Exam	1hr	10% (10)	7	LO #1 - #4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
1&2	Stresses - Introduction - Simple Stress
3&4	Stresses - Shearing Stress - Bearing Stress
5&6	Simple Strain - Stress-Strain Diagram - Hooke's Law: Axial and Shearing Deformations
7&8	Simple Strain - Poisson's Ratio: Statically Indeterminate Members - Thermal Stresses
9&10	Torsion - Torsion of Circular Shafts - Compatibility Equilibrium - Torsion formulas - Power transmission - Statically indeterminate problems
11&12	Shear and Moment in Beams - Shear and Moment - Interpretation of Vertical Shear and Bending Moment
13&14	- Shear-Moment Diagrams - Relations among Load, Shear, and Moment
15	- Shear-Moment Equations





Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	o A. Pytel and J. Kiusalaas, Strength of Materials. Cengage Learning, 3rd ed	No
Recommended Texts	o J. M. Gere and B. J. Goodno, Mechanics of Materials. Cengage Learning, 9th ed., 2018	Yes
Websites	o Websites related to Strength of Materials	

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
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Fail Group (0 - 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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

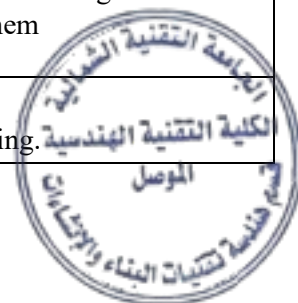




Module Information					
معلومات المادة الدراسية					
Module Title	BUILDING CONSTRUCTION		Module Delivery		
Module Type	Core		☒ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☒ Seminar		
Module Code	BCE 203				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	2	Semester of Delivery			1
Administering Department		BCE	College	Type College Code	
Module Leader	Dr. Omar Abdulwahhab Khalaf		e-mail	omar.khalaf@ntu.edu.iq	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		Ph.D.
Module Tutor	Dr. Omar Abdulwahhab Khalaf		e-mail	omar.khalaf@ntu.edu.iq	
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date		28/09/2025	Version Number	3.0	

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	• Know how to conduct field and laboratory soil tests • Knowing the types of foundations and how to create them • Learn about the methods of building walls and how to create them • Identify the types of thermal and sound insulators used in buildings • Identify the types of slip form and methods of creating them
Module Learning Outcomes	To understand: • Equip learners with skills in site preparation and site testing.





مخرجات التعلم للمادة الدراسية	• Introduce learners to the types of foundations used in building construction and specify the application of each type. • Familiarize learners with the types and methods of building construction, as well as the types of structural systems used and their components. • Introduce learners to the formwork used in the execution and construction of buildings. • -Educate learners on thermal and acoustic insulation methods for buildings by identifying types of insulation and their applications
Indicative Contents المحتويات الإرشادية	1. Introduction to Building Construction • Definition of building construction concepts. • Importance of planning and design in construction. 2. Types of Foundations • Shallow foundations: types and applications. • Deep foundations: types and applications. • Analysis of geological conditions and their impact on foundation selection. 3. Building Materials • Types of materials used in construction: concrete, brick, steel, wood. • Properties of materials and testing methods.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Interactive Lectures • Use multimedia presentations to illustrate key concepts and real-world applications. • Encourage questions and discussions to engage students actively. Hands-On Workshops • Organize practical sessions where students can work with construction materials and tools. • Simulate construction tasks to enhance understanding of techniques and processes. Site Visits





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	• Arrange visits to construction sites to provide students with firsthand experience. • Facilitate discussions with industry professionals to gain insights into real-world practices. Group Projects • Assign collaborative projects that require students to design and plan a building. • Encourage teamwork to develop communication and problem-solving skills. Case Studies • Analyze real construction projects to understand challenges and solutions. • Discuss the application of theories and principles in practical scenarios. Guest Lectures • Invite industry experts to share their experiences and knowledge. • Provide students with exposure to current trends and technologies in construction. Online Resources • Utilize online platforms for research and collaboration. • Encourage students to access digital libraries, forums, and webinars relevant to building construction.
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Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		





Module Evaluation					
تقييم المادة الدراسية					
As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	15% (15)	5,8,11 and 12	LO #1 - #3
	Class Work	2	10% (10)	2 and 12	LO #2 - #4
	Assignments	2	5% (5)	3 and 8	LO 1,2
	Seminars	2	5% (5)	4 and 9	LO #1-5
	Project	1	5%(5)	14	All
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #4
	Final Exam	3hr	50% (50)	16	ALL
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Building Construction Steps
Week 2	Site preparation
Week 3	Observing the Project During Site Planning
Week 4	Earthworks, Excavation, and Site Preparation
Week 5	Definition of the Concept of Foundations and Selection Criteria
Week 6	Shallow foundation
Week 7	Deep foundation
Week 8	Introduction to Types of Walls in Buildings and Their Benefits
Week 9	Brick Construction
Week 10	Stone and Block Construction
Week 11	Forms Used in Building Construction
Week 12	Slip forms
Week 13	Acoustical insulation
Week 14	Material
Week 15	Method of isolating





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Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Building construction handbook / Merritt	Yes
Recommended Texts	Building technology /Boyer	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.





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Module Information					
معلومات المادة الدراسية					
Module Title	SURVEYING-II			Module Delivery	
Module Type	Core			☒ Theory ☒ Lecture ☒ Practical ☒ Seminar	
Module Code	BCE 204				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		2	Semester of Delivery		1
Administering Department		BCE	College	TEMO	
Module Leader	Saleh Jaafer suleiman		e-mail	salehjaafer@ntu.edu.iq	
Module Leader's Acad. Title		Assistant Professor	Module Leader's Qualification		Dr.
Module Tutor			e-mail		
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date		28/09/2025	Version Number	3.0	

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 objectives of Surveying-II generally focus on advancing students' understanding of geospatial measurements, methods, and tools. It builds upon basic surveying concepts and covers more advanced topics in surveying, including: 1. Equip students with knowledge of the fundamental concepts and applications of total station equipment in surveying. 2. Develop skills to accurately set up, configure, and operate total stations for various engineering tasks. 3. Foster a solid understanding of horizontal and vertical curve computations and applications in civil engineering projects. 4. Introduce and apply advanced techniques in GPS and GIS for real-world surveying projects. 5. Ensure students can perform accurate field measurements and calculations using total stations in diverse engineering scenarios. 6. Prepare students to handle tunnel surveying tasks with precision. - Promote the correct use and interpretation of surveying data for infrastructure development projects.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this course, students will be able to: - Demonstrate proficiency in the operation, configuration, and setup of total station equipment. - Correctly interpret and draw horizontal and vertical curves, along with their calculations for engineering projects. - Apply GPS and GIS technology in land surveying and infrastructure projects effectively. - Perform accurate field measurements using total stations and analyze the data for project-specific requirements. - Execute tunnel surveying techniques with a strong understanding of its practical applications. - Handle electronic distance measurement (EDM) settings and other system configurations within total station devices. - Understand and explain technical terms and abbreviations related to total station use and surveying.
Indicative Contents المحتويات الإرشادية	Content Guidelines: Introduction to Total Station: - System description and components. - User interface and operating modes (theodolite, program, data management). - Station setup and application programs. Operation and Configuration: - Total station setup and field operation. - Electronic Distance Measurement (EDM) settings.





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	• Data collection and management techniques. • Curve Computations: • Horizontal and vertical curve theory, types, and computations. • Drawing and interpreting curves in project designs. • Advanced Surveying Techniques: • Global Positioning System (GPS) implementation in surveying. • Geographic Information System (GIS) in mapping and data analysis. • Field Measurements: • Practical field measurement techniques using total stations. • Project-based exercises on distance and angle measurements. • Tunnel Surveying: • Techniques and tools for surveying tunnel alignments. • Practical applications and case studies. • Instrument Calibration and Protection: • Instrument calibration (Check & Adjust). • System info and protection mechanisms.
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Teaching and Learning Strategies: • Lectures: • Hands-on Training: • Fieldwork to practice curve computations, tunnel surveying, and GIS-based mapping. • Group Projects: • Case Studies: • Assessment: • Quizzes, fieldwork reports, and group project presentations to assess students' practical skills and theoretical knowledge.
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Student Workload (SWL)

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	78	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	47	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	125		





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

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
Week 1,2	Identifying the integrated station device, describing the system and learning about the user interface, operation, configuring the device, weighing the device, learning to use programs, learning about applications.
Week 3,4	Learning about the settings of the electronic distance-measuring device (EDM), system information, checking, adjusting, and protecting devices, checking, adjusting, and initializing, learning about symbols, technical terms, and abbreviations, device components, and device settings, learning to measure distances, and learning to measure distances using a laser.
Week 5	Identify the different types of horizontal curves, perform calculations using the theodolite device and the integrated station device, and correct them in various applications of civil engineering works.
Week 6	Performing projection and lifting operations for different types of horizontal curves using the theodolite device and the integrated total station device in various applications of civil engineering works.





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Week 7,8	Identify the different types of vertical curves, perform calculations using the theodolite device and the integrated station device, and correct them in various applications of civil engineering works.
Week 9,10	Become familiar with GPS and learn the correct implementation of the system.
Week 11,12	Get to know the Geographic Information System (GIS) and learn the correct implementation of the system.
Week 13,14	Learn to use the GPS device and the integrated station device in carrying out building and construction works for small and large buildings related to civil engineering works.
Week 15	Identify tunnels and learn to use the integrated station device in the operations of digging and laying tunnels in various applications of civil engineering works.

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1,2	Lab 1: Introduction to the integrated station device, describing the system and learning about the user interface, operation, configuring the device, weighing the device, learning to use programs, learning about applications.
Week 3,4	Lab 2: Learning about the settings of the electronic distance-measuring device (EDM), system information, checking
Week 5-7	Lab 3: Identify the different types of horizontal curves, perform calculations using the theodolite device and the integrated station device, and correct them in various applications of civil engineering works.
Week 8,9	Lab 4: Identify the different types of vertical curves, perform calculations using the theodolite device and the integrated station device, and correct them in various applications of civil engineering works.
Week 10,11	Lab 5: Become familiar with GPS and learn the correct implementation of the system.
Week 12-13	Lab 6: Learn to use the GPS device and the integrated station device in carrying out building and construction works for small and large buildings related to civil engineering works.
Week 14,15	Lab 7: Identify tunnels and learn to use the integrated station device in the operations of digging and laying tunnels in various applications of civil engineering works.

Learning and Teaching Resources

مصادر التعلم والتدريس





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	Text	Available in the Library?
Required Texts	Elementary surveying : an introduction to geometrics' / Charles D. Ghilani, Paul R. Wolf. 13th ed. 2013	Yes
Recommended Texts	ENGINEERING SURVING: /W. Schofield and M. Breach. Published by Elsevier Ltd. 2007.	No
Websites	https://classroom.google.com/w/Njl1NDg4MzU0Mzkw/t/all	

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.

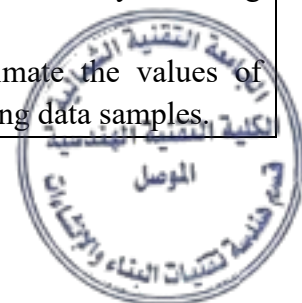




Module Information					
معلومات المادة الدراسية					
Module Title	Probability & Statistics		Module Delivery		
Module Type	Support		☒ Theory ☐ Lecture ☒ Tutorial ☐ Practical ☐ Seminar		
Module Code	BCE205				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	1	Semester of Delivery			2
Administering Department		BCE	College	TEMO	
Module Leader	Enas Hisham Mohammed		e-mail	enas.alhayali@ntu.edu.iq	
Module Leader's Acad. Title		Assistant lecturer	Module Leader's Qualification		Msc.
Module Tutor			e-mail	enas.alhayali@ntu.edu.iq	
Peer Reviewer Name		Name	e-mail	E-mail	
Scientific Committee Approval Date		28/09/2025	Version Number		3.0

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	- Understanding basic statistical principles: introducing students to basic statistical concepts such as mean, standard deviation, probability distributions, and hypothesis testing. - Collection and analysis of engineering data: teaching students how to collect engineering data from various sources and how to analyze it using appropriate statistical techniques. - Parameter estimation: teach students how to estimate the values of statistical parameters such as mean and variance using data samples.





	• Hypothesis testing: enabling students to test statistical hypotheses and evaluate their validity using appropriate statistical tests. • Model construction: teach students how to build statistical models to describe and predict geometric phenomena.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Basic statistical concepts: understand concepts such as Mean, median, mean, standard deviation, variance, probability distributions (such as normal distribution and discrete distributions), probability theory, and hypothesis testing. • Data collection methods: know the different data collection methods (such as questionnaires, observations, and experiments) and how to choose the appropriate sample size. • Data analysis techniques: understand the various statistical techniques of data analysis, such as descriptive analysis (table and frequency distributions), heuristic analysis (hypothesis tests, confidence intervals), and regression analysis. • Statistical software: the ability to use statistical computer programs (such as SPSS, Minitab, R) for data analysis
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • The basic principles of Statistics: Probabilities: the study of probabilities and their events, various probability distributions (e.g. normal distribution, discrete distributions). Random variables: types of random variables (connected, discrete), and their characteristics (e.g. mean, variance). Tabulation and iterative distributions: tabular and graphical data presentation methods. Measures of centrality and dispersion: calculation of Mean, median, modulus, variance, standard deviation. • Probability distributions: The normal distribution: its importance in engineering statistics and its applications. Other distributions: binomial distributions, toxicological distributions, exponential distributions. The theory of the limits of centrality: its concept and significance in statistical inference. • Statistical inference: Estimation: estimation of population parameter values (e.g. mean and variance) based on a sample. Hypothesis testing: testing hypotheses about population parameters using appropriate tests (e.g. t-test, z-test). Confidence intervals: build confidence intervals to estimate the value of a population parameter with a certain accuracy. • Regression analysis: Simple linear regression: a relationship between two variables, estimation of coefficients, testing the significance of coefficients. Multiple linear regression: a relationship between a dependent variable and multiple independent variables. Analysis of deviation from the line: assessment of the suitability of the model for the data.



	• Data quality and quality control: Statistical control schemes: monitoring of industrial processes and detection of deviations. Capacity analysis: assessing the ability of a production process to achieve the required specifications. • Applications of Engineering Statistics: Engineering Data Analysis: Analysis of data generated by engineering experiments. Process optimization: using statistics to improve the efficiency of industrial processes. Service life estimation: estimate the expected service life of products. Risk analysis: assessing the risks associated with engineering projects.
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

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

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

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

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	20% (20)	5,8,11 and 12	LO #1, #2 and #4
	Class Work	2	10% (10)	3 and 9	
	Assignments	2	10% (10)	2 and 12	LO #3, #4
	Midterm Exam	1hr	10% (10)	7	LO #1 and #2





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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Definition of Engineering Statistics
Week 2	Types of Statistics, What is the data, Types of data and Importance of data
Week 3	Measures of central tendency, Arithmetic mean (group and ungroup data)
Week 4	Measures of central tendency Median (group and ungroup data)
Week 5	Mode (group and ungroup data)
Week 6	Measures of dispersion
Week 7	Standard deviation (group and ungroup data)
Week 8	Mean deviation (group and ungroup data)
Week 9	Coefficient of variation (group and ungroup data)
Week 10	Measures of skewness
Week 11	Frequency table
Week 12	Frequency distribution table, Histogram, Polygon
Week 13	Measures of Kurtosis
Week 14	T- test one sample
Week 15	T- test paired sample
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Statistics by J. Jothikumar	No
Recommended Texts	Introduction to Statistics by David M.ney La	No
Websites	https://imstat.org/2023/02/15/free-open-access-engineering-statistics-book	



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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	Calculus 2		Module Delivery		
Module Type	Core		☒ Theory ☒ Tutorial ☐ Lab ☐ Lecture ☐ Practical ☐ Theory		
Module Code	BCE206				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		2			Semester of Delivery
Administering Department		BCE	College	TEMO	
Module Leader	Raghad		e-mail	Raghad.zidan@ntu.edu.iq	
Module Leader's Acad. Title		Assis. Lecturer	Module Leader's Qualification		Master
Module Tutor			e-mail		
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date		28/09/2025	Version Number		3.0

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	By the end of this module, students will be able to: 1. Deepen their understanding of definite and indefinite integrals and their real-world applications. 2. Extend integration techniques to cover surface area, arc length, and multiple integrals. 3. Analyze sequences and series, and apply convergence tests. 4. Construct and apply power series and Taylor/Maclaurin expansions for function approximations.





	5. Understand and apply polar, spherical, and cylindrical coordinate systems in mathematical modeling. 6. Introduce foundational vector operations in two and three dimensions. 7. Apply dot and cross product operations in engineering contexts. 8. Gain a foundational understanding of complex numbers and their mathematical properties.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this course, students will be able to: 1. Evaluate definite and indefinite integrals and apply integration techniques to compute arc lengths and surface areas. 2. Solve double and triple integrals in rectangular, cylindrical, and spherical coordinate systems. 3. Analyze sequences and infinite series, determine convergence using standard tests, and represent functions using power series. 4. Construct and apply Taylor and Maclaurin series for function approximation and error estimation. 5. Graph and analyze polar curves and compute areas bounded by polar functions. 6. Perform vector operations in two and three dimensions and apply them to engineering problems involving forces and motion. 7. Apply complex number operations and use them in mathematical and engineering contexts.
Indicative Contents المحتويات الإرشادية	1. Review of Integration Techniques - Definite and indefinite integrals - Substitution and integration by parts - Applications: arc length and surface area 2. Multiple Integrals - Double integrals in rectangular coordinates - Triple integrals - Change of variables - Cylindrical and spherical coordinate systems 3. Sequences and Infinite Series - Definition and limits of sequences - Convergence and divergence - Series convergence tests (ratio, root, alternating series tests) 4. Power Series - Representation of functions as power series - Interval and radius of convergence - Operations on power series 5. Taylor and Maclaurin Series - Derivation of Taylor and Maclaurin expansions - Approximation of functions - Error estimation





	6. Polar Coordinates - Graphing polar curves - Area in polar coordinates - Applications of polar representations 7. Vector Algebra and Geometry - Vectors in 2D and 3D - Dot product and cross product - Lines and planes in space - Engineering applications 8. Complex Numbers - Algebraic and polar forms - Operations on complex numbers - De Moivre's theorem - Applications in engineering contexts
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lectures and presentations Group discussions and problem-solving sessions Hands-on projects and practical applications Use of software tools for modeling and solving differential equations

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
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	4	20% (20)	5,8,11 and 12	LO #1, #2, 5 and #7



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Summative assessment	Class Work	2	10% (10)	2 and 12	LO #3, #4 and #6
	Assignments	2	10% (10)	4 and 9	All
	Midterm Exam	2hr	10% (10)	7	LO #1 - #5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Review of the Basics of Definite and Indefinite Integrals
Week 2	Applications of Integration: Surface Area – Arc Length
Week 3	Double and Triple Integration
Week 4	Sequence – Limits of Sequence
Week 5	Alternating Series – Ratio/Root Tests
Week 6	Power Series – Interval of Convergence
Week 7	Taylor / Maclaurin Series
Week 8	Polar Coordinate – Graphs
Week 9	Area in Polar Coordinates
Week 10	Spherical and Cylindrical Coordinates
Week 11	Introduction to Vectors (2D/3D) – Dot Product
Week 12	Cross Product of Vectors – Engineering Applications
Week 13	Dot & Cross Product– Engineering Applications
Week 14	Complex numbers
Week 15	Preparatory week before the final Exam





Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	. Calculus II & Calculus III, Paul Dawkins, 2007	Yes
Recommended Texts		No
Websites		

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





Module Information					
معلومات المادة الدراسية					
Module Title	جرائم نظام البعث في العراق		Module Delivery		
Module Type	Basic		☒ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar		
Module Code	NTU200				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level		2			Semester of Delivery
Administering Department		BCE	College	TEMO	
Module Leader	Abdul Kareem Zuhair		e-mail		
Module Leader's Acad. Title		Assis. Lecturer	Module Leader's Qualification		Master
Module Tutor			e-mail		
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date		28/09/2025	Version Number	3.0	

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	هنالك عدد من الاهداف مثل :- • معرفة تاريخ تأسيس دولة العراق والتطورات السياسية المعاصرة. • فهم طبيعة النظام السياسي في عهدي الملكي والجمهوري في العراق. • إدراك طبيعة الجرائم السياسية والاقتصادية والاجتماعية والثقافية التي ارتكبها نظام حزب البعث البائد ضد أبناء الشعب بمختلف مكوناته خلال حقبة حكمه. دعم مهارات فهم قضايا السياسية، وتعزيز سبل التعليم التفاعلي لتعزيز سبل المشاركة في الشأن العام – المواطن
	بنهاية هذا المقرر يكون الطالب قادراً على:



Learning Outcomes	1. تعريف مفهوم الجريمة وأقسامها وبيان أركانها القانونية، مع التمييز بين الجرائم العادية والجرائم الدولية (كالجرائم ضد الإنسانية والإبادة الجماعية). 2. شرح الأساس القانوني لتشكيل المحكمة الجنائية العراقية العليا (2005) وتحليل دورها في محاكمة رموز النظام السابق وفق مبادئ القانون الجنائي الدولي. 3. تحليل الجرائم المرتكبة خلال عهد نظام حزب البعث مثل الدجيل، الأنفال، قصف حلبجة، والمقابر الجماعية، في ضوء قواعد القانون الدولي الإنساني وحقوق الإنسان. 4. تقييم الآليات التنفيذية للجرائم والأساليب الأمنية والعسكرية والإدارية التي استُخدمت في ارتكاب الانتهاكات الجسيمة. 5. تحليل الآليات النفسية والاجتماعية التي استُخدمت لترسيخ القمع، ونشر الخوف، وتعزيز السيطرة السياسية على المجتمع. 6. مناقشة العلاقة بين الدين والدولة، ودور الثقافة والإعلام وعسكرة المجتمع في ترسيخ سياسات النظام وتأثيرها على البنية الاجتماعية. 7. تحليل الآثار البيئية والسكانية الناتجة عن القمع والحروب، بما في ذلك تجفيف الأهوار، الهجرة القسرية، وتدمير البيئة الزراعية والحيوانية. 8. تقييم مظاهر التمييز العنصري والطائفي وأثرها على النسيج الاجتماعي، مع مناقشة تداعياتها القانونية والاجتماعية على الدولة العراقية بعد عام 2003.
التفاصيل الأساسية للمادة	كتاب منهجي يدرس لطلبة المرحلة الثانية في الجامعات العراقية، ومن أبرز المواضيع التي يتناولها ويحاول تسليط الضوء عليها هي ... ماهية جرائم حزب البعث العربي الاشتراكي البائد ضد مبادئ حقوق الانسان في العراق منذ استيلاء وتفرد الحزب البائد بالسلطة السياسية في العراق سنة 1968 ولغاية سنة 2003 .
الكتب المنهجية	منهاج جرائم حزب البعث البائد في العراق / جمهورية العراق/ وزارة التعليم العالي والبحث العلمي، دائرة الدراسات والتخطيط والمتابعة، بغداد، 2023.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

سيتم اعتماد الاستراتيجيات الآتية في تدريس المقرر:

1. المحاضرات التفاعلية لعرض الخلفية التاريخية والقانونية للموضوع.
2. تحليل الوثائق والمصادر التاريخية والقانونية المتعلقة بانتهاكات حقوق الإنسان.
3. أسلوب دراسة الحالة لتحليل أحداث موثقة وأنماط الانتهاكات.
4. المناقشات الصفية الموجهة لتنمية التفكير النقدي والحوار المستند إلى الأدلة.
5. التكاليف البحثية المعتمدة على مصادر أكاديمية وقانونية موثوقة.
6. التعلم القائم على حل المشكلات من خلال مناقشة آليات المساءلة والعدالة الانتقالية.
7. العروض التقديمية الجماعية لتنمية مهارات التحليل والعرض العلمي.
8. أنشطة الكتابة التأملية لتعزيز الوعي الحقوقي والأخلاقي.

Student Workload (SWL)

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	33	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا
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Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	17	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	15% (15)	5,8,11 and 12	LO #1, #2 and #3, #4
	Class Work	2	10% (10)	3 and 11	
	Assignments	2	10% (10)	2 and 12	LO #5, #6
	Seminar	1	5%(5)	10	LO #1 - #8
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المناهج الاسبوعي النظري	
	المواد التي تم تغطيتها
الاول	تعريف الجريمة واقسام الجرائم
الثاني	المحكمة الجنائية العليا ٢٠٠٥ م في العراق
الثالث	جرائم نظام حزب البعث في الدجيل والانفال وغيرها
الرابع	الجرائم النفسية والاجتماعية التي ارتكبتها
الخامس	آليات الجرائم والطرق المنفذة
السادس	الآليات النفسية والاجتماعية التي استعملها النظام البعثي في العراق ضد أبناء الشعب
السابع	الدين والدولة في عهد نظام حزب البعث في العراق
الثامن	الثقافة والاعلام وعسكرة المجتمع في عهد نظام حزب البعث في العراق
التاسع	اثر القمع والحروب على البيئة والسكان في عهد نظام حزب البعث في العراق
العاشر	تجفيف الاهوار والهجرة القسرية في عهد نظام حزب البعث في العراق
الحادي عشر	تدمير البيئة الزراعية والحيوانية في عهد نظام حزب البعث في العراق
الثاني عشر	جريمة المقابر الجماعية في عهد نظام حزب البعث في العراق
الثالث عشر	جريمة الانفال في عهد نظام حزب البعث في العراق



الرابع عشر	جريمة قصف مدينة حلبجة في عهد نظام حزب البعث في العراق
الخامس عشر	التميز العنصري والطائفي بين أبناء الشعب في عهد نظام حزب البعث البائد في العراق

Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	قيس ناصر و عبد الهادي معتوق, التأسيس المعرفي لدراسة جرائم حزب البعث في العراق (مقدمة عام), مركز العراقي لتوثيق جرائم التطرف, بغداد, 2023.	
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
ملاحظة: سيتم تقريب العلامات التي تحتوي على فواصل عشرية أعلى أو أقل من 0.5 إلى العلامة الكاملة الأقرب (على سبيل المثال، ستقرب العلامة 54.5 إلى 55، بينما ستقرب العلامة 54.4 إلى 54). تلتزم الجامعة بسياسة عدم التساهل مع حالات "الرسوب القريب من النجاح"، وبالتالي فإن التعديل الوحيد على العلامات الممنوحة من قبل المقيمين الأصليين سيكون التقريب التلقائي كما هو موضح أعلاه.				





Module Information					
معلومات المادة الدراسية					
Module Title	Concrete Technology II		Module Delivery		
Module Type	Core		☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☒ Practical ☐ Seminar		
Module Code	BCE 209				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		2			Semester of Delivery
Administering Department		BCE	College	TEMO	
Module Leader	Mafaz Hani Abdullah		e-mail	mafaz.hani@ntu.edu.iq	
Module Leader's Acad. Title		Assistant lecturer	Module Leader's Qualification		MSc.
Module Tutor	Mafaz Hani Abdullah		e-mail	mafaz.hani@ntu.edu.iq	
Peer Reviewer Name		Name	e-mail	E-mail	
Scientific Committee Approval Date		28/09/2025	Version Number		3.0

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	By the end of this module, students should be able to: 1. Understand the fundamental properties of fresh and hardened concrete. 2. Perform laboratory tests to evaluate workability, air content, unit weight, and other properties of fresh concrete. 3. Identify and explain the factors influencing concrete behavior in both fresh and hardened states. 4. Demonstrate knowledge and skill in the manufacture and handling of concrete (batching, mixing, placing, compacting, curing). 5. Understand and apply concrete mix design methods.



