This course is intended to extend the knowledge and understanding of the mechanics of soils, previously developed in CEE3322. Throughout the course, the students will learn how to design the common geotechnical engineering systems.

The covered topics in this course include:

- Introduction to the sub-soil exploration techniques and preparation of site investigation plans
- Design of shallow and deep foundation systems
- Application of lateral earth pressure theories and design of earth retaining structures
- Stability analysis of earth slopes

At the end of this course, students will be able to analyze the laboratory and field tests data, and to identify the appropriate analytical approach to design a wide range of geotechnical systems. The students will improve their problem-solving abilities while working individually, and enhance their communication skills while working in groups. Where relevant, students will use software packages in their designs.

**Course Description:**
Application of shear strength, effective stress, and earth pressure theories to the design of shallow and deep foundations, earth slopes, braced cuts, and retaining structures and related safety issues.

**Prerequisites:**
CEE 3322A/B.

**Antirequisites:**
None

Note: It is the student's responsibility to ensure that all Prerequisite conditions are met or that special permission to waive these requirements has been granted by the Faculty. The student may be dropped from the course or not given credit for the course towards their degree if they violate the Prerequisite conditions.

**Contact Hours:**
3 lecture hours/week;
Lectures will be delivered in class, and will also be recorded and posted to the course OWL site.

2 tutorial hours/week.
Tutorial sessions will be delivered in class, and will also be recorded and posted to the course OWL site.

**Instructor:**
Dr. Ahmed Fahmy, P.Eng.
afahmy4@uwo.ca

Office hours: To be discussed in class

Administrative Assistant: Sandra McKay (smckay@uwo.ca)

**Textbook:**
Prepared class notes will be posted on the course website.
Other References (Purchase not required):

Units:
SI units will be used in lectures, tutorials, and examinations

Specific Learning Objectives:
The specific objectives of the course are:

1. Sub-surface exploration:
   By the end of this section, the students will be able to:
   i. Design a site investigation plan for a proposed/existing structure
   ii. Analyse field and laboratory tests results

2. Shallow Foundations:
   By the end of this section, the students will be able to:
   i. Describe the different types and configurations of shallow foundations
   ii. Identify the load transfer mechanism of shallow foundations
   iii. Calculate the applied stresses and the ultimate bearing capacity of shallow foundations
   iv. Identify and calculate the different settlement components of shallow foundations
   v. Understand the difference between limit state and working stress design approaches

3. Lateral earth pressure and retaining walls:
   By the end of this section, the students will be able to:
   i. Use Rankine and Coulomb theories to find the distribution of earth pressure acting on retaining walls
   ii. Design the different types of earth retaining structures and shoring walls

4. Deep Foundations:
   By the end of this section, the students will be able to:
   i. Describe the different configurations of piles
   ii. Describe the load-transfer mechanisms of axially loaded piles
   iii. Design single piles and pile groups satisfying the bearing capacity and settlement requirements

5. Slope Stability:
   By the end of this section, the students will be able to:
   i. Understand the common reasons for landslides
   ii. Define the short- and long-term critical failure surface and the corresponding factor of safety for a given earth slope
   iii. Describe the different mitigation techniques for existing slopes
   iv. Use the computer program Slide to analyse and design slopes and embankments

The instructor may expand or revise material presented in the course as appropriate.
General Learning Objectives:

E=Evaluate, T=Teach, I=Introduce; (I) = Introduction, (D) = Developing, (A) = Advanced level

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Evaluation:
The final mark will be determined as follows:
- Weekly Assignments: 25%
- Mid-term Exam: 20%
- Written Final Examination: 25%
- Oral Final Examination: 30%
- Total: 100%

1. Quizzes and Examinations:
A two-hour mid-term remotely proctored exam is tentatively scheduled for Monday, October 19, 2020. More details will be posted to the course website.

A three-hour final examination will be held during the regular examination period. A 15-minute oral examination will follow the final exam (at time and date to be announced on the course website).

2. Assignments:
The course includes six assignments. Assignments to be electronically submitted prior to the due date to the course website. Late assignments will be assessed a penalty of 10% per day, to a maximum of 4 days, after which they will receive a mark of zero. Extensions are to be negotiated with the course instructor, not the teaching assistants.

3. Use of English:
In accordance with Senate and Faculty Policy, students may be penalized up to 10% of the marks on all assignments, tests, and examinations for 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.

Cheating:
University policy states that cheating is a scholastic offence. The commission of a scholastic offence is attended by academic penalties that might include expulsion from the program. If you are caught cheating, there will be no second warning. For more information on scholastic offenses, please see:
http://www.uwo.ca/univsec/handbook/appeals/scholastic_discipline_undergrad.pdf

Attendance:
Any student who, in the opinion of the instructor, has not engaged sufficiently in class, 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.

Accommodation:
Students with disabilities work with Accessible Education (formerly SSD) which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The accommodation policy can be found here: Academic Accommodation for Students with Disabilities.

