Faculty of Engineering
Department of Civil Engineering

COURSE OUTLINE

CIVE 580 – Numerical Modelling in Geotechnical Engineering

Term – Fall 2017 (201709)

Instructor
Dr. Cheng Lin
Phone: (250) 472 5843
E-mail: chenglin918@uvic.ca

Office Hours
Days: Mondays
Time: 11:00AM -12:00PM
Location: ECS 424

List all prerequisites and co-requisites: Soil mechanics; Foundation engineering; Matlab; Maple

LECTURE DATE(S)

Section: A /CIVE 580
Days: Mondays
Time: 9:00AM-10:50AM
Location: Cornett Building B145

Reference Materials:
Any soil mechanics book and foundation engineering book

COURSE OBJECTIVES:
This course is developed for appreciation of the role of computer methods in solving geotechnical engineering problems. The course will focus on the numerical solutions to the following geotechnical engineering problems: axial and lateral behaviors of deep foundations, beams on elastic foundations, consolidation, seepage, dynamic soil-structure interaction, etc. These solutions are easy to use and widely adopted in practice, which lie between closed form solutions and solutions based on full finite element analysis or full finite difference analysis. The emphasis of this course is the application of the numerical methods to practical geotechnical engineering problems. Courses on computer programming and differential equations, familiarity with Matlab and Maple are prerequisite for this course.

LEARNING OUTCOMES: At the end of this course, students will be able to:
(refer Bloom’s Taxonomy Sharepoint Site for suggested verbs)
1. Summarize geotechnical engineering problems using the knowledge of soil mechanics
2. Construct a numerical model for a practical geotechnical engineering problem
3. Apply numerical techniques to solve for the geotechnical engineering problems
4. Predict the mechanical responses of geotechnical engineering structures using computer methods
5. Discuss the results of numerical modelling
6. Provide recommendations based on the numerical modelling results

Weight & Date(s) of Assessments:

<table>
<thead>
<tr>
<th>Weight</th>
<th>Date</th>
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<tbody>
<tr>
<td>Projects</td>
<td>25% each</td>
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COURSE LECTURE NOTES

Unless otherwise noted, all course materials supplied to students in this course have been prepared by the instructor and are intended for use in this course only. These materials are NOT to be re-circulated digitally, whether by email or by uploading or copying to websites, or to others not enrolled in this course. Violation of this policy may in some cases constitute a breach of academic integrity as defined in the UVic Calendar.

There will be no supplemental examination for this course.

GENERAL INFORMATION

Note to Students:
Students who have issues with the conduct of the course should discuss them with the instructor first. If these discussions do not resolve the issue, then students should feel free to contact the Chair of the Department by email or the Chair’s Secretary to set up an appointment.

“Attendance
Students are expected to attend all classes in which they are enrolled. An academic unit may require a student to withdraw from a course if the student is registered in another course that occurs at the same time.

An instructor may refuse a student admission to a lecture, laboratory, online course discussion or learning activity, tutorial or other learning activity set out in the course outline because of lateness, misconduct, inattention or failure to meet the responsibilities of the course set out in the course outline. Students who neglect their academic work may be assigned a final grade of N or debarred from final examinations.

Students who do not attend classes must not assume that they have been dropped from a course by an academic unit or an instructor. Courses that are not formally dropped will be given a failing grade, students may be required to withdraw and will be required to pay the tuition fee for the course.” UVic Calendar, (2017) http://web.uvic.ca/calendar2017-09/undergrad/info/regulations/attendance.html

ACCOMMODATION OF RELIGIOUS OBSERVANCE

The University recognizes its obligation to make reasonable accommodation for students whose observance of holy days might conflict with the academic requirements of a course or program.
Students are permitted to absent themselves from classes, seminars or workshops for the purposes of religious or spiritual observance.
In the case of compulsory classes or course events, students will normally be required to provide reasonable notice to their instructors of their intended absence from the class or event for reasons of religious or spiritual observance. In consultation with the student, the instructor will determine an appropriate means of accommodation. The instructor may choose to reschedule classes or provide individual assistance.
Where a student’s participation in a class event is subject to grading, every reasonable effort will be made to allow the student to make up for the missed class through alternative assignments or in subsequent classes. Students who require a rescheduled examination must give reasonable notice to their instructors. If a final exam cannot be rescheduled within the regular exam period, students may request an academic concession.
To avoid scheduling conflicts, instructors are encouraged to consider the timing of holy days when scheduling class events.

Discrimination and Harassment Policy (GV0205) http://web.uvic.ca/calendar2017-09/general/policies.html

Faculty of Engineering, University of Victoria Standards for Professional Behaviour

“It is the responsibility of all members of the Faculty of Engineering, students, staff and faculty, to adhere to and promote standards of professional behaviour that support an effective learning environment that prepares graduates for careers as professionals....”

You are advised to read the Faculty of Engineering document Standards for Professional Behaviour which contains important information regarding conduct in courses, labs, and in the general use of facilities.
http://www.uvic.ca/engineering/current/undergrad/index.php #section0-23

Cheating, plagiarism and other forms of academic fraud are taken very seriously by both the University and the Department. You should consult the Undergraduate Calendar for the UVic policy on academic integrity.

Policy on Academic Integrity http://web.uvic.ca/calendar2017-09/undergrad/info/regulations/academic-integrity.html

Equality

This course aims to provide equal opportunities and access for all students to enjoy the benefits and privileges of the class and its curriculum and to meet the syllabus requirements.
Reasonable and appropriate accommodation will be made
available to students with documented disabilities (physical, mental, learning) in order to give them the opportunity to successfully meet the essential requirements of the course. The accommodation will not alter academic standards or learning outcomes, although the student may be allowed to demonstrate knowledge and skills in a different way. It is not necessary for you to reveal your disability and/or confidential medical information to the course instructor. If you believe that you may require accommodation, the course instructor can provide you with information about confidential resources on campus that can assist you in arranging for appropriate accommodation. Alternatively, you may want to contact the Resource Centre for Students with a Disability located in the Campus Services Building.

The University of Victoria is committed to promoting, providing, and protecting a positive, and supportive and safe learning and working environment for all its members.”

### Course Schedule

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<thead>
<tr>
<th>Module</th>
<th>Topics</th>
<th>Date</th>
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<tr>
<td>1</td>
<td>Introduction</td>
<td>09.11</td>
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<tr>
<td>2</td>
<td>Axial deep foundation</td>
<td>09.18</td>
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<td>3</td>
<td>Axial deep foundation (Project 1)</td>
<td>09.25</td>
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<td>4</td>
<td>Beams on elastic foundation</td>
<td>10.02</td>
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<tr>
<td>5</td>
<td>Thanksgiving</td>
<td>10.09</td>
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<tr>
<td>6</td>
<td>Lateral deep foundation, sheet pile walls</td>
<td>10.16</td>
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<tr>
<td>7</td>
<td>Lateral deep foundation, sheet pile walls (Project 2)</td>
<td>10.23</td>
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<tr>
<td>8</td>
<td>Consolidation</td>
<td>10.30</td>
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<td>9</td>
<td>Consolidation (Project 3)</td>
<td>11.06</td>
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<tr>
<td>10</td>
<td>Reading break</td>
<td>11.13</td>
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<tr>
<td>11</td>
<td>Dynamic deep foundation</td>
<td>11.20</td>
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<tr>
<td>12</td>
<td>Dynamic deep foundation (Project 4)</td>
<td>11.27</td>
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