

**Ministry of Higher Education and Scientific Research
Scientific Supervision and Scientific Evaluation Apparatus
Directorate of Quality Assurance and Academic Accreditation
Accreditation Department**



Academic Program and Course Description Guide

2026

Introduction:

The MSc in Sustainable Engineering Structures is an advanced academic program designed to provide graduate students with specialized knowledge, research capabilities, and professional competencies in structural engineering and sustainable construction. The program integrates advanced theories of structural analysis and design with sustainability principles to address contemporary challenges in the planning, design, rehabilitation, and management of engineering structures.

The program offers a comprehensive educational framework that combines advanced coursework, scientific research, and practical engineering applications. Students develop expertise in reinforced concrete and steel structures, finite element analysis, structural dynamics, soil–structure interaction, rehabilitation of structures, sustainable materials, and infrastructure systems. Through independent research and scientific investigation, graduates gain the skills necessary to analyze complex structural problems, develop innovative and sustainable engineering solutions, and contribute effectively to the advancement of the construction industry.

The academic program description provides a concise overview of the program structure, objectives, learning outcomes, and educational strategies. It reflects the program's commitment to quality assurance, continuous improvement, and alignment with national and international standards for postgraduate engineering education. Furthermore, it serves

as an important reference for academic accreditation, program evaluation, and curriculum development.

This description has been prepared in accordance with the guidelines of the Ministry of Higher Education and Scientific Research and incorporates contemporary developments in sustainable structural engineering, advanced construction technologies, and quality assurance systems. The program aims to prepare highly qualified graduates capable of contributing to scientific innovation, sustainable development, and the enhancement of resilient infrastructure at local, regional, and international levels.

Academic Program Description Form

University Name: Wasit University

Faculty/Institute: College of Engineering

Scientific Department: Civil Engineering

Academic or Professional Program Name: Sustainable Engineering Structures

Final Certificate Name: MSc in Sustainable Engineering Structures

Academic System: Course

Description Preparation Date: 1/9/2026

File Completion Date: 9/9/2026

Signature:

Head of Department Name:

Asst. Prof. Dr. Alaa Kharbat Shadhar

Date: 9/9/2026

Signature:

Scientific Associate Name:

Asst. Prof. Dr. Mohammed Ghalib

Date: 9/9/2026

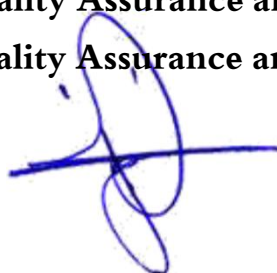
The file is checked by: Asst. Prof. Dr. Haider Majid Hasan

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Date: 9/9/2026

Signature:



Approval of the Dean

Prof. Dr. Thaer Saoud Salman

Date: 9/9/2026



1. Program Vision

To achieve excellence in postgraduate education, scientific research, and innovation in sustainable structural engineering, and to become a leading academic program that contributes to the development of resilient, sustainable, and environmentally responsible engineering structures and infrastructure systems that support societal well-being and sustainable development.

2. Program Mission

The mission of the MSc program in Sustainable Engineering Structures is to prepare highly qualified engineers and researchers through advanced education, scientific research, and practical applications in structural engineering. The program seeks to develop graduates capable of addressing complex challenges related to structural design, rehabilitation, sustainable construction materials, infrastructure resilience, and environmental sustainability through innovative and sustainable engineering solutions.

3. Program Objectives

1. Provide students with advanced theoretical and practical knowledge in structural engineering, structural analysis, and sustainable engineering design.
2. Develop the ability to conduct independent scientific research and apply advanced analytical, computational, and experimental methods to solve structural engineering problems.
3. Prepare graduates to design, assess, rehabilitate, and optimize engineering structures in accordance with sustainability principles, safety requirements, and modern design codes.
4. Enhance students' capabilities in utilizing advanced tools such as finite element analysis, computational mechanics, and structural dynamics for engineering applications.
5. Develop expertise in sustainable construction materials, green building technologies, and environmentally responsible infrastructure systems.
6. Strengthen communication, leadership, teamwork, and professional ethics required for multidisciplinary engineering practice and research.
7. Promote innovation, critical thinking, and lifelong learning to keep pace with emerging technologies and advances in structural engineering and sustainable construction.

8. Support collaboration with governmental institutions, industry sectors, and research organizations to address local, regional, and global challenges related to sustainable infrastructure and structural resilience.
9. Contribute to sustainable development through research and engineering solutions that improve structural performance, infrastructure durability, resource efficiency, and environmental protection.

4. Program Accreditation

The MSc in Sustainable Engineering Structures is committed to meeting the requirements of national academic quality assurance standards and the regulations of the Ministry of Higher Education and Scientific Research. The program continuously reviews and improves its curriculum, research activities, teaching methodologies, and educational outcomes to ensure academic excellence and alignment with national and international standards for postgraduate engineering education. The program also strives to support academic accreditation processes and continuous quality improvement in sustainable structural engineering education.

5. Other external influences

Ministry of Higher Education and Scientific Research

Master's degree in Water Resources and Environment Engineering

General notes:

1. The duration of study to obtain a master's degree in Water Resources and Environment Engineering is two calendar years after the initial university study until the end of the thesis defense. The College Council has the right to extend it for six months, and the University Council has the right, according to its conviction, to extend it for another six months only.
2. The number of study units during this period is (36) study units, including the thesis, (24) units for the total of the two semesters, and (12) study units including the thesis.
3. Units are calculated based on what was stated in Articles 19 and 20 of Chapter Two of the Postgraduate Studies Instructions and their amendments, as follows: (Every theoretical hour = one unit, every two hours in the applied project = one unit).
4. The admission plan according to the new innovation includes the following: (2) a student on the public channel, (1) a student on private expense, and the admission plan is determined for each academic year according to the academic contexts.

Curriculum First Semester

Code	Subject (Eng.)	Subject (Ar.)	Hour	Units
MSES-701	Theory of Elasticity	نظرية اللدونة	3	3
MSES-702	Advanced and sustainable design of R.C Structures	تصميم المنشآت الخرسانية المستدامة المتقدم	2	2
MSES-703	sustainable infrastructures	البنى التحتية المستدامة	2	2
MSES-704	Finite Element Method	طريقة العناصر المحددة	3	3
MSES-705	Prestressed Concrete	الخرسانة مسبقة الجهد	2	2
MSES-728	English Language	لغة إنكليزية	2	0
Total			12	12

Curriculum Second Semester

Code	Subject (Eng.)	Subject (Ar.)	Hour	Units
MSES-706	Bridge design	تصميم الجسور	2	2
MSES-707	Rehabilitation of Structures	تأهيل المنشآت	2	2
MSES-708	Structural Dynamics	الديناميكية الهيكلية	2	2
MSES-709	Soil-Structure Interaction	التأثير المشترك بين التربة والمنشأ	2	2
MSES-710	Sustainable Structural Materials	مواد انشائية مستدامة	2	2
MSES-730	Research Methodology	طرق بحثية	2	2
Total			12	12

