



Course Specifications

Course Title:	Foundation of Earth Structures Design
Course Code:	CE 438
Program:	B.Sc. in Civil Engineering
Department:	Civil Engineering
College:	Jubail University College
Institution:	Jubail University College

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A. Course Identification

1. Credit hours: 3
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: Level 5, Third Year
4. Pre-requisites for this course (if any): CE 315 Geotechnical Engineering I
5. Co-requisites for this course (if any): None

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	✓	100
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
Contact Hours		
1	Lecture	45
2	Laboratory/Studio	
3	Tutorial	
4	Others (specify)	
	Total	45

B. Course Objectives and Learning Outcomes

1. Course Description

CE 438: Foundation of Earth Structure Design (3-0-3)

Prerequisite: CE 315

Site investigation, including determination of soil properties for design; bearing capacity theory of shallow foundation; settlement of building foundations; design and analysis of retaining walls; sheet piles and braced excavations; design of the pile and pier foundations

2. Course Main Objective

The main purpose of this course is to enable the students perform site investigation by subsoil exploration and laboratory test to find out Geotechnical properties of soil used in foundation design practice and analysis and design of different earth retaining structures.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
	N/A	
2	Skills	
2.1	Determine the Geotechnical properties of soil through correlation	1
2.2	Estimate the soil bearing capacity	1
2.3	Calculate the settlement of building foundations	1
2.4	Analyze the earth retaining structures and deep foundation	1
2.5	Design earth retaining structures, braced cut and deep foundation	2
3	Values	
	N/A	

C. Course Content

No	List of Topics	Contact Hours
1	<u>Unit 1: Site Investigation</u> 1.1 Purpose of Site Investigation 1.2 Purpose of Site Investigation, 1.3 Soil Sampling, 1.4 Site Investigation Test Methods 1.5 Geophysical Exploration 1.6 Soil Properties Correlations 1.7 Determination of soil properties for design.	6
2	<u>Unit 2: Bearing Capacity Theory of Shallow Foundation</u> 2.1 Bearing Capacity Theory of Shallow Foundation 2.2 Terzaghi's Bearing Capacity Theory, Factor of Safety 2.3 Allowable Bearing Capacity	6
3	<u>Unit 3: Settlement of Building Foundations</u> 3.1 Elastic Settlement, 3.2 Consolidation Settlement 3.3 Secondary Settlement	3
4	<u>Unit 4: Design and Analysis of Retaining Walls</u> 4.1 Design and Analysis of Retaining Walls 4.2 Gravity and Cantilever Retaining Walls, 4.3 Mechanically Stabilized Retaining Walls.	6
5	<u>Unit 5: Sheet Piles</u> 5.1 Introduction to Sheet Piles 5.2 Design and analysis of Cantilever Sheet pile Walls, 5.3 Design and analysis of Anchored Sheet Pile Walls.	6
6	<u>Unit 6: Braced Cuts</u> 6.1 Introduction to Braced Excavations 6.2 Pressure Envelope for Braced Cut Design 6.3 Design of Various Components of a Braced Cut.	3
7	<u>Unit 7: Pile Foundation</u> 7.1 Types of Piles and their structural characteristics 7.2 Estimating pile length and Installation of piles 7.3 Load Transfer Mechanism, 7.4 Design Of Pile Foundations	12

	7.5 Estimation of Load Bearing Capacity of Piles, 7.6 Pile Load Tests, 7.7 Pile Dynamics Formula 7.8 Ultimate Capacity of Group piles 7.9 Elastic Settlement of Piles 7.10 Settlement of Group piles	
8	<u>Unit 8: Design Of Pier Foundations</u> 8.1 Introduction of Pier Foundations 8.2 Types of Pier Foundations 8.3 Design Considerations, 8.4 Estimation of Load Bearing Capacity. 8.5 Estimation of Load Bearing Capacity based Settlement Consideration.	3
9	<u>Unit 9: Saudi Building Code</u>	
Total		45

