Course Specification
(Bachelor)

Course Title:	Foundations Engineering
Course Code:	COE4305
Program:	Bachelor of Construction Engineering
Department:	Department of Civil and Environmental Engineering
College:	College of Engineering and computing in Al-Qunfudhah
Institution:	Umm Al-Qura University
Version:	4
Last Revision Date:	February 26

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A. General information about the course:

1. Course Identification

1. Credit hours: (2 credits)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (9th level/5th year)					
4. Course General Description:					
This course provides an in-depth understanding of foundation engineering principles, focusing on the classification, design, and analysis of various foundation systems. It covers key topics such as site exploration techniques, soil sampling, and geotechnical reporting, enabling students to evaluate subsurface conditions effectively. The course includes the design and analysis of shallow foundations, such as spread footings and combined footings, with an emphasis on structural performance. Additionally, it addresses the design of mat foundations, focusing on bearing capacity, differential settlement, and conventional rigid methods. Students will gain the necessary skills to apply foundation engineering concepts to real-world scenarios.					
5. Pre-requirements for this course (if any):					
Soil Mechanics - COE3304					
6. Co-requisites for this course (if any)**:**					
NA					
7. Course Main Objective(s):					

- Understand Foundation Principles: Gain in-depth knowledge of foundation engineering principles, including soil classification, design, and analysis of foundation systems.
- Master Site Investigation Techniques: Learn site exploration methods, soil sampling, and geotechnical reporting to evaluate subsurface conditions effectively.
- Design Shallow Foundations: Analyze and design shallow foundations, such as spread footings and combined footings, focusing on structural performance and bearing capacity.
- Design Mat Foundations: Develop skills to design mat foundations, considering bearing capacity, differential settlement, and conventional rigid methods.
- Apply Engineering to Real-World Scenarios: Apply foundation engineering concepts to solve practical problems and evaluate alternatives based on site constraints and performance.
- Enhance Professional Skills: Strengthen critical thinking and technical communication for effective foundation system selection and documentation.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100

No	Mode of Instruction	Contact Hours	Percentage
2	E-learning	None	None
3	Hybrid • Traditional classroom • E-learning	None	None
4	Distance learning	None	None

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	None
3.	**Field**	None
4.	**Tutorial**	None
5.	**Others (specify)**	None
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Recall foundation engineering principles and describe their applications in soil mechanics, site exploration, foundation classification, design considerations, and engineering standards.	**K1**	Lectures	Assignments, Quizs, Midterm and final exam
2.0	**Skills**			
2.1	Apply foundational engineering and scientific principles to identify, analyze, and solve complex foundation engineering problems, including soil behavior assessment, bearing capacity evaluation, and settlement analysis.	**S1**	Lectures	Assignments, Quizs, Midterm and final exam
2.2	Utilize critical thinking and problem-solving strategies to assess subsurface conditions, design foundation systems, and develop innovative, context-appropriate solutions for real-world foundation engineering challenges.	**S2**	Lectures	Assignments, Quizs, Midterm and final exam

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
2.3	Conduct site investigations, interpret geotechnical data, and apply statistical and engineering tools to analyze soil properties, assess foundation performance, and generate valid design conclusions.	**S3**	Lectures	Assignments, Quizs, Midterm and final exam
3.0	**Values, autonomy, and responsibility**			
3.1	**NA**			

C. Course Content

No	List of Topics	Contact Hours
1.	Foundation Perspective, Classification, and Types: Overview of foundation types and their classification.	**4**
2.	Design of Spread Footings: Square footings and rectangular footings as well as strip footings.	**4**
3.	Design of Rectangular Combined Footing: Design principles and applications.	**6**
4.	Design of isolated footing under eccentric loading	**4**
5.	Design of Mat Foundations: Bearing capacity of mat foundations, differential settlement of mats, structural design of mat foundations, and conventional rigid methods.	**6**
6.	Site Exploration: Methods of site investigations, soil boring and sampling, determination of soil properties from site tests, geophysical exploration, and laboratory tests with geotechnical reporting.	**6**
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Assignments**	**From 2-to-12**	**15**
2.	**Quizzes**	**5,7,11**	**15**
3.	**Midterm exam**	**7**	**30**
4.	**Final exam**	**16,17**	**40**

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	• Das, B. M., & Sivakugan, N.. Principles of foundation engineering (Latest ed.). Cengage Learning. • Bowles, J. E.. *Foundation analysis and design* (Latest ed.). McGraw-Hill.
Supportive References	• Coduto, D. P., Kitch, W. A., & Yeung, M.-C.. Foundation design: Principles and practices (Latest ed.). Pearson.
Electronic Materials	• Foundation Analysis and Design - Skyfi Labs Online Project-based Course - YouTube)
Other Learning Materials	• The Saudi Building Code (SBC 301), "Design Loads for Buildings and Structures", 2018. • The Saudi Building Code (SBC 304), "Concrete Structures", 2018. • ACI Committee, 318. "Building code requirements for structural concrete (ACI 318-19) and commentary." American Concrete Institute, 2019.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Equipped Classroom
Technology equipment (projector, smart board, software)	Blackboard, Data show, Smart Board
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	**Students** **Sttaff members**	**Indirect** **direct**
Effectiveness of Students assessment	**Students** **Sttaff members**	**Indirect** **direct**
Quality of learning resources	**Students**	**Indirect**

Assessment Areas/Issues	Assessor	Assessment Methods
	Sttaff members	
The extent to which CLOs have been achieved	Sttaff members	direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Civil and Environmental Engineering Department Council in Al-Qunfudah
REFERENCE NO.	The fifteenth session of the academic year 1446
DATE	01/05/2025