6. Expected learning outcomes of the program	
Knowledge	
1A	The ability to identify, formulate, and solve engineering problems using the principles of mathematics, science, and engineering
2A	The ability to conduct experiments, analyze data, and interpret results to reach sound engineering conclusions
Skills	
1B	The ability to design engineering systems or components that meet specified needs within realistic constraints
2B	The ability to communicate effectively, both orally and in writing, with diverse audiences
3B	The ability to work effectively in teams and manage projects efficiently in multidisciplinary environments
Ethics	
1C	Understanding ethical and professional responsibilities and the impact of engineering solutions on society and the environment
2C	The ability for continuous self-directed learning and keeping up with scientific and technological developments

7. Teaching and Learning Strategies
1. Theoretical Lectures: Serving as the primary means of delivering fundamental scientific knowledge. 2. Projects and Assignments: Particularly graduation projects and reports, aimed at developing design and innovation skills. 3. Presentations and Classroom Discussions: To strengthen communication and teamwork skills. 4. Field Visits: To connect students with real-world engineering practice. 5. E-Learning / Learning Management Systems (LMS): Through the use of electronic platforms and digital materials. 6. Self-Learning: Encouraging students to engage in independent research and utilize scientific resources

8. Evaluation methods
Implemented at all stages of the program in general.
Quizzes
Assignments
Projects
Report
Midterm Exam

9. Faculty					
Faculty Composition		Specialization		Academic Rank	
PT	FT			General	
	Permanent	Specific Specialization	Major	PhD, MSc, etc	Name
	Permanent	Geotech	Civil Engineering	PhD	اسعد حافظ حميش
	Permanent	Structure	Civil Engineering	PhD	ثائر سعود سلمان
	Permanent	Water resources	Civil Engineering	MSc	جاسم محمد رضا عزيز
	Permanent	Structure	Civil Engineering	PhD	حسين عسكر جابر
	Permanent	Structure	Civil Engineering	PhD	صلاح راشد عبد
	Permanent	Project management	Civil Engineering	PhD	علاء خرياط شذر
	Permanent	Structure	Civil Engineering	PhD	كرار علي فرع
	Permanent	roads	Civil Engineering	PhD	مقداد منذر عبدالغني

10. Professional Development

Mentoring new faculty members

☐ Orientation Program:

An introductory session upon appointment covering the college mission, program objectives (PEOs), and learning outcomes (GOs).

Explanation of department systems: Outcome-Based Education (OBE), quality assurance, and assessment mechanisms.

☐ Academic Advising:

Assignment of an experienced faculty member as an academic supervisor/mentor for each new member.

Providing support in lecture preparation, teaching strategies, and classroom management.

☐ Training in Teaching and Learning Strategies:

Involving new members in workshops on:

Effective teaching methods.

Preparing exams and rubrics for student assessment.

☐ Research Preparation and Publication:

Workshops on how to write and publish research papers.

☐ Continuous Professional Development:

An annual plan for each faculty member, including participation in workshops and training courses.

☐ Administrative Support:

Familiarization with university regulations, rights, and responsibilities.

11. Professional development of faculty members

☐ Workshops and Training Courses:

On teaching strategies and active learning.

On the use of e-learning systems (LMS) and distance learning tools.

On preparing rubrics and modern assessment tools.

☐ Scientific Conferences and Seminars:

Participation in research presentations or attendance at local and international conferences.

Exchange of expertise with other universities.

Participation in external training programs.

☐ Scientific Research and Publication:

Support for applied research and community-related projects.

Encouragement of publication in reputable scientific journals (Scopus, WoS).

Provision of financial or time support to facilitate research completion.

☐ Self-Assessment and Feedback:

Student surveys on faculty performance.

Annual performance evaluation.

12. Acceptance Criterion

1. He obtained a bachelor's degree in Civil Engineering.
2. Implementing the provisions of the conditions for applying for postgraduate studies in force in the Iraqi Ministry of Higher Education and Scientific Research

13. The most important sources of information about the program

1. The official website of the college/university.
2. Publication on the notice board.
3. Sending via the official email upon request.

14. Program Development Plan

- 1 .Curriculum and Course Development
- 2 .Achievement of Learning Outcomes (GOs)
- 3 .Development of Teaching and Assessment Methods

- 4 .Capacity Building for Faculty Members
- 5 .Development of Infrastructure and Laboratories
- 6 .Strengthening the Relationship with the Labor Market and the Community
7. Continuous Improvement

Program Skills Map										
Program Learning Outcomes										
Values		Skills			Knowledge		Core, supportive or basic	Name	Code	Level
2C	1C	3B	2B	1B	2A	1A				
★		★			★		Core	Theory of Elasticity	MSES-701	First Semester
★			★		★		Core	Advanced and sustainable design of R.C Structures	MSES-702	
	★	★				★	Core	sustainable infrastructures	MSES-703	
★				★	★		Core	Finite Element Method	MSES-704	
★		★			★		Core	Prestressed Concrete	MSES-705	
	★	★				★	Core	English Language	MSES-728	

Program Skills Map										
Program Learning Outcomes										
Values		Skills			Knowledge		Core, supportive or basic	Name	Code	Level
2C	1C	3B	2B	1B	2A	1A				
	★	★				★	Core	Bridge design	MSES-706	Second Semester
★		★			★		Core	Rehabilitation of Structures	MSES-707	
★		★				★	Core	Structural Dynamics	MSES-708	
★		★			★		Core	Soil-Structure Interaction	MSES-709	
★				★	★		Core	Sustainable Structural Materials	MSES-710	
	★	★				★	Core	Research Methodology	MSES-730	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Advanced and Sustainable Design of Reinforced Concrete Structures	Credits	
Administering Department	Civil Engineering	College	College of Engineering
Module Leader	Prof. Dr. Sallal Rashid Abid	E-mail	sallal@uowasit.edu.iq
Module Leader's Acad. Title	Professor	Module Leader's Qualification	Ph.D.

