



40 Course Specification of Soil Mechanics 1

I. Course Identification and General Information:					
1	Course Title:	Soil Mechanics 1			
2	Course Code & Number:	CE212			
3	Credit hours:	C.H			Credit Hours Tu.
		Th.	Tu.	Pr.	Tr.
		3	2	2	
4	Study level/ semester at which this course is offered:	3th level / 2nd semester			
5	Pre –requisite (if any):	Engineering Geology, Strength of Materials			
6	Co –requisite (if any):	-----			
8	Program (s) in which the course is offered:	Civil Engineering			
9	Language of teaching the course:	English+ Arabic			
10	Location of teaching the course:	Class room			
11	Prepared By:	Dr. Ziad algbobi & Eng. Saddam alhadama			
12	Date of Approval				

II. Course Description:
<p>This course is required by Civil Engineering Department. It deals with origin of soil and grain size, soil-particle size, particle shape, soil minerals, soil composition, types of soil, engineering properties of soil, the relationship between the soil properties, Plasticity and Structure of Soil, and soil classification. Furth more, it is concerned with soil compaction, permeability, seepage, and the methods of measurement of them. Also, it explains the vertical and horizontal stresses in soil due to geostatic stresses and external stresses under different applied loads.</p> <p>This course is taught through lectures, presentations, practical experiences, homework, and discussion. The students are evaluated through short exams, midterm and final exams, as well as activities and assignments such as researches, laboratory experiments, and field visits.</p>

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III. Course Intended learning outcomes (CILOs) of the course		Referenced PILOs
a.1	Define the principles of soil mechanics and theories of compactions and consolidations of soil.	A1
a.2	Describe the physical properties of soil, and soil behavior and the lab test procedure at different conditions.	A2
b.1	Discuss the calculate results to analysis engineering problems.	B1
b.2	Evaluate the problems of soil in field, and suggest the appropriate solutions.	B2
c.1	Conduct the experimental tests by correct method.	C1
c.2	Apply the mathematical approach to calculate the physical properties of soil, classification of soil and flow net in seepage.	C2
d.1	Enhance a student's ability to both verbally and in written experimental reports,	D1
d.2	Develop your knowledge and technical abilities to evaluate the soil problems and their solutions.	D5

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a.1- Define the principles of soil mechanics and theories of compactions and consolidations of soil.	Lecture Presentations Tutorial Experimental test	quizzes - mid & final exam - Written assignment – Written report
a.2- Describe the physical properties of soil, and soil behavior and the lab test procedure at different conditions.	Lecture Presentations Tutorial Experimental test	quizzes - mid & final exam - Written assignment – Written report

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(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b.1- Discuss the calculate results to analysis engineering problems.	Lecture Presentations Tutorial Experimental test	Lab exam - mid & final exam - Written assignment – Written report
b.2- Evaluate the problems of soil in field and suggest the appropriate solutions.	Lecture Presentations Tutorial Experimental test	Quizzes - mid & final exam - Written assignment – Written report- field visits.

C Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c.1- Conduct the experimental tests by correct method.	lab Lecture Tutorial Presentations	Reports, -Lab exam
C.2- Apply the mathematical approach to calculate the physical properties of soil, classification of soil and flow net in seepage.	Lecture Presentations Tutorial Reading	Problem set- Written exam- Written assignment

(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d.1- Enhance a student's ability to both verbally and in written reports,	Lab Lecture Multimedia Presentations	Reports, -Lab exam

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d2- Develop your knowledge and technical abilities to evaluate the soil problems and their solutions.	lab Lecture Multimedia Presentations	Lab exam - mid & final exam - Written assignment Written report
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IV. Course Content:					
A – Theoretical Aspect:					
Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	contact hours
1	Principle of soil mechanics	a1, a2	Introduction, origins of soil, types of soil, structural of soil, composition of soil, types of water and air in soil. Weathering, types of weathering.	2	6
2	Engineering Properties of soil	a1, a2, b1, b2, c1, c2	Type of soil properties, phases of soil; define of soil properties, the relationship between the properties, methods of calculate of the properties, grain size of soil. Also consistency of fine soil, activity, and relative density of soil.	4	12
3	Engineering classification of soil	a1, a2, a3, b1, b2, c1, c2	Define of classification, the soil classification systems. Classified the soil by unified soil classification system, AASHTO system, and triangle system.	1	3
4	Engineering classification of soil	a1, a2, a3, b1, b2, c1, c2	Define of classification, the soil classification systems. Classified the soil by unified soil classification system, AASHTO system, and triangle system.	1	3
5	Compaction of soil	a1, a2, a3, b1, b2, c1, c2	Define of compaction, important of compaction; theory of compaction; types of lab compactions; effect of compaction on soil properties; field compactions, and relative compaction.	2	6