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge and Understanding		
	N/A		
2.0	Skills		
2.1	Determine the Geotechnical properties of soil through correlation	Interactive learning Self-directed learning	Written exams (Quiz, midterm, final) and assignments
2.2	Estimate the soil bearing capacity		
2.3	Calculate the settlement of building foundations		
2.4	Analyze the earth retaining structures and deep foundation		
2.5	Design earth retaining structures, braced cut and deep foundation		
3.0	Values		
	N/A		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz 1	4	10%
2	Assignment 1	6	10%
3	Mid-term LT	8	20%
4	Quiz 2	12	10%
5	Assignment 2	14	10%
6	Final Exam LT	17-19	40%

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Office hours 5 hr/week; students can go in times of office hours for teacher to explain what could not be understood from the lesson.

- Students can communicate with a staff member outside the official working hours by email.
- Students are also encouraged to visit their academic advisors.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Braja, M.D. (2016), <i>Principles of Foundation Engineering</i> , USA: Cengage learning
Essential References Materials	Donald, P. C. (2000), <i>Foundation Design: Principles and Practices</i> , USA: Prentice Hall John Burland , Tim Chapman , Hilary Skinner and Michael Brown (2012). <i>Geotechnical Design, Construction and Verification</i> , UK: Institution of Civil Engineering
Electronic Materials	None
Other Learning Materials	None

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Lecture rooms with a capacity of at least 25 students and fitted with multimedia projector and a computer.
Technology Resources (AV, data show, Smart Board, software, etc.)	None
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	None

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment as per QMS-Policy-006 Feedback Survey, QMS-QAP-116 Monitoring Students' Satisfaction	Students	Indirect: Analyzing the results of the following surveys Course Evaluation Survey (CES), Program Evaluation Survey (PES), Student Experience Survey (SES)
Quality of Exam papers and Verifying Standards of Student Achievement as per QMS-Policy-		Direct: Peer review of examination papers and review or double check a

Evaluation Areas/Issues	Evaluators	Evaluation Methods
004 Policy for Examinations and Marking, QMS-ACP-102 Procedure for Marking Examinations	Examination Committee	minimum of three or 10% of answer papers. Verifying the entries in the Activity Mark Sheet.
Achievement of learning outcomes as per QMS-Policy-001 Course Review, QMS-CDP-106, QMS-CDP-112 Curriculum Review	Faculty	Direct: Course Report (Section B-3)
Implementation of the action plans based on previous semester as per QMS-Policy-001 Course Review, QMS-CDP-106 Procedure for Course Review, QMS-CDP-112 Procedure for Curriculum Review	Faculty	Direct and Indirect: Course report (Section G-1, G-2)
Monitoring Teaching and Learning as per QMS-Policy-005 Monitoring of Teaching and Learning	Chairperson/Program Director/Course Director	Indirect: Feedback by Chairperson/Program director/Course director. Program Delivery Record.
Effectiveness of planned Teaching Strategies QMS-Policy-001 Course Review	Faculty	Indirect: Course Report (Section B-4)
Course effectiveness and planning for improvement as per QMS-Policy-001 Course Review, QMS-CDP-106 Procedure for Course Review, QMS- CDP-112 Procedure for Curriculum Review	Faculty	Direct and Indirect: Course report (Section G-3)
Verifying Standards of Student Achievement and Quality of Exam papers as per QMS-ACP-119 External Assessment Review	Assessment External Reviewer	Direct: Report of assessment external reviewer. Review of sample of ten or 10% of student's assessments and coursework scripts.

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Civil Engineering Department Council
Reference No.	REG MIN-CED-10
Date	27-04-2020

Appendix A Revision Details

Revision no.	DESCRIPTION	Reference MoMs			
		DC		CDC	
		Sem	#	Sem	#
1	Revision of Course Teaching Strategies and action verbs based on the comments of NCAA reviewer	392	4	392	4
2	Course Specification Template 2018	402			