CE 4210/6210: Geotechnical Engineering Design

INSTRUCTOR:
Dr. Ravi N. Ravichandran
Office: 202 Lowry Hall
Office Phone: 864-656-2818
Email: nravic@clemson.edu

PREREQUISITES:
Students registered for this course must have completed the prerequisite course of CE 3210-Geotechnical Engineering with a passing grade. Chapter 2 of the class textbook is a good summary of the materials typically covered in CE 3210.

TEXTBOOKS:

OBJECTIVES:
This is a sequel to CE 3210-Geotechnical Engineering. The main objective is to apply the principles of soil mechanics to shallow and deep foundation and retaining wall design. The student will learn various elements of foundations and retaining walls and their designs, including site investigation and determination of soil parameters, selection of foundation type, analysis and design of foundations and retaining walls. Upon completion of this course the students will be able to:
(1) Investigate and evaluate subsurface soil conditions using techniques of geotechnical engineering.
(2) Evaluate bearing capacity and settlement failure conditions for shallow and deep foundations.

LECTURE TOPICS:
1. Introduction to CE 4210/6210 – Lecture Set (LS)#01
2. Short Review of Important Materials from Prerequisite Class – LS# 02 (Chapter 2)
3. Subsurface exploration – LS#03 to LS#11 (Chapter 3)
4. Principal Types of Foundations and Design Methods – LS#12
5. Ultimate Bearing Capacity of Shallow Foundations – LS#13 to LS#15 (Chapter 4)
6. Vertical Stress Increase in Soils – LS# 16 to LS#17 (Chapter 6)
7. Settlement of Shallow Foundations – LS#17-LS#21 (Chapter 7)
8. Pile Foundation Design – LS#22 to LS#25 (Chapter 9)
9. Lateral Earth Pressure and Retaining Wall Design – LS#26 to LS#30 (Chapter 12 & 13)

PROGRAM OUTCOMES:
This course contributes to the following Civil Engineering Program Outcomes:
• Knowledge of engineering in four technical areas of civil engineering (#2)
• Can produce designs for systems, components, or processes (#4)
• Ability to identify, formulate, and solve engineering problems (#6)

LECTURE FORMAT:
The lecture notes with some blanks will be posted on BB on time and you may have a printed copy before start watching the lecture video and fill in the blanks during the lecture.
EVALUATION AND GRADING SCHEME:

CE 4210-Undergraduate class:
- Homework: 25 %
- Test#1: Must be taken on 06/03/16 (LS#01 to LS#13): 25 %
- Test#2: Must be taken on 07/08/16 (LS#14 to LS#25): 25 %
- Test#3: Must be taken on 07/29/16 (Comprehensive): 25 %

CE 6210-Graduate class:
- Homework: 25 %
- Test#1: Must be taken on 06/03/16 (LS#01 to LS#13): 20 %
- Test#2: Must be taken on 07/08/16 (LS#14 to LS#25): 20 %
- Test#3: Must be taken on 07/29/16 (Comprehensive): 25 %
- Term projects: 10 %

Please note that the CE 6210 students are expected to show higher level of understanding of the class material and homework and tests may be different from the CE 4210 class in addition to term projects.

FINAL LETTER GRADE:
- A: 90 – 100
- B: 80 – 89
- C: 70 – 79
- D: 60 – 69
- F: Below 60

HOMEWORK:

Homework problems will be assigned almost every week. Homework must be neatly done showing logical steps required to obtain correct solution. No late submissions!

TESTS:

All exams must be taken at a recognized proctoring center such as a college test proctoring center, library etc. There is a form on blackboard which must be filled out and approved by the instructor at least two weeks prior to the first exam. Any students who are on campus who wish to have me proctor the exam must let me know. I will only offer a single time to take the exam with me during each time window. The student must show proper ID to the proctor when they show up to the exam.

All tests will be closed books and closed notes. An equation sheet will be given for each test if needed. There will be two parts in each test. Part I (20-40 %) will have a few ‘short answer’ questions and Part II (60-80 %) will have a few problems to solve.

TERM PROJECTS (ONLY FOR CE6210):

There will be a term project (given in two parts). The project will require the application of the concepts you learned in the class and prerequisite classes and foundation design and analysis software.

CLASS ATTENDANCE POLICY-LECTURE MATERIAL:

There is no on-campus requirement for this course. All students will be expected to watch all lecture videos and take notes on these videos. To assist in this, a notes outline has been provided on blackboard (lecture set). This outline contains much of the notes, figures/photos/examples which will be covered in this class. I recommend that you print it out full/half size in color if you
can afford it or take notes on the electronic copy using an electronic device. It will be much easier to read some of the figures if you do so.

ONLINE OFFICE HOURS:

Online office hours for this course will be held on Mondays, Wednesdays and Fridays from 1:00 p.m. to 2:00 p.m. EST. Any deviation from this schedule will be communicated via email. Office hours will be held online using Adobe Connect or other tools. Students will be able to participate using the chat option or by using verbal communication. Any student wanting to be able to verbally communicate must have a set of head phones and a microphone. Using built-in speakers and microphones will cause feedback through the system and cause disruption in the communication. The instructor will mostly respond to queries using the microphone and sketches. http://connect.clemson.edu/nielsonofficehours/

If you cannot make it to office hours then you may send your queries via email or may schedule a call or an office visit. Emails to the instructor will be viewed and addressed during normal business hours (i.e. 8:00 A.M. to 5:00 P.M. on Mon-Fri). Any emails sent outside of normal business hours will be addressed within 24 hours of when the email was sent except for weekends. Prompt responses to emails sent after 5:00 P.M. should not be expected. As many of our communications will occur online or via email, please take an opportunity to review the guidelines for proper “netiquette”. http://www.clemson.edu/ccit/learning_tech/distance_ed/prospective/about_de/ol_skills.html

CALCULATOR POLICY:

Only models of calculators approved by National Council of Examiners for Engineering and Surveying (NCEES) are permitted in this class. The following are the only calculators that will be permitted.

**Casio:** All fx-115 models. Any Casio calculator must contain fx-115 in its model name.

**Texas Instruments:** All TI-30X and TI-36X models. Any Texas Instruments calculator must contain either TI-30X or TI-36X in its model name.

**Hewlett Packard:** The HP 33s and HP 35s models, but no others.


ACADEMIC INTEGRITY STATEMENT:

The student is also required to read and observe the official statement on “Academic Integrity” that is available at http://www.clemson.edu/academic/integrity.htm. Important part of it is given below.

“As members of the Clemson University community, we have inherited Thomas Green Clemson’s vision of this institution as a “high seminary of learning.” Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form.”

CLEMSON UNIVERSITY TITLE IX (SEXUAL HARASSMENT) STATEMENT:

“Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran’s status, genetic information or protected activity (e.g.,
opposition to prohibited discrimination or participation in any complaint process, etc.) in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972. This policy is located at http://www.clemson.edu/campus-life/campus-services/access/title-ix/. Mr. Jerry Knighton is the Clemson University Title IX Coordinator. He also is the Director of Access and Equity. His office is located at 111 Holtzendorff Hall, 864.656.3181 (voice) or 864.565.0899 (TDD).”

**ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES:**

Students with disabilities who need accommodations should make an appointment with Dr. Arlene Stewart, Director of Disability Services, to discuss specific needs within the first month of classes. Students should present a Faculty Accommodation Letter from Student Disability Services when they meet with instructors. Student Disability Services is located in Suite 239 Academic Success Building (656-6848; sds-l@clemson.edu). Please be aware that accommodations are not retroactive and new Faculty Accommodation Letters must be presented each semester.