	6. Evaluate the performance of hardened concrete and interpret test results accurately.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of this module, students should be able to: 1. Describe the key physical properties of fresh concrete and the importance of workability and consistency. 2. Execute standard laboratory tests to assess fresh concrete properties such as slump, compaction factor, and flow. 3. Measure entrained air in concrete using volumetric, pressure, and gravimetric methods. 4. Demonstrate practical competence in the processes of concrete manufacturing, from raw material batching to curing. 5. Identify the main mechanical strengths of concrete, including compressive, tensile, and flexural strength, and explain the factors that affect them. 6. Evaluate and interpret the results of strength tests on hardened concrete, including discussion of test variability. 7. Apply concrete mix design procedures to develop mixes for different applications and performance requirements
Indicative Contents المحتويات الإرشادية	The module introduces the composition and behavior of concrete in both fresh and hardened states. It covers physical properties such as workability, consistency, bleeding, segregation, and unit weight. Students will study and perform tests related to fresh concrete, including slump and air content testing using multiple methods. The course also includes air-entrainment principles, unit weight and yield calculations, and the significance of proper batching, mixing, placing, and curing. Properties of hardened concrete and testing for various strengths are explored in detail. Additionally, students will learn different concrete mix design techniques, including methods established by the ACI and British standards.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	To ensure effective delivery of the module and to support the achievement of learning outcomes, the following strategies will be employed: • Interactive Lectures: Used to introduce theoretical concepts related to fresh and hardened concrete, including physical properties, strength, and mix design principles. These sessions will incorporate audiovisual aids and real-world examples to enhance comprehension. • Laboratory Sessions: Structured practical sessions that allow students to perform standardized concrete tests (e.g., slump, compaction, air



	content, strength tests), analyze results, and develop hands-on skills in concrete manufacturing. • Demonstrations: Instructor-led demonstrations of equipment and procedures used in the preparation, placement, and testing of concrete to model best practices and safety compliance. • Problem-Based Learning (PBL): Real-life construction scenarios will be presented to students, who will be required to identify problems, propose testing and design solutions, and justify choices using theoretical knowledge. • Group Work and Peer Collaboration: Small group activities will promote teamwork, communication, and collaborative learning, especially during mix design and lab report writing. • Case Studies and Industry Examples: Relevant case studies will be integrated to demonstrate the application of concrete technology in various engineering contexts, enhancing students' analytical and reflective thinking. • Formative Feedback and Tutorials: Regular feedback sessions and academic support tutorials will be offered to help students clarify concepts, refine practical skills, and prepare for assessments. • Independent Learning and Report Writing: Students will be expected to engage in guided independent research, laboratory reporting, and reflective writing to consolidate their learning outside the classroom.
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Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		





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

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Demonstrates knowledge about fresh concrete, Properties of fresh concrete: (Workability; Consistency; Segregation; Bleeding; Unit weight).
Week 2	Recognition of laboratory correctly execute Measurement of workability and Consistency, Factors affecting workability.
Week 3	Demonstrates knowledge about Air – Entrainment; Correctly execute Measurement of Entrained – Air: (Volumetric; Gravimetric and Pressure methods) Unit weight; yield; Cement factor.
Week 4	Demonstrates knowledge about Air – Entrainment; Correctly execute Measurement of Entrained – Air: (Volumetric; Gravimetric and Pressure methods) Unit weight; yield; Cement factor.
Week 5	Carries out manufacture of concrete: Batching; Mixing; Conveying; Placing; Compacting; and curing of concrete .
Week 6	Able to identify properties of hardened concrete
Week 7	Demonstrates Knowledge about kinds of strength. Able to identify factors affecting strength of hardened concrete. factors affecting test results of strength of hardened concrete.
Week 8	Demonstrates Knowledge about kinds of strength. Able to identify factors affecting strength of hardened concrete. factors affecting test results of strength of hardened concrete.





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Week 9	Mid-term exam
Week 10	Able to identify concrete mix design methods
Week 11	Able to identify concrete mix design methods
Week 12	Able to identify concrete mix design methods
Week 13	Able to identify concrete mix design methods
Week 14	Able to identify concrete mix design methods
Week 15	Able to identify concrete mix design methods

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Batching and mixing of ingredients of concrete.
Week 2	Lab 2: Measuring of slump of fresh concrete
Week 3	Lab 3: Measuring of slump of compacting factor concrete
Week 4	Lab 4: Measuring of unit weight of fresh concrete.
Week 5	Lab 5: Measuring the air entrainment of fresh concrete.
Week 6	Lab 6: Measuring of compressive strength of hardened concrete using different water to cement ratio.
Week 7	Lab 7: Measuring of the splitting tensile strength of concrete and the relationship between it and compressive strength.
Week 8	Lab 8: Measuring of Flexural strength of concrete using different aggregate to cement ratio.
Week 9	Mid-term exam
Week 10	Lab 10: Effect of specimen size on compressive strength of concrete.
Week 11-13	Lab 11: Mix design of concrete mixes according to ACI
Week 14-15	Lab 15: Field adjustment for mix design of concrete mixes.





Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Engineering Concrete, Mix Design and Test Methods, Irving Kett, 2000. Concrete Technology, Theory and Practice, M.S. SHETTY , 2005 Properties of concrete, Nivelles, 2011.	No
Recommended Texts	ASTM, Standard, 2020	Yes
Websites	https://www.astm.org/products-services/bos.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

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	SOLID MECHANICS		Module Delivery		
Module Type	Core		☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar		
Module Code	BCE 210				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		Semester of Delivery			2
Administering Department		BCE	College	TEMO	
Module Leader	Majid Ali Dhahir		e-mail	Majid.algburi@ntu.edu.iq	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		Ph.D.
Module Tutor			e-mail		
Peer Reviewer Name		Name	e-mail		
Scientific Committee Approval Date		28/09/2025	Version Number		3.0

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

Module Aims, Learning Outcomes and Indicative Contents	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Deepen understanding of fundamental principles of material strength: The course aims to enable students to understand and analyze the behavior of materials under different forces. 2. Develop the ability to analyze engineering systems: The course aims to enhance students' ability to analyze and design structural systems that meet strength and stiffness requirements. 3. Stress and Strain Analysis: The course teaches students how to calculate the stresses and strains experienced by materials due to applied forces. 4. Enhance engineering thinking: Students are trained to think logically and systematically to solve engineering problems related to material strength.



	5. Link theoretical concepts with practical applications: The course links theoretical material strength principles with practical solutions in engineering applications
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this module, students will be able to: 1. Understand the relationship between external loads and internal effects such as strains, deformations, and stresses in structural elements. 2. Define and classify different types of stresses in beams, including normal and shear stresses. 3. Derive and apply the flexure formula to determine bending stresses in beams with various cross-sections. 4. Analyze economic and unsymmetrical beam sections, evaluating their stress distribution and efficiency. 5. Explain and analyze the flexural behavior of beams, including moment distribution and section properties. 6. Apply the horizontal shear stress formula to evaluate shear stress distribution in beams. 7. Construct and interpret free-body diagrams and moment-curvature diagrams for structural analysis. 8. Describe the concept of beam deflections and their significance in structural performance. 9. Apply analytical methods such as the area-moment theorem and double integration method to calculate beam deflections.
Indicative Contents المحتويات الإرشادية	Topic: Stresses and Deflections in Beams, and Combined Stresses 1. Introduction to Beam Stresses - Basic concepts of stresses in beams - Definition of bending moment and its effects 2. Derivation of Flexure Formulas - Analysis of stress distribution in beams - Derivation of bending stress equation 3. Economic Sections - Factors affecting the design of economic sections - Selecting the optimal section for structural efficiency 4. Analysis of Unsymmetrical Beams - Difference between symmetrical and unsymmetrical beams - Stress distribution in unsymmetrical beams 5. Analysis of Flexure Action - Factors influencing beam bending - Different bending conditions and their effects 6. Horizontal Shear Stress Formula - Derivation of the shear stress equation - Practical applications of horizontal shear stress 7. Combined Stresses - Definition and effects of axial and flexural loads





	- Analysis of combined stresses in beams 8. Introduction to Beam Deflections - Definition of deflection and its significance in structural design - Factors affecting beam deflection 9. Area-Moment Method - Explanation of the theorem - Practical applications in beam deflection calculations 10. Double Integration Method - Steps to apply the method for deflection calculations - Example problems and solutions
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Lectures using various modern presentation tools. • Interactive whiteboard lectures. • Discussion groups during lectures to stimulate thinking and analysis. • Asking students a set of reflective questions during lectures that include words like "What," "How," "When," and "Why." • Assigning homework that requires problem-solving and reasoning

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





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

Delivery Plan (Weekly Syllabus)	
	Material Covered
1&2	Introduction to Beam Stresses - Basic concepts of stresses in beams, Definition of bending moment and its effects - Derivation of Flexure Formulas - Analysis of stress distribution in beams, Derivation of bending stress equation
3&4	Economic Sections - Factors affecting the design of economic sections - Selecting the optimal section for structural efficiency Analysis of Unsymmetrical Beams - Difference between symmetrical and unsymmetrical beams - Stress distribution in unsymmetrical beams
5&6	Horizontal Shear Stress Formula - Derivation of the shear stress equation - Practical applications of horizontal shear stress
7&8	Combined Stresses - Definition and effects of axial and flexural loads - Analysis of combined stresses in beams
9&10	- Introduction to Beam Deflections - o Definition of deflection and its significance in structural design - o Factors affecting beam deflection





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11&12	- Area-Moment Method ○ Explanation of the theorem ○ Practical applications in beam deflection calculations
13&14,15	- Double Integration Method ○ Steps to apply the method for deflection calculations - Example problems and solutions

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	A. Pytel and J. Kiusalaas, Strength of Materials. Cengage Learning, 3rd ed	No
Recommended Texts	J. M. Gere and B. J. Goodno, Mechanics of Materials. Cengage Learning, 9th ed., 2018	Yes
Websites	Websites related to Strength of Materials	

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	CONSTRUCTION TECHNIQUES		Module Delivery		
Module Type	Core		☒ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar		
Module Code	BCE 211				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		2			Semester of Delivery
Administering Department		BCE	College	TEMO	
Module Leader	Hiba Abdulhafith		e-mail	hibaabdulhafith@ntu.edu.iq	
Module Leader's Acad. Title		Assist Lecture	Module Leader's Qualification		M.Sc
Module Tutor	Hiba Abdulhafith		e-mail	hibaabdulhafith@ntu.edu.iq	
Peer Reviewer Name		Hiba Abdulhafith	e-mail	hibaabdulhafith@ntu.edu.iq	
Scientific Committee Approval Date		28/09/2025	Version Number	3.0	

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	• Demonstrates knowledge about Scaffolding, types, components, uses. • Demonstrates knowledge about Floors and roofs, timber, jack arching • Demonstrates knowledge and recognition about Damp proofing materials. • Demonstrates knowledge about the implementation of finishing, interior and exterior • Demonstrates knowledge about Doors and windows and upstairs rails.





	• Recognition of laboratory Type of failure in building, causes and measures
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Equip the learner with skills to identify the structural framework system, including columns and beams. • Introduce the learner to the types of flooring used. • Familiarize the learner with the types of finishing materials for both interior and exterior of buildings. • Introduce the learner to the complementary elements of a building, such as stairs, doors, and windows. • Educate the learner about the causes of failure in building elements and methods for remediation.
Indicative Contents المحتويات الإرشادية	• The learner identifies the types of columns and beams in the structural system. • The student differentiates between the types of flooring. • The student understands the finishing materials used inside and outside the building. • The student recognizes the types of stairs, doors, and windows. • The student understands the causes of failure in building elements and methods for their remediation..

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Interactive Lectures • Use multimedia presentations to illustrate key concepts and real-world applications. • Encourage questions and discussions to engage students actively. Hands-On Workshops • Organize practical sessions where students can work with construction materials and tools. • Simulate construction tasks to enhance understanding of techniques and processes. Site Visits • Arrange visits to construction sites to provide students with firsthand experience. • Facilitate discussions with industry professionals to gain insights into real-world practices. Group Projects





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	- Assign collaborative projects that require students to design and plan a building. - Encourage teamwork to develop communication and problem-solving skills. Case Studies - Analyze real construction projects to understand challenges and solutions. - Discuss the application of theories and principles in practical scenarios. Guest Lectures - Invite industry experts to share their experiences and knowledge. - Provide students with exposure to current trends and technologies in construction. Online Resources - Utilize online platforms for research and collaboration. - Encourage students to access digital libraries, forums, and webinars relevant to building construction.
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Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		





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

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
Week 1	types, components, uses.
Week 2	Columns classification, reinforcement
Week 3	Beams, types and reinforcement
Week 4	Types of Floors and roofs, timber, jack
Week 5	Concrete floors and roofs, one way, two way.
Week 6	Lift slab system and space frame roofing
Week 7	Damp proofing materials
Week 8	Floor finishing
Week 9	Inner wall finishing
Week 10	External wall finishing
Week 11	Modern finishing materials
Week 12	Upstairs, windows, Door





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Week 13,14,15	Type of failure in building, causes and measures
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Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	<i>Building Construction Illustrated</i> by Francis D.K. Ching	Yes
Recommended Texts	<i>Fundamentals of Building Construction: Materials and Methods</i> by Edward Allen and Joseph Iana	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

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Module Information					
معلومات المادة الدراسية					
Module Title	FLUID MECHANICS		Module Delivery		
Module Type	Support		☒ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar		
Module Code	BCE 212				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		2	Semester of Delivery		2
Administering Department		BCE	College	TEMO	
Module Leader	Dr. Mohammed Tareq Khaleel		e-mail	Mohammed.alsafaawe@ntu.edu.iq	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		Ph.D.
Module Tutor	Dr. Mohammed Tareq Khaleel		e-mail	E-mail	
Peer Reviewer Name		Name	e-mail	E-mail	
Scientific Committee Approval Date		28/09/2025	Version Number		3.0

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	- To understand the properties of fluids, dimensions and units. - To derive the equation of conservation of mass, momentum, energy and its application. - To use important concepts of continuity equation, Bernoulli's equation and turbulence, and apply the same to problems. - To understand the various flow measuring devices. - To understand the classification of flows: Steady, unsteady, uniform, non-uniform, laminar, turbulent.





Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this module, students will be able to: 1. Apply unit conversion and dimensional analysis in fluid mechanics problems using SI and British systems. 2. Analyze fluid statics problems, including pressure measurement using manometers and hydrostatic forces on submerged surfaces. 3. Apply Bernoulli's equation and momentum principles to evaluate fluid motion, forces, and energy conservation in engineering systems. 4. Analyze internal pipe flow, including Reynolds number, flow classification, viscosity effects, shear stress, velocity distribution, and head loss due to friction. 5. Draw and interpret Hydraulic and Energy Gradient Lines (HGL & EGL) for various flow conditions. 6. Evaluate flow measurement systems, including Venturi meters, orifice meters, rotameters, orifices, and weirs, and determine discharge coefficients. 7. Solve open channel flow problems using Manning's equation and Chezy's formula. 8. Analyze buoyancy and stability of floating bodies, including Archimedes' principle and metacentric height.
Indicative Contents المحتويات الإرشادية	Part A - Fundamentals of Fluid Mechanics • SI Units, Dimensions, Symbols, and Abbreviations: Understanding and application of SI units, dimensional analysis, symbols, and standard abbreviations used in fluid mechanics. • Development of Fluid Mechanics and Properties of Fluids: Historical perspective, physical properties of fluids such as density, specific weight, viscosity, compressibility, surface tension, and capillarity. Part B - Fluid Statics and Pressure Measurement • Characteristics of Flow: Fundamental parameters including discharge, velocity, pressure, and shear stress. • Pressure Measurement Techniques: Understanding of absolute and gauge pressure, Bourdon gauge, piezometer columns, simple and differential manometers. • Hydrostatic Forces on Surfaces: Calculation of forces on plane and curved surfaces and determination of the center of pressure.





Part C - Kinematics of Fluid Flow

- **Kinematics of Fluid Flow:**
Describing fluid motion, streamlines, stream tubes, path lines, and flow nets.
- **Classification of Flow:**
Types of flow: laminar, turbulent, steady, unsteady, compressible, and incompressible flow.
- **Continuity Equation:**
Derivation and application in steady flow conditions.

Part D - Fluid Dynamics

- **Energy Equation for Steady Flow:**
Derivation and application of the Bernoulli equation; kinetic, potential, and flow energy; hydraulic grade line and energy line.
- **Flow in Pressure Conduits:**
Analysis of steady flow in pipelines, laminar vs turbulent flow, critical flow.
- **Conduit Friction and Head Loss:**
Friction factor, empirical equations for pipe flow, head losses due to friction, pipe roughness, minor head losses, and practical applications.

Part E - Practical Applications and Problem-Solving

- **Pipeline Design and Pumping Systems (Part 1 & Part 2):**
Analysis and solutions for practical pipeline problems, with and without pumps, including head losses at entrance, contraction, expansion, and bends.
- **Friction Factor Charts and Economic Pipe Diameter:**
Derivation and use of friction factor charts and determining economical diameter of pipes.

Part F - Fluid Measurements

- **Measurement of Fluid Properties and Flow Quantities**
Static pressure measurement, velocity measurement by Pitot tubes, nozzles, Venturi meters, and discharge coefficients.
- **Introduction to Open Channel Flow:**
Types of channels, specific energy, specific energy curves, hydraulic





jump, and design of open channels.

Part G - Review and Exam Preparation

- **Revision and Problem Classes:**
 Solution of sample problems and practical exercises to reinforce understanding of fluid mechanics concepts.
- **Preparatory Week for Final Exam:**
 Comprehensive review and preparation for final assessments.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies

- Teaching students the basics of the curriculum (Whiteboard, discussion, videos)
- Training students to use computers and online teaching aids.
- To provide students with the skill of public speaking and discussing issues related to the curriculum.
- Training students to participate and express their opinions on the scientific material

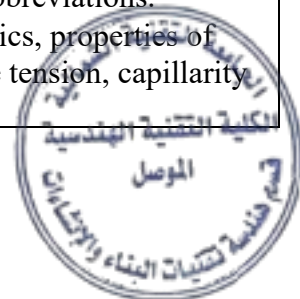




Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
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	4	15% (15)	2,5,9and 13	LO #1,3,5,7
	Classwork	2	5% (5)	3and 11	LO #2,4,6,8
	Assignments	2	5% (5)	6and 12	LO #3,6
	Seminar	1	5%(5)	12	LO #1-8
	Reports	4	10%(10)	5,8,11 and 12	LO #1-4
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	- Demonstrates knowledge about SI Units, dimensions, symbols, abbreviations. - Demonstrates knowledge about the Development of fluid mechanics, properties of fluids; density, specific weight, viscosity, compressibility, surface tension, capillarity etc.





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Week 2	• Demonstrates knowledge about the Characteristics of flow; discharge, velocity, pressure, shear etc. • Conducts the Standard tests concerning: Fluid static's; absolute and gauge pressure, pressure measurement; Bourdon gauge, piezometer column, simple manometer, differential manometer.
Week 3	Monitors and conducts hydrostatic forces on plane and curved surfaces, center of pressure.
Week 4	• Demonstrates knowledge about Kinematics of fluid flow. • Able to identify Classification of types of flow; streamlines, stream tube, path lines, flow net. • Correctly implement Continuity equation.
Week 5	• Correctly Derivatives and execute Energy equation for steady flow; potential, kinetic and flow energy; hydraulic grade line and energy line.
Week 6	• Correctly draw solution of flow problems.
Week 7	• Recognition of laboratory Steady flow in pressure conduits; laminar and turbulent flow; critical flow. • Correctly execute general equation for conduit friction; friction for laminar flow; friction for turbulent flow; pipe roughness.
Week 8	• Correctly draw and compute friction factor charts; empirical equations for pipe flow; economical diameter of pipes.
Week 9	• Demonstrates knowledge about Minor head losses; loss at entrance, losses due to contraction; losses due to expansion; loss in pipe fittings; loss in bend and elbows, etc.
Week 10	• Part 1_ Monitors and conducts Solution of practical pipeline problems; pipeline with pumps.
Week 11	• Part 2_ Monitors and conducts Solution of practical pipeline problems; pipeline with pumps.
Week 12	• Part 1_ Demonstrates knowledge about Fluid measurements; measurement of fluid properties ; measurement of static pressure; velocity measurement by different methods; measurements of discharge; nozzles; coefficients of contraction; coefficients of velocity; coefficients of discharge; Venture tube; nozzle meter; Pitot Tube.
Week 13	• Part 2_ Demonstrates knowledge about Fluid measurements; measurement of fluid properties ; measurement of static pressure; velocity measurement by different methods; measurements of discharge; nozzles; coefficients of contraction; coefficients of velocity; coefficients of discharge; Venture tube; nozzle meter; Pitot Tube.





Week 14	Introduction to open channels, types of channels, best hydraulic section, specific energy and specific energy curve,
Week 15	hydraulic jump, design of open channels,
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Fluid Mechanics Fundamentals and applications by Yunus A. Cengel, John M. Cimbala.	No
Recommended Texts	A textbook of fluid mechanics and hydraulic machines by Rajput	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	Mathematics			Module Delivery	
Module Type	Core			☒ Theory ☒ Tutorial ☐ Lab ☐ Lecture ☐ Practical ☐ Seminar	
Module Code	BCE213				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	2	Semester of Delivery			
Administering Department		BCE	College	TEMO	
Module Leader	Raghad		e-mail	Raghad.zidan@ntu.edu.iq	
Module Leader's Acad. Title		Assis. Lecturer	Module Leader's Qualification		Master
Module Tutor	Name (if available)		e-mail		
Peer Reviewer Name		Name	e-mail		
Scientific Committee Approval Date		28/09/2025	Version Number	3.0	

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	By the end of this module, students will be able to: 1. Understand and apply advanced integration techniques including improper integrals and hyperbolic functions. 2. Develop fluency in working with vector-valued functions and parametric representations. 3. Analyze and solve first-order ordinary differential equations (ODEs) using multiple methods. 4. Extend their understanding of higher-order linear differential equations with constant coefficients. 5. Apply differential equations to real-world problems and interpret general and particular solutions. 6. Explore De Moivre's Theorem and its role in complex number analysis. 7. Understand the geometric and algebraic representations of lines and planes in space.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of this module, students will be able to: • Apply De Moivre's Theorem in solving problems involving powers and roots of complex numbers. • Represent and analyze lines and planes using vector and parametric forms. • Review and compute definite and indefinite integrals, and apply advanced integration techniques. • Evaluate improper integrals and understand conditions for convergence. • Differentiate and integrate hyperbolic functions and inverse trigonometric functions. • Perform calculus operations on vector-valued functions including limits, derivatives, and integrals. • Solve first-order ordinary differential equations including separable, homogeneous, and linear types. • Determine exact and non-exact solutions to differential equations and apply integrating factors. • Solve Bernoulli equations and derive both general and particular solutions. • Solve higher-order linear differential equations with constant coefficients using appropriate methods. • Interpret the solutions of differential equations in both theoretical and applied engineering contexts.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction to Differential Equations • Definition and classification of differential equations • Importance and applications in engineering and science





First-Order Differential Equations

- Separable equations
- Homogeneous equations
- Linear first-order equations
- Exact equations and the method of integrating factors

Solutions of First-Order Equations

- General and particular solutions
- Applications to real-world problems (e.g., population growth, cooling laws)

Higher-Order Differential Equations

- Definition and classification of higher-order equations
- Homogeneous linear equations with constant coefficients
- Non-homogeneous linear equations: methods of undetermined coefficients and variation of parameters

Applications of Differential Equations

- Mechanical systems (e.g., mass-spring systems)
- Electrical circuits (e.g., RC and RL circuits)
- Fluid dynamics and heat transfer

Laplace Transforms

- Definition and properties of Laplace transforms
- Inverse Laplace transforms
- Application of Laplace transforms to solve differential equations

Systems of Differential Equations

- Introduction to systems of first-order differential equations
- Matrix methods and eigenvalues/eigenvectors
- Stability analysis of equilibrium points

Numerical Methods for Differential Equations

- Euler's method and its applications
- Runge-Kutta methods
- Error analysis and stability considerations

Series Solutions of Differential Equations

- Power series solutions near ordinary points
- Frobenius method for singular points

Partial Differential Equations (Introduction)

- Basic concepts and classifications
- Examples and applications in engineering and physics (e.g., heat equation, wave equation)

Conclusion and Review

- Summary of key concepts covered in the course
- Discussion on further applications of differential equations in various fields

Projects and Case Studies





	- Research projects related to real-world applications of differential equations - Case studies analyzing specific engineering problems using differential equation
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	- Lectures and presentations - Group discussions and problem-solving sessions - Hands-on projects and practical applications - Use of software tools for modeling and solving differential equations
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Student Workload (SWL)

الحمل الدراسي للطلاب محسوب لـ ١٥ أسبوعا

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

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	15% (15)	5,8,11 and 12	LO #1, #2 and #10, #11
	Class work	2	15% (15)	2 and 12	LO #3, #4 and #6, #7
	Assignments	2	10% (10)	4 and 9	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	De Mover's Theorem
Week 2	Equations of lines & planes
Week 3	Review of indefinite and definite integrals
Week 4	Integration techniques
Week 5	Improper integrals
Week 6	Hyperbolic Functions and Inverse Trig(Derivatives& Integration)
Week 7	Vector-Valued Functions – Derivatives/Integrals
Week 8	Introduction to ODEs- First order
Week 9	First-order linear differential equations, separable and homogeneous equations
Week 10	Exact Equation and Non-Exact Equation
Week 11	Bernoulli equations
Week 12	General and particular solutions
Week 13	Linear differential equations with constant coefficients
Week 14	Higher-order equations, differential equations
Week 15	Preparatory week before the final Exam
Week 16	De Mover's Theorem

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	. Calculus II &Calculus III, Paul Dawkins, 2007	Yes
Recommended Texts	.	No
Websites		





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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	Arabic Language		Module Delivery		
Module Type	Basic		✓ Theory ✓ Lecture Lab Tutorial Practical ✓ Seminar		
Module Code	NTU203				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level	2	Semester of Delivery		2	
Administering Department	BCE		College	TEMO	
Module Leader	Dr. Eesha I. Mohammed		e-mail	aysha.ibrahim@ntu.edu.iq	
Module Leader's Acad. Title		Assist Lecturer	Module Leader's Qualification		PhD.
Module Tutor	None		e-mail	None	
Peer Reviewer Name		None	e-mail	None	
Review Committee Approval		28/09/2025	Version Number		3.0

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	○ ينشأ الطالب على حب اللغة العربية لغة القرآن الكريم. ○ التعرف على مواطن الجمال في اللغة العربية وآدابها، ○ وأن يكتسب الطالب القدرة على دراسة فروع اللغة العربية. ○ تعريف الطالب بالفاظ اللغة العربية الصحيحة وتراكيبها وأساليبها السليمة بطريقة مشوقة وجذابة. ○ أن يستغل الطالب وقت فراغه بالقراءة والاطلاع والرجوع إلى المكتبة. ○ تمكين الطالب من القراءة الصحيحة، وأن يكتسب القدرة على استعمال اللغة استعمالاً صحيحاً في الاتصال مع الآخرين؛ كالسرعة وجودة الإلقاء وحسن التعبير، وتعويد حسن الاستماع لما يسمع مما يبسر له أموره ويعينه على قضاء حوائجه. ○ تنمية الذوق الأدبي لدى الطالب حتى يدرك النواحي الجمالية في أساليب الكلام ومعانيه وصوره. ○ تعويد الطالب التعبيرات السليمة الواضحة عن أفكاره وما يقع تحت حواسه نطقاً وكتابة وحسن استخدام علامات الترقيم. ○ تنمية قدرة ومهارة الطالب الإملائية والخطية بحيث يستطيع الكتابة الصحيحة من جميع النواحي. ○ إيقاظ وعي الطالب لإدراك شرف الكلمة وتوجيهه؛ للمحافظة على طهارتها ونقاها حتى لا تستعمل إلا في الخير. مساعدة الطالب على فهم التراكيب المعقدة والأساليب الغامضة
Module Learning Outcomes	1. معرفة القواعد النحوية والصرفية. 2. التعرف بأبرز المصنفات اللغوية والأدبية. 3. تحديد المشكلات اللغوية والأدبية لدى الدارسين. 4. القراءة المعاصرة للنصوص اللغوية والأدبية. 5. قراءة النصوص الأدبية وكتابتها وفق المعايير النحوية والصرفية.