Module Aims, Learning Outcomes and Indicative Contents	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The aim of this module is to complete the advanced design requirements of concrete structural members following the undergraduate reinforced concrete courses that consider the design based on gravity loads only. Therefore, the module tries to fill the gaps of knowledge in this side by reviewing the remaining design members that were not considered during the third and fourth stages of the undergraduate study. The focus is on the design of seismic resisting structures, and hence the earthquake building design requirements and considerations. Thus, the design requirements along this module would be those recommended by ASCE 71-6 and ACI 318-19. On the other hand, the ACI SP-17 (14) would be the main linking reference to extract design examples of the target structural members.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Understanding the design requirements, considerations, guidelines, and techniques of earthquake resisting structures. 2- Design of intermediate and special seismic-resisting reinforced concrete moment frames based on ACI 318-19 requirements including beams, columns, and joints. 3- Design of seismic-resisting reinforced concrete special shear walls, coupling beams of shear walls, and dual systems.
Indicative Contents المحتويات الإرشادية	The module focuses on enriching the student's knowledge about the design philosophy of reinforced concrete structures to withstand lateral loads induced from earthquakes and their actions. Thus, it delivers the required knowledge for special detailing of typical structural members and special structural members for seismic-resisting structures.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	As preceded, the aim of this module is to gain the required knowledge for the design of seismic-resisting reinforced concrete structural systems and members. Thus, the learning strategy is typically based on theoretical lectures that feed the students with the required knowledge to achieve this aim. Thus, the learning strategy includes: 1- Theoretical lectures, which are divided into two parts: (a) Seismic force resisting design considerations, and (b) ACI 318-19 requirements for reinforced concrete design against earthquake actions. 2- Presentation of self-prepared related subject that is not included in the lectures or about related case studies. 3- Home works and Exams
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Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري

Material Covered	
Week	lecture
Week 1	Introduction
Week 2	Structural Systems
Week 3	Earthquake Resisting Structures
Week 4	Seismic Loading Criteria
Week 5	ACI Equivalent Lateral Force Method
Week 6	<u>Mid-Term Exam of Part 1</u>
Week 7	ACI Provisions for Earthquake Resisting Structures-Beams
Week 8	ACI Provisions for Earthquake Resisting Structures-Columns
Week 9	Beam-Column Joints of Monolithic Reinforced Concrete Frames
Week 10	Coupling Beams & ACI Provisions for Intermediate Earthquake Resisting Structures
Week 11	<u>Self-Prepared Presentation</u>
Week 12	Structural Reinforced Concrete Walls-I
Week 13	Structural Reinforced Concrete Walls-II
Week 14	<u>Mid-Term Exam of Part 2</u>
Week 15	Reinforced Concrete Diaphragms

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1- ACI 318-19: Building Code Requirements for Structural Concrete 2- ACI 318-14: Building Code Requirements for Structural Concrete 3- ACI SP-17: The Reinforced Concrete Design Handbook 4- ASCE 7-16: Minimum Design Loads and Associated Criteria for Buildings and Other Structures	Yes
Recommended Texts	1- Design of Concrete Structures (15 th Edition); By: David Darwin, Charles W. Dolan, Arthur H. Nilson 2- Design of Reinforced Concrete (10 th Edition); by: J.C. McCormac & R. H. Brown	Yes

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	English Language I	Credits	
Administering Department	Civil Engineering	College	Engineering
Module Leader		E-mail	
Module Leader's Acad. Title		Module Leader's Qualification	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The aim of the model syllabus outlined above is to develop comprehensive English language skills in students, focusing on building a strong foundation in reading, writing, speaking, listening, and grammar. The primary objectives are: Language Competence: - Equip students with the ability to understand and use English in a variety of contexts, including everyday communication, academic settings, and formal situations. Skill Integration: - Develop proficiency in all four core language skills (reading, writing, speaking, and listening) through integrated and practice-oriented activities. Vocabulary and Grammar Mastery: - Expand students' vocabulary and strengthen their understanding of grammar rules to improve fluency and accuracy. Critical Thinking: - Encourage analytical thinking through reading comprehension, structured writing, and discussion activities. Confidence Building: - Foster confidence in students by providing opportunities to practice speaking, present ideas, and engage in group discussions or debates. Practical Application: - Ensure that students can apply the skills learned to real-life scenarios, such as conversations, writing tasks, and interpreting information. This aim aligns with creating a well-rounded learning experience that supports both academic progress and practical communication.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this course, students will be able to: 1. Reading Skills - Identify the main idea and supporting details in texts of varying complexity. - Employ skimming and scanning techniques to locate specific information. - Analyze tone, purpose, and inferred meanings in written material. 2. Writing Skills - Compose clear, coherent, and grammatically accurate sentences and paragraphs. - Structure different types of written texts, such as narratives, opinion essays, and persuasive writing. - Apply cohesive devices to enhance the flow and logic of written communication. 3. Speaking Skills - Communicate effectively in everyday conversations, group discussions, and formal presentations. - Demonstrate correct pronunciation, stress, and intonation patterns. - Participate in debates or role-playing activities, presenting ideas logically and confidently. 4. Listening Skills - Understand spoken English in various contexts, including conversations, lectures, and media. - Use active listening strategies to identify key points and details. - Summarize and respond appropriately to spoken information. 5. Grammar and Vocabulary - Apply foundational grammar rules, including correct usage of verb tenses, parts of speech, and sentence structure. - Use a broader range of vocabulary with accuracy in both spoken and written forms. - Identify and correct common grammatical errors in personal and peer writing.
Indicative Contents المحتويات الإرشادية	1. Introduction to the English Language - Grammar Fundamentals - Vocabulary Development - Writing Skills - Reading Skills - Speaking Skills - Listening Skills - Integrated Skills Practice - Critical Thinking and Analysis - Final Review and Assessment

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The teaching strategies for the foundational English Language course are designed to build basic language skills through engaging, practical, and interactive methods. A focus on gradual skill development ensures that students gain confidence and proficiency in a supportive learning environment. 1. Structured Interactive Lectures Purpose: Introduce foundational concepts in grammar, vocabulary, and the four language skills (reading, writing, speaking, listening). 2. Task-Based Learning Purpose: Promote practical application of foundational skills in real-world contexts. 3. Group and Pair Work Purpose: Foster collaboration, teamwork, and communication among peers. 4. Audio-Visual Learning Purpose: Enhance listening skills and expose students to diverse accents and contexts. 5. Practice and Repetition Purpose: Reinforce foundational concepts through consistent practice. 6. Role-Playing and Simulated Conversations Purpose: Develop speaking confidence in a controlled environment. 7. Guided Reading and Writing Workshops Purpose: Build foundational reading and writing skills. 8. Vocabulary Building Games Purpose: Make learning engaging and memorable while expanding vocabulary. 9. Feedback-Centered Learning Purpose: Provide constructive feedback to encourage improvement and build confidence. 10. Technology Integration Purpose: Enhance engagement and accessibility through digital tools. 11. Flipped Classroom for Basic Concepts Purpose: Encourage self-directed learning and maximize in-class interaction. 12. Culturally Relevant Content Purpose: Make learning relatable by using topics from students' cultural or everyday experiences. 13. Differentiated Instruction Purpose: Cater to diverse learning paces and styles. 14. Formative and Summative Assessments Purpose: Monitor progress and evaluate overall learning outcomes. 15. Reflection and Self-Assessment Purpose: Help students track their learning and set improvement goals. These strategies ensure a strong foundation in English language skills, emphasizing gradual development, consistent practice, and learner engagement. This approach prepares students for progression into the more advanced English Language II course.
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Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Material Covered	
Week	lecture
Week 1	Course Introduction & Basics
Week 2	Parts of Speech
Week 3	Verb Tenses (Part 1)
Week 4	Verb Tenses (Part 2)
Week 5	Vocabulary Building
Week 6	Listening & Speaking Skills (Part 1)
Week 7	Reading Comprehension (Part 1)
Week 8	Writing Skills (Part 1)
Week 9	Grammar Review
Week 10	Listening & Speaking Skills (Part 2)
Week 11	Reading Comprehension (Part 2)
Week 12	Writing Skills (Part 2)
Week 13	Speaking & Listening Skills (Part 3)
Week 14	Final Review
Week 15	Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	New Headway Upper Intermediate Student's Book 2014.	
Recommended Texts	English Grammar in Use by Raymond Murphy.	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	English Language II	Credits	
Administering Department	Civil Engineering	College	Engineering
Module Leader		E-mail	
Module Leader's Acad. Title		Module Leader's Qualification	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	This module aims to advance students' English proficiency by building on foundational skills and focusing on intermediate-level communication, critical analysis, and academic language use. The specific aims include: Enhancing Core Language Skills - To develop students' abilities in reading, writing, speaking, and listening to handle more complex and context-specific tasks effectively. Building Advanced Grammar Proficiency - To deepen students' understanding of advanced grammatical structures, enabling accurate and fluent language use in diverse contexts. Expanding Vocabulary Range - To introduce students to more sophisticated vocabulary, including idiomatic expressions, collocations, and professional terminology. Developing Academic and Professional Communication - To prepare students for academic writing, formal correspondence, and professional interactions by teaching structured and purpose-driven communication. Fostering Critical Thinking and Analytical Skills - To enable students to critically analyze texts, arguments, and spoken language, identifying implicit meanings, biases, and logical fallacies. Promoting Real-Life Application - To equip students with the skills needed to confidently use English in real-world scenarios, such as presentations, debates, and professional writing. Boosting Confidence and Independence in Language Use