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IV. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	contact hours
6	Permeability & seepage	a1,a2,a3, b1,b2,c1, c2	Define of permeability, important of permeability; Darcy's law, coefficient of permeability, the factor effect on determine the coefficient of permeability, method of determine the coefficient of permeability, equivalent coefficient of permeability, two-dimension permeability, Seepage, and flow net.	2	6
7	In Situ Stresses & Stresses in a Soil Mass	a1,a2,a3, b1,b2, c2	Types of stresses in soil, geostatic stresses, Concept of effective stress, Stresses in saturated soil without seepage, upward seepage, and downward seepage, Conditions for heaving or boiling for seepage under a hydraulic structure, Stresses in a Soil Mass, Determination of vertical stress increase at a certain depth due to the application of load on the surface.	2	6
Number of Weeks /and Units Per Semester				14	42

B - Tutorial Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes
1	Engineering Properties of soil	4	8	a1, a2, b1, b2, c1, c2
2	Engineering classification of soil	2	4	a1, a2, b1, b2, c1, c2

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3	Compaction of soil	2	4	a1, a2, b1, b2, c1, c2
4	Permeability & seepage	3	6	a1, a2, b1, b2, c1, c2
5	In Situ Stresses & Stresses in a Soil Mass	3	6	a1, a2, b2, c1, c2
Number of Weeks /and Units Per Semester		14	28	

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C- Practical Aspect:				
Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes
1	How write the report	1	2	a.1, a2, b1,c1, d1,d2
2	Water content of soil	1	2	a2, c1, d1
3	Density & unite weight of soil	1	2	a2, c1, d1
4	Specific gravity of soil	1	2	a2, c1, d1
5	Sieve analysis test	1	2	a2, c1, d1
6	Hydrometer analysis test	1	2	a2, c1, d1
7	Liquid limit & Plastic limit& Shrinking limit tests	1	2	a2, c1, d1
8	Standard and modified compaction test	2	4	a2, c1, d1
9	field density test	1	2	a2, c1, d1
10	Constant head test	1	2	a2, c1, d1
11	Falling head test	3	6	a2, c1, d1
Number of Weeks /and Units Per Semester		14	28	

V. Teaching strategies of the course:
Lecture Multimedia Presentations Presentations Tutorial Quiz Lab

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VI. Assignments:				
No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Principle of soil mechanics	b1,b2,c1,c2,d1,d2	1,2	2
2	Engineering Properties of soil	b1,b2,c1,c2,d1,d2	3,4,5	2
3	Engineering classification of soil	b1,b2,c1,c2,d1,d2	6,7	2
4	Compaction of soil	b1,b2,c1,c2,d1,d2	8,9	2
5	Permeability & seepage	b1,b2,c1,c2,d1,d2	10,11	2
6	In Situ Stresses & Stresses in a Soil Mass	b1,b2,c1,c2,d1,d2	12,13	2.5

VII. Lab Reports:				
No	Reports	Aligned CILOs(symbols)	Week Due	Mark
1	Report 1 (water content)	b1,b2,c1,c2,d1,d2	2	1.25
2	Report 2 (density & unit weight)	b1,b2,c1,c2,d1,d2	3	1.25
3	Report 3 (specific gravity)	b1,b2,c1,c2,d1,d2	4	1.25
4	Report 4 (sieve analysis)	b1,b2,c1,c2,d1,d2	5	1.25
5	Report 5 (hydrometer analysis)	b1,b2,c1,c2,d1,d2	6	1.25
6	Report 6 (liquid limit & plastic limit & shrinking limit)	b1,b2,c1,c2,d1,d2	7	1.25
7	Report 7 (standard compaction test)	b1,b2,c1,c2,d1,d2	8	1.25
8	Report 8 (modified compaction test)	b1,b2,c1,c2,d1,d2	9	1.25
9	Report 9 (field compaction test)	b1,b2,c1,c2,d1,d2	10	1.25
10	Report 10 (constant head test)	b1,b2,c1,c2,d1,d2	11	0.5
11	Report 11 (falling head test)	b1,b2,c1,c2,d1,d2	12	0.75