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مخرجات التعلم للمادة الدراسية	6. تعزيز الثقة بالنفس والجرأة والفصاحة 7. المنافسة والتميز في سوق العمل.
Indicative Contents المحتويات الإرشادية	○ إن واخواتها والمبتدأ والخبر ○ كيفية تجنب الأخطاء وأنواع الأفعال ○ أسماء الاستفهام وأسماء الوصل فضلا عن ادوات النصب وأدوات الجزم وأنواع الأفعال ○ المشاكل والمعوقات ونقاشات

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	1. تبسيط المعلومات وتنظيمها. 2. تسهيل عملية استرجاع المعلومات. 3. ربط المفاهيم الجديدة بالمكتسبات السابقة 4. إيجاد العلاقة بين المفاهيم. 5. تسهيل تذكر المعارف والمعلومات
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Student Workload (SWL)

الحمل الدراسي للطلاب

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

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي النظري

Week	Material Covered
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Week 1	ان وأخواتها
Week 2	كان وأخواتها
Week 3	الاستثناء
Week 4	أدوات النصب
Week 5	أدوات الجزم
Week 6	أنواع الافعال وطرق اعرابها
Week 7	النعت وانواعه
Week 8	نائب فاعل
Week 9	كيفية التخلص من الاخطاء
Week 10	الاستفهام
Week 11	لغة الضاد
Week 12	المبتدأ والخبر
Week 13	التقديم والتأخير
Week 14	الأسماء الموصولة
Week 15	كيفية كتابة الطلب وإجابة الكتب الواردة

Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	الكامل في اللغة والادب لابي عباس المبرد	Yes
Recommended Texts	كتاب النحو الواضح في قواعد اللغة العربية، لعلي الجارم ومصطفى أمين	No
Websites	https://www.eshamel.ne https://shamela.ws/book/10018	





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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.				

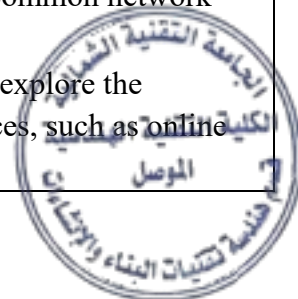




Module Information					
معلومات المادة الدراسية					
Module Title	Computer			Module Delivery	
Module Type	Basic			☐ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☒ Practical ☒ Seminar	
Module Code	NTU202				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level	2	Semester of Delivery			
Administering Department		BCE	College	TEMO	
Module Leader	Dr. Omar Abdulwahhab Khalaf		e-mail	omar.khalaf@ntu.edu.iq	
Module Leader’s Acad. Title		Lecturer	Module Leader’s Qualification		Ph.D.
Module Tutor	Ekhlas N. Alansari		e-mail	ekhlasmohammed@ntu.edu.iq	
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date		28/09/2025	Version Number		3.0

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	- Networking Fundamentals: Students will gain a solid understanding of networks, including their types, components, and basic security concepts. They will also learn how to troubleshoot common network issues. - E-commerce and Digital Banking: The module will explore the concepts of electronic banking and its various services, such as online banking, mobile banking, and ATM transactions.





	• Computer Troubleshooting: Students will develop skills in identifying and resolving common hardware and software problems. • Introduction to Artificial Intelligence: This section will provide a foundational understanding of AI, its history, techniques, and ethical implications. • AI Applications and Impact: Students will explore the practical applications of AI in various industries, as well as its societal implications, including ethical considerations. • Future of AI: The module will delve into emerging trends in AI and discuss the potential future directions of this technology.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of the semester, the students will be able to: 1. Students will be able to design, implement, and troubleshoot basic computer networks. They will understand network topologies, protocols, and security measures. 2. E-commerce Expertise: Students will gain a comprehensive understanding of electronic commerce, including online banking, payment systems, and digital marketing. They will be able to identify the key components of a successful e-commerce business. 3. Troubleshooting Skills: Students will be equipped with the ability to diagnose and resolve common hardware and software issues, improving their problem-solving skills. 4. AI Fundamentals: Students will develop a solid foundation in artificial intelligence, including its history, applications, and ethical implications. They will be able to explain key concepts such as machine learning and deep learning. 5. Technological Awareness: Students will stay up-to-date with the latest advancements in technology, particularly in the areas of networking, e-commerce, and AI. 6. Critical Thinking and Problem-Solving: Students will be able to apply critical thinking skills to analyze complex technological problems and develop effective solutions
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A Security and Networking: What is a network? Types of networks. Basic network components. Network Security Basics. Understanding network threats. Network Troubleshooting Part B E-Commerce: Concepts of Electronic banking services this include online banking: ATM and debit card services, Phone banking, SMS banking, electronic alert, Mobile banking. Part C Computer Troubleshooting:





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	Identifying and solving common hardware and software problems that computer users encounter. Basic troubleshooting techniques and tools for diagnosing and resolving issues Part D Introduction to AI: Definition of AI, History of AI, AI Techniques and Approaches, Challenges and Ethical Considerations. Part E AI in Our Daily Lives: AI in smartphones and virtual assistants like Siri or Google Assistant Part F Applications of AI: Education, Healthcare, Finance, Transportation, Marketing and Advertising. Part G AI and Society: (How AI affects social, AI and international relations, AI and the future of humanity) Part H Ethical Challenges in AI : (AI ethics, privacy and surveillance, the impact of AI on the job market). Part I The Future of AI (Future trends in AI, recent research and emerging technologies)
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	• Lecture: Introduce new concepts and demonstrate techniques. • Board (Normal or Smart) • Computers • Presentation software such as PowerPoint • Group Work: Encourage collaboration and problem-solving through group activities. • Q&A: Facilitate discussion and address student questions
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

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





Module Evaluation					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	10% (10)	5,8,11 and 12	LO #1, #2 and #4, #6
	Class Work	2	5% (5)	2 and 12	LO #3, #5 and #6, #7
	Assignments	2	5% (5)	5 and 9	All
	laboratory	4	15%(15)	5,8,11 and 12	All
	Seminar	1	5%(5)	12	All
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري والعملي	
	Material Covered
Week 1	Security and Networking: What is a network? Types of networks. Basic network components. Network Security Basics. Understanding network threats. Network Troubleshooting
Week 2	E-Commerce: Concepts of Electronic banking services this include online banking: ATM and debit card services, Phone banking, SMS banking, electronic alert, Mobile banking
Week 3-4	Computer Troubleshooting: Identifying and solving common hardware and software problems that computer users encounter. Basic troubleshooting techniques and tools for diagnosing and resolving issues
Week 5-6	Introduction to AI: Definition of AI, History of AI, AI Techniques and Approaches, Challenges and Ethical Considerations.
Week 7	Midterm Exam
Week 8-9	AI in Our Daily Lives: AI in smartphones and virtual assistants like Siri or Google Assistant





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Week 10-11-12	Applications of AI: Education, Healthcare, Finance, Transportation, Marketing and Advertising.
Week 13	AI and Society: (How AI affects social, AI and international relations, AI and the future of humanity)
Week 14	Ethical Challenges in AI :(AI ethics, privacy and surveillance, the impact of AI on the job market).
Week 15	The Future of AI (Future trends in AI, recent research and emerging technologies)
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Security and Networking: What is a network? Types of networks. Basic network components. Network Security Basics. Understanding network threats. Network Troubleshooting
Week 2	E-Commerce: Concepts of Electronic banking services this include online banking: ATM and debit card services, Phone banking, SMS banking, electronic alert, Mobile banking
Week 3-4	Computer Troubleshooting: Identifying and solving common hardware and software problems that computer users encounter. Basic troubleshooting techniques and tools for diagnosing and resolving issues
Week 5-6	Introduction to AI: Definition of AI, History of AI, AI Techniques and Approaches, Challenges and Ethical Considerations.
Week 7	Midterm Exam
Week 8-9	AI in Our Daily Lives: AI in smartphones and virtual assistants like Siri or Google Assistant
Week 10-11-12	Applications of AI: Education, Healthcare, Finance, Transportation, Marketing and Advertising.
Week 13	AI and Society: (How AI affects social, AI and international relations, AI and the future of humanity)
Week 14	Ethical Challenges in AI :(AI ethics, privacy and surveillance, the impact of AI on the job market).
Week 15	The Future of AI (Future trends in AI, recent research and emerging technologies)
Week 16	Preparatory week before the final Exam





Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts		
Recommended Texts	1. Graham Brown, David Watson, "Cambridge IGCSE Information and Communication Technology", 3rd Edition (2020) 2. Alan Evans, Kendall Martin, Mary Anne Poatsy, "Technology In Action Complete", 16th Edition (2020). 3. Ahmed Banafa, "Introduction to Artificial Intelligence (AI)", 1st Edition (2024). 4. الخضر علي الخضر بحث " أساسيات الحاسوب " 2016 . 5. الدكتور عادل عبدالنور, "مدخل إلى عالم الذكاء الاصطناعي " 2005 .	
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.





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Module Information					
معلومات المادة الدراسية					
Module Title	CONCRETE TECHNOLOGY III			Module Delivery	
Module Type	Core			☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☒ Practical ☒ Seminar	
Module Code	BCE 301				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level			3		
Administering Department		BCE	College	TEMO	
Module Leader	Mafaz Hani Abdullah			e-mail	mafaz.hani@ntu.edu.iq
Module Leader's Acad. Title		Assistant lecturer		Module Leader's Qualification	MSc.
Module Tutor	Mafaz Hani Abdullah			e-mail	mafaz.hani@ntu.edu.iq
Peer Reviewer Name		Name		e-mail	E-mail
Scientific Committee Approval Date		28/09/2025		Version Number	3.0

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





Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	This module aims to provide students with advanced knowledge and understanding of concrete as a construction material. It covers the properties, behaviours, and performance of fresh and hardened concrete, including its durability, sustainability, and special types. It also equips students with skills in non-destructive testing, quality assessment, and sustainable material selection in accordance with modern engineering practices.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this module, students will be able to: 1. Explain the behaviour and properties of fresh and hardened concrete, including elasticity, shrinkage, creep, and durability. 2. Describe the importance and methods of concrete curing. 3. Evaluate the bond strength between steel and concrete using testing methods such as the pull-out test. 4. Apply non-destructive testing (NDT) methods to assess concrete quality. 5. Identify and analyse special types of concrete and their mix design principles (e.g., high strength, lightweight, foamed, and aerated concretes). 6. Assess the sustainability aspects of concrete, including life cycle assessment (LCA), green building materials, and carbon footprint. 7. Integrate sustainability principles into material selection and concrete design.
Indicative Contents المحتويات الإرشادية	1. Introduction to concrete technology; properties of fresh and hardened concrete 2. Field adjustments and workability of concrete 3. Elasticity of concrete 4. Shrinkage and creep in concrete 5. Durability of concrete 6. Importance and methods of concrete curing 7. Bond strength between steel and concrete – pull-out test 8. Non-destructive testing (NDT) of concrete 9. Mid-term exam 10. High performance concrete – mix design 11. Lightweight aggregate concrete – mix design 12. Sustainability in concrete production 13. Green building materials, life cycle assessment (LCA), and carbon footprint 14. Integration of sustainability principles into concrete design

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم





Strategies	To ensure effective learning, a combination of theoretical instruction, practical applications, and interactive activities will be employed. The following strategies will be used: 1. Lectures and Interactive Discussions • Objective: Provide foundational knowledge on concrete materials, properties, and design principles. • Approach: Use PowerPoint presentations, real-world examples, and case studies to explain key concepts. • Engagement: Encourage students to ask questions, participate in discussions, and share experiences related to concrete applications. 2. Laboratory Experiments and Practical Demonstrations • Objective: Reinforce theoretical knowledge through hands-on experience with concrete materials and testing methods. • Approach: Conduct lab sessions on fresh and hardened concrete properties, mix design, and in-situ testing. • Engagement: Assign students to small groups for conducting experiments and interpreting results. 3. Field Visits and On-Site Observations • Objective: Provide real-world exposure to concrete construction, testing, and quality control. • Approach: Arrange visits to construction sites, batching plants, and material testing labs. • Engagement: Require students to prepare field reports and presentations based on their observations. 4. Problem-Based Learning (PBL) and Case Studies • Objective: Develop critical thinking and problem-solving skills in concrete engineering. • Approach: Present real-world challenges such as concrete mix failures, structural cracks, or durability issues. • Engagement: Assign students to analyze cases, propose solutions, and justify their recommendations. 5. Group Projects and Mini-Research Assignments • Objective: Encourage teamwork, research skills, and innovation in concrete applications. • Approach: Assign projects such as optimizing concrete mix designs, evaluating sustainability aspects, or developing special types of concrete. • Engagement: Require students to present findings in reports and presentations. 6. Continuous Assessment and Feedback • Objective: Monitor student progress and provide timely guidance.
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	• Approach: Use quizzes, online assessments, and peer reviews to reinforce learning. • Engagement: Provide detailed feedback and hold one-on-one discussions for improvement.
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Student Workload (SWL)			
الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	78	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	47	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	125		

Module Evaluation					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	15% (15)	5,8,11 and 12	LO #1, #3 and #5, #7
	Assignments	2	10% (10)	2 and 12	LO #2 and #4, #6
	Projects / Lab.	1	5% (5)	14	All
	Report	4	10% (10)	5,8,11 and 12	LO #1 - #7
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		





Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to concrete technology, fresh concrete, hardened concrete, and field adjustment
Week 2	Demonstrates knowledge about Elasticity of concrete
Week 3	Demonstrates knowledge about Shrinkage and Creep of concrete
Week 4	Demonstrates knowledge about Durability of concrete
Week 5	Demonstrates knowledge about Importance of curing, and Methods of curing concrete
Week 6	Demonstrates knowledge about measuring the bond strength of steel with concrete using a pull-out test
Week 7	Non-destructive test of concrete
Week 8	Non-destructive test of concrete
Week 9	Mid-term exam
Week 10	Special types of concrete: High strength concrete, Mix design
Week 11	Special types of concrete: Lightweight aggregate concrete , Mix design
Week 12	Special types of concrete: Lightweight aggregate concrete , Mix design
Week 13	Sustainability of concrete, Green building materials, life cycle assessment and carbon footprint.
Week 14	Sustainability of concrete, Green building materials, life cycle assessment and carbon footprint.
Week 15	Sustainability of concrete, Green building materials, life cycle assessment and carbon footprint.

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Preparation of concrete specimens.
Week 2	Lab 2: Static Modulus of Elasticity test of concrete.
Week 3	Lab 3: Shrinkage test of mortar and concrete.
Week 4	Lab 4: Density, Adsorption and Voids ratio test of concrete.
Week 5	Lab 5: Density, Adsorption and Voids ratio test of concrete.





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Week 6	Lab 6: Pull out test .
Week 7	Lab 7: Ultrasonic pulse velocity test of concrete.
Week 8	Lab 8: Hummer test of Concrete.
Week 9	Mid-term exam
Week 10	Lab 10: Mix design of High strength concrete and conducting the learned tests in this course.
Week 11	Lab 11: Mix design of High strength concrete and conducting the learned tests in this course
Week 12	Lab 12: Mix design of Lightweight aggregate concrete and conducting the learned tests in this course
Week 13	Lab 13: Mix design of Lightweight aggregate concrete and conducting the learned tests in this course
Week 14	Lab14: Pozzolanic Activity Test of some materials used in Green mortar / concrete production
Week 15	Lab 15: Testing some properties of green mortar/ concrete and comparing it with the reference mix

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Engineering Concrete, Mix Design and Test Methods, Irving Kett, 2000. Advanced Concrete Technology, John Newman Ban Seng Choo, 2003 High Performance Concrete, P.-C.Aitcin, 2004. Concrete Technology, Theory and Practice, M.S. SHETTY , 2005 Properties of concrete, Nivelles, 2011 Concrete Technology, Nivelles, 2010	No
Recommended Texts	ASTM, Standard, 2020	Yes
Websites	https://www.astm.org/products-services/bos.html	





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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.				





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Module Information				
معلومات المادة الدراسية				
Module Title	Fundamentals of Reinforced Concrete		Module Delivery	
Module Type	Core		☒ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	BCE 302			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	3	Semester of Delivery		
Administering Department		BCE	College	TEC
Module	Dr. Ammar Abduljabar		e-mail	ammarabduljabar@ntu.edu.iq
Module Leader’s Acad. Title		Lecturer	Module Leader’s Qualification	Ph.D.
Module Tutor			e-mail	E-mail
Peer Reviewer Name		Name	e-mail	E-mail
Scientific Committee Approval Date	28/09/2025		Version Number	3.0

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	To develop an understanding of performance and design methodology for basic reinforced concrete structural elements.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Determine the static and kinematic indeterminacy of beam, truss and frame. 2. Analyze propped cantilevers, fixed and continuous beams 3. Analyze indeterminate beams, pin and rigid jointed structures with and without temperature effect. 4. Understand the concepts of slope deflection method for beams and portal frame.





	5. Analyze continuous beams and portal frame using moment distribution method 6. Draw influence line diagrams for determinate and indeterminate beams.
Indicative Contents المحتويات الإرشادية	1. Structural Analysis and Design Philosophy - Identification and calculation of different types of loads. - Application of load combinations as per ACI code for ultimate strength design. - Understanding safety provisions, strength reduction factors (ϕ), and the philosophy of limit states design. - Principles of structural analysis for determinate and indeterminate beams and frames. 2. Material Properties of Concrete and Steel - Stress-strain behavior of concrete in compression. - Modulus of elasticity and stiffness of concrete and their significance in deflection calculations. - Stress-strain curve, yield strength (f_y), and modulus of elasticity of steel. 3. Flexural Analysis and Design of Beams - The three stages of beam behavior: uncracked, cracked, and yield. - Analysis and design of singly reinforced rectangular beams. - Design of doubly reinforced rectangular beams. - Analysis and design of T-beams. - Practical considerations: bar spacing, concrete cover, and minimum beam dimensions. 4. Shear Design in Beams - Understanding the phenomenon of diagonal tension in reinforced concrete beams. - Behavior of beams without and with shear reinforcement (stirrups). - ACI requirements for shear strength calculation. - Design of web reinforcement (stirrups): spacing, size, and layout. 5. Bond, Anchorage, and Development Length - Fundamentals of flexural bond and the concept of development length. - ACI specifications for development of tension reinforcement. - Anchorage of bars using standard hooks. - Development length for bars in compression. 6. Design of Short Columns - Behavior of concentrically loaded columns. - The role of spirals and lateral ties in providing confinement. - Analysis of columns subjected to combined axial load and bending. - Design of round (spiral) columns. 7. Serviceability - Mechanisms of flexural cracking in beams. - ACI code provisions for crack control through reinforcement distribution and spacing.





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	- Calculation of immediate deflections using the effective moment of inertia.
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lecture & In-Class Activities Preliminary & Further Assignment (Homework), Seminar, Implementation/Application/Practice Final Exam Preparation for the Final Exam Mid-Term Exam Preparation for the Mid-Term Exam Short Exam and Preparation for the Short Exam

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

Module Evaluation تقييم المادة الدراسية					
		Time/Numbe	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative	Quizzes	4	15% (15)	5,8,11 and	LO #1 - #6
	Class Work	2	15% (15)	4 and 9	
	Assignments	2	10% (10)	2 and 12	LO #1 - #6
Summative	Midterm Exam	2hr	10% (10)	7	LO #1 - #4
	Final Exam	3hr	50% (50)	16	All





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Total assessment			100%(100)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	Material Covered
1,2	Demonstrates knowledge about Analysis of the structures: - Loads, Load combinations, Safety provisions of the ACI code, Analysis of beams and frames, ACI moment coefficients, Arrangement of live load.
3	Demonstrates knowledge about Materials: - Properties of concrete in compression, Modulus of elasticity, Stiffness, Properties of concrete in tension, Shrinkage and Temperature effects, Reinforcing steels for concrete.
4, 5,6, 7	Demonstrates knowledge about Flexural analysis and design of beams: - Behavior of reinforced concrete beam, tension-reinforced beams analysis, Design of rectangular beams, Design aids, and Practical considerations in beams design, rectangular beam with tension and compression reinforcement, T-beams.
8,9	Demonstrates knowledge about Shear and diagonal tension in beams: - Inhomogeneous elastic beams with diagonal tension, ACI code requirements for shear design, reinforced concrete beams without shear reinforcement, reinforced concrete beams with web reinforcement deep beams and the effect of axial forces
10,11	Demonstrates knowledge about Bond, Anchorage and development length: - Flexural bond fundamentals, Bond strength and development length, ACI-code specifications for tension reinforcement development, tension bars anchorage by hooks, Compression development of bars, Bar cutoff and bend points in beams, as well as bar splices.
12,13	Demonstrates knowledge about Short columns: - Compression along an axis, spirals and lateral ties rectangular column compression and bending Analysis of strain compatibility and interaction diagrams Columns that are round, ACI-code requirements for column design, design tools, bending in both directions, the load contour method





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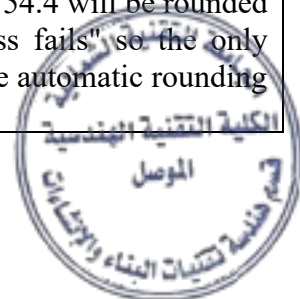


14,15	• Demonstrates knowledge about Serviceability: • Flexural member cracking, ACI-code provisions for crack control, deflection control, immediate deflections, and long-term load deflections ACI-code provisions for deflection control, including deflections caused by shrinkage and temperature variations.
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Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Reinforced Concrete: Mechanics and Design – James K. Wight & James G. MacGregor Design of Reinforced Concrete – Jack C. McCormac & Russell H. Brown	
Recommended	Reinforced Concrete Design – S. Unnikrishna Pillai & Devdas Menon Reinforced Concrete Design – Chu-Kia Wang, Charles G. Salmon & José A. Pincheira	
Websites		

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks	Definition
Success (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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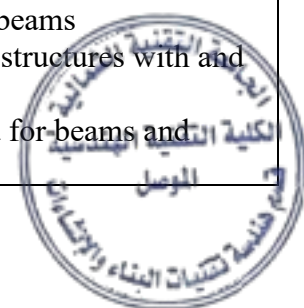
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Module Information						
معلومات المادة الدراسية						
Module Title	STRUCTURAL ANALYSIS			Module Delivery		
Module Type	Core			☒ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar		
Module Code	BCE 303					
ECTS Credits	5					
SWL (hr/sem)	125					
Module Level		3	Semester of Delivery			1
Administering Department		BCE	College	TEMO		
Module	Muthana Adel Najim		e-mail	abbu@ntu.edu.iq		
Module Leader's Acad. Title		Assis. Prof		Module Leader's Qualification		PhD
Module Tutor				e-mail	E-mail	
Peer Reviewer Name		Name		e-mail	E-mail	
Scientific Committee Approval Date		28/09/2025		Version Number		3.0

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 course will help the students understand the concepts of indeterminacy of structural elements, analysis of the structures, drawing shear force and bending moment diagrams.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Determine the static and kinematic indeterminacy of beam, truss and frame. 2. Analyze propped cantilevers, fixed and continuous beams 3. Analyze indeterminate beams, pin and rigid jointed structures with and without temperature effect. 4. Understand the concepts of slope deflection method for beams and portal frame.