	○ To encourage students to take initiative in learning, expressing their ideas clearly and persuasively, and applying their skills in academic and professional settings. Overall Goal The module aims to provide students with the tools to use English effectively and confidently in intermediate to advanced contexts, preparing them for higher-level academic study, professional environments, and everyday communication.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this module, students will be able to: 1. Advanced Reading Skills • Analyze and evaluate texts to identify arguments, tone, bias, and implied meanings. • Synthesize information from multiple sources for academic or professional purposes. • Demonstrate comprehension of complex written materials through summaries and critiques. 2. Advanced Writing Skills • Write structured and coherent essays, including comparative and argumentative essays. • Produce professional documents such as formal emails, résumés, and cover letters. • Apply academic writing conventions, including citing sources and avoiding plagiarism. 3. Speaking and Presentation Skills • Deliver structured presentations using appropriate visual aids and non-verbal communication techniques. • Engage effectively in debates, articulating logical arguments and responding to opposing views. • Demonstrate improved pronunciation, intonation, and fluency in intermediate-level conversations. 4. Advanced Listening Skills • Understand and critically evaluate spoken language in a variety of contexts, including lectures, debates, and podcasts. • Identify persuasive techniques, logical fallacies, and key points in spoken communication. • Summarize and respond to complex spoken content with accuracy. 5. Grammar and Vocabulary Mastery • Use advanced grammatical structures, including passive voice, conditionals, and reported speech, with accuracy. • Incorporate a wider range of vocabulary, including idiomatic expressions, collocations, and academic terminology, into speech and writing. • Identify and correct errors in grammar, vocabulary, and sentence structure independently.

	6. Critical Thinking and Analytical Skills - Evaluate the effectiveness of arguments and use evidence to support personal opinions in discussions and writing. - Demonstrate the ability to critique and interpret content, identifying strengths and weaknesses in arguments. - Apply reasoning and analysis to synthesize information from various sources.
Indicative Contents المحتويات الإرشادية	- Advanced Grammar - Vocabulary Development - Reading Skills - Writing Skills - Speaking Skills - Listening Skills - Integrated Skills Practice - Academic and Professional Preparation - Critical Thinking and Analysis - Real-Life Application and Reflection - Summative Assessment Preparation

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The teaching strategies for this course are designed to engage students actively, promote independent learning, and ensure the practical application of skills. A mix of learner-centered, collaborative, and interactive approaches will be employed to support the course objectives and outcomes. Interactive Lectures Purpose: Introduce new concepts and provide a theoretical foundation for grammar, vocabulary, and writing skills. Task-Based Learning Purpose: Help students practice and apply language skills in real-life contexts. Group Work and Peer Collaboration Purpose: Foster teamwork, enhance communication skills, and promote peer learning. Role-Playing and Simulations Purpose: Provide realistic scenarios for practicing speaking and listening skills. Technology-Enhanced Learning Purpose: Leverage digital tools to enhance engagement and access to resources. Reading and Analysis Workshops Purpose: Develop critical reading and analytical skills. Presentation Practice Purpose: Build confidence and improve verbal communication. Flipped Classroom Approach Purpose: Encourage independent learning and active engagement in class. Feedback-Oriented Learning Purpose: Help students identify strengths and areas for improvement. Integrated Skills Activities Purpose: Combine reading, writing, speaking, and listening skills in practical applications.

	11. Differentiated Instruction • Purpose: Address diverse learning needs and proficiency levels. 12. Summative and Formative Assessments • Purpose: Measure progress and provide continuous guidance for improvement. 13. Reflective Practices • Purpose: Encourage students to evaluate their own learning and set goals for improvement. These strategies ensure a balance of theoretical learning, skill application, and reflective practices, making the course engaging, practical, and effective for achieving the module outcomes.
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Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Material Covered	
Week	lecture
Week 1	Introduction to English Language II
Week 2	Complex Sentence Structures
Week 3	Advanced Grammar (Part 1)
Week 4	Advanced Grammar (Part 2)
Week 5	Advanced Vocabulary
Week 6	Reading for Analysis
Week 7	Listening for Understanding
Week 8	Writing for Specific Purposes (Part 1)
Week 9	Writing for Specific Purposes (Part 2)
Week 10	Presentation Skills
Week 11	Debate and Argumentation
Week 12	Listening for Critical Thinking
Week 13	Advanced Reading and Writing
Week 14	Review and Practice
Week 15	Final Assessments and Feedback

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	New Headway Upper Intermediate Student's Book 2014.	
Recommended Texts	English Grammar in Use by Raymond Murphy.	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	Finite Elements	Credits	
Administering Department	Civil Engineering	College	Engineering
Module Leader	Thaar Al Gasham	E-mail	thaar@uowasit.edu.iq
Module Leader's Acad. Title	Prof. Dr.	Module Leader's Qualification	PhD

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To provide a strong foundation in the theory and structure of finite element methods (FEM). 2. To explore the discretization process and the general formulation of FEM for various engineering applications. 3. To analyze different types of finite element methods and their applications to fluid mechanics problems. 4. To understand and solve the Navier-Stokes equations, including heat transfer effects and incompressible flow scenarios. 5. To introduce concepts related to two-phase flow and its finite element modeling. 6. To apply FEM to analyze slow incompressible and compressible viscous fluid flow problems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Module Learning Outcomes (MLOs) 1. Knowledge and Understanding ○ Demonstrate an understanding of the structure and mathematical foundations of FEM. ○ Explain the discretization process and formulate FEM equations for fluid flow problems. ○ Analyze and solve Navier-Stokes equations with heat transfer and incompressible flow scenarios. 2. Intellectual Skills ○ Evaluate different finite element methods and select appropriate techniques for specific applications.

