KOMAR UNIVERSITY OF SCIENCE AND TECHNOLOGY
(KUST)

Geotechnical Engineering Syllabus			
Course Title	**Geotechnical Engineering**		
Course Code	**CVE 3330**	**No. of Credits**	**3 CH**
Department	**Civil Engineering**	**Faculty**	**Engineering**
Pre-requisites Course Code	**Soil Mechanics (CVE3320C)**	**Co-requisites Course Code**	
Course Coordinator(s)	**Dr. Sabah Saadi Fayaed**		
Email	**sabah.saadi@komar.edu.iq**	**IP No.**	**116**
Other Course Teacher(s)/Tutor(s)	**Non**		
Learning Hours	**Section 1: Sunday and Tuesday (10:00am- 11:30am)** **Section 2: Monday and Wednesday (10:00am- 11:30am)**		
Contact Hours	**Wednesday and Thursday (8:00am- 10:00am)**		
Course Type	**Departmental Requirement**		
Offer in Academic Year	**Fall 2015**		

COURSE DESCRIPTION

This course is intended to give students a good understanding of the theoretical and empirical principles of Geotechnical Engineering. Soil mechanics consists of the study of soil properties and soil behavior, whereas foundation engineering is the design of foundations on soils and rock. Focus of this course will be on geological formations of natural soils, Slope Stability, Ultimate Bearing Capacity, Allowable Bearing Capacity and Settlement, Mat Foundations, Retaining Walls, Sheet Pile Walls and Pile Foundations. The style of this syllabus is adopted from Iowa University.

COURSE OBJECTIVES

1. To understand relationships between physical characteristics of soils and mechanical characteristics such as; strength and compressibility.
2. To Provide coverage of analysis and design methods so that the student has adequate background on the design of basic foundations for buildings and also the design of earth-retaining structures.
3. Understand the modeling techniques commonly used in soil mechanics and how to apply them.

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COURSE LEARNING OUTCOME

After participating in the course, students would be able to:

1. Apply fundamental concepts learned previously or concurrently in mathematics, statics, mechanics of deformable bodies, fluid mechanics and soil mechanics to the solution of geotechnical problems in civil engineering. **(ABET Outcome E & A)**

2. Determine ultimate and allowable bearing capacity of shallow foundations. **(ABET Outcome E)**

3. Design and analyze foundations such as footings and piles. **(ABET Outcome C & E)**

4. Determine soil parameters for foundation design. **(ABET Outcome E)**

5. Classify the types of loads and stresses that can be applied to the foundations. **(ABET Outcome E)**

6. Understand failure criteria applicable to foundations, design criteria and uncertainties in foundation design. **(ABET Outcome A & C)**

Grading Scale:

Points	Percentage Scores
A	**95-100**
A-	**90-94**
B+	**87-89**
B	**83-86**
B-	**80-82**
C+	**75-79**
C	**70-74**
C-	**65-69**
D+	**60-64**
D	**55-59**
D-	**50-54**
F	**0-49**
W	**Withdrawal**
I	**Incomplete**

Note: The minimum passing grade to pass this course is C-which is equivalent to 65%.

COURSE CONTENT

Course Topics Include:

Chapter 1: Geotechnical Properties of Soil
Chapter 2: Slope Stability
Chapter 3: Ultimate Bearing Capacity for Shallow Foundations
Chapter 4: Allowable Bearing Capacity and Settlement for Shallow Foundations
Chapter 5: Mat Foundations
Chapter 6: Retaining Walls
Chapter 7: Sheet Pile Walls
Chapter 8: Pile Foundations

COURSE TEACHING AND LEARNING ACTIVITIES

Course Teaching and Learning Activities:

1. Interactive class discussion
2. Hands- on Exercises
3. Home work
4. Tests and Quizzes

COURSE ASSESSMENT Tools

Assessment Tool	Description	Weight
Quizzes (5)	Quizzes are scheduled as shown in the semester schedule.	**10 %**
Mid- term	The mid-term will be conducted after week 7 of the semester.	**25 %**
Homework (2)	The H.W will be conducted during the semester.	**5 %**
Contribution	Students will be evaluated by the instructor based on their participation in the class, commitment, pop quizzes and other activities.	**5 %**
Test	The test will be conducted after week 11 of the semester.	**15 %**
Project	The project will be conducted in week 13 of the semester	**10 %**
Final Exam	The final exam will be conducted in week 16 of the semester	**30 %**

ESSENTIAL READINGS: (Journals, textbooks, website addresses etc.)

Textbooks:

Principles of Geotechnical Engineering. 8 th Ed. (2001), Braja M. Das; Brooks/Cole Publishers, ISBN: 053438742X

References:

1- Craig's Soil Mechanics, 7 th edition, R.F. Craig , Taylor & Francis Group. ISBN: ISBN 0–415–32703–2.