	5. Analyze continuous beams and portal frame using moment distribution method 6. Draw influence line diagrams for determinate and indeterminate beams.
Indicative Contents المحتويات الإرشادية	1. Stability and Determinacy of Structures • Definition of stability and determinacy • Conditions for static and kinematic stability • External and internal determinacy • Equilibrium equations and degree of static indeterminacy • Examples of stable, unstable, determinate, and indeterminate structures 2. Statically Determinate Rigid Frames • Characteristics of statically determinate frames • Analysis using equilibrium equations • Reactions and internal force calculations • Support conditions and their impact on determinacy • Real-world applications of rigid frames 3. Statically Determinate Trusses • Definition and classification of trusses • Assumptions in truss analysis • Methods of analysis: Method of joints and method of sections • Zero-force members and their identification • Practical applications in bridges and roof structures 4. Virtual Work and Unit Load Method for Elastic Deformation: Beams and Frames • Concept of virtual work and principle of virtual forces • Application of unit load method to determine deflections • Energy methods in structural analysis • Calculation of deflections and rotations in beams and frames • Work-energy relations in structures 5. Method of Virtual Work: Trusses • Application of virtual work principles in truss analysis • Calculation of nodal displacements and member deformations • Compatibility conditions in trusses • Examples and step-by-step solution approach 6. Approximate Analysis of Statically Indeterminate Structures: Frames • Need for approximate methods in structural analysis • Assumptions in approximate analysis • Portal method and cantilever method • Comparison with exact methods • Practical applications in multi-story buildings 7. Analysis of Statically Indeterminate Structures by the Method of Consistent Deformations • Principle of consistent deformations • Compatibility equations and redundant forces • Application to beams, trusses, and frames • Stepwise solution approach • Examples and practical considerations





	8. Analysis of Statically Indeterminate Structures by the Method of Slope Deflection • Introduction to slope-deflection equations • Assumptions and limitations • Application to beams and frames • Calculation of moments, rotations, and deflections • Example problems and real-world applications 9. Displacement Method of Analysis: Moment Distribution • Introduction to the moment distribution method • Fixed-end moments and distribution factors • Successive approximations and convergence • Application to continuous beams and frames • Practical significance and limitations
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم		
Strategies	• Lecture & In-Class Activities • Preliminary & Further • Assignment (Homework), • Implementation/Application/Practice • Final Exam • Preparation for the Final Exam • Mid-Term Exam • Preparation for the Mid-Term Exam • Short Exam and • Preparation for the Short Exam	Seminar,

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	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/Numbe	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative	Quizzes	4	15% (15)	5,8,11 and	LO #1, #3 and #5
	Class Work	2	5% (5)	3 and 11	LO #2,4,6

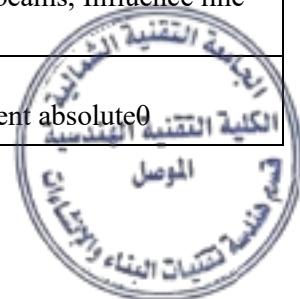


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	Seminar	1	5%(5)	12	ALL
	Project	1	5%(5)	14	ALL
	Assignments	2	10% (10)	4 and 9	LO #3, #4 and #6
Summative	Midterm Exam	2hr	10% (10)	7	LO #1 - #4
	Final Exam	3hr	50% (50)	16	ALL
Total assessment			100% (100)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	Material Covered
1	Demonstrates knowledge about Introduction: Definition of engineering structures, Classification of engineering structures Forces applied on engineering structures, Types of loads and supports.
2	Demonstrates knowledge about Stability and determinacy of structures: Method used for stability of engineering structure, Stability and determinacy of beams. Stability and determinacy of trusses, Stability and determinacy of rigid frames.
3&4	Demonstrates knowledge about Statically determinate beams Application of the Equations of Equilibrium, Statically determinate rigid frames. Application of the Equations of Equilibrium, statically determined Trusses, Common forms of trusses, The joint method, Members of the Zero-Force, The sectional method, Complex trusses and Compound trusses.
5&6	Demonstrates knowledge about Influence line for statically determinate structures: Influence line for beams, Qualitative influence lines. Influence line for beams, Influence line for floor girders, Influence line for trusses.
7	Demonstrates knowledge about: Moving concentrated loads, Maxima criterion Maximum bending moment absolute





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8	Demonstrates knowledge about approximate analysis for statically indeterminate structures: Vertical loads on building frames and Lateral loads on building frames: (Portal method).
9&10	Demonstrates knowledge of deflection using energy methods of structures: (Beams, Truss, Rigid frames), External work and strain energy, Work and energy principal, Virtual work principal (Virtual work method): Trusses, Virtual Work Method: Beams and Frames.
11&12	Slope-deflection method for statically indeterminate beams and rigid frames without joint translation.
13&14&15	Demonstrate knowledge about the moment distribution method: Fixed-end situations (FEMs), Distribution factor, Member stiffness factor, Joint stiffness factor (DF), relative stiffness factor of members, Factor of carry-over, Modified stiffness factor, Modification of the stiffness factor, moment distribution for beams, Moment distribution for frames without joint translation.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Structural Analysis – Aslam Kassimali Structural Analysis – C.S. Hibbeler Structural Analysis – S.S. Bhavikatti	No
Recommended	Matrix Structural Analysis – William McGuire, Gallagher & Ziemian	No
Websites		





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Grading Scheme				
مخطط الدرجات				
Group	Grade	التقدير	Marks	Definition
Success (50 - 100)	A – Excellent	امتياز	90 - 100	Outstanding Performance
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Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.				





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Module Information					
معلومات المادة الدراسية					
Module Title	Soil Mechanics			Module Delivery	
Module Type	Core			☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☒ Practical ☒ Seminar	
Module Code	BCE 304				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	3	Semester of Delivery			
Administering Department	BCE	College	TEMO		
Module	Dr. Harith Ibrahim		e-mail	harithali@ntu.edu.iq	
Module Leader's Acad. Title		Assis. Prof	Module Leader's Qualification		Ph.D.
Module Tutor			e-mail	E-mail	
Peer Reviewer Name		Name	e-mail	E-mail	
Scientific Committee Approval Date	28/09/2025		Version Number	3.0	

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 student should understand the nature of soil, its formation, classification and engineering properties. The student should also know the behavior of soil under stresses, the effect of water flowing inside the soil, the using of soil as a construction material. The different methods used for testing the soil in laboratory and field should also be given to the student.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this module, students will be able to: 1. Soil Formation, Classification, and Geotechnical Properties - Demonstrate a fundamental understanding of soil formation processes, including rock erosion and weathering. - Differentiate between residual and transported soils and describe their engineering significance.





	- Identify the types of soil based on their geological origin and physical characteristics. - Classify soils using standard classification systems such as USCS and AASHTO. 2. Rock Types and Their Influence on Soil Formation - Recognize the three main rock types (sedimentary, igneous, metamorphic) and their contribution to soil formation. - Explain the engineering properties of different rock types and their influence on soil behavior. 3. Geotechnical Index and Strength Properties - Analyze grain size distribution and its effect on soil grading and compaction. - Identify clay minerals and their role in soil plasticity, shrink-swell behavior, and shear strength. - Understand the weight-volume relationship in soil and apply fundamental equations to determine soil properties. - Perform laboratory and field tests to evaluate soil compaction characteristics. 4. Hydraulic Properties of Soils - Define permeability and its role in soil behavior under seepage conditions. - Conduct permeability tests in both laboratory and field settings to determine hydraulic conductivity. - Apply Darcy's Law to calculate seepage velocity and flow rates through soils. 5. Seepage and Flow through Soils - Analyze one-dimensional and two-dimensional flow in soil structures using flow net analysis. - Evaluate the risks of piping, boiling, and seepage failure in earth structures. - Develop solutions to mitigate seepage-related failures in embankments, dams, and foundations. 6. Stress Distribution in Soils - Explain the principles of total stress, effective stress, and pore water pressure. - Calculate effective stress under different loading conditions and its impact on soil strength and stability. - Apply effective stress principles in geotechnical engineering applications such as consolidation and slope stability.
Indicative Contents المحتويات الإرشادية	1. Knowledge of Soil Formation, Deposits, and Types of Soil - Definition of soil and its engineering significance - Soil formation processes: Weathering and rock erosion - Types of soil deposits: Residual vs. transported soils - Organic soils and their characteristics - Classification of soils based on origin, grain size, and composition 2. Soil Formation by Rock Erosion - Physical and chemical weathering processes





- Factors affecting rock erosion and soil formation
- Role of climate, topography, and time in soil development
- 3. Residual and Transported Soils, Organic Soils**
 - **Residual soils:** Formation, characteristics, and engineering properties
 - **Transported soils:** Types based on mode of transport (colluvial, alluvial, aeolian, glacial)
 - **Organic soils:** Peat and other organic deposits, their behavior and challenges in construction
- 4. Types of Rocks: Sedimentary, Igneous, and Metamorphic**
 - Formation and classification of rocks
 - Engineering properties and relevance to geotechnical engineering
 - Examples of each rock type and their influence on soil formation
- 5. Identification of Geotechnical Properties**
 - Index properties: Grain size distribution, Atterberg limits, specific gravity
 - Strength properties: Shear strength, compressibility, and consolidation
 - Factors affecting geotechnical properties
- 6. Formation of Natural Sedimentation and Grain Size Distribution**
 - Sedimentation processes and their impact on soil structure
 - Grain size distribution curve and its significance
 - Soil gradation: Well-graded vs. poorly graded soils
- 7. Clay Minerals and Soil Classification**
 - Types of clay minerals: Kaolinite, montmorillonite, illite
 - Effect of clay minerals on soil behavior
 - Unified Soil Classification System (USCS) and AASHTO classification
- 8. Weight–Volume Relationship and Soil Compaction**
 - Definitions: Water content, void ratio, degree of saturation, porosity
 - Phase relationships in soil mechanics
 - Principles and methods of soil compaction
 - Standard and modified Proctor tests
- 9. Identification of Hydraulic Properties: Permeability (Field & Lab)**
 - Definition and importance of permeability in soil engineering
 - Darcy's Law and coefficient of permeability
 - Laboratory permeability tests (constant head, falling head)
 - Field tests for permeability (pumping test, borehole permeability test)
- 10. Continuous Flow and One- & Two-Dimensional Flow**
 - Fundamentals of seepage and groundwater movement
 - **One-dimensional flow:** Permeability in stratified soils
 - **Two-dimensional flow:** Seepage through embankments and dams
 - Flow net analysis: Importance and construction
 - Piping and boiling phenomena in soil
- 11. Principles of Effective Stress**
 - Concept and significance of effective stress in soil mechanics
 - Relationship between total stress, pore water pressure, and effective stress
 - Effect of effective stress on soil strength and consolidation
- 12. Total Stress, Effective Stress, and Pore Water Pressure**
 - Definition of total stress and its components



	• Role of pore water pressure in soil behavior • Effective stress equation and its engineering applications • Variation of pore water pressure under different loading conditions
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Lecture & In-Class Activities • Laboratory • Assignment (Homework) • Seminar • Report Writing • Final Exam • Preparation for the Final Exam • Mid-Term Exam • Preparation for the Mid-Term Exam • Short Exam and • Preparation for the Short Exam

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Numbe	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative	Quizzes	4	15%(15)	5,8,11 and 12	LO #1 - #3, LO #4 - #6
	Classwork	2	5% (5)	5 and 9	LO #2 #3, LO #4 - #5,
	Seminars	2	5% (5)	3 and 11	ALL
	Project/ Lab.	1	5% (5)	14	ALL
	Report	4	10% (10)	5,8,11 and 12	AL





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Summative	Midterm Exam	2hr	10% (10)	7	LO #1 -4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
1	Demonstrates knowledge about soil formation, Their deposits, Types of soil.
2, 3	Demonstrates knowledge about soil classification systems
4	identify soil geotechnical properties
5	Demonstrates knowledge about Soil classification.
6	Demonstrates knowledge about soil Weight– volume relationships
7	Demonstrates knowledge about Soil compaction
8	Able to identify soil hydraulic properties.
9	Identify permeability in the laboratory conditions
10	Identify permeability in the field conditions
11	Demonstrates knowledge about soil stresses.
12,13	Principles of soil effective stress, Total soil stress, Soil Effective stress., Pore water pressure in soil masses
14,15	Stresses within soil mass due to structures

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

Week	Material Covered
1	Soil Classification & Identification Determination of grain size distribution (sieve analysis & hydrometer test).
2	Atterberg limits (liquid limit, plastic limit, and shrinkage limit).





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3	Visual classification and field identification of soils.
4	Soil Moisture Content & Specific Gravity determination
5	Oven-drying method for moisture content determination.
6	Specific gravity of soil solids using pycnometer.
7	Soil Gypsum content, SO _x soil content
8	Organic matter content, Total Soluble salts Content (T.S.S)
9	Soil Compaction : Standard and Modified Proctor Compaction Tests.
10	Determination of optimum moisture content (OMC) and maximum dry density (MDD) for fine and granular soils.
11	Effect of compaction on soil properties, Compaction ratio in the field
12	California Bearing Ratio CBR test
13	Permeability of Soil: Constant-head permeability test (coarse, fine -grained soils).
14	Permeability of Soil: Falling-head permeability test (coarse, fine-grained soils).
15	Calculation of soil coefficient of permeability of coarse fine soils, and Water table level detection in the field

Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Das, B. M. <i>Principles of Geotechnical Engineering</i> (9 th Edition). Cengage Learning Holtz, R. D., Kovacs, W. D., & Sheahan, T. C. <i>An Introduction to Geotechnical Engineering</i> (2nd Edition). Pearson. Terzaghi, K., Peck, R. B., & Mesri, G. <i>Soil Mechanics in Engineering Practice</i> (3rd Edition). Wiley.	
Recommended		
Websites		





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Grading Scheme				
مخطط الدرجات				
Group	Grade	التقدير	Marks	Definition
Success (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	PAVEMENT ENGINEERING		Module Delivery		
Module Type	Core		☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☒ Practical ☒ Seminar		
Module Code	BCE 305				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		3	Semester of Delivery		1
Administering Department		BCE	College	TEMO	
Module Leader	Dr. Zaid Hazim Al-Saffar		e-mail	Zaid.alsaffar@ntu.edu.iq	
Module Leader's Acad. Title			Module Leader's Qualification		Ph.D.
Module Tutor			e-mail	E-mail	
Peer Reviewer Name		Name	e-mail	E-mail	
Scientific Committee Approval Date		28/09/2025	Version Number		3.0

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	By the end of this course, students will be able to: 1. Understand the fundamental principles and functional requirements of pavement systems. 2. Classify soils and assess their suitability for highway construction using standard geotechnical methods. 3. Analyze soil compaction and stabilization methods including chemical and mechanical techniques. 4. Evaluate geosynthetic materials (e.g., geogrids) and their application in pavement structures.





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	- Identify asphalt materials, their properties, production, and application techniques. - Conduct laboratory and field procedures for asphalt mixture design and testing. - Apply quality assurance practices in road construction projects.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this course, students will be able to: - Explain the types, functions, and structural components of pavement systems. - Classify various soil types and interpret data obtained from soil surveys and geotechnical investigations. - Describe and apply appropriate soil compaction and stabilization techniques, including chemical and mechanical methods. - Assess the use, selection criteria, and installation procedures of geosynthetics, particularly geogrids, in pavement construction. - Identify asphaltic materials and describe their properties, sources, refining processes, and composition. - Conduct asphalt mix design procedures and perform laboratory tests such as the Marshall and Superpave methods. - Apply field practices related to asphalt applications, including job mix preparations, curing, and quality control measures.
Indicative Contents المحتويات الإرشادية	- Introduction to Pavements: Description, functional requirements, types, and applications. - Earthworks: Sub-grade, subbase, and base works. - Soil Classification: AASHTO classification system and its application in highway construction. - Soil Exploration Methods: Geophysical methods, Ground Penetrating Radar (GPR) principles, and advantages. - Soil Compaction: Concepts of optimum moisture content, compacting effort, field procedures, and California Bearing Ratio (CBR) testing. - Soil Stabilization: Techniques using cement, asphalt, lime, polymer solutions, and geogrid applications. - Asphaltic Materials: Types, characteristics, classification, refining processes, and properties. - Cutback and Emulsion: Types, characteristics, applications, and specifications for prime and tack coats. - Asphalt Mixtures: Knowledge of hot, warm, and cold mix designs, job mix preparations in labs and plants, and field applications.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	- Lecture & In-Class Activities - Preliminary & Further Study





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	• Laboratory • Assignment (Homework) • Seminar • Report Writing • Final Exam • Preparation for the Final Exam • Mid-Term Exam • Preparation for the Mid-Term Exam • Short Exam and • Preparation for the Short Exam
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Student Workload (SWL) الحمل الدراسي للطلاب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	37	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	15% (15)	5,8,11 and 12	LO #1, #3 and #6
	Assignments	2	5% (5)	2 and 12	LO #2, #4 and #5
	Seminars	2	5% (5)	3 and 9	All
	Project / Lab.	1	5% (5)	14	All
	Report	4	10% (10)	5,8,11 and 12	LO #3, #4 and #6
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		
Delivery Plan (Weekly Syllabus)					





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	Material Covered
1	Introduction and Description of Pavements, Functional Requirements, Types and Uses of Pavements, earthworks (Sub-grade and Subbase works, base works)
2,3	AASHTO classification for soil, Soil surveys for highway construction, Geophysical Methods of Soil Exploration, Ground Penetrating Radar (GPR): Principles and advantages
4	Soil Compaction, Optimum Moisture Content, Compacting Effort, Field Compaction Procedures, California Bearing Ratio (CBR)
5,6	Soil stabilization (stabilized by cement, asphalt, lime, Polymer-based water solutions), Geogrid (Types of Geogrids: Key Considerations for Geogrid Selection and Installation), Frost Action in Soils
7,8	Asphaltic materials, descriptions, types, characteristics, uses. Classification or Source of Asphalt, Refining Processes, Asphalt Composition, Properties of Asphalt Materials
9,10	Cutback and emulsion, types, characteristics and uses, Prime and tack coats (specifications, applications), Rate of Curing
11,12	Demonstrates knowledge and correctly implement asphalt mixtures (Hot, warm and Cold) mix
13, 14,15	Monitors and conducts asphalt content determination (Marshal and Superpave), Job mix, preparations in laboratory and plants, applications in the fields.

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
1	Penetration test of bitumen
2	Softening point test of bitumen
3	Ductility test of bitumen
4	Elastic Recovery
5	Specific gravity test of bitumen
6	Flash point
7	Viscosity
8	Solubility
9	Site visit to asphalt plant
10	Prime coat and tack coat (test and sampling)
11	Marshall mix design

Learning and Teaching Resources





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مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Traffic and Highway Engineering, Fourth Edition Nicholas J. Garber and Lester A. Hoel	No
Recommended Texts	Hot Mix Asphalt Materials, Mixture Design and Construction ” by Roberts et al. Pavement Analysis and Design ” by Yang H. Huang Asphalt Pavements: A Practical Guide to Design, Production and Maintenance ” by Patrick Lavin	No
Journals	Transportation Research Record (TRR) International Journal of Pavement Engineering Journal of Materials in Civil Engineering (ASCE) Construction and Building Materials (Elsevier)	





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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 ANALYSIS		Module Delivery		
Module Type	Core		☒ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar		
Module Code	BCE 306				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	3	Semester of Delivery			1
Administering Department		BCE	College	TEMO	
Module Leader	Nabel Kalel Asmel		e-mail	nabeelismail@ntu.edu.iq	
Module Leader's Acad. Title		Assistant Professor	Module Leader's Qualification		PhD
Module Tutor	Enas Hisham Mohammed		e-mail	Enas.alhayali@ntu.edu.iq	
Peer Reviewer Name		Name	e-mail		
Scientific Committee Approval Date		28/09/2025	Version Number		3.0

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

Module Aims, Learning Outcomes and Indicative Contents	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	This course aims to equip students with the fundamental knowledge and practical skills required to analyze and solve ordinary and partial differential equations, with a particular focus on applications in structural and construction engineering. The primary objectives include: Understanding the theoretical foundations of ordinary and partial differential equations. Analyzing and solving linear differential equations of second and higher orders using methods such as the undetermined coefficient method and integration techniques.





	3. Applying ordinary differential equations (ODEs) to engineering problems, including beam and column analysis, beam-columns, beams on elastic foundations, and forced oscillations in dynamic analysis. 4. Identifying and implementing singular functions, such as the unit step function, unit impulse function, and unit moment function, in mathematical modeling. 5. Correctly executing integration methods to solve ODE applications related to beam analysis. 6. Understanding Fourier series and Euler formulas, and applying Fourier expansions (full-range and half-range) to solve construction engineering problems. 7. Laplace transforms and Laplace inverse to solve construction engineering problems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of this course, students will be able to: 1. Demonstrate knowledge of fundamental concepts in ordinary differential equations, including linear differential equations, homogeneous equations, and general solutions. 2. Solve initial value problems for homogeneous linear differential equations of any order using various techniques. 3. Apply the undetermined coefficient method to solve non-homogeneous differential equations in engineering applications such as structural dynamics and beam analysis. 4. Model engineering problems involving beams, columns, beam-columns, and elastic foundations using differential equations. 5. Analyze and solve problems involving Fourier series, including Euler formulas, expansions for arbitrary periods (2L), and odd/even function representations. 6. Implement Fourier series applications in structural engineering, including vibration analysis and response predictions. 7. Students learn to apply Laplace and inverse Laplace transforms to solve differential equations in construction engineering. In addition to, they use mathematical methods to analyse vibrations and dynamic structural systems. Also, they interpret physical results such as damping, stability, and time response of structures. 8. Use singular functions effectively, including unit step functions, unit impulse functions, and unit moment functions, in engineering applications.
Indicative Contents المحتويات الإرشادية	I. Ordinary Differential Equations (ODEs) • Introduction to ordinary differential equations (ODEs) • Linear differential equations: second-order and higher • Homogeneous linear equations and their general solutions • Initial value problems and solutions for higher-order ODEs • ODEs with constant coefficients





	• Non-homogeneous equations and the method of undetermined coefficients II. Applications of ODEs in Engineering • Structural applications of ODEs: ◦ Beams and columns ◦ Beam-columns ◦ Beams on elastic foundations • Dynamic analysis and forced oscillations III. Singular Functions and Their Applications • Unit step function • Unit impulse function • Unit moment function IV. Fourier Series and Its Applications • Introduction to Fourier series • Euler formulas and Fourier series for different periods • Expansions for odd and even functions • Half-range expansions • Applications of Fourier series in construction engineering V. Laplace Transforms and Inverse Laplace for Construction Engineering Applications: • Introduction to Laplace Transform – Definition, purpose, and engineering significance. • Basic Properties and Theorems – Linearity, shifting, differentiation, and integration in the s-domain. • Application to Structural Dynamics – Solving mass–spring–damper systems. • Engineering Case Studies – Dynamic analysis of beams, bridges, and concrete structures. Understand the fundamental principles of Laplace and inverse Laplace transforms and their role in solving time-dependent engineering problems
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Lecture & In-Class Activities • Assignment (Homework) • Seminar





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	• Final Exam • Preparation for the Final Exam • Mid-Term Exam • Preparation for the Mid-Term Exam • Short Exam and • Preparation for the Short Exam
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Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	15% (15)	5,8,11 and 12	LO #2, #4 and #6
	Class Work	2	10% (10)	2 and 12	LO #3, #4 and #7, #8
	Assignments	2	10% (10)	3 and 8	All
	Seminar	1	5% (5)	14	All
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		





Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
1	Demonstrates knowledge about ordinary differential equations, liner differential equations, homogeneous linear equations of the second order, general solution. Basis initial value problem.
2	Homogeneous linear differential equations of arbitrary order n, equations of order with constant coefficients, non-homogeneous equations solving by the method of undetermined coefficient.
3	Non-homogeneous equations solving by the method of undetermined coefficient.
4	Uses correctly the applications of O.D.E of undetermined coefficient method in: beam
5	Uses the applications of O.D.E of undetermined coefficient method in: column,
6	Uses correctly the applications of O.D.E of undetermined coefficient method in: beam on elastic foundation.
7	Correctly execute the applications of O.D.E of integration method in beams.
8	Correctly execute Fourier series, Euler formulas
9	Fourier series for any period (2L), odd and even functions,
10	Half – rang expansion fourier series
11	Applications of Fourier series in construction engineering.
12	Laplace Transforms
13	Inverse Laplace Transforms
14	Engineering Applications, and engineering significance.of Laplace and inverse Laplace transforms to solve differential equations in construction engineering.
15	Able to identify and implement singular function: unit step function, unit impulse function, unit moment function.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Advanced engineering mathematics / Erwin kreyszig	
Recommended Texts	Applied mathematics for engineering & physicists / pipes & harvill	
Websites		





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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.				





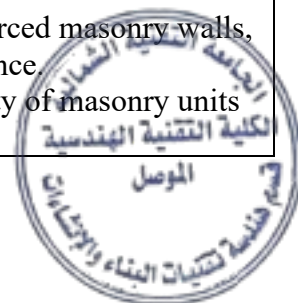
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Module Information					
معلومات المادة الدراسية					
Module Title	MASONRY BUILDINGS		Module Delivery		
Module Type	Core		☒ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☒ Seminar		
Module Code	BCE 307				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		3	Semester of Delivery		2
Administering Department		BCE	College	TEMO	
Module Leader	Waseem Thabit Mohammed		e-mail	jasimabd@ntu.edu.iq	
Module Leader's Acad. Title		Assist. Lect.	Module Leader's Qualification		Master
Module Tutor			e-mail	E-mail	
Peer Reviewer Name		Name	e-mail	E-mail	
Scientific Committee Approval Date		28/09/2025	Version Number		3.0

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 course aims to: • Introduce different types of masonry materials and their mechanical properties, including strength, durability, and aesthetic considerations. • Develop an understanding of load-bearing capacity and deformation analysis in masonry structures. • Provide fundamental principles for designing reinforced masonry walls, columns, and beams to enhance structural performance. • Equip students with the skills to estimate the quantity of masonry units and mortar required for construction projects.





	• Train students in assessing the condition of existing masonry structures and identifying potential structural deficiencies. • Explore specialized topics such as confined masonry, infill masonry in reinforced concrete frames, and advanced assessment techniques for aging masonry buildings.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of the course, students will be able to: 1. Identify different masonry materials, including bricks, stones, and blocks. Evaluate masonry materials based on strength, durability, and visual appeal. 2. Analyze the mechanical behavior of masonry under various loading conditions. Calculate the strength, stiffness, and deformation characteristics of masonry elements. 3. Apply design principles to reinforced masonry structural components. Ensure compliance with safety standards and durability requirements. 4. Calculate the quantity of bricks, blocks, and mortar required for masonry construction. Develop cost-effective material estimation techniques for project planning. 5. Conduct structural evaluations of masonry buildings to identify deficiencies. Recommend appropriate maintenance and rehabilitation measures. 6. Understand the role of confined masonry in seismic-resistant construction. Analyze the behavior of masonry infill in reinforced concrete frames. 7. Apply assessment techniques to evaluate the stability and integrity of aging masonry structures. 8. Develop strategies for rehabilitation, strengthening, and retrofitting based on assessment results.
Indicative Contents المحتويات الإرشادية	Types of Masonry Materials and Their Properties - Classification of masonry materials (bricks, stones, blocks). - Strength and durability characteristics of different masonry types. - Aesthetic and functional considerations in material selection. Mechanical Properties of Masonry: Calculating Strength and Stiffness - Stress-strain behavior of masonry materials. - Load-bearing capacity and failure modes. - Methods for analyzing stiffness and deformation. Design of Reinforced Masonry Walls, Columns, and Beams - Design principles for reinforced masonry structural elements. - Load distribution and reinforcement techniques. - Case studies on masonry design applications. - Material estimation methods for masonry structures. - Calculation techniques for bricks, blocks, and mortar. - Optimizing material usage for cost efficiency. Condition Assessment of Existing Masonry Structures - Structural evaluation methodologies. - Identifying cracks, material degradation, and structural distress. - Rehabilitation techniques for masonry buildings. Special Topics - Confined Masonry and Infill Masonry





	- Principles and applications of confined masonry. - Performance of masonry infill walls in RC frames. - Seismic considerations in confined masonry structures. Special Topics - Assessment of Existing Masonry Structures (Parts I, II, III) - Advanced assessment techniques for old masonry structures. - Use of non-destructive testing methods. - Strategies for retrofitting and strengthening aging masonry buildings. - This course will provide students with both theoretical knowledge and practical skills in masonry construction, design, assessment, and rehabilitation.
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Lecture & In-Class Activities • Assignment (Homework) • Seminar • Final Exam • Preparation for the Final Exam • Mid-Term Exam • Preparation for the Mid-Term Exam • Short Exam and • Preparation for the Short Exam

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





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





Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Types of Masonry Materials and Their Properties
Week 2	Identification and evaluation of masonry materials such as bricks, stones, and blocks, focusing on strength, durability, and appearance.
Week 3	Mechanical Properties of Masonry: Calculating Strength and Stiffness
Week 4	Methods to analyze and calculate the load-bearing capacity and deformation of masonry elements.
Week 5	
Week 6	Design of Reinforced Masonry Walls, Columns, and Beams
Week 7	
Week 8	Principles of designing structural masonry elements for enhanced strength and durability.
Week 9	Quantity Estimation of Masonry Units and Mortar for Construction Projects
Week 10	Techniques for calculating the required materials for efficient project planning.
Week 11	
Week 12	Condition Assessment of Existing Masonry Structures
Week 13,14,15	Confined Masonry, Infill Masonry, Special Topics - Masonry Infill in RC Frames - Special Topics - Assessment of Existing Masonry Structures - Special Topics - Assessment of Existing Masonry Structures Part - II Special Topics - Assessment of Existing Masonry Structures Part - III

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Masonry Structures: Behavior and Design – Hamid Ahmad Structural Masonry – Walter H. Pfeifer	
Recommended Texts	Modern Masonry: Brick, Block, Stone – Clois E. Kicklighter Design of Masonry Structures – James Amrhein	





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	3. Eurocode 6: Design of Masonry Structures – CEN 4. TMS 402/602 – Building Code Requirements and Specification for Masonry Structures – The Masonry Society	
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.