	○ Develop FEM models to simulate and analyze two-phase flow phenomena. ○ Apply FEM to solve slow viscous fluid flow problems, both compressible and incompressible. 3. Practical and Professional Skills ○ Use computational tools to implement FEM for fluid flow problems. ○ Solve real-world engineering problems involving FEM analysis of viscous fluids and heat transfer. ○ Validate FEM solutions through critical analysis and comparison with theoretical or experimental results. 4. Transferable Skills ○ Apply advanced problem-solving techniques to complex fluid flow and heat transfer problems. ○ Communicate technical findings effectively through reports and presentations. ○ Work collaboratively to design, implement, and analyze FEM-based solutions.
Indicative Contents المحتويات الإرشادية	1. Introduction to Finite Element Methods (FEM) • Fundamental principles and mathematical foundations. • Structure and components of FEM. 2. Discretization Techniques • Mesh generation and element types. • Variational and Galerkin methods for discretization. 3. General Form of the Finite Element Method • Matrix formulation and assembly. • Boundary conditions and solution techniques. 4. Various Types of Finite Element Methods • Continuous and discontinuous Galerkin methods. • Mixed and hybrid finite element approaches. 5. Incompressible Flows • FEM analysis of incompressible fluid flow. • Challenges and techniques for ensuring stability. 6. Navier-Stokes Equations with Heat Transfer • Formulation and FEM solutions. • Applications in convective heat transfer and thermal-fluid systems. 7. Two-Phase Flow • Governing equations and finite element modeling. • Applications in multiphase systems and fluid interfaces.

	8. Finite-Element Analysis of Slow Incompressible Viscous Fluids • Application of FEM to Stokes flow. • Stability and convergence considerations. 9. Finite-Element Analysis of Slow Compressible Viscous Fluids • Compressible fluid flow equations. • FEM techniques for low-Mach-number flows.
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures • Explain the theoretical foundations of FEM and its applications in fluid mechanics. • Use diagrams, case studies, and real-world examples to clarify complex concepts. 2. Tutorials and Workshops • Provide hands-on problem-solving sessions focusing on FEM formulation and application. • Facilitate small-group discussions on various FEM techniques and their implementation. 3. Computer-Based Simulations • Teach the use of FEM software tools (e.g., ANSYS, COMSOL) for solving fluid flow problems. • Assign computational exercises to develop practical modeling skills. 4. Independent Study • Assign research topics and readings to deepen students' understanding of FEM applications. • Encourage exploration of advanced topics, such as multiphase flow and heat transfer analysis. 5. Group Projects • Collaborate on projects involving the FEM-based design and analysis of fluid systems. • Emphasize teamwork, critical thinking, and technical report preparation.

	6. Case Studies and Real-World Applications - Analyze case studies related to FEM in fluid mechanics and thermal systems. - Discuss industry practices and recent developments in FEM.
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Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Material Covered	
Week	lecture
Week 1	Course Introduction & Basics
Week 2	The Structure of Finite Element Methods
Week 3	The Structure of Finite Element Methods
Week 4	Discretization
Week 5	General form of the finite element method
Week 6	Various types of finite element methods
Week 7	Incompressible flows
Week 8	Navier-Stokes equations including heat transfer
Week 9	Two-phase flow
Week 10	Finite-element analysis of slow incompressible viscous fluid
Week 11	Finite-element analysis of slow incompressible viscous fluid
Week 12	Finite-element analysis of slow compressible viscous fluid
Week 13	Finite-element analysis of slow compressible viscous fluid
Week 14	Case Study
Week 15	Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts		
Recommended Texts	"The Finite Element Method in Engineering" by Singiresu S. Rao	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	Optimization	Credits	2
Administering Department	Civil Engineering	College	College of Engineering
Module Leader	Asst. Prof. Dr. Alaa Kharbat	E-mail	akhirbat@uowasit.edu.iq
Module Leader's Acad. Title	Assistant Professor	Module Leader's Qualification	Ph.D.

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	This module is prepared to introduce the students to the theory of mathematical optimization and its applications in science and engineering. The module aims at endowing the students with the necessary mathematical background and a consistent methodological toolbox, to formulate optimization problems and to effectively develop an algorithmic approach to its solution. The module is centered around classical optimization problems such as linear programming and nonlinear regression problems arising in a myriad of areas including operations research, computational data science, and financial mathematics, among many others.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	A student who completes this module successfully should be able to: 1 - Formulate a mathematical optimization problem by identifying a suitable objective and constraints. 2 - Identify the mathematical structure of an optimization problem (linear/nonlinear, constrained/unconstrained, continuous/discrete, convex/non-convex) and to choose an algorithm approach consistent with this classification. 3 - Implement different computational optimization algorithms. 4 - To analyze the results of a computational optimization method in terms of optimality guarantees, sensitivities, and performance.
Indicative Contents المحتويات الإرشادية	The course covers developments of advanced optimization models and solution methods for technical and economical planning problems. The basis in the course is the optimization process, from a real planning problem to interpretation of the solutions of the underlying optimization problem. In the modeling part we focus on problems with discrete elements, but also knowledge about important classes of optimization problems and their properties will be highlighted.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Learning and teaching strategies consist the following: It provides deepened knowledge about mathematical modeling and the formulation of optimization problems. It also provides knowledge about algorithms and solution methods. A special focus is Goal programming The course will provide knowledge to understand basic and advanced theory, models, methods, and concepts within optimization like: - strengths and weaknesses with different ways of formulating technical and economical planning problems - how different formulations and algorithms can be combined to efficient solution methods - theory about linear programming, Goal programming, and stochastic programming.
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Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري

Material Covered	
Week	lecture
Week 1	Introduction to optimization
Week 2	Definition, Objective Function, constraints
Week 3	Problem formulation
Week 4	Linear programming
Week 5	Graphical Method
Week 6	Goal programming
Week 7	Transportation problem
Week 8	Assignment problem
Week 9	1 st Mid Exam
Week 10	Network Optimization Models
Week 11	Decision Analysis Using Decision Trees
Week 12	Markov Chains
Week 13	Introduction to Non-linear optimization
Week 14	Multi Objective Function
Week 15	2 nd Mid Exam

Learning and Teaching Resources			مصادر التعلم والتدريس
	Text	Available in the Library?	
Required Texts	Introduction to operations research. Frederick S. Hillier, Gerald J. Lieberman. 9th ed. by McGraw-Hill. 2010.	/	
Recommended Texts	Handbook of Formal Optimization. Anand J. Kulkarni (editor), Amir H. Gandomi. Springer. 2024.	/	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	Research Methodology	Credits	2
Administering Department	Civil Engineering	College	College of Engineering
Module Leader	Asst. Prof. Dr. Alaa Kharbat	E-mail	akhirbat@uowasit.edu.iq
Module Leader's Acad. Title	Assistant Professor	Module Leader's Qualification	Ph.D.

