General Information
CEE 455 – Geotechnical Engineering II
_____ Semester 20__

Instructor:	Phillip Ooi
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Office hours:	_____
Grader:	_____
Textbook:	None required. References will be provided on Laulima

Grading:

Mandatory Homework	10%
Mid-term exam 1	25%
Mid-term exam 2	25%
Final exam	40%
Total	100%

Notes:

(a) Homework assignments are due in class typically 1 week after they are assigned. Homework assignments will be graded based on a maximum score of 10/10. Late HWs will not be accepted.
(b) You are strongly encouraged to read relevant reading assignments.
(c) In **all homework assignments**, you must (i) complete the following sentence" "The main thing learned from this homework assignment is……..……" and (ii) answer the following question: "Why is this thing important?"
(d) Any student who feels s/he may need an accommodation based on the impact of a disability is invited to contact the KOKUA program privately. I would be happy to work with you, and the KOKUA Program (Office for Students with Disabilities) to ensure reasonable accommodations in this course. KOKUA can be reached at 956-7511 or 956-7612 (voice/text) in room 013 of the Queen Lili'uokalani Center for Student Services.

Academic Integrity Statement

Per the University of Hawai'i Student Conduct Code, the following additional actions may constitute a violation of Academic Dishonesty:

- use of any unauthorized assistance in taking quizzes, tests, or examinations
- use of sources beyond those authorized by the instructor in solving homework problems or assignments; e.g.; Chat GPTor other AI platforms
- acquisition, without permission, of tests or other academic material belonging to a member of the UH faculty, staff or student body (i.e. use of Chegg or similar website to reference old tests, assignments, etc. without permission)
- engaging in any behavior specifically prohibited by a faculty member in the course syllabus or class discussion

The immediate disciplinary actions will be at the discretion of the instructor but may result in reporting to the Department, College, and/or the **Office of Judicial Affairs** where, if found in violation, the resulting sanction(s) may include **expulsion** from the University.

Department of Civil and Environmental Engineering

CEE 455 – GEOTECHNICAL ENGINEERING II
____ 20__

Designation as: Required

Course (catalog) description:

Continuation of 355 introducing geotechnical engineering topics including: field exploration, lateral earth pressures, slope stability and bearing capacity theory.

Prerequisite(s): 355 or consent.

Textbook(s) and/or other required material: None required

Course Learning Outcomes: Upon completion of this course, students will be able to: (1) apply principles of soil mechanics to formulate calculations and design earth retaining structures, soil slopes and shallow foundations and (2) list a few types of geosynthetics and their functions.

Topics covered:

Review of Basic Soil Mechanics (self study); Field Exploration (Drilling Borings, Sampling, In Situ Testing); Types of Lateral Earth Pressure (At Rest Pressures, Active and Passive) and Theories (Rankine, Coulomb and Logspiral); Earth Pressures due to Surcharge Loads; Design for Sliding and Overturning; Anchored Bulkheads; Slope Stability Analyses of Infinite and Finite Slopes; Finite Slope Stability Techniques Including Culmann Analysis, Swedish Circle $\phi = 0$ Method, Ordinary Method of Slices, Bishop's Simplified Method, Force Equilibrium Procedures, Slope Stability Charts and Computer Software; Slope Stabilization and Repair; Bearing Capacity Failure Modes; Upper and Lower Bound Theorems; Bearing Capacity Theory; Prandtl's Solution for $\phi = 0$ soil; Solution for a c-ϕ Soil; Effects of Foundation Shape, Depth, Load Inclination, Load Eccentricity and Ground Water Table on Bearing Capacity; Bearing Capacity, Settlement of Footings on Sands Using In Situ Testing and Geosynthetics Types and Functions.

Class schedule: 2 sessions, 75-minutes per session.

Laboratory schedule: None

Contribution of course to meeting the Requirements of Criteria 1 and 2: Usually taken in the senior year, this course contains technical and professional topics that prepare students for a professional career in civil engineering and for further study in the discipline (geotechnical engineering) associated with the program. This course contributes in meeting Criteria 1 and 2 as an advanced topic in the civil engineering

program. It includes engineering science and engineering design of retaining structures, slopes and footings.

Relationship of course to program outcomes: Related to outcomes based on the following scale:

"blank" = no emphasis; 1 = some emphasis; 2 = moderate emphasis; 3 = significant emphasis

Outcomes / Course	1	2	3	4	5	6	7
CEE 455	3	2	1	1			1

Person who prepared this description and date of preparation: Phillip Ooi (_____, 20__)

COURSE OUTLINE FOR CEE 455

Date	Subject	Reading
	Introduction	
	Shear strength from in situ tests	Ch. 5 of EL-2870
	Lateral earth pressures	Clough and Duncan Handout
	Lateral earth pressures	
	No class (_____ Day)	
	Lateral earth pressures	
	Lateral earth pressures	
	Lateral earth pressures	
	Lateral earth pressures	
	Lateral earth pressures	
	Lateral earth pressures	
	Lateral earth pressures	
	Lateral earth pressures	
	Slope stability	Forest Service Slope Stab. Ref. Guide
	Slope stability	Landslides Investigation and Mitigation Special Report 247
	Slope stability	
	Slope stability	
	Mid-term on lateral earth pressures	
	Slope stability	
	Slope stability	
	Slope stability	
	Slope stability	
	Bearing capacity	Ch. 7 of EL-2870
	Bearing capacity	
	Bearing capacity	
	Bearing capacity	
	Mid-term on slope stability	
	Bearing capacity	
	Bearing capacity	
	Bearing capacity	
	Geosynthetic types and functions	
	Q&A session	
	Cumulative Final Exam (7:30 to 9:30 am)	

Review Questions – Not Required to Turn In but Highly Recommended to Complete

1. What are the various Atterberg limits and what are their physical significances?
2. What is relative density? How is it estimated?
3. What are pressure, elevation and total heads? How are they estimated?
4. What are equipotential and flow lines?
5. What is effective stress? How is it estimated?
6. What is overconsolidation ratio?
7. Define the pole or the origin of planes.
8. What is the difference between axi-symmetric and plane strain loading?
9. What are the shear strength parameters of soil and what failure criteria are they derived from?
10. Is the shear strength of soil unique? If not, what does it depend on?
11. Describe when you would use total stress analysis.
12. Describe when you would use effective stress analysis.
13. What are the two stages in a triaxial test?
14. List the different types of triaxial tests and describe how they differ?
15. Which types of triaxial tests are associated with total stress analysis and which types are associated with effective stress analysis?
16. What is the difference between peak and residual strengths?
17. What is dilation? What soils tend to dilate? What soils tend to compress?
18. What is the significance of Skempton's $\overline{A}_f$?
19. What test is required to obtain the unconfined compressive strength and how is the unconfined compressive strength related to the undrained shear strength?
20. What is stress path and why is it important?