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Module Information					
معلومات المادة الدراسية					
Module Title	CONSTRUCTION MANAGEMENT		Module Delivery		
Module Type	Core		☒ Theory ☒ Lectfure ☐ Lab ☐ Tutorial ☒ Practical ☒ Seminar		
Module Code	BCE 308				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		3			Semester of Delivery
Administering Department		BCE	College	TEMO	
Module	Ahmed Mohammed Sami Al-Janabi		e-mail	ahmed.aljanabi@ntu.edu.iq	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		Ph.D.
Module Tutor			e-mail	E-mail	
Peer Reviewer Name		Name	e-mail	E-mail	
Scientific Committee Approval Date	28/09/2025		Version Number	3.0	

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	- To establish an understanding of how construction industry operates including the project life cycle and participants involved. To introduce the principles of project management and its functions. - To provide the students with essentials of construction management including procurement, planning, estimating, and scheduling. - To familiarize students with measuring and managing performance in construction. - To present and discuss some tools to improve performance at project and organizational level.



	To increase the awareness of students on the emerging issues and advanced processes in construction.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	- Understanding of general concepts and methods of constructions and/project management. - Ability in Planning and scheduling of construction projects. - Ability to assigning of resources (Materials, Labors, Equipment, Money) and control. - Ability in Time estimating of construction projects. - Ability in participating in taking-over, final measurement and acceptance of construction projects, solving construction problems
Indicative Contents المحتويات الإرشادية	1. Introduction to the Course - Overview of construction management as a discipline. - The role of construction management in the industry. - The characteristics of the construction sector at domestic and global levels. - The structure of the course and key learning objectives. 2. Construction Project Management - Definition and nature of construction projects. - The project life-cycle and its phases. - Principles and functions of project management. - Key stakeholders in construction project management. 3. Construction Cost Estimation and Bidding - Importance of planning and design in project cost estimation. - Project scope management and cost estimation techniques. - Elements of cost estimation and budgeting. - Bidding process and contractor selection strategies. 4. Construction Project Planning and Scheduling - Introduction to scheduling and its significance in project management. - Work breakdown structure (WBS) and its role in project planning. - Scheduling techniques: Gantt charts, network diagrams, and PERT. - The Critical Path Method (CPM) for project scheduling. - Resource allocation and management. - Project crashing and time-cost trade-offs. 5. Construction Procurement - Fundamentals of investment in construction projects. - Financing strategies for construction projects. - Procurement methods and strategies. - Comparison of project delivery methods. - Contract types and risk-sharing mechanisms. - National and international construction contracts. - Contract administration and claims management. 6. Performance Measurement in Construction - Definition and importance of performance measurement. - Common performance issues in construction projects. - Factors affecting project success. - Industry reports and construction performance benchmarks. - Key performance indicators (KPIs) and their applications. 7. Improving Project and Organizational Performance in Construction





	• Benchmarking best practices for construction management. • Risk management strategies for minimizing project uncertainties. • Financial management techniques in construction projects. • Dispute resolution and claims management approaches. • Effective human resources management in construction teams. • Knowledge management and innovation in construction. • Total quality management (TQM) for improving project efficiency. • Strategic use of IT and digital technologies in construction. • Collaborative strategies for enhancing construction productivity. • Health and safety considerations in construction projects. 8. Project Management Strategies • Overview of project management strategies for improved construction performance. • Application of strategic management in construction projects. • Case studies on successful project management implementations. • Final assignment and course wrap-up. This structured guideline provides a comprehensive framework for understanding key aspects of construction management, ensuring students gain both theoretical and practical insights into the field.
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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 a project work. Presenting lecturers by using white board, ○ Demonstration method implies presenting information with the help of visual aids (data show, video, etc) ○ visiting project site as practical aid of teaching and applications, ○ Written method implies the following forms of activity: copying, taking notes, composing theses, writing reports... etc. ○ E-learning implies using the Internet and multi-media means in the process of teaching. ○ Cooperative teaching is a teaching strategy in the process of which each member of a group not only has to learn the subject himself, but also to help his fellow-student to learn it better.





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Student Workload (SWL) الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	77	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	15% (15)	3, 6, 10 and 13	(1, 2), (3,4), (5)
	Classwork	2	10% (10)	5 and 9	(1, 2), (3,4), (5)
	Assignments	2	5% (5)	4 and 11	(1, 2), (3,4), (5)
	Seminar	2	5% (5)	6 and 12	All
	Project	1	5% (5)	14	All
Summative assessment	Midterm Exam	2hr	10% (10)	7	All
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	Material Covered
1	Introduction to the course Demonstrates knowledge - Construction management as a discipline. - Context of construction management. Characteristics of the construction industry, domestic and global construction market,
2,3	Construction project management Uses correctly the definition of a project, nature of construction projects, project life-cycle, principles of project management, project management functions.
4	Construction cost estimation and bidding Correctly implement planning and design, project scope management, elements of cost estimation, estimating methods, project budgeting, bidding.





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5,6	Construction project planning and scheduling Correctly implement scheduling process, work breakdown structures, scheduling techniques, critical path method, resource management, crashing.
7,8	Construction procurement Correctly implement investing in construction projects, project finance, procurement strategies, project delivery methods, contract types, national and international contracts, and contract and claim management.
9	Performance measurement Correctly execute definition of performance, performance issues in construction, factors affecting project success, industry reports, performance measurement tools, key performance indicators.
10,11,12	Improving project and organizational performance in construction Demonstrates knowledge about benchmarking, risk management, financial management, claims and dispute resolution, human resources management, knowledge management, total quality management, strategic use of IT, strategic collaborations, health and safety.
13,14,15	Project management strategies Demonstrates knowledge about course overview, project management strategies to enhance performance in construction, final assignment.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Barbara J. Jackson (2010). <i>Construction Management JumpStart, Second Edition</i>. Wiley Publishing, Inc., Indianapolis, Indiana Kerzner, H. (2022). <i>Project Management: A Systems Approach to Planning, Scheduling, and Controlling</i>. Wiley. Lough, R. H., Sears, G. A., & Sears, S. K. (2015). <i>Construction Project Management</i>. Wiley. Callahan, M. T., Quackenbush, D. G., & Rowings, J. E. <i>Construction Project Scheduling</i>. McGraw-Hill	
Recommended	Halpin, D. W., & Senior, B. A. <i>Construction Management</i>. Wiley. Hendrickson, C. <i>Project Management for Construction: Fundamental Concepts for Owners, Engineers, Architects, and Builders</i>. Prentice Hall. Gould, F. E., & Joyce, N. E. (2008). <i>Construction Project Management</i>. Pearson.	
Websites		





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Grading Scheme				
مخطط الدرجات				
Group	Grade	التقدير	Marks	Definition
Success (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	ADVANCED SOIL MECHANICS		Module Delivery		
Module Type	Core		☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☒ Practical ☒ Seminar		
Module Code	BCE 309				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		3			Semester of Delivery
Administering Department		BCE	College	TEMO	
Module	Dr. Harith Ibrahim		e-mail	harithali@ntu.edu.iq	
Module Leader's Acad. Title			Module Leader's Qualification		Ph.D.
Module Tutor			e-mail	E-mail	
Peer Reviewer Name		Name	e-mail	E-mail	
Scientific Committee Approval Date	28/09/2025		Version Number		3.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Provide students with fundamental knowledge about soil formation, types of soil, and their deposits. 2. Enable students to understand the distribution of external stresses in soil and their effects on structures. 3. Enhance students' understanding of consolidation theories and settlement analysis, including Terzaghi's theory and its assumptions. 4. Develop students' ability to analyze shear strength of soil using Mohr-Coulomb theory.





	5. Train students in conducting laboratory soil tests, such as direct shear test, triaxial test, and coefficient of pure water pressure measurement. 6. Introduce students to the characteristics and engineering behavior of collapsible and swelling soils.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of this course, students will be able to: - Understand soil formation and deposition, identify different soil types, and describe their engineering properties. - Analyze the distribution of external stresses in soil and assess their impact on structural stability. - Apply consolidation theory in soil settlement analysis, including performing calculations related to compression and settlement. - Interpret Mohr-Coulomb shear strength theory and apply it in analyzing soil stability under different loading conditions. - Conduct laboratory soil tests, including direct shear test, triaxial test, and pure water pressure coefficient measurement, and accurately interpret test results. - Evaluate problems associated with collapsible and swelling soils and propose suitable engineering solutions.
Indicative Contents المحتويات الإرشادية	Instructional Content Guidelines Module 1: Introduction to Soil Mechanics - Importance of soil mechanics in civil engineering. - Soil as a three-phase system (solid, liquid, and gas). - Soil formation, weathering processes, and soil deposits. Module 2: Soil Classification & Index Properties - Soil particle size and classification systems (USCS, AASHTO). - Atterberg limits (liquid limit, plastic limit, shrinkage limit). - Specific gravity and unit weight of soils. Module 3: Soil Compaction & Field Control - Principles of soil compaction and its effect on strength and permeability. - Standard and modified Proctor compaction tests. - Field compaction control methods (nuclear density gauge, sand cone test). Module 4: Permeability & Seepage - Darcy's Law and soil permeability. - Laboratory and field permeability tests (constant and falling head tests). - Flow nets and seepage analysis through earth dams and retaining structures. Module 5: Stress Distribution in Soil - Stress due to self-weight of soil. - Vertical stress due to point loads, line loads, and uniformly distributed loads (Boussinesq's and Westergaard's equations). - Influence diagrams and pressure bulb concept. Module 6: Consolidation & Settlement Analysis - Concept of soil consolidation and settlement.





	• Terzaghi's one-dimensional consolidation theory and assumptions. • Coefficient of consolidation (C_v) and time rate of settlement. • Primary and secondary consolidation. Module 7: Shear Strength of Soil • Concept of shear strength and failure criteria. • Mohr's Circle and Mohr-Coulomb failure theory. • Laboratory shear strength tests: direct shear test, triaxial test, unconfined compression test. • Stress path analysis for drained and undrained conditions. Module 8: Expansive & Collapsible Soils • Definition and characteristics of swelling soils (clay minerals, moisture variation effects). • Swell potential tests and mitigation techniques. • Collapsible soils and their engineering implications. • Methods for treating problematic soils. Module 9: Lateral Earth Pressure & Retaining Structures • Rankine's and Coulomb's theories of lateral earth pressure. • Active, passive, and at-rest earth pressure conditions. • Design considerations for retaining walls and sheet piles. Module 10: Bearing Capacity & Foundation Design • Terzaghi's bearing capacity equations for shallow foundations. • Effect of water table on bearing capacity. • Load tests and field evaluation of soil bearing capacity. • Types of foundations: shallow and deep foundations. Module 11: Slope Stability Analysis • Types of slopes and failure mechanisms. • Methods of slope stability analysis (infinite slope, limit equilibrium methods). • Factor of safety and reinforcement techniques for slope stabilization. Module 12: Laboratory Tests & Field Applications • Overview of essential soil mechanics laboratory tests. • In-situ soil testing methods (SPT, CPT, plate load test). • Interpretation of soil test data for engineering applications.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Lecture & In-Class Activities • Laboratory • Assignment (Homework) • Seminar • Report Writing • Final Exam • Preparation for the Final Exam • Mid-Term Exam • Preparation for the Mid-Term Exam • Short Exam and • Preparation for the Short Exam





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Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
As		Time/Numbe	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative	Quizzes	4	15% (15)	5,8,11 and 12	LO #1 - #2, LO #3 - #5
	Assignments	2	5% (5)	2 and 12	LO #1 - #3, LO #4 - #6,
	Seminar	2	5% (5)	3 and 8	LO #2 - #3, LO #4 -
	Project/ Lab.	1	5% (5)	14	
	Report	4	10% (10)	5,8,11 and 12	LO #1 - #4
Summative	Midterm Exam	2hr	10% (10)	7	All
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100)		





Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
1	Demonstrates knowledge about Consolidation theory & building settlement.
2	Long term and short-term settlement of plastic and Non plastic soils respectively
3	Terzaghi's theory of consolidation & assumptions (long term settlement).
4	Consolidation test and Consolidation analysis
5	Demonstrates knowledge about soil shear stresses in cohesive and Non-cohesive soils
6	Cohesion and friction components of soil shear stress
7	Soil shear strength determination tests: Direct shear test, Unconfined compressive strength, triaxial test
8	Soil bearing capacity determination in simple form (Terzaghi formula)
9	Soil Stabilization techniques
10	Demonstrates knowledge about collapsible soil, soil Collapsible coefficient determination
11	Demonstrates knowledge about swelling soil, swelling percent and swelling pressure test
12	Introduction to Soil lateral earth pressure, Types of Coefficients lateral earth pressure
13	Soil lateral earth pressure estimation methods
14	Soil Slope stability
15	Factor of safety for soil slopes

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

Week	Material Covered
1	Consolidation Test One-dimensional oedometer test for settlement analysis.
2	Determination of soil settlement by oedometer quick test for plastic soils
3	Determination of soil settlement by oedometer long term slow test for plastic soils
4	soil settlement analysis by slow and long term tests
5	Direct Shear Test Testing cohesionless and cohesive soils under different normal stresses.
6	Determination of shear strength parameters (cohesion & internal friction angle).
7	Analysis of failure envelopes.
8	Swelling and Collapsibility Tests
9	Swell test for expansive soils (free swell index, swell pressure).
10	Collapse potential test for collapsible soils.
11	Engineering solutions for expansive and collapsible soils.
12	Soil Stabilization Techniques
13	soil types and soil stabilization selective criteria , case study tests
14	Soil tests for soil site investigation preparation, case study
15	Final Practical Exam & Case Study Analysis : Performing one of the major soil tests independently. Interpretation and discussion of real-world soil mechanics problems.





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Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Das, B. M. <i>Principles of Geotechnical Engineering</i> (9th Edition). Cengage Learning. Holtz, R. D., Kovacs, W. D., & Sheahan, T. C. <i>An Introduction to Geotechnical Engineering</i> (2nd Edition). Pearson.	
Recommended	Terzaghi, K., Peck, R. B., & Mesri, G. <i>Soil Mechanics in Engineering Practice</i> (3rd Edition). Wiley.	
Websites		

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





Module Information					
معلومات المادة الدراسية					
Module Title	ENVIRONMENTAL ENGINEERING			Module Delivery	
Module Type	Core			☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☒ Practical ☐ Seminar	
Module Code	BCE 310				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		3	Semester of Delivery		2
Administering Department		BCE	College	TEMO	
Module Leader	Dr. Nabil I. Khalil		e-mail	nabeelasmeel@ntu.edu.iq	
Module Leader's Acad. Title			Module Leader's Qualification		Ph.D.
Module Tutor			e-mail	E-mail	
Peer Reviewer Name		Name	e-mail	E-mail	
Scientific Committee Approval Date		28/09/2025	Version Number	3.0	

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	Water Demand & Consumption: - Demonstrate knowledge of the demand for water for various purposes, including fire demand and per capita demand. - Understand factors affecting water consumption and fluctuation in demand. - Analyze the design period, forecasting population growth, and determine design periods for water supply components. Water Sources:





	- Demonstrate understanding of various water sources: surface sources, groundwater sources, and infiltration galleries. - Assess and select the most suitable water sources based on relative merits. 3. Intake Works: - Demonstrate knowledge of intake works, including their types, locations, requirements, and features. 4. Water Quality: - Understand impurities in water, their effects, and their significance, including waterborne diseases. - Learn the process of collecting water samples for analysis. - Understand water analysis methods, including physical, chemical, and bacteriological aspects. - Know the water quality standards (I.S. & WHO). 5. Water Treatment Process: - Demonstrate understanding of flow diagrams and layouts of different water treatment works. - Learn about aeration, filtration, and sedimentation, including their purpose, types, and design criteria. - Gain knowledge of disinfection methods, including chlorination, breakpoint chlorination, superchlorination, and tertiary treatments. 6. Distribution Systems: - Demonstrate understanding of different types of water supply systems (continuous and intermittent), and various layout systems (gravity, pumping, and combined systems). - Learn about the maintenance of distribution systems and equalizing storage. - Understand the types of storage reservoirs and their capacity requirements. 7. Air Pollution Control: - Introduce the concept of air pollution, various pollutants, their sources, and effects on human health and materials. - Understand methods for preventing air pollution at the source and the introduction of control devices.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this course, students will be able to: 1. Estimate Water Demand: - Accurately estimate water demand for various uses and apply the knowledge to design water supply systems. - Analyze the fluctuation of water demand and adjust designs for future needs. 2. Select Water Sources: - Evaluate surface and groundwater sources for water supply systems, selecting the most suitable sources based on specific criteria. 3. Design Intake Works:





	- Design intake systems, determining appropriate location, type, and requirements for efficient water intake. 4. Assess Water Quality: - Conduct water quality tests, analyze results, and compare them with I.S. & WHO standards. - Understand the significance of impurities in water and their effects on human health. 5. Apply Water Treatment Methods: - Design and evaluate water treatment processes, including aeration, sedimentation, flocculation, filtration, and disinfection. - Solve design problems related to rapid sand filters and sedimentation tanks. 6. Design Water Distribution Systems: - Design water distribution systems using appropriate layouts and systems (gravity, pumping, or combined). - Address the maintenance needs and capacity requirements for storage reservoirs. 7. Control Air Pollution: - Identify sources of air pollution and assess the impact on health and the environment. - Apply methods for controlling air pollution, including prevention at the source and installation of control devices.
Indicative Contents المحتويات الإرشادية	Module 1: Water Demand and Consumption • Water demand for domestic, industrial, agricultural, and fire purposes. • Factors affecting water consumption: climate, population growth, seasonal variations. • Fluctuation in demand and its impact on system design. • Design period and forecasting population growth for water supply components. Module 2: Water Sources • Surface water sources: rivers, lakes, and reservoirs. • Groundwater sources: wells, boreholes, and infiltration galleries. • Assessment of water sources: availability, quality, and sustainability. • Selection of water sources based on economic, environmental, and technical criteria. Module 3: Intake Works • Types of intake systems: gravity intake, pumping intake, and infiltration galleries. • Design considerations for intake location, size, and operational features. • Assessment of water quality at intake points.





	Module 4: Water Quality and Analysis • Impurities in water: organic, inorganic, biological, and particulate impurities. • Effects of waterborne diseases and their prevention. • Collection of water samples and techniques for laboratory analysis. • Physical, chemical, and bacteriological analysis methods. • Water quality standards (I.S. & WHO). Module 5: Water Treatment Process • Aeration: Purpose, types of aerators (gravity and spray). • Sedimentation: Process and design criteria for sedimentation tanks, types of coagulants, jar tests, and coagulation dosing. • Flocculation: Mechanism of flocculation and the use of clariflocculators. • Filtration: Design and operation of rapid sand filters, slow sand filters, and pressure filters. • Disinfection: Chlorination (pre, post, breakpoint, and superchlorination), disinfection methods, and introduction to tertiary treatments. Module 6: Water Distribution System • Types of water supply systems: continuous, intermittent, gravity, pumping, and combined systems. • Distribution system layouts: dead-end, gridiron, circular, and radial systems. • Equalizing storage and types of reservoirs. • Maintenance considerations for distribution systems. Module 7: Air Pollution Control • Types of air pollutants: particulate matter, gases (CO₂, NO_x, SO_x), and volatile organic compounds. • Sources of air pollution: industrial, vehicular, natural. • Effects of air pollution on human health and the environment. • Prevention and control techniques at the source, and the role of control devices (filters, scrubbers).
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Lecture & In-Class Activities Study • Laboratory • Reading • Assignment (Homework) • Seminar





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	• Report Writing • Final Exam • Preparation for the Final Exam • Mid-Term Exam • Preparation for the Mid-Term Exam • Short Exam and • Preparation for the Short Exam
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Student Workload (SWL) الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	77	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	15% (15)	5,8,11 and 12	LO #1, #2 and #7
	Class Work	2	5% (5)	3 and 12	
	Assignments	2	5% (5)	2 and 10	LO #3, #4 and #6, #7
	Project	1	5% (5)	14	All
	Report	1	10% (10)	5	All
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
1,2,3	Quantity Estimation of water:





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	- Demonstrates knowledge of the Demand of water. Consumption for various purposes. Fire demand, Per capita demand. Factors affecting consumption. Fluctuation in demand. Design period, forecasting population, and design periods for water supply components. - Demonstrates knowledge of the Sources: Surface sources, ground water sources, Infiltration Galleries, Relative merits of sources, assessment & suitability, selection. Demonstrates knowledge of the Intake works: Intakes, type, location, requirement & features.
4,5	Water quality - Demonstrates knowledge of the Impurities in water, their effects and significance water borne diseases, collection of water Samples. - Demonstrates knowledge of the Water analysis physical, chemical and bacteriological. - Demonstrates knowledge of the Water quality standards: I.S & .WHO, - Demonstrates knowledge of the Flow diagrams and layouts of different water treatment works.
6,7,8	Aeration and Filtration - Demonstrates knowledge of the Aeration: Purpose, type of gravity, aerator & spray aerators. - Demonstrates knowledge of the Sedimentation: Plain and with coagulation, different coagulants used, dose of coagulant, Jar test, coagulant, feeding and mixing devices. - Demonstrates knowledge of the Flocculation, Clariflocculator. - Able to design of sedimentation tanks according to Design criteria. - Demonstrates knowledge of the Filtration: Rapid sand and slow sand filters, filter media, Rate of filtration, under drainage system and washing process, pressure filter. - Able to solve Simple design problems on rapid sand filters modifications of filters.
9,10	Disinfection - Demonstrates knowledge of the Requirement of good disinfectant, methods of disinfection. - Demonstrates knowledge of the Chlorination: Methods, prechlorination, post chlorination. - Demonstrates knowledge of the Demonstrates knowledge of the Break point chlorination and super chlorination forms of chlorine. - Demonstrates knowledge of the Introduction to tertiary treatments like Softening, Ion Exchange, Reverse Osmosis, Desalination and Defluoridation.
11,12,13	Air pollution Demonstrates knowledge of the Introduction to air pollution, various pollutants their sources and their effects on man and material, prevention or air pollution at sources, introduction to control devices.
14,15	Air pollution Dry mechanical isolating, Saturated Mechanical Isolating Scrubbing Particles Isolating by filters, Electrostatic Precipitation Sonic and ultra sonic particle isolation

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر



Material Covered



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1	Turbidity
2	Total Dissolved solids
3	Electrical Conductivity
4	Hardness measurements
5	Sulphate measurements
6	BOD Tests
7	COD Tests
8	DO Tests
9	Jar Test

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	<i>Introduction to Environmental Engineering</i> (5th Edition). McGraw-Hill Education. <i>Water Supply and Sanitary Engineering</i> (13th Edition). S. Chand Publishing <i>Water Treatment: Principles and Design</i> (3rd Edition). Wiley-Interscience.	
Recommended Texts		
Websites		





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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.				

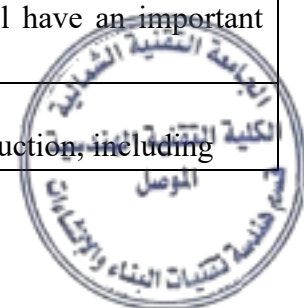




Module Information					
معلومات المادة الدراسية					
Module Title	ADVANCED PAVEMENT ENGINEERING		Module Delivery		
Module Type	Core		☒ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☒ Seminar		
Module Code	BCE 311				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		3			Semester of Delivery
Administering Department		BCE	College	TEMO	
Module Leader	Dr. Zaid Hazim Al-Saffar		e-mail	Zaid.alsaffar@ntu.edu.iq	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		Ph.D.
Module Tutor			e-mail	E-mail	
Peer Reviewer Name		Name	e-mail	E-mail	
Scientific Committee Approval Date		28/09/2025	Version Number	3.0	

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 student must learn the geometrical engineering design of highways, The structural design of flexible & rigid pavements. The student must learn also, All the site works that may be needed for road construction & maintenance of pavements. The student can be able to accomplish the important tests of soil layers, asphalt and concrete pavements as well as he will have an important information about airport & railway engineering.
Module Learning Outcomes	By the end of this module, students will be able to: 1. Explain the key aspects of asphalt pavement construction, including





مخرجات التعلم للمادة الدراسية	material selection, laying, and compaction techniques. 2. Describe the organizational structure and functions of state road and bridge authorities, focusing on their role in highway development and maintenance. 3. Apply the principles of flexible pavement design, considering factors such as traffic loading, material properties, and environmental conditions. 4. Analyze pavement structures using AASHTO design methodologies to determine layer thicknesses and structural integrity. 5. Demonstrate an understanding of rigid pavement design principles, including material selection and structural considerations. 6. Evaluate the design and function of joints and reinforcement in rigid pavements to enhance performance and longevity. 7. Investigate the causes and effects of pumping in rigid pavements and propose mitigation strategies. 8. Design effective drainage systems to improve pavement durability and prevent water-related damage. 9. Assess highway maintenance and rehabilitation techniques, including resurfacing, reconstruction, and preservation methods. 10. Identify and classify common distresses in both flexible and rigid pavements, providing recommendations for corrective measures.
Indicative Contents المحتويات الإرشادية	- Asphalt pavement constructions - state organization of roads and bridges - principle of flexible pavement design. - AASHTO structural design - principles of rigid pavement design - Joints and reinforcing - pumping in rigid pavement - Drainage systems - highway maintenance and rehabilitation - identify distresses in flexible and rigid pavement





Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	- Lecture & In-Class Activities - Preliminary & Further Study - Assignment (Homework) - Seminar - Report Writing - Mid-Term Exam - Preparation for the Mid-Term Exam - Short Exam and - Preparation for the Short Exam - Preparation for the Final Exam - Final Exam
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	77	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	15% (15)	5,8,11 and 12	LO #1, 3, 5 and #9
	Classwork	2	10% (10)	4 and 9	
	Assignments	2	5% (5)	2 and 12	LO #2, #4 and #6, #8
	Seminars	2	5% (5)	4 and 12	All
	Project	1	5% (5)	14	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
1,2	Demonstrates knowledge about asphalt pavement constructions, placing, spreading, pavers, rollers, field tests, levelling and thickness controlling.
3	Able to identify state organization of roads and bridges
4,5,6	- Demonstrates knowledge about principle of flexible pavement design. - Able to identify method of design for new pavement, AASHTO design method, charts for design. Correctly execute and solve examples in AASHTO structural design
7,8,9	Demonstrates knowledge about principles of rigid pavement design, layers, fixed and slip forms. Joints and reinforcing, Carries out control of levelling and finishing in addition to pumping in rigid pavement
10	Demonstrates knowledge about Drainage systems, culverts, siphon, ditches and filters
11	Monitors and conducts highway maintenance and rehabilitation
12,13	Able to identify distresses in flexible pavement
14,15	Able to identify distresses in rigid pavement

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Pavement Design and Materials: A Guide for Engineers (2009). International Road Assessment Program. Huang, Y. H. (2004). <i>Pavement Analysis and Design</i> (2nd Edition). Prentice Hall.	
Recommended Texts	AASHTO (2015). <i>AASHTO Design Guide for Flexible Pavements</i>. American Association of State Highway and Transportation Officials.	





