Carleton University

Department of Civil and Environmental Engineering

Geotechnical Engineering • GIVE 4301 • Winter 2025

Instructor: Dr. Siva Sivathayalan
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5050MC, 613-520-2600 ext. 5802.

Teaching Assistant: Thayanthan, T.
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Lectures: Every Week (First class: Jan 7th)
Tue, Thurs 14:30 – 16:00

P/A Class: "Even" Weeks (First class: Jan 15th)
Wed 14:30-17:30

Primary Text:

Das, B. M. Principles of Foundation Engineering, 10th Edition, 2023, Cengage Learning. ($75-$343)

Supplementary Texts:

Canadian Foundation Engineering Manual (CFEM), 4th Edition, 2007. BiTech Publishers [ISBN: 978 0920 505281]

e-Books (Available via library.carleton.ca):

Shallow Foundations: Bearing Capacity and Settlement, 2nd Edition, BM Das, CRC Press 2009

The Foundation Engineering Handbook, M. Gunaratne, (Ed). Taylor & Francis. 2006

Art of Foundation Engineering Practice, ASCE Geotechnical Special Publications 198 (GSP 198).

Week	Topics	Das (CFEM)
1	Introduction/Review: Effective stress, sands vs clays, Index properties	2/1-10
1-4	Subsurface Exploration, Sampling, and In-situ Methods Split spoon, Shelby tube, Piston sampling, Geotechnical Reports Vane shear, SPT, CPT, DMT, Pressuremeter, Plate load tests, Seismic tests	3/12-23,26-29 (4)
5-7	Limit states, Shallow Foundations Ultimate, Allowable bearing capacity, Effect of water table, Factor of safety, Spread footings on sand, clay Combined Footings, Eccentrically loaded footings, Mat Foundations Stress increments, Settlement Criteria	5-9 (7, 8, 10, 11)
8-10	Deep Foundations Single piles: Types of piles, pile bearing capacity, pile settlement, pile load tests Pile Groups: Group considerations, efficiency, negative skin friction, batter piles Pile driving: formulae & equipment, wave analysis	11,12 (17-20)
11-12	MSE Walls, Braced Excavations Mechanically Stabilized Walls, braced excavations, sheet pile walls, pressure distribution, bottom heave, boiling, de-watering	16,17 (25, 26)
13	Special Topics Earthquake Resistant Design	NA (6)

Calendar description:

A critical study of the theories in soil mechanics and their application to the solution of geotechnical engineering problems. Field investigations, laboratory and field testing, shallow foundations, special footings, mat foundations, pile foundations and excavations. Discussion of new methods and current research.

Learning Objectives:

This course builds upon CIVE 4208, and it is expected, upon successful completion, a student would have

- an improved understanding of the fundamental concepts in soil mechanics and foundation engineering,
- the ability to select appropriate in-situ tests for site characterization,
- a solid appreciation of the concepts of ULS & SLS, and uncertainty in foundation design,
- the skillset to select an appropriate foundation type to suit the problem, and
- the ability to design both shallow or deep foundations as required.

Student Evaluation:

Assignments	20%
Midterm	30% (In-class, tentatively on Mar 5th)
Final Exam	50% (Date to be set by Examination Services)

A minimum standing of 35% is required in each of the above components to obtain a passing grade in the course. The final examination is for evaluation purposes only and students will not have access to their marked exam.

Attendance, Submissions, and Appeal of grades:

- Attendance to lectures and problem analysis sessions is mandatory. At least 85% attendance is required to obtain a passing grade in the course. Requests for exemption must be supported by *acceptable* documentation.
- Late assignments will receive a 10% penalty if submitted the day following the due date, and 100% penalty if late by more than a day (unless prior arrangements have been made). Appeal of term work grades should be made within one week of the posting of marks
- Students who claim extenuating circumstances as a reason for missed term work are responsible for immediately informing the instructor. This must occur as soon as the circumstances are known to exist, and no later than three (3) days after the term work was due.

Instructional offences:

Definitions, penalties and the processes to be followed are noted in the Undergraduate calendar, and at the faculty and University websites.

Academic Accommodation:

Students requiring special arrangements to meet the academic obligations during the term because of disability, pregnancy, religious practice or other reasons should write to me during the first two weeks of class (or as soon as the need for accommodation is known to exist). Please see https://students.carleton.ca/course-outline/ for further details.

Students with disabilities requiring academic accommodation in this course must register with the Paul Menton Centre for Students with Disabilities (PMC, ☎ 613 520 6608 or pmc@carleton.ca) for a formal evaluation of disability-related needs. Registered PMC students are required to contact the PMC every term to ensure that your instructor receives your Letter of Accommodation on time.