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VIII. Schedule of Assessment Tasks for Students during the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	assignment	1 to 13	12.5	5	b1,b2,c2,d1,d2
2	Participation	1 to 14	12.5	5	a1,a2,d1,d2
3	quizzes	4 and 8	12.5	5	a1,a2,b1,b2,c1,c2
4	Reports.	1 to 12	37.5	15	b1,b2,c1,c2,d1,d2
5	Mid-term exam.	7 th	50	20	a1,a2, b1,b2,c1,c2
6	Final-exam.	16 th	125	50	a1,a2, b1,b2,c1,c2
	Sum		250	100%	

IX. Learning Resources:

- Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).

1- Required Textbook(s) (maximum two).

- 1- Braja M. Das, Khaled Sobhan ,2018,"Principles of Geotechnical Engineering " 9th Edition, Cengage Learning

2- Essential References.

- 1-Muni Budhu, (2015) "Soil Mechanics and fundamentals"
- 2- J. A. Knappett and R. F. Craig (2012)" Craig's Soil Mechanics" 8th Edition, Spon Press

3- Electronic Materials and Web Sites *etc.*

- 1-www.kutub.info/library/book/8474.
- 2-www.engaswan.com

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X. Course Policies:	
1	Class Attendance: The students should have more than 75 % of attendance according to rules and regulations of the faculty.
2	Tardy: The students should respect the timing of attending the lectures. They should attend within 1 minutes from starting of the lecture.
3	Exam Attendance/Punctuality: The student should attend the exam on time. The punctuality should be implemented according to rules and regulations of the faculty for midterm exam and final exam.
4	Assignments & Projects: The assignment is given to the students after each chapter, the student has to submit all the assignments for checking on time.
5	Cheating: If any cheating occurred during the examination, the student is not allowed to continue and he/she has to face the examination committee for enquiries .
6	Plagiarism: The student will be terminated from the Faculty, if one student attends the exam on another behalf according to the policy, rules and regulations of the university.
7	Other policies: -All the teaching materials should be kept out the examination hall. -The mobile phone is not allowed. -There should be a respect between the student and his teacher.

Reviewed By	<u>Vice Dean for Academic Affairs and Post Graduate Studies</u> <u>Dr. Tarek A. Barakat</u> <u>Dr. Mohammad Algorafi</u>
	<u>Deputy Rector for Academic Affairs Dr. Ibrahim AlMutaa</u> <u>Dr. Ahmed mujahed</u> <u>Dr. Munaser Alsubri</u>

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Course Plan (Syllabus) of Soil Mechanics 1

I. Information about Faculty Member Responsible for the Course:							
Name of Faculty Member	Dr. ziad algbobi	Office Hours					
Location& Telephone No.		SAT	SUN	MON	TUE	WED	THU
E-mail		2		2			

II. Course Identification and General Information:					
1-	Course Title:	Soil Mechanics 1			
2-	Course Number & Code:	CE212			
3-	Credit hours:	C.H			
		Th.	Tu.	Pr.	Tr.
		3	2	2	
4-	Study level/year at which this course is offered:	3 rd Level/ 2 nd semester			
5-	Pre –requisite (if any):	Engineering Geology, Strength of Materials			
6-	Co –requisite (if any):	-----			
7-	Program (s) in which the course is offered	Civil Engineering			
8-	Language of teaching the course:	English+ Arabic			
9-	System of Study:	Semester			
10-	Mode of delivery:	Lecture + practical + lab			
11-	Location of teaching the course:	Class room +lab			

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III. Course Description:

This course **is** required by Civil Engineering Department. **It** deals with **origin of soil and grain size, soil-particle size, particle shape, soil minerals**, soil composition, types of soil, engineering properties of soil, the relationship between the soil properties, Plasticity and Structure of Soil, and soil classification. **Furth more, it is concerned with** soil compaction, permeability, seepage, and the methods of measurement of them. **Also, it explains** the vertical and horizontal stresses in soil due to geostatic stresses and external stresses under different applied loads.