Websites	Journal of Transportation Engineering (ASCE). Road Materials and Pavement Design (Taylor & Francis). Transportation Research Record: Journal of the Transportation Research Board. International Journal of Pavement Engineering.	

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

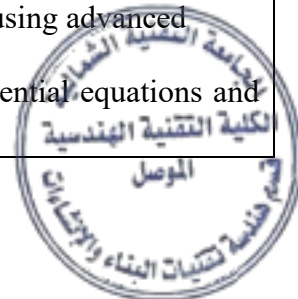




Module Information					
معلومات المادة الدراسية					
Module Title	NUMERICAL ANALYSIS		Module Delivery		
Module Type	Core		☒ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar		
Module Code	BCE 312				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		3			Semester of Delivery
Administering Department		BCE	College	TEMO	
Module Leader	Nabel Kalel Asmel		e-mail	nabeelismail@ntu.edu.iq	
Module Leader's Acad. Title		Assist. Professor	Module Leader's Qualification		PhD
Module Tutor			e-mail	E-mail	
Peer Reviewer Name		Name	e-mail	E-mail	
Scientific Committee Approval Date		28/09/2025	Version Number		3.0

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	☐ To develop a thorough understanding of numerical methods and their applications in solving mathematical problems. ☐ To equip students with the skills to implement various numerical methods for solving equations, performing interpolation, and executing numerical integration and differentiation. ☐ To enable students to solve systems of linear equations using advanced numerical techniques. ☐ To familiarize students with methods for solving differential equations and applying numerical methods





Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On successful completion of this course unit, students/learners will or will be able to 1. Demonstrate knowledge of numerical methods and their application in nonlinear equations. 2. Correctly implement iterative methods for solving equations, including the fixed-point method and Newton-Raphson method. 3. Execute various interpolation techniques, such as linear interpolation, quadratic interpolation, and Lagrange interpolation. 4. Perform numerical integration and differentiation using appropriate numerical methods. 5. Apply numerical methods in linear algebra, including the solution of systems of linear equations using Gauss elimination, LU factorization, and Cholesky method. 6. Solve systems of linear equations using iterative methods, including Gauss-Seidel and Jacobi methods. 7. Analyze and solve differential equations using numerical methods, including Euler, modified Euler, and the Runge-Kutta method (4th order).
Indicative Contents المحتويات الإرشادية	Introduction to Numerical Methods • Overview of numerical methods and their importance in mathematics and engineering. Numerical Methods in Nonlinear Equations • Iterative methods for solving nonlinear equations: ◦ Fixed-point method ◦ Newton-Raphson method Interpolation Techniques • Linear interpolation • Quadratic interpolation • Newton's forward difference formula • Newton's backward difference formula • Lagrange interpolation Numerical Integration and Differentiation • Techniques for numerical integration (e.g., Trapezoidal rule, Simpson's rule) • Numerical differentiation methods Numerical Methods in Linear Algebra • Systems of linear equations: ◦ Gauss elimination ◦ LU factorization ◦ Cholesky method ◦ Gauss-Jordan elimination Matrix Operations • Inverse matrix by elimination method • Solution of systems of linear equations using iterative methods: ◦ Gauss-Seidel iteration ◦ Jacobi method • Eigenvalues and eigenvectors Numerical Methods for Differential Equations





	- Euler method - Modified Euler method - Runge-Kutta method (4th order)
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	- Lecture & In-Class Activities - Assignment (Homework) - Preparation for the Short Exam - Short Exam - Preparation for the Mid-Term Exam - Mid-Term Exam - Preparation for the Final Exam - Final Exam

Student Workload (SWL) الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	4.0
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	62	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	4.0
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	15% (15)	5,8,11 and 12	LO#1,3,5,7
	Assignments	2	10% (10)	2 and 9	LO#2,4,6
	Class work	2	15% (15)	4 and 11	LO#5,7
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO1-5#
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		





Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
1&2	Demonstrates knowledge about numerical methods, numerical methods in nonlinear equations. Correctly implement Interpolation: linear interpolation, quadratic interpolation, Newton's
3&4	Correctly implement the solution of equations by iteration: fixed- point method, Newton – Raphson method.
5	Newton's forward difference formula, Newton's backward difference formula
6	, Lagrange interpolation, numerical integration & differentiation.
7	Demonstrates knowledge and correctly implement numerical methods in linear algebra, system of linear equations, Gauss elimination, Gauss Jordan elimination.
8&9	Lu factorization
10	Correctly implement Inverse matrix by elimination method, Cholesky method
11&12	System of linear equations solution by iteration: Gauss - Seidel Iteration, Jacobi method iteration.
13	Demonstrates knowledge numerical methods for differential equation, Euler method
14	Modified Euler method
15	Runge-Kutta method -4th order.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	<i>Numerical Methods for Engineers</i> (7th Edition). McGraw-Hill Education. <i>Numerical Analysis</i> (10th Edition). Cengage Learning.	
Recommended Texts		
Websites	MIT OpenCourseWare – Numerical Methods for Engineers. Coursera – Numerical Methods for Engineers and Scientists (University of Michigan).	





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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	DESIGN of REINFORCED CONCRETE STRUCTURES			Module Delivery	
Module Type	Core			☒ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	BCE 401				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		4	Semester of Delivery		1
Administering Department		BCE	College	TEMO	
Module Leader	Dr. Hassan M. Ahmed		e-mail	albegmprli@ntu.edu.iq	
Module Leader's Acad. Title		Assis. Prof	Module Leader's Qualification		Ph.D.
Module Tutor			e-mail		
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date		28/09/2025	Version Number	3.0	

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	Students will build on their knowledge of reinforced concrete design to understand the behavior of reinforced concrete and to design practical reinforced concrete components.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of this course, students will be able to: - Apply the basic requirements of the American Concrete Institute ACI 318 design specification. - Introduction and material properties - Design methods (working stress and ultimate strength methods)





	▪ Apply the concepts of strain compatibility and equilibrium concepts to determine the strength of RC members ▪ Design simple and continuous RC beams of rectangular cross-sectional shape for flexure. ▪ Design simple and continuous RC beams of any cross-sectional shape for shear, flexure, and deflection. ▪ Design RC beam-columns of any cross-sectional shape (rectangular, doubly, T-beam) ▪ Design RC slabs (one-way and two-way slabs) ▪ Design of RC columns (short and slender columns, tied and spiral columns, and concentrically or uni-axially or bi-axially loaded columns) ▪ Deflection calculations and its limitations
Indicative Contents المحتويات الإرشادية	1. Slender Columns - Definition of a slender column and how it differs from a short column. - Behavior of columns under combined compression and bending, considering slenderness. - ACI criteria for classifying frames as Non-Sway (Braced) vs. Sway (Unbraced). - The ACI Moment Magnifier Method for Non-Sway Frames: Calculating the moment magnifier factor (δ_{ns}) to amplify column moments. - The ACI Moment Magnifier Method for Sway Frames: Calculating the moment magnifier factor (δ_s) for story-based magnification. 2. Analysis and Design of Slabs - Knowledge of different types of slabs: One-way slabs, Two-way edge-supported slabs, Two-way column-supported slabs (Flat Plates, Flat Slabs, and Waffle Slabs). - Design methodology for one-way slabs, treated as a series of continuous, wide, shallow beams. - Design and placement of temperature and shrinkage reinforcement. 3. Two-Way Slab Design: - Understanding how loads are carried in two directions and the concept of column and middle strips. - Direct Design Method (DDM): Step-by-step procedure for the analysis and design of two-way column-supported slabs, including ACI depth limitations for deflection control. - Equivalent Frame Method (EFM): Principles and application for more complex or irregular layouts. - Shear Design: Critical shear considerations in flat plates and flat slabs, including punching shear and the design of shear reinforcement (shear heads, stud rails, or drop panels). - Detailing Considerations: Placement and detailing of openings in two-way slab systems.





	4. Concrete Building Systems - Role of shear walls as lateral force-resisting elements in building systems. - ACI code provisions for the design of shear walls for flexure and shear. - Analysis and design of common stair configurations (e.g., longitudinally supported) as inclined one-way slabs. 5. Introduction to Prestressed Concrete - The basic concept of prestressing: pre-compressing the concrete to counteract tensile stresses from loads. - Advantages and applications of prestressed concrete (longer spans, reduced cracking, shallower members). - Methods of Prestressing: Pre-tensioning vs. post-tensioning, their processes, and typical applications. - Prestressing Steel: Properties of high-strength strands, wires, and bars (e.g., low relaxation, high ultimate strength). • Concrete for Prestressing: Requirements for high-strength concrete and its early-age properties.
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lecture & In-Class Activities, Preliminary & Further Study, Assignment (Homework) Project Work, Seminar, Technical Visit, Final Exam, Mid-Term Exam and Mid-Term Exam.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	45	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	55	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		





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

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
1,2,3	Demonstrates knowledge of the Slender columns : - Define the slender column, - Concentrically loaded columns. - Compression plus bending - ACI criteria for non-sway frames versus sway frames - ACI moment magnifier method for non-sway frames - ACI moment magnifier method for sway frames Second-order analysis for slenderness effects.
4	Able to Analysis and design of One- Way slabs - knowledge of the types of slabs, - Design of one-way slabs, temperature and shrinkage reinforcement,
5, 6	Able to Analysis and design of One- Way slabs - Behavior of two-way edge supported slabs, and two-way column supported slabs, - Direct design method for column supported slabs, depth limitation of the ACI code, - Equivalent frame method, - The Openings in slabs.
7, 8	Analysis and design of Flat slabs - Behavior of two-way column supported slabs,





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	○ Direct design method for column supported slabs, depth limitation of the ACI code, ○ Equivalent frame method, ○ Shear design in flat plates and flat slabs, ○ The Openings in slabs.
9,10,11	● Demonstrates knowledge of the Concrete building systems: ● Shear walls, ACI code provisions for shear wall design. ● Stair design ● Earthquake resistant design principles
13,14,15	Demonstrates knowledge of the Prestressed Concrete: ● Demonstrates knowledge of the Principles of prestressed concrete, ● Demonstrates knowledge of the Methods of prestressing, ● Demonstrates knowledge of the prestressing steel, and concrete for prestressed construction.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Reinforced Concrete: Mechanics and Design – James K. Wight & James G. MacGregor Design of Reinforced Concrete – Jack C. McCormac & Russell H. Brow ACI 318 – Building Code Requirements for Structural Concrete	Yes
Recommended Texts	1. Reinforced Concrete Structures – Robert Park & Thomas Paulay 2. Structural Concrete: Theory and Design – M. Nadim Hassoun & Akthem Al-Manaseer 3. Seismic Design of Reinforced Concrete and Masonry Buildings – Paulay & Priestley 4. Design of Concrete Structures – Arthur H. Nilson	
Websites	● ACI Technical Documents and Design Examples	





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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	TRANSPORTATION ENGINEERING		Module Delivery		
Module Type	Core		☒ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☒ Seminar		
Module Code	BCE 402				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		4	Semester of Delivery		1
Administering Department		BCE	College	TEMO	
Module Leader	Zaid Hazim Al-Saffar		e-mail	Zaid.alsaffar@ntu.edu.iq	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		Ph.D.
Module Tutor			e-mail		
Peer Reviewer Name			e-mail	Zaid.alsaffar@ntu.edu.iq	
Scientific Committee Approval Date		28/09/2025	Version Number	3.0	

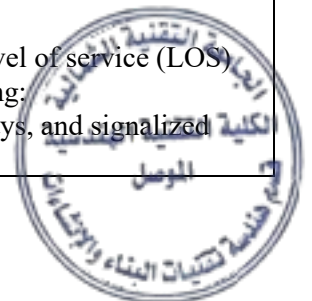
Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	To understand the principles of geometric design for various transportation facilities, to know the design of at-grade and grade separated intersections along with design of drainage facilities.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of this course, students will be able to: Introduction to Highway Engineering - Understand the fundamental principles and practices of highway engineering. - Identify and apply highway survey and location methods. Highway Functional Classification



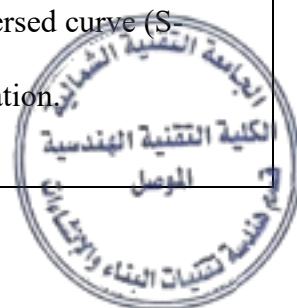


- Classify highways based on AASHTO functional classification standards.
- Explain the hierarchy of functional highway systems and their applications.
- 3. **Highway Engineering Components**
 - Identify and describe the key components of highway engineering.
 - Analyze the characteristics of drivers and pedestrians and their impact on highway design.
- 4. **Road Characteristics**
 - Calculate stopping sight distance, decision sight distance, and passing sight distance.
 - Determine the minimum turning radius for vehicle maneuverability.
- 5. **Vehicle Characteristics**
 - Analyze the static, kinematic, and dynamic characteristics of vehicles and their influence on highway design.
- 6. **Design of Highway Facilities**
 - Apply fundamental principles and best practices in the design of highway facilities.
- 7. **Factors Affecting Geometric Design**
 - Explain the objectives and principles of geometric highway design.
 - Assess the impact of traffic volume and speed on geometric design parameters.
- 8. **Cross-Sectional Elements**
 - Identify and describe key cross-sectional elements of highways, including:
 - Travel lanes, shoulders, and medians.
 - Barriers, curbs, gutters, guardrails, sidewalks, and side slopes.
- 9. **Highway Alignments and Alternatives**
 - Evaluate the factors affecting highway alignment and route selection.
 - Interpret inflection points and analyze topographic terrain maps.
- 10. **Horizontal Curves**
 - Differentiate between various types of horizontal curves, including simple circular, compound, reversed (S-curve), and spiral (transition) curves.
 - Explain the concepts of minimum turning radius and superelevation in curve design.
- 11. **Vertical Curves**
 - Analyze crest and sag curves and their impact on visibility and vehicle operation.
 - Determine the minimum curve lengths and grade requirements for safe vertical alignment.
- 12. **Special Facilities for Heavy Vehicles**
 - Design appropriate climbing lanes and emergency escape ramps for steep grades.
- 13. **Traffic Flow Elements**
 - Analyze speed-flow-density relationships, gap acceptance, and queuing theory in traffic flow studies.
- 14. **Capacity and Level of Service (LOS)**
 - Apply the principles of highway capacity and level of service (LOS) analysis for different types of roadways, including:
 - Two-lane highways, freeways, multilane highways, and signalized intersections.





	15. Traffic Volumes and Corrections - Conduct traffic volume studies using various counting methods. - Apply correction factors and compute key traffic volume metrics such as AADT, ADT, and DHV. 16. Traffic Loads on Pavements - Analyze pavement loading using Equivalent Single Axle Load (ESAL), tandem, and tridem axle loads. - Evaluate load damage factors, growth factors, and pavement stress analysis. 17. Principles of Railway Engineering - Identify and describe railway cross-section elements and embankment specifications. 18. Principles of Airport Engineering - Explain airport orientation principles, runway and taxiway specifications, and the use of signals and markings in airport design.
Indicative Contents المحتويات الإرشادية	Introduction to Highway Engineering • Overview of highway engineering principles and practices. • Highway survey and location methods. Highway Functional Classification • Functional classification of highways according to AASHTO. • Hierarchy of functional systems. Highway Engineering Components • Key components of highway engineering. • Characteristics of drivers and pedestrians. Road Characteristics • Stopping sight distance, decision sight distance, passing sight distance. • Minimum turning radius. Vehicle Characteristics • Static, kinematic, and dynamic characteristics of vehicles. Design of Highway Facilities • Principles and practices for designing highway facilities. Factors Affecting Geometric Design • Objectives of geometric design. • Traffic volume and speed considerations. Cross-Sectional Elements • Principles and marginal elements: ◦ Travel lane, shoulders, medians. ◦ Barriers, curbs, gutters, guardrails, sidewalks, and side slopes. Highway Alignments and Alternatives • Highway alignment considerations. • Points of inflection and topography terrain maps. Horizontal Curves • Types of horizontal curves: ◦ Simple circular curve, compound curve, reversed curve (S Curve), spiral curve (transition curve). • Concepts of minimum turning radius and superelevation. Vertical Curves • Crest and sag curves, undercrossing clear distance.





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	- Minimum lengths and grades. Special Facilities for Heavy Vehicles - Design considerations for climbing lanes and emergency escape ramps on steep grades. Traffic Flow Elements - Speed-flow-density relationships, gap acceptance, and queuing theory. Capacity and Level of Service (LOS) - Principles for highway segments, including: - Two-lane highways, freeways, multilane highways, and signalized intersections. Traffic Volumes and Corrections - Traffic counting methods, correction factors, AADT, ADT, and DHV. Traffic Loads on Pavements - Equivalent Single Axle Load (ESAL), tandem and tridem axle loads. - Load damage factor, growth factor, and pavement stresses. Principles of Railway Engineering - Railway cross-section elements and embankment specifications. Principles of Airport Engineering - Airport orientations, runway and taxiway specifications, signals, and markings.
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lecture & In-Class Activities, Preliminary & Further Study, Group Work, Assignment (Homework) , Project Work, Seminar, Final Exam, Mid-Term Exam and short Exam.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		





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

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
1	- Demonstrates knowledge of the: Introduction to highway engineering, Highway survey and location - Demonstrates knowledge of the Highways functional classification according to AASHTO, - Demonstrates knowledge of the Hierarchy of functional systems
2,3	- Demonstrates knowledge of the Highway engineering components, characteristics of the driver and pedestrian - Demonstrates knowledge of the Road characteristics, stopping sight distance, decision sight distance, passing sight distance, minimum turning radius
4	- Demonstrates knowledge of the Vehicle characteristics, static, kinematic and dynamic - Able to design of the highway facilities,
5,6	- Demonstrates knowledge of the factors affecting and the Objectives of Geometric Design, traffic volume, traffic speed. - Demonstrates knowledge of the Cross-sectional elements: Principles (travel lane, shoulders & medians) and marginal (barriers, curbs, gutters, guardrails, sidewalks & side slope)
7	- Demonstrates knowledge of the Highway alignments and alternatives, points of inflections, topography terrain maps. - Demonstrates knowledge of the Horizontal curves, simple circular curve, compound curve, reversed Curve (S-Curve), spiral Curve (Transition Curve)
8	- Demonstrates knowledge of the Horizontal curves, simple circular curve, compound curve, reversed Curve (S-Curve), spiral Curve (Transition Curve) - Demonstrates knowledge of the Minimum turning radius, superelevation concepts, curve radius based on SSD



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9	• Demonstrates knowledge of the following: Vertical curves, crest and sag curves, under crossing clear distance, minimum length and grades. • Demonstrates knowledge of the following: Special facilities for heavy vehicle on steep grades, climbing lanes, emergency escape ramps
10	• Demonstrates knowledge of the following: Traffic flow elements, speed-flow-density relationships, Gap and Gap acceptance, Queuing theory.
11	• Demonstrates knowledge of the following: Principles of capacity and level of service (LOS) for highway segments, two-lane highways, freeways highway, multilane-highway and signalized intersections • Demonstrates knowledge of the following: Traffic volumes, counting, traffic volume correction factors, AADT, ADT, DHV
13	• Demonstrates knowledge of the following: Traffic loads, equivalent single axle load (ESALs) tandem axle load, tridem axle loads, load damage factor, growth factor, and stresses on pavements.
14	• Demonstrates knowledge of the following: Principles of railway engineering, Railway cross section elements and embankments, specifications
15	• Demonstrates knowledge of the following: Principles of airport engineering, Airport orientations, runway and taxiway specifications, signals and marking.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"Highway Engineering" by Paul H. Wright and Fred L. Mannering "Traffic and Highway Engineering" by Nicholas J. Garber and Lester A. Hoel "Principles of Highway Engineering and Traffic Analysis" by Fred L. Mannering, Walter P. Edwards, and Scott S. Thompson	Yes
Recommended Texts		
Websites		





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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.				

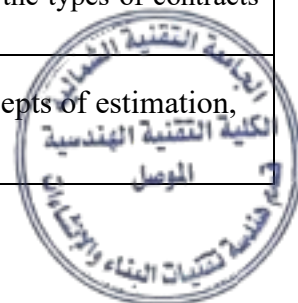




Module Information					
معلومات المادة الدراسية					
Module Title	QUANTITY SURVEYING & ESTIMATING		Module Delivery		
Module Type	Core		☒ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☒ Seminar		
Module Code	BCE 403				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		4	Semester of Delivery		1
Administering Department		BCE	College	TEMO	
Module Leader	Waseem Thabit		e-mail	Waseem.thabit@ntu.edu.iq	
Module Leader’s Acad. Title		Assis. Lecturer	Module Leader’s Qualification		Master
Module Tutor			e-mail		
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date		28/09/2025	Version Number		3.0

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 student will be able to make approximate and detailed estimates of buildings, specify the proper method of measurement, and do the rate analysis for different items of works. He will also be able to write the technical specifications for various civil engineering works. Finally, he will get thorough knowledge on the types of contracts and the general and special conditions related to them.
Module Learning Outcomes	1. Demonstrate an understanding of the fundamental concepts of estimation, including its definition, benefits, and types.





مخرجات التعلم للمادة الدراسية	2. Apply general rules for quantitative surveys and select appropriate measurement units for various construction items. 3. Analyze rates for construction work and understand the cost variables related to materials, labor, and equipment. 4. Perform accurate measurements and record data for construction works, including earthworks and masonry. 5. Estimate quantities for different construction materials and processes, including concrete and finishing works. 6. Understand technical specifications and their role in ensuring project quality and cost estimation. 7. Utilize computer-aided estimation tools effectively for construction project analysis. 8. Apply valuation principles to determine property values and understand factors influencing valuations.
Indicative Contents المحتويات الإرشادية	Introduction to Estimation in Engineering Projects: • Definition and benefits of estimation. • Factors affecting cost estimation. • Types of estimation and practical examples of approximate estimation. Quantitative Survey Principles: • Selecting measurement units for various items. • Measurement modes for different construction details. Rate Analysis: • Cost variables for materials, labor, and equipment. • Overhead charges and rate analysis difficulties. • Examples of rate analysis in civil engineering construction. Working Quantities Methods: • Measurement and abstract sheets. • Excavation and fill works for wall footings. • Methods for calculating lengths of various works (strips and center lines). Earthworks Estimation: • Overview of earthworks in engineering projects (irrigation channels, roadway embankments). • Calculation methods for earthwork volumes (grid leveling and triangular methods). Masonry Works Estimation: • Basic units and materials for masonry.





	• Estimation techniques for walls, damp proofing, and various masonry works. Concrete Works Estimation: • Primary materials and mixing processes for concrete. • Estimation of quantities for different concrete elements (footings, beams, columns). Finishing Works Estimation: • Types of finishing works (plastering, painting, coating). • Estimation methods for interior and exterior finishes, including tiles and ceramics. Technical Specifications: • Definition and scope of technical specifications. • Role in quality assurance and cost estimation for engineering projects. Computer-Aided Estimation: • Utilizing spreadsheet applications and software for estimation purposes. Valuation Principles: • Understanding valuation purpose and functions. • Factors affecting property valuations and the valuer's responsibilities.
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lecture & In-Class Activities, Preliminary & Further Study, Assignment (Homework), Project Work, Seminar, Final Exam, Mid-Term Exam and short Exam.

Student Workload (SWL) الحمل الدراسي للطلاب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	4
Unstructured SWL (h/sem)	37	Unstructured SWL (h/w)	2





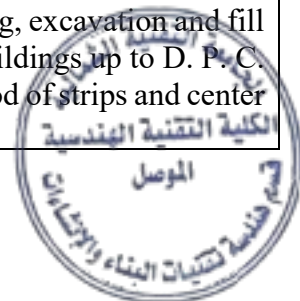
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الحمل الدراسي غير المنتظم للطلاب خلال الفصل		الحمل الدراسي غير المنتظم للطلاب أسبوعيا	
Total SWL (h/sem)	100		
الحمل الدراسي الكلي للطلاب خلال الفصل			

Module Evaluation					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	15% (15)	5,8,11 and 12	LO #1, #3, 5 and #8
	Classwork	2	10% (10)	3 and 8	LO #2, #4, and #6,
	Assignments	2	10% (10)	2 and 12	LO #2, #4, and #6,
	Project	1	5%(5)	14	All
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #5
	Final Exam	3hr	50% (50)	16	ALL
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
1&2	Demonstrates knowledge of the Introduction: engineering projects & estimation, definition of estimation, benefits of estimation, factors affecting cost estimation, types of estimation, and practical examples on approximate estimation.
3	Demonstrates knowledge of the General rules in quantitative survey: Principles in selecting the measurement units of items, various units and measurement modes for different items and details of quantities measuring.
4	Demonstrates knowledge of rate analysis, cost of materials and labor variables and equipment -hour costs based on overall costs and outputs, Overhead charges, rates for various items of civil engineering construction work, rate analysis difficulties and examples.
5	- Demonstrates knowledge of the Methods of working quantities for various items of works, - Able to perform the Measurement and abstract sheets and recording, excavation and fill works for wall footings, estimation of walls and other items of buildings up to D. P. C. level, methods used to calculate the length of various works: method of strips and center lines method, examples and problems.





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6	- Demonstrates knowledge of the Earthworks for various engineering projects: irrigation channels, roadway embankments, - Demonstrates knowledge of the methods used for calculating earthwork quantities and volumes, Mass diagrams, calculations of excavation volumes due to cut works (grid leveling method and triangular method), examples and problems.
7	- Able to perform the Estimation of masonry works, - Demonstrates knowledge of the basic units and materials used, - Able to perform the Estimation of walls construction, damp proofing used, brick works, block works, stone works, examples and problems.
8	Able to perform the Estimation of concrete works, primary materials used, mixing of concrete materials, types of concrete mixers, calculating quantities of concrete materials, examples and problems
9&10	Able to perform the Estimation of concrete works quantities for spread and combined footings, Able to perform the Estimation of concrete works quantities for lintels, beams, roofs, columns and stairs
11	- Demonstrates knowledge of the Finishing works (types), - Able to perform the estimation of outside and inside finishing works, plastering, painting, brick and stone coating, glass works, specifications. Able to perform the Estimation of tiles works: tiles, mosaic, ceramic, porcelain, ... etc., specifications.
12	Demonstrates knowledge of the Technical specifications: definition, scope, resources and types of specifications, role of specifications in engineering project quality and estimated cost, technical specifications for various works.
13	Able to implement the Computer-aided estimation: (using spread sheet applications and other software packages in estimation)
14,15	Demonstrates knowledge of the Valuation: Principles, purpose and function of valuation, Factors affecting the valuation of properties, Valuer and his duties.

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
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Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	“Estimating in Building Construction” by Steven J. Peterson & Frank R. Dagostino –	Yes
Recommended Texts	“Construction Estimating Using Excel” by Steven J. Peterson – A practical guide to using spreadsheets for cost estimation.	





