Western University - Faculty of Engineering

Department of Civil and Environmental Engineering

CEE 9533A – Geotechnical Site Investigation and Instrumentation

Wednesdays 3:00 – 6:00 pm, Location NCB113

Course Outline – Fall 2017

COURSE DESCRIPTION

Geotechnical engineers have a fascinating, yet occasionally confounding, job because they deal with inherently *variable* materials arranged by Nature – soil and rock. Karl Terzaghi once purportedly stated, "Nature has no contract with mathematics…" Similarly Peck (1972) stated, "In construction underground, where the engineer deals with materials having properties that vary not only in space but also in time, details of construction often have significant or even overwhelming influence on the behavior of the structure and of the surrounding soil. For an understanding of the behavior, these details must be observed and recorded." As such, geotechnical engineers, perhaps more than any other branch of civil engineering, rely on physical (and preferably insitu) measurements of material (soil and rock) properties and behavior for use in engineering design and in the subsequent evaluation of engineering performance.

Therefore, the general objectives of this course are to: (1) introduce the observational method in geotechnical engineering; (2) introduce a broad range of in situ testing devices and field instrumentation that students will encounter and use in practice; (3) provide a solid understanding of the applications and limitations of these devices and instruments through an examination of their theoretical, experimental, and empirical development; (4) introduce first-hand the use and interpretation of some of these devices, instrumentation, and measurements at real project sites and via selected important case histories; and (5) discuss emerging technologies and trends in in-situ testing and field instrumentation, including data acquisition and data management. The course includes four written assignments, a term project and a final exam.

TOPICS

1) Introduction to Geotechnical Monitoring and Observational Method

2) Drilling for Site Investigation and Sampling Methods

3) Geophysical Methods for Site Investigation

4) Field Hydraulic Conductivity Measurement

5) Geotechnical In-situ Tests

   a. Standard Penetration Test and Interpretation

   b. Cone Penetration Test and Interpretation

c. Field Vane Shear test

d. Pressuremeter Test

e. Dilatometer and Goodman Jack

f. Borehole shear test

g. Plate load test

h. Borehole shear test

i. Emerging technologies

PRE-REQUISITES

This course is intended for graduate students enrolled in civil engineering with an interest in geotechnical engineering, site investigation and instrumentation. It is expected that students will have basic understanding of soil mechanics obtained by taking suitable courses at either the undergraduate or graduate level. Students without a suitable background in soil mechanics should discuss this with the instructor prior to registering for the course.

INSTRUCTOR

Professor Abouzar Sadrekarimi, Ph.D., P.Eng., Office: SEB3010D, Email: asadrek@uwo.ca

CONTACT HOURS

Three lecture hours per week on Wednesdays (3:00 – 6:00 pm) including discussion and presentation times.

COURSE MATERIALS

Prepared class notes should be brought to each class and may be downloaded from the course website (http://owl.uwo.ca).

The following textbooks will be used for this course:

Dunnicliff, J. (1993). "Geotechnical Instrumentation for Monitoring Field Performance" John Wiley & Sons.

Clayton, C. R. I., Matthews, M. C. and Simons, N. E. (1995). "Site Investigation" 2nd Edition, Blackwell Science. Prepared class notes will be made available through the course OWL site at http://owl.uwo.ca/, along with other useful reference material and data for assignments.

COMPUTING

Assignments will require the processing of data using computer data-analysis software such as MS Excel or similar, and students will be assumed to be proficient in the use of MS Excel.

TERM PROJECT

Each student (or group) will submit a term project. Projects will be due two weeks before the end of the semester (just make sure you give them the project well before the two weeks); the actual deadline will be discussed in class. I am looking for a term paper that might resemble the literature review chapter of a good MS thesis. Instructions and specifications are provided in a separate handout. Each student will also make a 10-15 minute oral presentation to the class, and the oral presentation will count for part of the term project grade. I will ask students to identify their topic during the third week of class. If more than one student (or group) picks the same topic, I will use a coin toss to determine which student may write on the selected topic, and the other student(s) must select a different topic. No one may write on the same topic as that used for another class.

