Objectives:

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) teach theoretical, semi-empirical, and empirical methods of test and instrumentation interpretation and site characterization; (5) 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 (6) discuss emerging technologies and trends in in-situ testing and field instrumentation, including data acquisition and data management.

Topics:

Note that all topics may not be covered due to time constraints.

1) Introduction to Geotechnical Monitoring and Observational Method
   a. Benefits of using geotechnical instrumentation
2) Fundamentals of Geotechnical Monitoring
   a. Measurement uncertainty
3) Instrumentation transducers and data acquisition
   a. Measurement of groundwater pressure
   b. Measurement of total stress in soil
   c. Measurement of stress change in rock
   d. Measurement of deformations
   e. Measurement of load and strain in structural members
   f. Measurement of temperature
   g. Measurement of acceleration
   h. Data acquisition systems
4) Discussion of Example Cases of Geotechnical Monitoring
5) Methods for Field Investigation
   a. Standard Penetration Test and Interpretation
   b. Cone Penetration Test and Interpretation
   c. Field Vane Shear test
   d. Pressuremeter Test
Prequisites:
This course is intended for graduate students enrolled in civil engineering with an interest in geotechnical engineering and the design of earth dams. 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.

Corequisites:
None

Antirequisites:
None

Note: It is the student’s responsibility to ensure that all Prerequisite and Corequisite conditions are met or that special permission to waive these requirements has been granted by the Faculty. It is also the student’s responsibility to ensure that they have not taken a course listed as an Antirequisite. The student may be dropped from the course or not given credit for the course towards their degree if they violate the Prerequisite, Corequisite or Antirequisite conditions.

Instructor:
Dr Abouzar Sadrekarimi, SEB3010D, email: asadrek@uwo.ca.

Contact Hours:
Three lecture hours per week.

Course Materials:
The following textbooks will be used for this course:


Prepared class notes will be made available through the course OWL site at [http://owl.uwo.ca/](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 paper:**
Each student 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. No two students may write on the same topic, and I will ask students to identify their topic during the third week of class. If more than one student 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:**
The final course mark will be determined as follows:
- Assignments: 25%
- Term paper and class presentation: 25%
- Final exam: 50%

Total: 100%

**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:**
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:
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.


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