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	“Means Building Construction Cost Data” by R.S. Means – “Construction Planning, Equipment, and Methods” by Robert L. Peurifoy & Clifford J. Schexnayder – Covers equipment costing and labor productivity in	
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.				

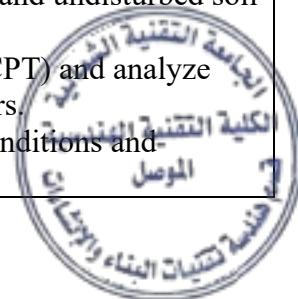




Module Information					
معلومات المادة الدراسية					
Module Title	FOUNDATION ENGINEERING		Module Delivery		
Module Type	Core		☒ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☒ Seminar		
Module Code	BCE 404				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		1 4	Semester of Delivery		1
Administering Department		BCE	College	TEMO	
Module Leader	Dr. Tareq hassan		e-mail	tareqrahal@ntu.edu.iq	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		Ph.D.
Module Tutor			e-mail		
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date		28/09/2025	Version Number	3.0	

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	By the end of this course, students will be able to: 1. Understand the principles and importance of soil investigation for foundation design. 2. Explain various methods of subsurface exploration, including auguring, boring, wash boring, and rotary drilling. 3. Apply sampling techniques to obtain representative and undisturbed soil samples for analysis. 4. Conduct and interpret penetration tests (SPT and SCPT) and analyze bore log reports to determine soil strength parameters. 5. Select appropriate foundation types based on soil conditions and bearing capacity requirements.





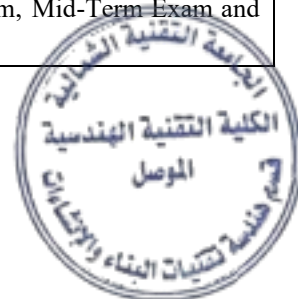
	6. Perform laboratory tests related to soil properties and prepare technical reports. 7. Analyze bearing capacity theories and understand the factors affecting soil bearing capacity. 8. Evaluate bearing capacity from in-situ tests such as SPT, SCPT, and plate load tests. 9. Determine settlement of shallow foundations in granular and clay deposits and assess allowable settlements. 10. Differentiate between types of footings and analyze contact pressure distribution for isolated, combined, and mat foundations. 11. Understand the principles and applications of floating foundations and their role in geotechnical engineering.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of this course, students will be able to: 1. Demonstrate knowledge of soil investigation procedures and their significance in foundation engineering. 2. Explain and apply different exploration methods, including auguring, boring, wash boring, and rotary drilling. 3. Utilize appropriate sampling techniques, including split spoon and thin-wall samplers, to collect soil samples. 4. Perform and interpret results from penetration tests (SPT, SCPT) and generate bore log reports. 5. Analyze soil strength parameters and select suitable foundation types based on geotechnical data. 6. Conduct laboratory tests on soil samples and develop professional geotechnical reports. 7. Apply bearing capacity theories and assess factors influencing soil bearing capacity. 8. Interpret in-situ test data (SPT, SCPT, and plate load) to estimate bearing capacity. 9. Calculate settlement of shallow foundations and evaluate total and differential settlements. 10. Differentiate between various footing types (isolated, combined, raft, and floating foundations) and assess their suitability. 11. Design and proportion different types of mat foundations based on soil conditions and structural requirements.
Indicative Contents المحتويات الإرشادية	Guideline Content 1. Soil Investigation • Purpose and importance of soil investigation • Planning a geotechnical site investigation • Soil classification and index properties 2. Methods of Subsurface Exploration • Auguring and boring techniques • Wash boring and rotary drilling methods • Depth and spacing of boreholes





	3. Soil Sampling Techniques • Representative vs. undisturbed sampling • Split spoon sampler and thin-wall sampler • Sampling procedures and sample preservation 4. Penetration Tests and Bore Log Interpretation • Standard Penetration Test (SPT) • Static Cone Penetration Test (SCPT) • Bore log preparation and interpretation • Strength parameter determination 5. Foundation Selection Based on Soil Conditions • Factors influencing foundation type selection • Soil strength, settlement, and bearing capacity considerations 6. Laboratory Testing and Reporting • Essential soil tests for foundation design • Data interpretation and report preparation 7. Bearing Capacity of Soils • Theories of bearing capacity (Terzaghi, Meyerhof, Hansen, Vesic) • Factors affecting bearing capacity • Estimation of bearing capacity using in-situ tests (SPT, SCPT, plate load test) 8. Settlement Analysis • Settlement of shallow foundations on granular and clay soils • Total and differential settlement • Allowable settlement criteria 9. Design of shallow Foundations • Design of shallow foundation (Isolated footing) Contact pressure • Design of rectangular combined footings • Design of trapezoidal combined footings
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lecture & In-Class Activities, Preliminary & Further Study, Group Work, Assignment (Homework) , Report Writing, Project Work, Seminar, Final Exam, Mid-Term Exam and short Exam.





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

Module Evaluation					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	15% (15)	5,8,11 and 12	LO #1, #2, 4,6,8 and #10
	Class Work	2	10% (10)	2 and 12	LO #2, #4, and #8,
	Assignments	2	5% (5)	6 and 11	LO #5, #8
	Seminar	1	5% (5)	10	ALL
	Project	1	5% (5)	14	ALL
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #8
	Final Exam	3hr	50% (50)	16	ALL
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
المناهج الاسبوعي النظري	
	Material Covered
Week 1	Site investigation
Week 2	Collecting samples , No. of holes , Depth of bore holes
Week 3	Laboratory tests , Report writing
Week 4	Bearing capacity of soil theories
Week 5	Factors affecting bearing capacity
Week 6	Bearing capacity in case of eccentric load
Week 7	Bearing capacity layered soil
Week 8	Soil settlement





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Week 9	Elastic settlement
Week 10	Consolidation settlement
Week 11	Introduction for foundation design
Week 12	Design of shallow foundation (Isolated footing)
Week 13	Design of rectangular combined footings
Week 14	Design of trapezoidal combined footings.
Week 15	Preparing to final exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Bowles, J.E. <i>Foundation Analysis and Design</i> . McGraw-Hill. Das, B.M.. <i>Principles of Foundation Engineering</i> . Cengage Learning. Coduto, D.P.. <i>Foundation Design: Principles and Practices</i> . Prentice Hall.	No
Recommended Texts	Tomlinson, M.J., & Woodward, J. . <i>Foundation Design and Construction</i> . Pearson. Terzaghi, K., Peck, R.B., & Mesri, G. <i>Soil Mechanics in Engineering Practice</i> . Wiley.	
Websites		





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





Module Information					
معلومات المادة الدراسية					
Module Title	CONSTRUCTION DRAWING		Module Delivery		
Module Type	Core		☒ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☒ Practical ☐ Seminar		
Module Code	BCE 405				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		4	Semester of Delivery		1
Administering Department		BCE	College	TEMO	
Module Leader	Jasim Mohammed Abid		e-mail	jasimabd@ntu.edu.iq	
Module Leader’s Acad. Title		Assis. Prof	Module Leader’s Qualification		Master
Module Tutor			e-mail		
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date		28/09/2025	Version Number	3.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Enable students to understand the importance of civil drawing in engineering and industrial fields, as well as its role in communication between engineers and workers. 2. Develop students' skills in reading and drawing structural and engineering plans, including reinforced concrete and steel structures. 3. Equip students with the ability to analyze and draw structural details of multi-story buildings, including foundations, columns, shear walls, slabs, and staircases.





	4. Enhance practical understanding of reinforcement detailing in various structural elements such as beams, slabs, and staircases. 5. Familiarize students with steel structures, including column base plate connections, beam-column connections, and different types of steel joints. 6. Introduce students to pre-stressed concrete structures, water tanks, and architectural details, including floors, roofs, doors, and windows.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this course, students will be able to: 1. Demonstrate knowledge of civil drawing fundamentals and their applications in engineering and construction. 2. Read and interpret concrete drawings, including longitudinal and cross-sections of multi-story buildings. 3. Draw and detail reinforced concrete foundations such as isolated, combined, strap, continuous, and raft foundations. 4. Read and draw reinforced concrete columns and cross-sections. 5. Read and draw shear walls and staircases, including types and reinforcement details. 6. Read and draw reinforced concrete beams, including simple, cantilever, fixed, continuous, and girder beams with reinforcement details. 7. Read and draw different types of reinforced concrete slabs, including one-way slabs, two-way slabs, flat slabs, and ribbed & hollow block slabs with reinforcement details. 8. Read and draw building joints, including expansion joints and construction joints. 9. Demonstrate knowledge of steel drawing, including column base plate connections and beam-column connections (riveted, welded, and bolted). 10. Read and draw pre-stressed concrete elements and water tanks. 11. Read and draw architectural details, including floors, roofs, doors, windows, and finishing methods.
Indicative Contents المحتويات الإرشادية	The course will cover the following topics: 1. Introduction to Civil Drawing Definition and importance in engineering and industrial applications





Communication between engineers and workers through drawings

2. Concrete Drawing and Sectioning

Reading and drawing concrete structural details

Longitudinal and cross-sections in multi-story buildings

Roof, beam, column, staircase, and footing details

3. Reinforced Concrete Foundations

Types: Isolated, combined, strap, continuous, and raft foundations

Reinforcement detailing for each foundation type

4. Reinforced Concrete Columns and Shear Walls

Reading and drawing columns and cross-sections

Shear walls: types and reinforcement detailing

5. Reinforced Concrete Beams

Types: Simple beam, cantilever beam, fixed beam, continuous beam, girder

Reinforcement details, cutoff and bent-up methods

6. Reinforced Concrete Slabs

Types: One-way slabs, two-way slabs, flat slabs, ribbed & hollow block slabs

Reinforcement details and structural considerations

7. Building Joints

Types of joints in buildings

Expansion joints and construction joints

8. Steel Structure Drawings

Column base plate connections

Beam and column connections (riveted, welded, bolted)

9. Pre-stressed Concrete and Water Tanks

Basics of pre-stressed concrete elements

Water tank design and reinforcement details

10. Architectural Drawings

Floors and roofs: types, materials, and finishing methods

Doors and windows: types and selection based on function

This course provides students with essential drafting skills required for structural and architectural drawings, preparing them for practical applications in civil engineering projects.





Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Lecture & In-Class Activities, Assignment (Homework) , Final Exam, Mid-Term Exam and short Exam.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

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

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	15% (15)	5,8,11 and 12	LO #1, #2, 4,6,8 and #10
	Class Work	2	5% (5)	6 and 13	LO #3,5,7 and #11
	Assignments	2	5% (5)	2 and 12	LO #2, #4, and #8,
	Laboratory	4	15%(15)	5,8,11 and 12	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 والعملية)

Material Covered





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1	• Demonstrates knowledge of the Introduction to define the civil drawing & all application in engineering & industrial fields between the engineer & worker.
2	• Reads and draws Concrete drawing & how to take the longitudinal & cross sections in multi-story buildings. Able to Show details of roofs, beams, columns, stairs, and footing.
3	• Reads and draws Reinforced concrete footings, Wall footing, Isolated, Combined, Strap, Continuous, Raft foundations.
4	• Reads and draws Reinforced concrete columns and cross sections.
5	• Reads and draws Shear walls and staircase, type of staircase, reinforcement details
6	• Reads and draws Reinforced concrete beams: • Simple beam, simple beam with cantilever, fixed beam, Continuous beam, Girder, type of reinforcement cut-of and bent-up method.
7,8	• Reads and draws Reinforced concrete slabs (Types of slabs): • One-way slabs, two way slabs, Flat slabs, Ribbed & hollow – block slabs with all reinforcement details.
9	• Reads and Draws Building joints, Types of joints, Expansion joints, and Construction joints.
10	• Demonstrates knowledge of the steel drawing, • Reads and Draws steel column base plat connection
11	• Reads and Draws Beam, and column connections (Riveted, Welded , Bolts)
12	• Reads and Draws Pre-stressed concrete, Water tanks and
13	• Reads and Draws Architectural details: Floors & roofs types, their materials, Finishing methods, Doors & windows, Types of doors & windows according to their uses.
14	• Reads and Draws Elevators
15	• Demonstrates knowledge of the Municipal engineering drawing: • Reads and Draws Water distribution systems: Internal water networks for building (cold & hot), • Reads and Draws Water treatment station, • Reads and Draws Sewage network systems for building.





Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Ching, F. D. K. . <i>Building Construction Illustrated</i> . Wiley. Wakita, O. A., & Linde, R. M. . <i>The Professional Practice of Architectural Working Drawings</i> . Wiley. McMullan, R.. <i>Environmental Science in Building</i> . Palgrave Macmillan. AutoCAD	Yes
Recommended Texts	Engineering Drawing and Design – David A. Madsen & David P. Madsen Building Construction Illustrated – Francis D.K. Ching	
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	DESIGN OF STEEL STRUCTURES		Module Delivery		
Module Type	Core		☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar		
Module Code	BCE 406				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		4	Semester of Delivery		1
Administering Department		BCE	College	TEMO	
Module Leader	Dr. Muhammed A. Basheer		e-mail	mbasher@ntu.edu.iq	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		Ph.D.
Module Tutor			e-mail		
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date		28/09/2025	Version Number		3.0

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	After successful completion of this course the student will be able to understand the behavior and design of different types of structural steel members and connections. He will gain an educational experience in the design of simple steel structures. Learning Outcomes •Basic understanding of the AISC specifications for design of steel structures. •Knowledge of the design of steel members including connections. •Knowledge of serviceability issues in design.





Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Demonstrate knowledge of the properties and behavior of steel as a construction material. 2. Apply design principles for various steel structural components, including beams, columns, and connections. 3. Analyze the stability and load-carrying capacity of steel structures under different loading conditions. 4. Utilize relevant design codes and standards in the design process. 5. Design various types of steel structures, including frames, trusses, and roof systems. 6. Evaluate the effects of temperature, corrosion, and other environmental factors on steel structures. 7. Conduct structural analysis using software tools for steel structure design.
Indicative Contents المحتويات الإرشادية	Introduction to Steel Structures: • Properties of steel. • Advantages and disadvantages of steel as a construction material. • Overview of steel structure applications. Design Principles: • Working stress design (WSD) vs. limit state design (LSD). • Load combinations and factors. Steel Structural Elements: • Design of steel beams: bending, shear, and deflection. • Design of steel columns: axial loads and buckling considerations. Connections in Steel Structures: • Types of connections: bolted and welded. • Design principles for connections. Trusses and Frames: • Analysis and design of trusses. • Design of moment-resisting frames. Stability Analysis: • Lateral stability of structures. • Bracing systems and their role in stability. Serviceability and Durability: • Deflection limits and vibration analysis.





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	- Effects of temperature and corrosion on steel structures. Design Codes and Standards: - Introduction to AISC, Eurocode, and other relevant codes. - Application of codes in design.
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lecture & In-Class Activities, Preliminary & Further Study, Assignment (Homework), Seminar, Final Exam, Mid-Term Exam and short Exam.

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

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

Delivery Plan (Weekly Syllabus)
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المناهج الاسبوعي النظري

Material Covered	
	Week 1: Introduction to Steel Structures and Properties of Steel Week 2: Design Principles: Working Stress and Limit State Design Week 3: Design of Steel Beams: Bending, Shear, and Deflection Week 4,5: Design of Steel Columns: Axial Loads and Buckling Week 6,7: Connections in Steel Structures: Types and Design Principles Week 8,9: Analysis and Design of Trusses Week 10,11: Design of Moment-Resisting Frames Week 12,13: Stability Analysis: Lateral Stability and Bracing Systems Week 14: Serviceability and Durability: Deflection Limits and Corrosion Week 15: Design Codes and Standards: AISC and Eurocode Week 16: Final Examination Preparation

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"Steel Design" by William T. Segui "Structural Steel Design" by Jack C. McCormac and James K. Nelson "Design of Steel Structures" by S. K. Duggal "AISC Steel Construction Manual" by the American Institute of Steel Construction (AISC)	Yes
Recommended Texts	"Steel Structures: Design and Behavior" by Charles G. Salmon and John E. Johnson	
Websites		





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Grading Scheme مخطط الدرجات				
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Module Information					
معلومات المادة الدراسية					
Module Title	INOVATIVE PROJECT -I		Module Delivery		
Module Type	Core		☐ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☒ Practical ☒ Seminar		
Module Code	BCE 407				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		1 4			Semester of Delivery
Administering Department		BCE	College	TEMO	
Module Leader	Zaid.alsaffar		e-mail	Zaid.alsaffar@ntu.edu.iq	
Module Leader’s Acad. Title			Module Leader’s Qualification		Ph.D.
Module Tutor			e-mail		
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date		28/09/2025	Version Number	3.0	

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 student will be able to design, calculate quantities, and plot the architectural, constructional, sanitary, & electrical plans & details for a certain project in civil engineering.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Design Competence: - Ability to design and create architectural and construction drawings that meet project requirements. Quantity Calculation: - Accurately calculate material quantities for architectural, constructional, sanitary, and electrical components. Plan Plotting:





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	- Proficiently plot plans using software tools (e.g., AutoCAD, Revit) with clear details. Integration of Disciplines: - Integrate architectural, structural, sanitary, and electrical elements in cohesive project plans. Project Presentation: - Prepare and present professional project plans, explaining design choices and calculations.
Indicative Contents المحتويات الإرشادية	Introduction to Civil Engineering Design: Overview of civil engineering projects and disciplines. Architectural Design Principles: Basics of architectural layout, compliance with regulations. Construction Drawings: Types of drawings and their purposes, drawing standards. Sanitary Engineering Design: Plumbing layouts and water supply management. Electrical Design: Electrical systems in buildings, integration with other plans. Quantity Surveying: Calculating material quantities and estimation techniques. Software Tools: Introduction to design software for plotting and detailing. Project Case Studies: Analysis of real projects for best practices and lessons learned.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Web Based Learning, Practice at a workplace, Group Work ,Thesis Work, Report Writing ,Final Exam, and Mid-Term Exam
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Student Workload (SWL)

الحمل الدراسي للطلاب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	37	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	100		





Module Evaluation					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Project Work	1			
	Seminar	1			
Summative assessment	Midterm Exam	1hr	10% (10)		
	Final Exam	1hr	50% (50)		
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
1-14	Different project subjects supervised by teaching staff such as: • Thermal insulation and consideration of walls. • Ventilation strategy of buildings. • Acoustic noise (isolation) of wall and ceiling.

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





Module Information					
معلومات المادة الدراسية					
Module Title	MATERIALS FOR HERITAGE BUILDINGS		Module Delivery		
Module Type	Core		☒ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☒ Seminar		
Module Code	BCE 408				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		4	Semester of Delivery		2
Administering Department		BCE	College	TEMO	
Module Leader	Harith Ibrahim		e-mail	harithali@ntu.edu.iq	
Module Leader's Acad. Title		Assist.Prof.	Module Leader's Qualification		Ph.D.
Module Tutor			e-mail		
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date		28/09/2025	Version Number		3.0

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	By the completion of the course, the student is familiar with the fundamental methodological tools needed to choose and use materials and technologies for the preservation of historic building materials in a way that maximizes their efficacy, compatibility, and longevity.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. By the completion of the course, the student will be familiar with the fundamental methodological tools needed to choose and use materials and technologies for the preservation of historic building materials, ensuring efficacy, compatibility, and longevity.





	2. Students will understand the development of ancient building materials, construction methods, and maintenance techniques, with a particular emphasis on stone, wood, and masonry. 3. Students will be able to specify a set of criteria to ensure that materials chosen for conservation and rehabilitation are best suited to each building's requirements in terms of safety, efficiency, compatibility, and cost-effectiveness. 4. Students will learn to manage multiple design variables simultaneously to optimize conservation and rehabilitation strategies
Indicative Contents المحتويات الإرشادية	Historical Construction Materials: • Overview of materials like natural stones, fired-clay bricks, wood, cements, and cement-based concrete. • Study of their microstructure, classification, and historical evolution. Deterioration Processes: • Examination of pollutants and physical, mechanical, and chemical deterioration, focusing on moisture's role. Characterization of Old Materials: • Techniques for characterizing old materials using destructive and non-destructive methods, with case studies and standards. Restoration Procedures: • Introduction to restoration, repair, and upkeep of historic buildings, emphasizing performance-based design. Construction Methods in Heritage Buildings: • Overview of timber structures, stone, and brick masonry. Building Techniques and Structural Components: • Analysis of foundational components like walls, columns, beams, roofs, and arches. Repair Techniques: • Discussion on retrofitting masonry and repairing structural timber, including energy retrofitting. Restoration of Structural Integrity:





	- Study of pathology in construction, identifying causes of decay and diagnostic methods. Cost Control and Facility Management: - Overview of maintenance procedures and strategies for controlling rehabilitation costs, including Life Cycle Cost Evaluation (LCC).
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lecture & In-Class Activities, Preliminary & Further Study, Assignment (Homework) Project Work, Seminar, Report Writing, Final Exam, Mid-Term Exam and short Exam.

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

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	15%(15)	5,8,11 and 12	LO #1- #4
	Class Work	2	10% (10)	5 and 10	LO #1- #4
	Assignments	2	10% (10)	3 and 6	LO #1- #4
	Seminar	2	5% (5)	6 and 11	LO #1- #4
Summative assessment	Midterm Exam	2hr	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
1,2,3	- Historical construction materials included natural stones, fired-clay bricks, binders, mortars, plasters/renders, stuccoes, and finishes, as well as wood, cements, artificial stones, and cement-based concrete. Microstructure and classification. Evolution both historically and technologically. - Pollutants and physical, mechanical, and chemical deterioration processes in historic building materials. Moisture's role in the deterioration of materials - Characterization of old construction materials and their transformation products using destructive and non-destructive diagnostic methods. Case studies. Standards.
4	Introduction: procedures for historic building restoration, repair, and upkeep. Historic structures should use performance-based building design, a history of construction.
5,6,7	- Construction methods and materials used in heritage buildings - Timber structures: structural timber, wood characteristics. - Stone and brick masonry, including masonry mortar and brick masonry. 3. Building techniques and structural components: the groundwork, the walls, the piers and columns, the beams, the floors, the roofs and trusses, and the arches and vaults.
8,9,10	- Repair techniques and renovation approaches: - Retrofitting of stone and brick masonry as a method of repair. - Repairs to structural timber. - Energy retrofitting and calculating U-Value 4. Restoration of historic structures' structural integrity
11,12	- pathological construction - Construct a definition of pathology. Failure, abnormality, and flaw. - Decaying materials and structures have certain causes. Investigative procedure. - Method of diagnosis. For non-destructive building construction inspections, a diagnostic system. - Failed instances. Informational documents regarding defects. An examination of errors and flaws.
13,14,15	- Controlling costs and facility management - Historic building maintenance procedures. - Controlling the costs of rehabilitation initiatives. - Life Cycle Cost Evaluation (LCC).





Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Historic Building Materials: An Overview" by James S. McCarthy - A comprehensive look at traditional construction materials and their properties. Building Pathology: Deterioration, Diagnostics, and Intervention" by Andy McDonald - Discusses various deterioration processes and diagnostics for historic buildings. Conservation of Historic Buildings" by Bernard Feilden - A guide to the conservation and restoration of historic structures, focusing on materials and methods.	No
Recommended Texts	Historic Preservation: An Introduction to Its History, Principles, and Practice" by J. Timothy Kell Covers the principles and practices of historic preservation, including materials and construction methods. Restoration of Historic Buildings: A Guide to Principles and Practices" by Andrew M. McMillan	No
Websites		





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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	ADVANCED FOUNDATION ENGINEERING		Module Delivery		
Module Type	Core		☒ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☒ Seminar		
Module Code	BCE 409				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		4	Semester of Delivery		2
Administering Department		BCE	College	TEMO	
Module Leader	Israa Mohammed		e-mail	israa.m.mushtaq@ntu.edu.iq	
Module Leader's Acad. Title		Assist. Lecturer	Module Leader's Qualification		MSc.
Module Tutor			e-mail		
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date		28/09/2025	Version Number	3.0	

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

Module Aims, Learning Outcomes and Indicative Contents	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	This course aims to: 1. Provide students with fundamental knowledge of foundation engineering and soil investigation methods. 2. Enable students to analyze soil bearing capacity and select appropriate foundation types. 3. Introduce the principles, design criteria, and construction methods of deep foundations. 4. Develop students' ability to design pile foundations and pile caps.



	- Equip students with knowledge of lateral earth pressure and retaining structures. - Enable students to analyze slope stability and address challenges associated with expansive soils.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this course, students will be able to: Interpret soil investigation data and select suitable shallow and deep foundation systems. Analyze and calculate soil bearing capacity and design shallow foundations according to engineering principles. Explain the principles of deep foundations and analyze and design single piles and pile groups. Apply load testing procedures (static and dynamic) to evaluate pile performance. Design pile caps and assess foundation settlement. Analyze lateral earth pressure using Rankine and Coulomb theories and design concrete retaining walls. Analyze and design sheet pile walls for earth retention systems. Evaluate slope stability and determine the factor of safety using appropriate analytical methods. Identify challenges related to expansive soils and propose suitable engineering mitigation techniques.
Indicative Contents المحتويات الإرشادية	• Introduction to Foundation Engineering • Soil Investigation and Site Exploration • Bearing Capacity of Soils and Design of Shallow Foundations • Deep Foundations: Principles and Types of Piles • Pile Installation Methods (Driven, Bored, Screw Piles) • Bearing Capacity of Single Piles and Pile Groups • Static and Dynamic Load Testing of Piles • Design of Pile Caps and Settlement Analysis • Theories of Lateral Earth Pressure (Rankine & Coulomb) • Types and Design of Retaining Walls • Sheet Piles: Types, Applications, and Design • Slope Stability Analysis and Factor of Safety • Expansive Soils: Problems and Mitigation Techniques





Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Lecture & In-Class Activities, Preliminary & Further Study, Group Work, Assignment (Homework) , Project Work, Seminar, Final Exam, Mid-Term Exam and short Exam.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	44	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	77	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	15% (15)	5,8,11 and 12	LO #2,4,6,8,10
	ClassWork	2	10% (10)	2 and 12	LO #3,5,7,9
	Assignments	2	5% (5)	3 and 8	LO #2,4,6
	Project	1	5%(5)	10	ALL
	Seminar	1	5%(5)	14	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





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1,2	• Demonstrates knowledge of the Deep foundations, • Demonstrates knowledge of the Types and uses of piles, • Demonstrates knowledge of the Construction of piles, • Demonstrates knowledge of the Bearing capacity of single pile, Bearing capacity of pile group, • Able to conduct Load test on piles, • Able to Design of piles cap, and Settlement of piles.
3,4,5	• Demonstrates knowledge of the Lateral earth pressure.
6,7,8	• Demonstrates knowledge of the Retaining walls- types of retaining walls, • Able to Design of concrete retaining walls. • Demonstrates knowledge of the construction of retaining walls
9,10	• Demonstrates knowledge of the Sheet piles- types of sheet piles, • Able to design of sheet piles, • Demonstrates knowledge of the construction of sheet pile
11,12	• Demonstrates knowledge of the Slope stability, Types & factors affecting slope stability
13,14,15	• Demonstrates knowledge of the Expansive soil- methods of construction on expansive soil

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Primary sources: - WILEY J. & INC S., (2011), “ SOIL MECHANICS AND FOUNDATIONS” , 3rd Edition, ISBN: 978-1-118-13604-1, August 2011, 784 pages. - BRAJA M. DAS Principles of Foundation Engineering, SI Seventh Edition.	Yes
Recommended Texts	1- Edward J., Shyam N., John A. , (2011), “Suggested Analysis and Design Procedures for Combined Footings and Mats” Reported by ACI Committee 336 . 2- Michael B., (2016), “Design methods based upon rapid pile load tests” ISSMGE - ETC 3 International Symposium on Design of Piles in Europe. Leuven, Belgium, 28 & 29• Suggested related links: None.	
Websites		





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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.

