Course Specification
(Bachelor)

Course Title:	Soil Mechanics (2)
Course Code:	CE 3203
Program:	Bachelor of Science in Civil Engineering
Department:	Civil Engineering Department
College:	College of Engineering& Architecture
Institution:	Umm Al-Qura University
Version:	1
Last Revision Date:	31 January 2025

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A. General information about the course:

1. Course Identification

1. Credit hours: (2)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 8 / 4th Year)					
4. Course General Description:					
This course covers Soil Compressibility and Settlement, stress distribution in soil due to various loads using methods like influence charts and Newmark solutions. Shear strength concepts, including Mohr-Coulomb failure criteria and lab tests, are explored. Subsoil exploration techniques, such as soil sampling, boring, and geophysical methods, are introduced. Lateral earth pressure theories, including Rankine and Coulomb methods, are analyzed for retaining structures. Stability analysis of slopes and retaining walls, considering seepage, failure modes, and earthquake effects, is also examined. The course also includes soil filters, heaving effects, and the method of slices for slope stability analysis.					
5. Pre-requirements for this course (if any)**:**					
CE 2202 Soil Mechanics (1)					
6. Co-requisites for this course (if any)**:**					
N/A					
7. Course Main Objective(s):					
• **Understand shear strength of soil and measuring its parameters.** • **Understand soil exploration process and reporting.** • **Determine lateral earth pressure on retaining walls and check stability of earth slope and retaining structures**					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%

No	Mode of Instruction	Contact Hours	Percentage
2	E-learning	N/A	
3	Hybrid • Traditional classroom • E-learning	N/A	
4	Distance learning	N/A	

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	24
2.	**Laboratory/Studio**	N/A
3.	**Field**	N/A
4.	**Tutorial**	N/A
5.	**Others (specify)**	N/A
Total		24

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	Knowledge of the basics of subject.	K1	Through lectures, module notes, tutorials, coursework, examinations, and group project work.	Assignments, homework, quizzes, midterm and final.
1.2	Knowledge of the fundamental physical and analytical principles of the subject	K1	Through lectures, module notes, tutorials, coursework, examinations, and group project work.	Assignments, homework, quizzes, midterm and final.
2.0	**Skills**			
2.1	Ability to use the principles of the subject matter to identify and apply the basic laws to practical problems.	S1	Through lectures, module notes, tutorials, coursework, examinations, and group project work.	Assignments, homework, quizzes, midterm and final.

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
2.2	Ability to use any engineering software related to the subject	S1	Through lectures, module notes, tutorials, coursework, examinations, and group project work.	Assignments, homework, quizzes, midterm and final.
3.0	**Values, autonomy, and responsibility**			
3.1	Creating proficiency in teamwork through collective assignments in preparing reports and laboratory work.	V.1	Through lectures, module notes, tutorials, coursework, examinations, and group project work.	Assignments, homework, quizzes, midterm and final.
3.2	To demonstrate innovation in engineering science through tracking development in soil classification systems and soil consolidation.	V.2	Through lectures, module notes, tutorials, coursework, examinations, and group project work.	Assignments, homework, quizzes, midterm and final.

C. Course Content

No	List of Topics	Contact Hours
1.	**Introduction to Soil Stress Distribution** • Stress distribution in soil mass • Stress due to point load, line load, and uniform loads	**4**
2.	**Stress Distribution Methods** • Distribution method • Influence charts and Newmark's solution	**4**
3.	**Shear Strength of Soil – Fundamentals** • Mohr-Coulomb failure criteria • Importance of shear strength in geotechnical engineering	**4**
4.	**Laboratory Shear Strength Tests** • Direct shear test (shear box test) • Triaxial test and unconfined compression test • Vane shear test	**4**
5.	**Introduction to Subsoil Exploration** • Importance of geotechnical investigations • Planning a soil exploration program	**4**

6.	**Field Exploration Techniques** • Number and depth of borings • Exploratory boring in the field • Soil sampling and field tests	**4**
7.	**Soil Exploration Reporting** • Soil exploration reports and their components • Coring in rock and Rock Quality Designation (RQD) • Geophysical exploration methods	**4**
8.	**Introduction to Lateral Earth Pressure** • Lateral earth pressure magnitude and distribution • Earth pressure at rest	**4**
9.	**Earth Pressure Theories** • Rankine's active and passive earth pressure theory • Coulomb's theory and its applications	**4**
10.	**Retaining Structures and Earth Pressure** • Approximate analysis of active force on retaining walls • Design considerations for retaining walls	**4**
11.	**Stability of Retaining Walls** • Failure modes of retaining walls • Factor of safety against instability	**4**
12.	**Stability of Slopes – Infinite Slopes** • Stability of infinite slopes without and with water seepage • Effect of seepage and seepage pressure	**4**
13	**Stability of Slopes – Finite Slopes** • Stability of finite slopes with plane failure surfaces • Earthquake effects on slope stability	**4**
14.	**Advanced Slope Stability Analysis** • Circular cylindrical failure surfaces • Method of slices for stability analy	**4**
15.	**Soil Compressibility and Settlement**	**4**
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Home work	**Weekly**	**10**
2.	Mid-term exam	**5**	**25**
3.	Laboratory and project	**1-10**	**25**
4.	Final Exam	**12**	**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	**Braja M. Das,(2021), Principles of Geotechnical Engineering 10th Edition.**
Supportive References	**List Required Textbooks** **Budhu, Muni (2011) "Soil Mechanics and Foundations", John Wily** **& Sons** **Supportive References** **List Essential References Materials (Journals, Reports, etc.)** **http://www.springer.com/Geotechnical+soil+mechanics**
Electronic Materials	**List Recommended Textbooks and Reference Material (Journals, Reports, etc)** • **Budhu, Muni (2011), Soil Mechanics and Foundations, 3rd edition.** • **Braja M. Das, (2016) Soil Mechanics Laboratory Manual 9th Edition.**
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	classroom 40seats, Soil Mechanics laboratory 20 students working in parallel
Technology equipment (projector, smart board, software)	Data show, Laboratory equipment
Other equipment (depending on the nature of the specialty)	Well-equipped computer lab and libraries are available for students for addition resource

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Faculty members who teach this course	• Students questioners running at the semester end,

Assessment Areas/Issues	Assessor	Assessment Methods
		• Analysis of students` marks • Regular feedback of the students about the course and the teaching methods
Effectiveness of Students assessment	Faculty members who teach this course	• Students questioners running at the semester end, • Analysis of students` marks • Regular feedback of the students about the course and the teaching methods
Quality of learning resources	Faculty members who teach this course	• Frequent improvement for teaching and learning techniques. • Frequent survey for latest references. • Encouraging the students in team work cooperation and writing reports.
The extent to which CLOs have been achieved	Independent member(s) teaching staff	A sample of students answer sheets is revised by a specified committee of the department.
Other	Faculty members who teach this course and those teaching other courses relevant to this course.	Regular revising and improving of the course contents and consulting the faculty members who teach this course and those

Assessment Areas/Issues	Assessor	Assessment Methods
		teaching other courses relevant to this course.

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	CIVIL ENGINEERING COUNCIL
REFERENCE NO.	THE FIFTEENTH SESSION OF THE ACADEMIC YEAR 1446
DATE	30 APRIL 2025

Course coordinator

Dr. Khalid Riyadh