2- Fundamentals of Soil Behavior, 3rd Ed.,(2005), James K. Mitchell, Kenichi Soga. Wiley,

COURSE POLICY *(including plagiarism, academic honesty, attendance etc)*

Attendance Policy:

Students are expected to attend each class for the entire semester. Students are responsible for material present in lectures. Only students with official KUST absence, family crises, and illness are excused from class. Three occasions of lateness count as one absence. The student who misses 10 percent of the classes will be placed on probation.

Make up Policy:

Since all examination are announced in advance, zero grade will be given to any missed examination unless a student's has an acceptable reason, such as illness, for not being able to take the examination during all those days when the examination was announced.

Academic Dishonesty:

Any type of dishonesty (Plagiarism, Copying another's test or home-work, etc) will Not be tolerated. Students found guilty of any type of academic dishonesty are subject to failure in this course, plus further punishment by the University Consul.

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Course calendar: Please check the academic calendar for fall 2015

Week	Beg/End Dates	Topics (Chapters)	Course Assignments per chapter
1	**(28-9 to 1-10) / 2015**	**Chapter 1: Geotechnical Properties of Soil** • Introduction • Grain-Size Distribution • Size Limits for Soils • Weight–Volume Relationships	
2	**(4-10 to 8-10) / 2015**	**Chapter 2: Slope Stability** • Introduction • Factor of Safety • Stability of Infinite Slopes	
3	**(11-10 to 15-10) / 2015**	**Chapter 2: Continued** • Infinite Slope with Steady-state Seepage • Finite Slopes-General • Analysis of Finite Slopes with Plane Failure Surfaces (Culmann's Method)	
4	**(18-10 to 22-10) / 2015**	**Chapter 3: Ultimate Bearing Capacity for Shallow Foundations** • General Concept • Terzaghi's Bearing Capacity Theory • Factor of Safety	**Quiz 1** (Ch.1 and Ch.2)
5	**(25-10 to 29-10) / 2015**	**Chapter 3: Continued** • Modification of Bearing Capacity Equations for Water Table • The General Bearing Capacity Equation • Effect of Soil Compressibility	
6	**(1-11 to 5-11) / 2015**	**Chapter 4: Allowable Bearing Capacity and Settlement for Shallow Foundations** • Stress Due to a Concentrated Load • Stress Due to a Circularly Loaded Area • Stress below a Rectangular Area	**Quiz 2** (Ch.3) **Submitting "H.W1"**
7	**(8-11 to 12-11) / 2015**	**Chapter 4: Continued** • Average Vertical Stress Increase Due to a Rectangularly Loaded Area	

		• Stress Increase under an Embankment	
	15-11 to 19-11	**Mid-term**	**(Ch.1, Ch.2, Ch.3 and Ch.4)**
8	**(22-11 to 26-11) / 2015**	**Chapter 5: Mat Foundations** • Combined Footings • Common Types of Mat Foundations • Bearing Capacity of Mat Foundations	
9	**(29-11 to 3-12) / 2015**	**Chapter 6: Retaining Walls** • Proportioning Retaining Walls • Application of Lateral Earth Pressure Theories to Design • Stability of Retaining Walls	**Quiz 3** (Ch.5)
10	**(6-12 to 10-12) / 2015**	**Chapter 6: Continued** • Check for Overturning • Check for Sliding along the Base • Check for Bearing Capacity Failure	
11	**(13-12 to 17-12) / 2015**	**Chapter 7: Sheet Pile Walls** • Construction Methods • Cantilever Sheet Pile Walls • Cantilever Sheet Piling Penetrating Sandy Soils	**Quiz 4** (Ch.6) **Submitting "H.W2"**
12	**(20-12 to 24-12) / 2015**	**Chapter 7: Continued** • Cantilever Sheet Piling Penetrating Clay • Special Cases for Cantilever Walls Penetrating Clay • Anchored Sheet-Pile Walls	
	(27-12 to 31-12) / 2015	**New Year Holiday**	
13	**(3-1 to 7-1) / 2016**	**Chapter 8: Pile Foundations** • Types of Piles and Their Structural Characteristics • Estimating Pile Length • Installation of Piles	**TEST (Ch. 5, Ch. 6 and Ch.7)**
14	**(10-1 to 14-1) / 2016**	**Chapter 8: Continued** • Load Transfer Mechanism • Equations for Estimating Pile Capacity	**Quiz 5 (**Ch.8)
15	**(17-1 to 21-1) / 2016**	**Review Week for Academic Courses**	
16	**(24-1 to 28-1) / 2016**	**Final Examination for Academic Courses**	**All the Chapters**

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