



Module (Course Syllabus) Catalogue 2023-2024

College/ Institute	Erbil Polytechnic University	
Department	Highway Engineering Technique Department	
Module Name	Foundations Analysis & Design	
Module Code	FAD704	
Degree	Technical Diploma <input type="checkbox"/> Bachelor <input checked="" type="checkbox"/> High Diploma <input type="checkbox"/> Master <input type="checkbox"/> PhD <input type="checkbox"/>	
Semester	7 th	
Qualification	M.Sc. Structural Engineering	
Scientific Title	Assistant Lecturer	
ECTS (Credits)	6	
Module type	Prerequisite <input type="checkbox"/> Core <input checked="" type="checkbox"/> Assist. <input type="checkbox"/>	
Weekly hours	4 hours	
Weekly hours (Theory)	(4) hr Class	(108) Total hrs Workload
Weekly hours (Practical)	(None)hr Class	(None)Total hrs Workload
Number of Weeks	15	
Lecturer (Theory)	Ali J. Nouri Al – Barazanchi	
E-Mail & Mobile NO.	ali.nouri@epu.edu.iq – 07706416969	
Lecturer (Practical)	None	
E-Mail & Mobile NO.		
Websites		

Course Book

<p>Course Description</p>	<p>Increase student knowledge and learn the principles and practices for the investigation, design, contracting, and construction of shallow, intermediate, and deep foundations, including remediation of soft, wet, expansive, and frost-prone soils.</p> <p>After attending this course, student shall have a firm grasp of the background and design specifics necessary to compete in this industry, including industry-leading information on the principles and practices of foundation design for buildings, transportation infrastructure, utilities, and industrial facilities. Understand practical emerging technologies including advanced design techniques for pressuremeter-supported foundation design; aggregate piers; auger cast, helical, and micro piles; and design for lateral loads, frost heave, and wet/dry cycles.</p>
<p>Course objectives</p>	<ul style="list-style-type: none"> • Understand the importance of geotechnical investigation in foundation design • Apply analytical skills to solving problems in foundation design • Understand the basic requirements of international codes for foundation design • Appreciate the interaction between soils and structures • Identify the key geotechnical and structural issues in foundation design • Appreciate the range of foundation types available and their application • Select an appropriate foundation system for a structure • Appreciate the practical problems of design and detailing when designing foundations • Introduce the student to certain case studies
<p>Student's obligation</p>	<p>a. To attend the classes regularly with minimum absence.</p> <p>b. To participate actively in the class discussion and Q&A session</p> <p>c. Study on daily basis to digest the class material</p> <p>d. To write note off-handouts</p> <p>e. Prepared for sudden Quizzes</p> <p>f. Vet through the references provided by the lecturer and to solve as much as possible of homework and exercises for the subjective materials.</p> <p>g. Prepare the assignment and the seminar as instructed by the lecturer.</p>
<p>Required Learning Materials</p>	<p>Students at this stage with the workload assigned technical for the subject are not required to scatter their attention with bunch of sources. Students are encouraged to thoroughly study the refence given by the lecturer and to vet through available cyber data related to the subject and this shall include the concrete technology worked examples and all those are support with construction site visit for the students to appreciate and monitor closely the application of the theoretical concept in construction.</p>

	Task		Weight (Marks)	Due Week	Relevant Learning Outcome
	Evaluation	Paper Review		None for B.SC.	
Assignments		Homework	10	Weekly	Application for subject by subject
		Class Activity	2	Weekly	Participate in syllabus learning
		Report	8	4 th & 8 th	Concentrate on certain subject of the module and cover its technical aspects
		Seminar	8	6 th & 10 th	Individual or in group for subjects within the module but out of the syllabus
		Essay			
		Project			
Quiz		8			
Lab.					
Midterm Exam		24	7 th		
Final Exam		40	14 th & 15 th		
Total		100			
Specific learning outcome:	By the end of the current course, the student shall be able to learn the major activities related to the foundation analysis and design which is the part that makes the backbone for any constructional project. The student would be able to put a scenario for the soil investigations works, assess the subsoil bearing capacity, decide on the proper foundation for the structure, calculate the anticipated settlement, design the foundations (concrete wise for shallow foundations (Spread, Continuous, Strip and Raft) and deep (Piled) foundations, soil treatment for strengthening and retaining structure. The most effective matter the student learns in this course is to decide on safe and most economical foundation system for the subjective projects.				
Course References:	<ul style="list-style-type: none"> ▪ Foundation Analysis and Design: Joseph E. Bowles ▪ Principles of Foundation Engineering: Braja M. Das ▪ Shallow foundations bearing capacity and settlement: Braja M. Das ▪ Fundamentals of Geotechnical Engineering: Braja M. Das ▪ Foundation Design: Principles and Practices (3rd Edition) 3rd Edition by Donald P. Coduto (Author) & William A. Kitch 				