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	This module is prepared to standardize the teaching of research methods course mainly for MSc postgraduate students. It can also be used as a resource for anyone who is interested in research.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After studying this module, students will be able to: ☐ Discuss what is meant by the term 'research' and describe the stages of the research process ☐ Identify and formulate a research problem using literature review as sources of information ☐ Access resources and use the proper citations and references ☐ Formulate and write research questions or hypotheses and research objectives ☐ Construct reliable research tools for data collection on the basis of other researchers
Indicative Contents المحتويات الإرشادية	• Identify a problem to be researched • Write a thesis/research proposal • Conduct research • Write a thesis report • Write a manuscript • Critical appraise evidence

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Learning and teaching strategies consist the following:
	• Formulating the Research Problem • Extensive Literature Review • Developing the objectives • Preparing the Research Design including Sample Design • Collecting the Data • Analysis of Data • Generalization and Interpretation

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري

Material Covered	
Week	lecture
Week 1	Research article: Abstract, aim and objectives
Week 2	Research article: Critical Evaluation of Literature Review
Week 3	Research article: Methodology
Week 4	Research article: Results and discussion
Week 5	Research article: Conclusions, Further work and limitations
Week 6	Review paper: how to find the gap, how to summarise research articles, structure
Week 7	How to Publish in High Impact Factor Journal
Week 8	How to Answer Reviewers Response: Norms and Principles for Writing a Response Letter
Week 9	Solid publisher and journals as well as predators and hanging journals
Week 10	Presentation and poster: contain, types, top tips for effective presentations
Week 11	Dissertations the writing process
Week 12	Dissertation defense and dissertation marking scheme
Week 13	References styles and tool (i.e., End Note)
Week 14	General Functions
Week 15	Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Research Methodology: Concept and Cases. Dr Deepak Chawla & Dr Neena Sondhi. 2016	/
Recommended Texts	Research Methodology and Scientific Writing. C. George Thomas. 2021	/

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	Soil-Structure Interaction	Credits	
Administering Department	Civil Engineering	College	Engineering
Module Leader	Dr. Asad H. Aldefae	E-mail	asadaldefae@uowasit.edu.iq
Module Leader's Acad. Title	Prof. Dr.	Module Leader's Qualification	PhD in Geot. Eng.

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To make the students understand various theories applicable to Soil-Structure-Interaction and the principal components of Soil-Structure-Interaction concisely 2. To make the students aware of the collective response of the structure, the foundation, and the geologic media underlying and surrounding the foundation, to a specified free-field ground motion. To make the students learn and modelling of seismic soil-structure interaction effects on building structures in engineering practice.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Students will be able to relate with the practical significance and importance of Soil-Structure interaction. 2- Students will be able to model Soil-structure interaction problems using various concepts. 3- Students will be able to compute various parameters associated with dynamic analysis of structure and foundation. 4- S Students will be able to apply the theories of Dynamic Soil-Structure Interaction to various practical Engineering problems. tudents will be able to understand the Material nonlinearity of soil.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	
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Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري

Material Covered	
Week	lecture
Week 1	Introduction Objectives and practical significance and importance of Soil-Structure interaction (SSI)
Week 2	Earthquakes
Week 3	Structural Dynamic, Single degree of freedom system
Week 4	Structural Dynamic, Spectral acceleration
Week 5	Fixed base structure, Structures on soft ground; Modelling of unbounded media
Week 6	Fundamentals of Soil-Structure Interaction Rational methods of analysis of substructure; Equation of motion for flexible and rigid base.
Week 7	Kinematic interaction, Inertial interaction, and Effect of embedment.
Week 8	Concepts in dynamic analysis of structure and foundation Dynamic stiffness of Surface foundation, Embedded foundation.
Week 9	Shallow (strip) foundation and Deep (piles) foundations.
Week 10	Nonlinear Analysis Material nonlinearity of soil, Geometrical nonlinearity; Soil-pile structure interaction.
Week 11	Engineering Applications Engineering Applications of Dynamic Soil-Structure Interaction.
Week 12	Fixed base structure, Structures on soft ground; Modelling of unbounded media
Week 13	Fundamentals of Soil-Structure Interaction Rational methods of analysis of substructure; Equation of motion for flexible and rigid base.
Week 14	Kinematic interaction, Inertial interaction, and Effect of embedment.
Week 15	Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1- Chowdhury, I. and Dasgupta, S. P., "Dynamics of Structure and Foundation – A Unified Approach", CRC Press, Balkema, 2009. 2- A Practical Guide to Soil-Structure Interaction. 3- Minimum Design Loads and Associated Criteria for Buildings and Other Structures	
Recommended Texts	1- Kurian, N. P., "Design of Foundation Systems – Principles and Practices", Publishing House, New Delhi, Alpha Science International, U.K.,2005. 2- J.W. Bull, "Soil-Structure Interaction: Numerical Analysis and Modelling", CRC Press, 1st edition,1994.	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	Theory of Elasticity	Credits	
Administering Department	Civil Engineering	College	College of Engineering
Module Leader	Asst. Prof. Jasim.M. Mhalhal	E-mail	jasimmahmoud714@gmail.com
Module Leader's Acad. Title	Assistant Professor	Module Leader's Qualification	Master

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Elasticity is an elegant and fascinating subject that deals with determination of the stress, strain, and displacement distribution in an elastic solid under the influence of external forces. Following the usual assumptions of linear, small-deformation theory, the formulation establishes a mathematical model that allows solutions to problems that have applications in many engineering and scientific fields. ❖ Civil engineering applications include important contributions to stress and deflection analysis of structures, such as rods, beams, plates, and shells. Additional applications lie in aeromechanics involving the stresses in materials such as soil, rock, concrete, and asphalt. ❖ Mechanical engineering uses elasticity in numerous problems in analysis and design of machine elements. Such applications include general stress analysis, contact stresses, thermal stress analysis, fracture mechanics, and fatigue. ❖ Materials engineering uses elasticity to determine the stress fields in crystalline solids, around dislocations, and in materials with microstructure. ❖ Applications in aeronautical and aerospace engineering include stress, fracture, and fatigue analysis in aero structures.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The theory of elasticity is not applied mathematics. Solving differential equations and integral equations is not the objective of the theory of elasticity. Students and young researchers, who can use the modern commercial finite element method (FEM) software, are not attracted by the classical approach of applied mathematics. This situation is not good. Students, young researchers and young engineers skip directly from the elementary theory of the strength of materials to FEM without