This course **is** taught through lectures, presentations, practical experiences, **homework**, and discussion. The **students are** evaluated through short exams, midterm and final exams, as well as **activities and assignments such as researches**, laboratory experiments, and field visits.

IV. Intended learning outcomes (ILOs) of the course:

• **Brief summary of the knowledge or skill the course is intended to develop:**

a.1 Define the principles of soil mechanics and theories of compactions and consolidations of soil. A1

a.2 Describe the physical properties of soil, and soil behavior and the lab test procedure at different conditions. A2

b.1 Discuss the calculate results to analysis engineering problems. B1

b.2 Evaluate the problems of soil in field, and suggest the appropriate solutions. B2

c.1 Conduct the experimental tests by correct method. C1

c.2 Apply the mathematical approach to calculate the physical properties of soil, classification of soil and flow net in seepage.

d.1 Enhance a student's ability to both verbally and in written experimental reports, D1

d.2 Develop your knowledge and technical abilities to evaluate the soil problems and their solutions. D5

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V.Course Content:

- **Distribution of Semester Weekly Plan Of course Topics/Items and Activities.**

A – Theoretical Aspect:

Order	Topics List		Week Due	Contact Hours
1	Principle of soil mechanics	Introduction, origins of soil, types of soil, structural of soil, composition of soil, types of water and air in soil. Weathering, types of weathering.	1,2	6
2	Engineering Properties of soil	Type of soil properties, phases of soil; define of soil properties, the relationship between the properties, methods of calculate of the properties, grain size of soil. Also, consistency of fine soil, activity, and relative density of soil.	3,4,5,6	12
3	Engineering classification of soil	Define of classification, the soil classification systems. Classified the soil by unified soil classification system, AASHTO system, and triangle system.	7	6
4	Midterm Exam		8	3
5	Engineering classification of soil	Define of classification, the soil classification systems. Classified the soil by unified soil classification system, AASHTO system, and triangle system.	9	3
6	Compaction of soil	Define of compaction, important of compaction; theory of compaction; types of lab compactions; effect of compaction on soil properties; field compactions, and relative compaction.	10,11	6
7	Permeability & seepage	Define of permeability, important of permeability; Darcy's law, coefficient of permeability, the factor effect on determine the coefficient of permeability, method of determine the coefficient of permeability,	12,13	6

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		equivalent coefficient of permeability, two-dimension permeability, Seepage, and flow net.		
8	In Situ Stresses &Stresses in a Soil Mass	Types of stresses in soil, geostatic stresses, Concept of effective stress, Stresses in saturated soil without seepage, upward seepage, and downward seepage, Conditions for heaving or boiling for seepage under a hydraulic structure, Stresses in a Soil Mass, Determination of vertical stress increase at a certain depth due to the application of load on the surface.	14,15	6
9	Final Exam		16	3
Number of Weeks /and Units Per Semester			16	48

B - Tutorial Aspect:			
Order	Topics List	Week Due	Contact Hours
1	Engineering Properties of soil	1,2,3,4	8
2	Engineering classification of soil	5,6	4
3	Compaction of soil	7,8	4
4	Permeability & seepage	9,10,11	4
5	In Situ Stresses & Stresses in a Soil Mass	12,13,14	4
Number of Weeks /and Units Per Semester		14	28

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C- Practical Aspect:			
Order	Topics List	Week Due	Contact Hours
1	How to write the report	1	2
2	Water content of soil	2	2
3	Density & unite weight of soil	3	2
4	Specific gravity of soil	4	2
5	Sieve analysis test	5	2
6	Hydrometer analysis test	6	2
7	Liquid limit & Plastic limit& Shrinking limit tests	7	2
8	Standard and modified compaction test	8,9	4
9	field density test	10	2
10	Constant head test	11	2
11	Falling head test	12,13,14	6
Number of Weeks /and Units Per Semester		14	28