Course topics (Theory)	Weeks	Learning Outcome
Subsoil Explorations		
1. Introduction	1 st	Under this subject the student shall be introduced to the importance of the explorations to identify the soil characteristics which shall be used as the based for the bearing capacity of the subsoil and evaluate the capacity of deep pile
2. Soil Explorations Scenario	1 st	
3. Number of boreholes and test pits	1 st	
4. Depth of boreholes and type of drillings	1 st	
5. Sampling and types of samples	2 nd	
6. Laboratory tests over soil samples	2 nd	
7. Field tests	2 nd	
8. Outcome of tests	2 nd	
9. Reporting	2 nd	
Bearing Capacity of Shallow Foundations		
1. Introduction	3 rd	Student shall learn the evaluation of the bearing capacity for shallow foundations from shear strength parameters and field tests for all types of shallow foundations (Spread, Strip & Raft)
2. Bearing Capacity equations for Shallow Foundations	3 rd	
3. Effect of water table over the bearing capacity	3 rd	
4. Factor influencing Bearing Capacity	3 rd	
5. Bearing capacity for eccentrically loaded foundations	4 th	
6. Layered soil bearing capacity	4 th	
7. Bearing capacity form field tests – SPT	4 th	
8. Bearing Capacity from field test - PLT	4 th	
Settlements of Foundations		
1. Introduction	5 th	Students shall learn under the chapter's syllabus the difference between immediate and consolidation settlement and how to calculate each with time – consolidation scenario
2. Types of Settlements	5 th	
3. Short Term Settlements (Immediate Settlements)	5 th	
4. Consolidation Settlements	6 th	
5. Time – Consolidation scenario	6 th	
6. Solved examples	6 th	
Deep (Pile) Foundations		
1. Introduction	7 th	Student shall learn by end of this chapter when he should decide to go for deep foundation and the analysis of the pile's capacity and ultimately the design of the number
2. Types of Piles	7 th	
3. Analysis of Piles Capacity	7 th	
4. Pile End Bearing Evaluation	7 th	
5. Pile Skin Friction Evaluation	8 th	
6. Calculate Pile Capacity	8 th	

7. Group of Piles	8 th	of piles required under load column with its pile cap. The student shall also learn the testing methods for piles to ensure their carrying capacity.
8. Block Shear of Piles	8 th	
9. Piles under eccentric load	8 th	
10. Settlement of piles	9 th	
11. Case of broken piles	9 th	
12. Estimate pile length of designated load	9 th	
13. Design of piles with pile caps	9 th	
14. Testing of Piles	9 th	
Reinforced Concrete Shallow Foundation Design		
1. Introduction	10 th	Student shall learn in this chapter to differentiate between the different types of the shall ow foundations. The reinforced concrete design shall be taught for spread, strip, combined and raft foundation after ACI – 19 Code of Practice
2. Types of shallow foundations	10 th	
3. Analysis and design of spread foundations	10 th	
4. Analysis and design of strip foundations	11 th	
5. Analysis and design of combined footing	11 th	
6. Analysis and design of trapezoidal combined footing	11 th	
7. Analysis and design of raft foundations	12 th & 13 th	
Questions Example Design		
Attached copy for the academic year 2021 – 2022, final, first Attempt exam with solution		
Extra notes:		
None so far		
External Evaluator		