	understanding the basic principles of the theory of elasticity. The author has seen many mistakes and judgment errors made by students, young researchers and young engineers in their applications of FEM to practical problems. These mistakes and judgment errors mostly come from a lack of basic knowledge of the theory of elasticity. Firstly, this study of elasticity theory provides the basic but very important essence of the theory of elasticity. Second, many useful and interesting applications of the basic way of thinking are presented and explained. They will be able to understand the new approach of the theory of elasticity which is different from the classical mathematical theory of elasticity and will enjoy solving many interesting problems without using FEM.
Indicative Contents المحتويات الإرشادية	This course focuses on provide students with the critical knowledge and technical expertise of sustainability and infrastructures, integrate their knowledge to identify inter dependencies between each infrastructure system and their structural elements.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	As previously mentioned, the objective of this unit is to acquire the required knowledge of elasticity theory and understand the behavior of materials under the influence of different loads. Therefore, the learning strategy usually relies on theoretical lectures that provide students with the required knowledge to achieve this objective. Therefore, the learning strategy includes: This objective. Therefore, the learning strategy includes: 3- Theoretical lectures, which are divided into three parts: 3- Elasticity theory. 2- Presentation related to studies of structures under the influence of different loads. 3- Homework and tests.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Material Covered	
Week	lecture
Week 1	Introduction
Week 2	Two Dimensional Stress, Three Dimensional Stress and Stress Transformation
Week 3	Strains in Two Dimensional Problems
Week 4	Strains in Three Dimensional Problems

Week 5	Strain in an Arbitrary Direction
Week 6	Conditions of Compatibility
Week 7	Relationship between Stresses and Strains: Generalized Hooke's Law
Week 8	Equilibrium Equations
Week 9	Saint Venant's Principle and Boundary Conditions
Week 10	Plane Stress and Plane Strain
Week 11	Basic Conditions for Exact Solutions: Nature of Solutions
Week 12	Circular Disk Subjected to Concentrated Force
Week 13	Torsion of a Bar with Uniform Section

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1-Theory of Elasticity and Stress Concentration. YunitakaMurakami).	
Recommended Texts	1-Elasticity: Theory, Applications, and Numerics by Martin H. 3rd Edition. Sadd Ph.D. (Author). 2-Theory of Elasticity. by TIMOSHENKO.1951. 3-Introduction to Linear Elasticity Hardcover – January 1, 1994.by Phillip L. Gould (Author	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	Prestressed concrete	Credits	
Administering Department	Civil engineering	College	College of engineering
Module Leader	Dr. Karrar Al-Lami	E-mail	karrarali@uowasit.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	Ph.D.

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The aim of this graduate-level course on prestressed concrete is to provide students with a comprehensive understanding of the principles, design, and application of prestressed concrete structures. This course will present theoretical foundations and practical implementations of prestressing techniques, emphasizing the advantages and challenges associated with their use in modern construction. Throughout the semester, students will explore various methods of prestressing, including pre-tensioning and post-tensioning, and examine their effects on structural behavior and performance. The course will cover key topics such as material properties, loss calculations, stress analysis, and serviceability and ultimate limit states. By integrating both traditional and advanced design methodologies, the course aims to equip students with the skills necessary to design safe, efficient, and economically viable prestressed concrete structures. Additionally, the course will incorporate case studies and real-world examples to highlight the application of prestressed concrete in various engineering projects. Students will engage in hands-on design exercises and computational simulations to reinforce their understanding and develop practical expertise
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Fundamental Understanding: Gain a thorough understanding of the principles and theories underlying prestressed concrete technology. • Material Properties: Develop knowledge about the material properties of concrete and prestressing steel, including high-strength materials and their behavior under stress. • Practical Application: Understand the practical aspects of prestressing, such as tendon layout, jacking methods, and the construction sequence.

	• Loss Calculations: Master the techniques for calculating prestress losses, including those due to elastic shortening, creep, shrinkage, relaxation, and friction. • Code Compliance: Familiarize with relevant codes and standards governing the design and construction of prestressed concrete structures specifically ACI 318. • Stress Analysis: Acquire skills in analyzing stress distributions in prestressed concrete members under various loading conditions. • Design Proficiency: Develop the ability to design prestressed concrete structures, including pre-tensioned and post-tensioned elements, using both traditional and modern methods. • Problem-Solving Skills: Enhance problem-solving abilities through hands-on design exercises, case studies, and computational simulations.
Indicative Contents المحتويات الإرشادية	The course is focusing on prestressed concrete. Therefore, the students should possess a strong background on topics of mechanics, reinforced concrete and structural analysis.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The course is structured around comprehensive lectures that elucidate the topics outlined in the syllabus. Class sessions will also feature interactive discussions to bridge knowledge gaps and consider diverse perspectives. To reinforce new material, students will receive regular homework assignments. Additionally, the course includes a design project that enables students to apply their acquired knowledge practically. Finally, a series of exams will be administered to evaluate student understanding and proficiency.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Material Covered	
Week	lecture
Week 1	Concepts, History, and Applications
Week 2	Material and Prestressing Systems
Week 3	Principles of analysis and design
Week 4	Losses in Prestress, Part I: Elastic shortening, steel relaxation, and creep
Week 5	Losses in Prestress, Part II: shrinkage, friction (curvature and wobble), and anchorage
Week 6	Flexural design, Part I: Allowable stresses
Week 7	Flexural design, Part II: Design equations
Week 8	Midterm exam
Week 9	Flexural design: Part III (Examples)
Week 10	Ultimate flexural strength
Week 11	Shear strength, Part I
Week 12	Shear strength, Part II

Week 13	Serviceability of prestressed concrete, Part I
Week 14	Serviceability of prestressed concrete, Part II
Week 15	Project presentation and discussion

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	• Prestressed concrete by Nawy, 5th edition • ACI code 318	
Recommended Texts	• Prestressed concrete analysis and design by Antonie E. Naaman	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	Sustainable Infrastructures	Credits	
Administering Department	Civil Engineering	College	College of Engineering
Module Leader	Asst. Prof. Dr. Hussain Askar Jabir	E-mail	haskar@uowasit.edu.iq
Module Leader's Acad. Title	Assistant Professor	Module Leader's Qualification	Ph.D.

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The aim of this module is to study the necessity of sustainable infrastructures and its fundamentals, by give introduction to sustainable engineering and its applications & design of infrastructures. Infrastructure systems include: Bridges, buildings, and water tanks projects system. Emphasis is put on infrastructure integration and foundation design using principles of sustainability and resilience.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of this course, students are able to : 1. Understand what sustainability means and how it can be applied for engineering projects. 2. Understand the role that foundation can play and use various techniques to construct sustainable building 3. Analyze and calculate the critical design load on different types of bridges according to different codes and standards 4. Analyze and design calculation of some buildings and construction systems, including; water tanks projects and infrastructures.
Indicative Contents المحتويات الإرشادية	This course focuses on provide students with the critical knowledge and technical expertise of sustainability and infrastructures, integrate their knowledge to identify inter-dependencies between each infrastructure system and their structural elements.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	As mentioned, the aim of this module is to gain the required knowledge for the Sustainability and infrastructures. Thus, the learning strategy is typically based on theoretical lectures that feed the students with the required knowledge to achieve this aim. Thus, the learning strategy includes: 1- Theoretical lectures, which are divided into three parts: (a) sustainable Engineering. (b) Analysis of loads according to different codes and standards on different type of Bridges system. (c) Analysis and design of different types of reinforced concrete water tanks. 2- Presentation related to case studies. 3- Home works and exams.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Material Covered	
Week	lecture
Week 1	Introduction
Week 2	Sustainable Engineering
Week 3	Principles of Sustainable Engineering
Week 4	Role of Structural Engineering in Achieving Structural Sustainability
Week 5	Types of Structural Systems of Bridges
Week 6	Codes and Standards of Loads on Bridge
Week 7	Analysis of different types of loads on Bridges
Week 8	Presentation
Week 9	Mid-Term Exam 1
Week 10	Introduction to the Types of Reinforced Concrete Tanks
Week 11	Detailed Analysis of Rectangular tanks
Week 12	Analysis of Rectangular water tanks by PCA Tables
Week 13	Design of Rectangular Reinforced Concrete Tanks
Week 14	Design of Circular Reinforced Concrete Tanks
Week 15	Mid-Term Exam 2