VI. Teaching strategies of the course:
Lecture Multimedia Presentations Presentations Tutorial quiz lab

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VII. Assignments:				
No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Principle of soil mechanics	b1,b2,c1,c2,d1,d2	1,2	2
2	Engineering Properties of soil	b1,b2,c1,c2,d1,d2	3,4,5	2
3	Engineering classification of soil	b1,b2,c1,c2,d1,d2	6,7	2
4	Compaction of soil	b1,b2,c1,c2,d1,d2	8,9	2
5	Permeability & seepage	b1,b2,c1,c2,d1,d2	10,11	2
6	In Situ Stresses & Stresses in a Soil Mass	b1,b2,c1,c2,d1,d2	12,13	2.5

VIII. Lab Reports:				
No	Reports	Aligned CILOs(symbols)	Week Due	Mark
1	Report 1 (water content)	b1,b2,c1,c2,d1,d2	2	1.25
2	Report 2 (density & unit weight)	b1,b2,c1,c2,d1,d2	3	1.25
3	Report 3 (specific gravity)	b1,b2,c1,c2,d1,d2	4	1.25
4	Report 4 (sieve analysis)	b1,b2,c1,c2,d1,d2	5	1.25
5	Report 5 (hydrometer analysis)	b1,b2,c1,c2,d1,d2	6	1.25
6	Report 6 (liquid limit & plastic limit & shrinking limit)	b1,b2,c1,c2,d1,d2	7	1.25
7	Report 7 (standard compaction test)	b1,b2,c1,c2,d1,d2	8	1.25
8	Report 8 (modified compaction test)	b1,b2,c1,c2,d1,d2	9	1.25
9	Report 9 (field compaction test)	b1,b2,c1,c2,d1,d2	10	1.25
10	Report 10 (constant head test)	b1,b2,c1,c2,d1,d2	11	0.5
11	Report 11 (falling head test)	b1,b2,c1,c2,d1,d2	12	0.75

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IX. Schedule of Assessment Tasks for Students during the Semester:				
Assessment	Type of Assessment Tasks	Week Due	Mark	Proportion of Final Assessment
1	assignment	1 to 13	12.5	5
2	Participation	1 to 14	12.5	5
3	quizzes	4 and 8	12.5	5
4	Reports.	1 to 12	37.5	15
5	Mid-term exam.	7 th	50	20
6	Final-exam.	16 th	125	50
	Sum		250	100%

X. Learning Resources:	
<ul style="list-style-type: none"> Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher). 	
1- Required Textbook(s) (maximum two).	
	1- Braja M. Das, Khaled Sobhan ,2018,"Principles of Geotechnical Engineering " 9th Edition, Cengage Learning
2- Essential References.	
	1-Muni Budhu,(2015) "Soil Mechanics and fundamentals" 2- J. A. Knappett and R. F. Craig (2012)" Craig's Soil Mechanics" 8th Edition, Spon Press
3- Electronic Materials and Web Sites etc.	
	1-www.kutub.info/library/book/8474. 2-www.engaswan.com

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Yahya Al khattabi

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Algorafi

Dean of the Faculty
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Academic Development
Center & Quality Assurance
Ass. Prof. Dr.
Huda Al-Emad

Rector of Sana'a University
Prof. Dr. Al-Qassim Mohammed Abbas



XI. Course Policies:	
Unless otherwise stated, the normal course administration policies and rules of the Faculty of ----- apply. For the policy, see: -----	
	Class Attendance:
1	The students should have more than 75 % of attendance according to rules and regulations of the faculty.
	Tardy:
2	The students should respect the timing of attending the lectures. They should attend within 1 minutes from starting of the lecture.
	Exam Attendance/Punctuality:
3	The student should attend the exam on time. The punctuality should be implemented according to rules and regulations of the faculty for midterm exam and final exam.
	Assignments & Projects:
4	The assignment is given to the students after each chapter, the student has to submit all the assignments for checking on time.
	Cheating:
5	If any cheating occurred during the examination, the student is not allowed to continue and he/she has to face the examination committee for enquiries .
	Plagiarism:
6	The student will be terminated from the Faculty, if one student attends the exam on another behalf according to the policy, rules and regulations of the university.
	Other policies:
7	<ul style="list-style-type: none"> -All the teaching materials should be kept out the examination hall. -The mobile phone is not allowed. -There should be a respect between the student and his teacher.

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