UNITS

SI units will be used in lectures and examinations

EVALUATION METHOD

The final course mark will be determined as follows:

Assignments: 20%

Class participation: 5%

Term project and presentation: 25%

Final exam*: 50%

Total 100%

*** Students must pass the final examination to pass this course**. Students who fail the final examination will be assigned the aggregate mark, as determined above, or 48%, whichever is less.

ASSIGNMENTS

Assignments will be assigned on the course website (http://owl.uwo.ca). The individual assignments are due a week after they are posted on the course website on following week at **2:30 p.m.** in the lecture. Late submissions will be deducted 10% per day and not be accepted 7 days after the due date.

USE OF ENGLISH

In accordance with Senate and Faculty Policy, students may be penalised up to 10% of the marks on all assignments, tests, and examinations for the improper use of English. Additionally, poorly written work with the exception of the final examination may be returned without grading. If

resubmission of the work is permitted, it may be graded with marks deducted for poor English and/or late submission.

SCHOLASTIC OFFENCES

The statement: "Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:
http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_grad.pdf

PLAGIARISM

University policy states that plagiarism, defined as the "act or an instance of copying or stealing another's words or ideas and attributing them as one's own." (excerpted from Black's Law Dictionary, West Group, 1999, 7th ed., p. 1170) is a scholastic offence. In submitting any written work as part of the coursework requirements for this course students must ensure that this work is written in their own words. Whenever students take an idea or a passage of text from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations.

All required papers may be subject to submission for textual similarity review to the commercial plagiarism-detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (http://www.turnitin.com).

A student who is found guilty of plagiarism in respect of any written work submitted as part of the coursework requirements for this course will be given a grade of zero for the submitted work. Repeated acts of plagiarism, either in this course or any other course subsequent to a first offence, will result in the student being given a failing grade for the course in which the subsequent offence occurs, and may also incur further penalties such as requiring the student to withdraw from the program in which they are enrolled in.

ATTENDANCE

Any student who, in the opinion of the instructor, is absent too frequently from class, laboratory, or tutorial periods will be reported to the Dean (after due warning has been given). On the recommendation of the Department concerned, and with the permission of the Dean, the student will be debarred from taking the regular final examination in the course.

ACCESSIBILITY

Please contact the course instructor if you require material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Services

for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation.

CONDUCT

Students are expected to arrive at lectures on time, and to conduct themselves during class in a professional and respectful manner that is not disruptive to others. Late comers may be asked to wait outside the classroom until being invited in by the Instructor. Please turn off your cell phone before coming to a class, tutorial, quiz or exam.

On the premises of the University or at a University-sponsored program, students must abide by the Student Code of Conduct: http://www.uwo.ca/univsec/board/code.pdf.

SICKNESS AND OTHER PROBLEMS

Students should immediately consult with the Instructor or Department Chair if they have any problems that could affect their performance in the course. Where appropriate, the problems should be documented (see attached). The student should seek advice from the Instructor or Department Chair regarding how best to deal with the problem. Failure to notify the Instructor or Department Chair immediately (or as soon as possible thereafter) will have a negative effect on any appeal.

For more information concerning medical accommodations, please see: http://www.uwo.ca/univsec/handbook/appeals/accommodation_medical.pdf.

NOTICE

Students are responsible for regularly checking their email, and the course OWL site for new notices related to the course.

HEALTH AND WELLNESS

As part of a successful graduate student experience at Western, we encourage students to make their health and wellness a priority. Western provides several on campus health-related services to help you achieve optimum health and engage in healthy living while pursuing your graduate degree. For example, to support physical activity, all students, as part of their registration, receive membership in Western's Campus Recreation Centre. Numerous cultural events are offered throughout the year. for example, please check out the Faculty of Music web page http://www.music.uwo.ca/, and our own McIntosh Gallery http://www.mcintoshgallery.ca/. Information regarding health- and wellness-related services available to students may be found at http://www.health.uwo.ca/. Students seeking help regarding mental health concerns are advised to speak to someone they feel comfortable confiding in, such as their faculty supervisor, their program director (graduate chair), or other relevant administrators in their unit. Campus mental health resources may be found at http://www.health.uwo.ca/mental_health/resources.html.