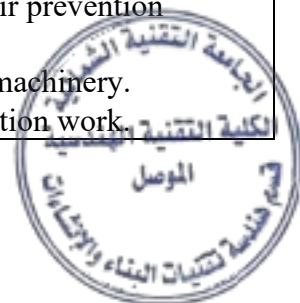




Module Information					
معلومات المادة الدراسية					
Module Title	SAFETY IN CONSTRUCTION		Module Delivery		
Module Type	Support		☒ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar		
Module Code	BCE 410				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level		4	Semester of Delivery		2
Administering Department		BCE	College	TEMO	
Module Leader	Faris Jihad Thyab		e-mail	Faris.j.thyab@ntu.edu.iq	
Module Leader’s Acad. Title		Assist. Lecturer	Module Leader’s Qualification		Master degree
Module Tutor			e-mail		
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date		28/09/2025	Version Number	3.0	

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	- To know causes of accidents related to construction activities and human factors associated with these accidents. - To understand the construction regulations and quality assurance in construction. - To have the knowledge in hazards of construction and their prevention methods. - To know the working principles of various construction machinery. - To gain knowledge in health hazards and safety in demolition work.





Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Identify common causes and types of accidents specific to construction sites, and explain how poor safety culture, unsafe conditions, and unsafe acts contribute to incidents. 2. Recognize typical construction site hazards, including working at height, excavation, confined spaces, moving machinery, and hazardous materials, and propose appropriate control measures. 3. Apply safe working practices for high-risk activities, such as working at height, lifting operations, hot work, and demolition, in accordance with industry standards and safety procedures. 4. Explain the safe selection, operation, inspection, and maintenance of construction equipment and machinery, ensuring compliance with safety standards and manufacturer guidelines. 5. Contribute to the development of construction site safety management systems, including toolbox talks, site inductions, permit-to-work systems, and emergency planning.
Indicative Contents المحتويات الإرشادية	1. Accident Causes & Safety Management - Understand common causes of construction accidents, including human error. - Learn how safety management systems and training help prevent accidents. - Know the role of permits, pre-planning, and quality checks in safe construction. 2. Managing Construction Hazards - Identify key hazards in excavation, scaffolding, tunneling, and confined spaces. - Understand safety controls for roadwork, high-rise, and power plant projects. 3. Working at Heights - Learn fall prevention methods and safe access techniques. - Understand safety rules (like OSHA) for working at heights. - Review real accident cases to understand what went wrong. 4. Machinery and Tool Safety - Know how to safely choose, use, and check cranes and other machinery. - Use safety checklists for tools and equipment on site. 5. Demolition Safety - Learn safe methods for different types of demolition work. - Understand the importance of surveys, supervision, and fire safety before and during demolition.





Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Lecture & In-Class Activities, Assignment (Homework), Group Work , Project Work, Final Exam, Mid-Term Exam and short Exam.
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Student Workload (SWL)

الحمل الدراسي للطلاب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	27	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	75		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	15% (15)	5,8,11 and 12	LO #1- #3
	Class Work	2	10% (10)	3 and 8	LO #2- #4
	Assignments	2	5% (5)	2 and 12	LO #1- #2
	Seminars	2	5% (5)	2 and 12	All
	Project	1	5%(5)	14	All
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1- #4
	Final Exam	3hr	50% (50)	16	ALL
Total assessment			100% (100 Marks)		





Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
1,2	Demonstrates Knowledge About Accidents, Causes, And Management Systems Understanding accident causes and safety management systems is essential in construction, where high-risk activities often lead to serious injuries or fatalities. Accidents commonly result from poor planning, lack of training, unsafe equipment, and human factors like fatigue or unsafe behaviour. Legal requirements and contract clauses play a key role in assigning safety responsibilities.
3	Demonstrates knowledge of managing Hazards of Construction and Prevention Managing hazards in construction requires identifying risks across a wide range of high-risk activities such as excavation, trenching, basement work, and shaft construction. Key safety measures include proper scaffold erection and inspection, secure falsework, and safe methods for assembling and dismantling structural frameworks.
4, 5	Preventing Falls Begins with Secure Access and Sturdy Platforms. Working at heights is one of the leading causes of fatal accidents in construction, making fall prevention and protection essential. Key safety measures include establishing safe access and egress, ensuring the proper use of ladders, and constructing secure scaffolding and stable work platforms like stairways, ramps
6,7	Protecting Workers with Reliable Fall Arrest Systems and Strict Procedures. Work must be performed on roofs, edges, or fragile surfaces, active fall protection systems such as safety belts, nets, fall arrestors, and safety monitoring zones are mandatory. administrative controls like permit-to-work systems, height passes, and controlled access zones are crucial to ensure that only trained and authorized personnel perform these high-risk tasks.
8, 9	Ensuring Safety Through Rigorous Machinery Selection and Inspection. Construction machinery must be carefully selected, operated, inspected, and tested to ensure safe and efficient use on site. This includes major equipment like cranes (tower, mobile, and hoisting types), builder's hoists, winches, chain pulley blocks, and conveyors.
10,11	Preventing Accidents with Proper Operation and Comprehensive Training. Safety must also be ensured when using a wide range of other equipment, including concrete mixers, vibrators, pumps, welding machines, and earth-moving equipment like excavators, loaders, dumpers, and graders.
12, 13	Foundation of Safe Demolition Lies in Meticulous Pre-Planning. Demolition work, whether manual, mechanical, or involving explosives, requires detailed planning and strict safety measures to prevent serious accidents. a process begins with essential preparatory steps such as conducting pre-demolition surveys, developing a comprehensive method statement, and defining safe clearance zones to protect personnel and the public
14, 15	Managing On-Site Hazards and Emergencies Ensures Safe Execution. Throughout the execution of demolition, a wide range of hazards must be actively managed according to iraqi safety standards. These include falling materials, structural collapses, dust, noise, and exposure to harmful substances.





Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
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Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Construction Safety Management and Engineering" by John L. Rynearson, 2014. Safety and Health in Construction" by C. Rayner, 2016.	Yes
Recommended Texts	Occupational Health and Safety in Construction Work" by J. S. Dorman, 2013.	
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 AIDED DESIGN OF STRUCTURE		Module Delivery		
Module Type	Core		☒ Theory ☒ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☒ Seminar		
Module Code	BCE 411				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		4	Semester of Delivery		2
Administering Department		BCE	College	TEMO	
Module Leader	Ban A. Khalil		e-mail	banahmed@ntu.edu.iq	
Module Leader’s Acad. Title		Lecturer	Module Leader’s Qualification		Master
Module Tutor			e-mail		
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date		28/09/2025	Version Number	3.0	

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

Module Aims, Learning Outcomes and Indicative Contents	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The main objective of this program is to train students in the use of ETABS software for structural analysis and design of civil engineering structures, enabling them to create structural models, perform different types of analyses, and design reinforced concrete and steel structures according to international code
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this course, the student should be able to: - Understand the ETABS environment and its applications in structural engineering. - Create 2D and 3D structural models (beams, columns, slabs, shear walls, frames, and buildings).





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	• Apply different types of loading (dead load, live load, wind load, earthquake load, temperature load, etc.) and define load combinations. • Perform static and dynamic analyses of structures using ETABS. • Design reinforced concrete members (beams, columns, slabs, shear walls, and foundations) according to selected design codes. • Design steel structures using ETABS design modules. • Integrate ETABS with other civil engineering software (SAFE, CSI Bridge, AutoCAD).
Indicative Contents المحتويات الإرشادية	• Overview of ETABS: Introduction, interface, modeling environment, and file management. • Structural Modeling: Creating models of beams, columns, slabs, shear walls, cores, and multi-story buildings. • Load Applications: Defining and applying dead loads, live loads, wind loads, earthquake loads, and special loads. • Analysis Methods: Static. • Concrete Design: Design and detailing of beams, slabs, columns, shear walls. • Steel Design: Analysis and design of steel frames, trusses. • Integration with SAFE : Foundation design • Case Studies and Project Applications.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Lecture & In-Class Activities, Laboratory, Assignment (Homework) , Project Work, Seminar, Final Exam, Mid-Term Exam and short Exam.
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Student Workload (SWL)

الحمل الدراسي للطلاب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	77	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	125		





Module Evaluation					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	15% (15)	5,8,11 and 12	LO 2,4,6
	Assignments	2	5% (5)	2 and 12	LO 1,3,5,7
	Project	1	5%(5)	14	ALL
	Laboratory	4	15%(15)	5,8,11 and 12	ALL
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO 1-5
	Final Exam	3hr	50% (50)	16	ALL
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري والعملي	
	Material Covered
1	- Introduction to ETABS software, overview of user interface. - Starting a new project and defining project parameters (units, design codes). - Creating grid systems and story levels. <i>(Practical: Open ETABS → define grid lines and stories → save project template).</i>
2,3,4	- Structural Modeling: Creating beams, columns, slabs, walls, shear walls, and cores. - Using drawing tools and property assignment for concrete and steel sections. - Defining material properties (concrete grade, steel grade, etc.). <i>(Practical: Model a simple 2D frame → assign section properties → extrude to 3D).</i>
5	ETABS components: Menu bar functions, modeling toolbar, analysis toolbar.
6,7	- Load definitions: Dead load, live load, superimposed load, temperature load. - Load application on frame elements, slabs, and shells. <i>(Practical: Apply floor load and wind load on a multi-story frame → define load combination)</i>
8,9,10	- Application Examples in RC structures: - Modeling and analyzing concrete beams, slabs, and columns. - Design of shear walls and multi-story reinforced concrete buildings.





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	Load cases: gravity loads, lateral loads (wind and earthquake). (Pactical: Analyze a 10-story RC frame building under seismic and wind loads).
11,12	- Analysis and Design of Steel Structures: - Steel frames, steel trusses, and high-rise steel structures. - Assigning steel sections from international databases. - Buckling and lateral-torsional stability checks. (Pactical: Model and analyze a 6-story steel frame under wind loa
13	- Integration of ETABS with other software: - Import/export models to SAFE,, AutoCAD. - Comparative overview of ETABS vs. STAAD.Pro, SAFE.
14, 15	Foundation Design

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1-User's Guide Integrated Building Design Software 2- CSI Analysis Reference Manual For SAP2000®, ETABS®, SAFE® and CSiBridge®	Yes
Recommended Texts		
Websites		





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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	REPAIRS & REHABILITATION OF STRUCTURES		Module Delivery		
Module Type	Core		☒ Theory ☒ Lecture ☒ Lab ☒ Tutorial ☒ Practical ☒Seminar		
Module Code	BCE 412				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		4	Semester of Delivery		2
Administering Department		BCE	College	TEMO	
Module Leader	Hassan Mohammed Ahmed		e-mail	albegmprli@ntu.edu.iq	
Module Leader’s Acad. Title		Assis Prof	Module Leader’s Qualification		PhD
Module Tutor			e-mail		
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date		28/09/2025	Version Number		3.0

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	To learn various distress and damages to concrete and masonry structures • To understand the importance of maintenance of structures • To study the various types and properties of repair materials • To assess the damage to structures using various tests • To learn the importance and methods of substrate preparation • To learn various repair techniques of damaged structures, corroded structures
Module Learning Outcomes	By the end of this course students will have the capability/knowledge of 1. various distress and damages to concrete and masonry structures





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مخرجات التعلم للمادة الدراسية	2. the importance of maintenance of structures, types and properties of repair materials etc 3. assessing damage to structures and various repair techniques
Indicative Contents المحتويات الإرشادية	Distress and Damage in Structures: - Overview of common types of distress and damage in concrete and masonry structures. - Identification and classification of structural issues. Importance of Maintenance: - Understanding the significance of regular maintenance for structural longevity. - Strategies for effective maintenance planning. Repair Materials: - Study of different types of repair materials and their properties. - Criteria for selecting appropriate materials for specific repairs. Damage Assessment: - Techniques for assessing structural damage using various testing methods. - Interpretation of test results to inform repair decisions. Substrate Preparation: - Importance of proper substrate preparation before repairs. - Methods for preparing surfaces to ensure successful bonding of repair materials. Repair Techniques: - Overview of various repair techniques for damaged and corroded structures. - Case studies illustrating successful repair implementations.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lecture & In-Class Activities, Assignment (Homework), Laboratory, Project Work , Report Writing ,Seminar Final Exam, Mid-Term Exam and short Exam.

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





Module Evaluation					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	15% (15)	5,8,11 and 12	LO1-3
	Class Work	2	10% (10)	3 and 8	LO1-3
	Assignments	2	10% (10)	2 and 12	LO1-3
	Seminar	2	5% (5)	5 and 11	ALL
Summative assessment	Midterm Exam	2hr	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
1	Introduction: - Demonstrates knowledge of the Maintenance, rehabilitation, repair, retrofit and strengthening, need for rehabilitation of structures.
2	Cracks in R.C. buildings - Demonstrates knowledge of the Various cracks in R.C. buildings, causes and effects
3	Maintenance - Demonstrates knowledge of the Maintenance importance of maintenance, routine and preventive maintenance.
4	Damages to masonry structures - Demonstrates knowledge of the Various damages to masonry structures and causes
5	Repair materials - Demonstrates knowledge of the Various repair materials, Criteria for material selection, Methodology of selection, - Demonstrates knowledge of the Health and safety precautions for handling and applications of repair materials Special mortars and concretes - Demonstrates knowledge of the Polymer Concrete and Mortar, Quick setting compounds
6	Grouting materials





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	• Demonstrates knowledge of the Gas forming grouts, Sulfoaluminate grouts, Polymer grouts, Acrylate and Urethane grouts. • Bonding agents • Demonstrates knowledge of the Latex emulsions, Epoxy bonding agents.
7	• Protective coatings • Demonstrates knowledge of the Protective coatings for Concrete and Steel
8	• Damage diagnosis and assessment • Able to conduct Visual inspection, • Able to conduct Non Destructive Test using Rebound hammer, • Able to conduct Ultra sonic pulse velocity, • Able to conduct Semi destructive test, • Able to conduct Probe test, • Able to conduct Pull out test, • Able to conduct Chloride penetration test, • Demonstrates knowledge of the Carbonation, and able to conduct Carbonation depth testing, • Able to conduct Corrosion activity measurement
9	• Substrate preparation • Demonstrates knowledge of the Importance of substrate/surface preparation, General surface preparation methods and procedure, Reinforcing steel cleaning • Crack repair • Demonstrates knowledge of the Various methods of crack repair, Grouting, Routing and sealing, Stitching, Dry packing, Autogenous healing, Overlays, Repair to active cracks, Repair to dormant cracks.
10	• Corrosion of embedded steel in concrete • Demonstrates knowledge of the Corrosion of embedded steel in concrete, Mechanism, Stages of corrosion damage, Repair of various corrosion damaged of structural elements (slab, beam and columns)
11,12	• Jacketing • Demonstrates knowledge of the Jacketing, Column jacketing, Beam jacketing, Beam Column joint jacketing, Reinforced concrete jacketing, Steel jacketing, FRP jacketing. • Strengthening • Demonstrates knowledge of the Strengthening, Beam shear strengthening, Flexural strengthening
13,14,15	• Renovation & Rehabilitation of Historic Buildings • Demonstrates knowledge of the different types of work on historic buildings defined • Restoration • Renovation • Rehabilitation • 4. Remodel, Repair, Renew, Reconstruct, Recondition, and Adaptive Re-use

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري



Material Covered



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1	• Introduction: Demonstrates knowledge of the Maintenance, rehabilitation, repair, retrofit and strengthening, need for rehabilitation of structures.
2	• Deterioration of Concrete & Steel: Durability, permeability, reinforcement corrosion, carbonation, chloride ingress; ASR; sulfate/freeze–thaw; protective systems.
3	• Cracking & Distress in RC/Masonry/Steel: Types, causes, mapping, severity, monitoring.
4	• Condition Assessment Planning: Levels of assessment, inspection forms, sampling plans, risk-based prioritization; safety for inspections; access methods.
5	• NDT Methods I (Concrete): Visual grading; rebound hammer, UPV, covermeter, half-cell potential, resistivity, pull-off/bond, Windsor probe, impact-echo.
6	• NDT Methods II & Materials Testing: Ground-penetrating radar (GPR), IR thermography, corrosion rate, core extraction & lab tests, petrography, chloride/carbonation profiling.
7	• Proof/Diagnostic Load Testing: Load test objectives, instrumentation, acceptance criteria, short-term deflection/creep effects, safety.
8	• Repair Materials & Protection Systems: Cementitious repair mortars/micro-concrete, polymer-modified systems, epoxy injection, grouts, anchors/adhesives, shotcrete, corrosion inhibitors, cathodic protection, coatings, waterproofing.
9	• Substrate preparation: Demonstrates knowledge of the Importance of substrate/surface preparation, General surface preparation methods and procedure, Reinforcing steel cleaning • Crack repair: Demonstrates knowledge of the Various methods of crack repair, Grouting, Routing and sealing, Stitching, Dry packing, Autogenous healing, Overlays, Repair to active cracks, Repair to dormant cracks.
10,11	• Strengthening Techniques I (RC & Masonry): Section enlargement, RC/steel jacketing, steel plate bonding, post-installed rebar, shear/ductility upgrades, walls & slabs.
12	• Strengthening Techniques II (Advanced): FRP (EBR, NSM), anchors & terminations, fire/UV/environmental durability, prestressed FRP/steel, external post-tensioning.
13,14,15	• Renovation & Rehabilitation of Historic Buildings • Demonstrates knowledge of the different types of work on historic buildings defined • Restoration • Renovation • Rehabilitation • 4. Remodel, Repair, Renew, Reconstruct, Recondition, and Adaptive Re-use





Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	9. Concrete Repair, Rehabilitation and Retrofitting (2nd Edition, Routledge, 2019) – Alexander et al. 10. Handbook of Materials Failure Analysis: With Case Studies from the Construction Industries (Elsevier, 2018) 11. Structural Renovation of Buildings: Methods, Details, and Design Examples (McGraw-Hill, 2020) – Alexander Newman	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.





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Module Information معلومات المادة الدراسية			
Module Title	SUSTAINABLE CONSTRUCTION MATERIALS		Module Delivery
Module Type	Core	☒ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☒ Seminar	
Module Code	BCE 413		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level	4	Semester of Delivery	2
Administering Department	BCE	College	TEMO
Module Leader	Bassma Abdul Nafii	e-mail	Bassma.a.saeed@ntu.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	PhD
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	28/09/2025	Version Number	3.0

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

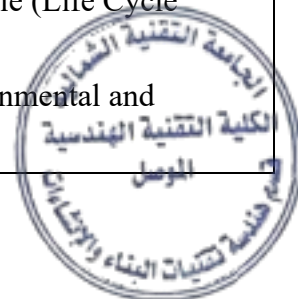




Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	By the end of this course, students will be able to: • Understand the concept of sustainability and its critical role in construction practices as well as green architecture principles. • Enable students to understand the characteristics of both conventional and sustainable building materials and compare them in terms of environmental and economic performance. • Learn about the greenhouse effect, global warming, and their link to construction materials. • Enable students to understand the characteristics of both conventional and sustainable building materials and compare them in terms of environmental and economic performance. • Develop students' ability to select appropriate sustainable materials for various architectural projects. • Enhance students' environmental awareness during the design and construction stages • Understand carbon footprint, embodied energy of materials, and the methods of calculating these factors. • Identify and evaluate sustainability rating systems in the construction industry. • Familiarize students with modern technologies used in the production and application of sustainable building materials.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the completion of this course, students will be able to: 1. Demonstrate a comprehensive understanding of sustainability in the context of construction materials and green architecture. 2. Identify and evaluate the resources and reserves available for construction materials. 3. Analyze the environmental impact of materials in construction, focusing on the greenhouse effect, global warming, and carbon footprint. 4. Identify the factors that make a building material sustainable (such as durability, recyclability, embodied energy, etc.). 5. Understand the relationship between material selection and its environmental impact throughout the building's life cycle (Life Cycle Assessment - LCA). 6. Utilize sustainability rating systems to assess the environmental and economic viability of construction materials.





	7. Propose strategies for reducing the environmental impact of construction materials in building practices.
Indicative Contents المحتويات الإرشادية	1. Introduction to Sustainability and Its Need Definition and importance of sustainability in construction and the concept, goals, and history of green architecture. 2. Resources and Reserves in Construction Materials Overview of material resources used in construction. The relationship between material, form, function, and aesthetics 3. The Greenhouse Effect and Global Warming The science behind the greenhouse effect. Impact of construction materials on global warming. 4. Carbon Footprint of Materials and Calculations Definition of carbon footprint. Methods of calculating carbon emissions of construction materials. Case studies and real-world examples. 5. Characteristics of sustainable buildings materials. Physical and environmental factors and comparing between natural building materials and recycled materials. 6. Life Cycle Assessment (LCA) and Cost Analysis Introduction to Life Cycle Assessment and its stages. Evaluating environmental and economic impact across a material's lifespan. Cost analysis techniques for sustainable material selection. 7. Sustainability Rating Systems Overview of global sustainability rating systems such as LEED, BREEAM, and Green Star. Criteria for rating materials based on sustainability. 8. Sustainability Implications in Construction Materials The environmental, social, and economic implications of material selection. Challenges in selecting sustainable materials. 9. Sustainability Issues in Cement and Concrete Materials Environmental impact of cement production and concrete mixing. Sustainable alternatives and innovations in concrete and cement materials.





	10. Sustainability Issues in Asphalt Materials The environmental footprint of asphalt production and usage. Recycling and sustainable practices in asphalt production. 11. Sustainability Issues in Metals The impact of metal production on the environment. Sustainable practices in metal selection and usage. 12. Sustainability Issues in Wood Wood as a renewable resource: challenges and opportunities. Sustainable forestry practices and their role in construction. 13. Sustainability Issues in Glass Environmental impact of glass production and recycling. Sustainable innovations in glass materials for construction. 14. Sustainability Issues in Masonry The environmental cost of brick and stone production. Sustainable alternatives in masonry materials.
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lecture & In-Class Activities, Assignment (Homework), Report Writing, Seminar, Final Exam, Mid-Term Exam and short Exam.

Student Workload (SWL) الحمل الدراسي للطلاب محسوب لـ ١٥ أسبوعاً			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعياً	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	77	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعياً	5
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	125		





Module Evaluation					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	15% (15)	5,8,11 and 12	LO# 1, 3, 5, 7
	Class Work	2	10% (10)	3 and 8	LO# 3,4,5
	Assignments	2	10% (10)	2 and 12	LO# 2,4,6
	Seminars	2	5% (5)	6 and 11	All
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO# 1- 5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
1	Introduction to Sustainability in construction and Green Architecture
2	Demonstrate characteristics of Sustainable Building Materials
3	Greenhouse Effect and Global Warming
4	Carbon Footprint of Materials and Calculations
5	Natural Building Materials And Recycled Materials
6	Life Cycle Assessment and Cost Analysis
7	Sustainable Insulation and Acoustic Materials
8	The relationship between sustainability and material, form, function, and aesthetic.
9	Sustainability Implications in Construction Materials
10	Sustainability Issues in Cement and Concrete Materials
11	Sustainability Issues in Metals
12	Sustainability Issues in Wood
13	Sustainability Issues in Glass
14	Sustainability Issues in Masonry





Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Sustainability and its Need (Introduction): • Book: <i>Understanding Green Building Materials</i> Traci Rose Rider, Stacy Glass and Jessica McNaughton Resources and Reserves in Construction Materials: • Book: <i>Green Building, Materials and Civil Engineering</i> Jimmy C.M. Kao, Wen-Pei Sung, Ran Chen • <i>The Green Building Materials Manual: A Reference to Environmentally Sustainable Initiatives and Evaluation Methods</i> Hannah Rae Roth, Meghan Lewis, Liane Hancock Greenhouse Effect and Global Warming: • Book: <i>Global Warming: Understanding the Forecast</i> by David Archer.	Yes
Recommended Texts	<i>Climate Change 2021: The Physical Science Basis</i> (IPCC). <i>Global Status Report on Building and Construction</i> (UN Environment). <i>Journal of Sustainable Development.</i>	
Websites		





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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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Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
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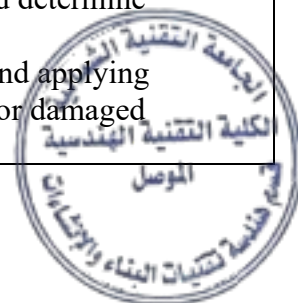




Module Information					
معلومات المادة الدراسية					
Module Title	INOVATIVE PROJECT -II		Module Delivery		
Module Type	Core		☐ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☒ Practical ☒ Seminar		
Module Code	BCE 414				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		4			Semester of Delivery
Administering Department		BCE	College	TEMO	
Module Leader			e-mail		
Module Leader’s Acad. Title			Module Leader’s Qualification		
Module Tutor			e-mail		
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date		28/09/2025	Version Number	3.0	

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 student will be able to design, calculate quantities, and plot the architectural, constructional, sanitary, & electrical plans & details for a certain project in civil engineering.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Assess Structural Conditions: Demonstrate the ability to analyze existing structures to identify damage, assess structural integrity, and determine necessary repairs. Apply Repair Techniques: Gain proficiency in selecting and applying appropriate repair and retrofitting methods for deteriorated or damaged structures.





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	Conduct Research and Development: Exhibit the capability to explore, research, and implement innovative materials and techniques for improving structural performance. Restore Historical Buildings: Show an understanding of the principles and methods required for restoring and rehabilitating historical buildings while preserving cultural heritage. Design Sustainable Structures: Design new structures with an emphasis on sustainability, durability, and efficiency, adhering to modern engineering standards. Incorporate Sustainability in Projects: Apply sustainable construction practices and principles in various building and development projects.
Indicative Contents المحتويات الإرشادية	Structural Assessment Projects: Analyze existing structures to determine damage and repair needs. Repair and Retrofit Projects: Implement various repair techniques on damaged or aging structures. Research and Development Projects: Explore new materials and techniques to improve structural performance. Historical Building Restoration Projects: Preserve cultural heritage through restoration and rehabilitation of historical buildings. New Structure Design Projects: Design new structures focusing on sustainability and efficiency. Sustainability Projects: Apply sustainable engineering principles in construction and development projects.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Web Based Learning, Practice at a workplace, Group Work ,Thesis Work, Report Writing ,Final Exam, and Mid-Term Exam

Student Workload (SWL) الحمل الدراسي للطلاب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	37	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	100		





Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Project Work	1			
	Seminar	1			
Summative assessment	Midterm Exam	1hr	10% (10)		
	Final Exam	1hr	50% (50)		
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
1-14	Different projects supervised by staff members.

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

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





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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.