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1. American Association of State Highway and Transportation Officials AASHTO. 2. British Standard B.S 5400 3. Iraqi Standards Specifications for Road and Bridges- Loading.	
Recommended Texts	1. Sustainable Concrete Solutions by Costas Georgopoulos and Andrew Minson 2. Development in Bridge Design & Construction, by K.C. Rockey. 3. Bridge Analysis Simplified, by Bakhat & Jeager 4. Advance R.C. Design, by N. Crishna Raja	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	Bridge Design	Credits	
Administering Department	Civil Engineering	College	College of Engineering
Module Leader	Prof. Dr. Sallal Rashid Abid	E-mail	sallal@uowasit.edu.iq
Module Leader's Acad. Title	Professor	Module Leader's Qualification	Ph.D.

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	This aim of this course is to give introduction to bridge engineering with focus on loads and superstructure design of reinforced concrete bridge structures. AASHTO specifications are the most widely used standards for analysis and design of bridge structures all internationally and regionally. Therefore, AASHTO specifications are the only depended provisions in this module. However, local specifications are also disclosed occasionally.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Defining elements of bridge structures and types of bridges. 2- Defining types of loads and their design implementation on bridge superstructures based on AASHTO requirements. 3- Design of reinforced concrete slab bridge superstructures based on AASHTO design requirements. 4- Design of reinforced concrete beam bridge superstructures based on AASHTO design requirements.
Indicative Contents المحتويات الإرشادية	The module focuses on enriching the student's knowledge about the design philosophy of reinforced concrete bridge superstructures to withstand dead loads, traffic loads, thermal loads, and other loads and actions.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	

	As preceded, the aim of this module is to gain the required knowledge for the design of reinforced concrete bridge superstructures. Thus, the learning strategy is typically based on theoretical lectures that feed the students with the required knowledge to achieve this aim. Thus, the learning strategy includes: 1- Theoretical lectures, which are divided into two parts: (a) Loads and loading of bridge superstructures, and (b) Design of slab and beam reinforced concrete superstructures based on AASHTO requirements. 2- Presentation of self-prepared related subject that is not included in the lectures or about related case studies. 3- Home works and exams.
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Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Material Covered	
Week	lecture
Week 1	Introduction
Week 2	General Design and Site Requirements
Week 3	Design Philosophy
Week 4	Loads I
Week 5	Loads II
Week 6	Loads III
Week 7	Loads IV
Week 8	<u>Mid-Term Exam 1</u>
Week 9	Reinforced Concrete Slab Bridges I
Week 10	Reinforced Concrete Slab Bridges II
Week 11	<u>Self-Prepared Presentation</u>
Week 12	Reinforced Concrete Beam Bridges I
Week 13	Reinforced Concrete Beam Bridges II
Week 14	Reinforced Concrete Beam Bridges III
Week 15	<u>Mid-Term Exam of Part 2</u>

Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1- AASHTO LRFD Bridge Design	Yes

	Specifications (4 th Edition: SI units) 2- AASHTO LRFD Bridge Design Specifications (7 th Edition)	
Recommended Texts	1- Bridge Engineering Handbook. Edited by: Wai-Fah Chen and Lian Duan. 2- Design of Highway Bridges: An LRFD Approach (3 rd Edition). Richard M. Barker and Jay A. Puckett	Yes

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	Sustainable Structural Materials	Credits	
Administering Department	Civil Engineering	College	College of Engineering
Module Leader	Asst. Prof. Dr. Hussain Askar Jabir	E-mail	haskar@uowasit.edu.iq
Module Leader's Acad. Title	Assistant Professor	Module Leader's Qualification	Ph.D.

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The aim of this module is to study the necessity of structural materials and its properties, by give introduction to sustainable structural materials and its applications. The traditional construction method excavates raw resources and processes them into useful construction products. Structural engineers now look for alternative material sources. The current sustainable structural engineers design and make concrete from waste products and salvaged materials. When making concrete for sustainable structural elements, you can use fly ash, waste products, and recycled aggregates to replace Portland cement and natural aggregates.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of this course, students are able to: 1. Understand what sustainability of structural materials means and how it can be applied for engineering projects. 2. Understand the role that foundation can play and use alternative and recycle materials to construct sustainable building 3. Understand the Materials recycled in concrete production, where stabilized knowledge on the use of various waste types materials
Indicative Contents المحتويات الإرشادية	Sustainable structural materials is a systemic approach to using and reusing materials more productively over their entire lifecycles. It represents a change in how a society thinks about the use of natural resources and environmental protection. By looking at a product's entire lifecycle new opportunities can be found to reduce environmental impacts, conserve resources, and reduce costs.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies

As mentioned, the aim of this module is to gain the required knowledge for the Sustainability of structural materials. Thus, the learning strategy is typically based on theoretical lectures that feed the students with the required knowledge to achieve this aim. Thus, the learning strategy includes:

- 1- Theoretical lectures.
- 2- Presentation related to case studies.
- 3- Home works and exams.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري

Material Covered

Week	lecture
Week 1	Introduction to Sustainability
Week 2	Sustainable Structural Engineering
Week 3	Construction and Demolition Waste
Week 4	Construction and Demolition Waste
Week 5	Using of Fly Ash
Week 6	Recycled plastic Concrete
Week 7	Recycled plastic Concrete
Week 8	Presentation
Week 9	Mid-Term Exam 1
Week 10	Waste rubber aggregates
Week 11	Waste rubber aggregates
Week 12	Recycling of waste glass in construction materials
Week 13	Recycling of waste glass in construction materials
Week 14	Relative performance of recycled aggregates concrete versus conventional concrete
Week 15	Mid-Term Exam 2

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1. New Trends in Eco-efficient and Recycled Concrete by Jorge de Brito and Francisco Agrela. 2. Sustainability of construction materials by Jamal M. Khatib	
Recommended Texts	1. Construction Materials by Peter Domone and John Illston 2. Sustainable Concrete Solutions by Costas Georgopoulos and Andrew Minson	