Academic Consideration for Student Absence
Students will have up to two (2) opportunities during the regular academic year to use an on-line portal to self-report an absence during the term, provided the following conditions are met: the absence is no more than 48 hours in
duration, and the assessment for which consideration is being sought is worth 30% or less of the student’s final grade. Students are expected to contact their instructors within 24 hours of the end of the period of the self-reported absence, unless noted on the syllabus. Students are not able to use the self-reporting option in the following circumstances:

- for exams scheduled by the Office of the Registrar (e.g., December and April exams)
- absence of a duration greater than 48 hours,
- assessments worth more than 30% of the student’s final grade,
- if a student has already used the self-reporting portal twice during the academic year

If the conditions for a Self-Reported Absence are not met, students will need to provide a Student Medical Certificate if the absence is medical, or provide appropriate documentation if there are compassionate grounds for the absence in question. Students are encouraged to contact their Faculty academic counselling office to obtain more information about the relevant documentation.

Students should also note that individual instructors are not permitted to receive documentation directly from a student, whether in support of an application for consideration on medical grounds, or for other reasons. All documentation required for absences that are not covered by the Self-Reported Absence Policy must be submitted to the Academic Counselling office of a student’s Home Faculty.

For Western University policy on Consideration for Student Absence, see Policy on Academic Consideration for Student Absences - Undergraduate Students in First Entry Programs and for the Student Medical Certificate (SMC), see: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf.

Religious Accommodation
Students should consult the University's list of recognized religious holidays, and should give reasonable notice in writing, prior to the holiday, to the Instructor and an Academic Counsellor if their course requirements will be affected by a religious observance. Additional information is given in the Western Multicultural Calendar.

Use of Recordings:
All of the remote learning sessions for this course will be recorded. The data captured during these recordings may include your image, voice recordings, chat logs and personal identifiers (name displayed on the screen). The recordings will be used for educational purposes related to this course, including evaluations. The recordings may be disclosed to other individuals under special circumstances. Please contact the instructor if you have any concerns related to session recordings. Participants in this course are not permitted to record the sessions, except where recording is an approved accommodation, or the participant has the prior written permission of the instructor.

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. 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

Some components of this course, namely the tutorial sessions, will involve online interactions. To ensure the best experience for both you and your classmates, please honour the following rules of etiquette:

- please “arrive” to class on time
- please use your computer and/or laptop if possible (as opposed to a cell phone or tablet)
- ensure that you are in a private location to protect the confidentiality of discussions in the event that a class discussion deals with sensitive or personal material
- to minimize background noise, kindly mute your microphone for the entire class until you are invited to speak, unless directed otherwise
- In order to give us optimum bandwidth and web quality, please turn off your video camera for the entire class unless you are invited to speak
- please be prepared to turn your video camera off at the teaching assistant/instructor’s request if the internet connection becomes unstable
- unless invited by your teaching assistant/instructor, do not share your screen in the meeting
The course teaching assistant/instructor will act as moderator for the class and will deal with any questions from participants. To participate please consider the following:

- if you wish to speak, use the “raise hand” function and wait for the instructor to acknowledge you before beginning your comment or question
- remember to unmute your microphone and turn on your video camera before speaking
- self-identify when speaking.
- remember to mute your mic and turn off your video camera after speaking (unless directed otherwise)

General considerations of “netiquette”:

- Keep in mind the different cultural and linguistic backgrounds of the students in the course.
- Be courteous toward the teaching assistant/instructor, your colleagues, and authors whose work you are discussing.
- Be respectful of the diversity of viewpoints that you will encounter in the class and in your readings. The exchange of diverse ideas and opinions is part of the scholarly environment. “Flaming” is never appropriate.
- Be professional and scholarly in all online postings. Cite the ideas of others appropriately.

Note that disruptive behaviour of any type during online classes, including inappropriate use of the chat function, is unacceptable. Students found guilty of Zoom-bombing a class or of other serious online offenses may be subject to disciplinary measures under the Code of Student Conduct.

**Contingency plan for an in-person class pivoting to 100% online learning:**

In the event of a COVID-19 resurgence during the course that necessitates the course delivery moving away from face-to-face interaction, all remaining course content will be delivered entirely online, either synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL for students to view at their convenience). The grading scheme will not change. Any remaining assessments will also be conducted online as determined by the course instructor.

**Online Proctoring Notice:**

Tests and examinations in this course will be conducted using the remote proctoring service, Proctortrack. By taking this course, you are consenting to the use of this software and acknowledge that you will be required to provide personal information (including some biometric data) and the session will be recorded. More information about this remote proctoring service is available in the Online Proctoring Guidelines at the following link: https://www.uwo.ca/univsec/pdf/onlineproctorguidelines.pdf.

Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. Information about the technical requirements are available at the following link: https://www.proctortrack.com/tech-requirements/.

**Notice:**

Students are responsible for regularly checking their email, course website (https://owl.uwo.ca) and notices posted outside the Civil and Environmental Engineering Department Office

**Consultation:**

Students are encouraged to discuss problems with their teaching assistant and/or the Instructor in tutorial sessions. Office hours will be arranged for the students to meet with the Instructor and teaching assistants. Other individual consultation can be arranged by appointment with the instructor.

The document “INSTRUCTIONS FOR STUDENTS UNABLE TO WRITE TESTS OR EXAMINATIONS OR SUBMIT ASSIGNMENTS AS SCHEDULED” is part of this course outline.