



The Department of Civil and Environmental Engineering of Carleton University is pleased to announce a Short Course on Advanced Foundation Design, to be held at Carleton University on April 2-3, 2020.

### **Course description**

This short course will focus on the analysis and design of both shallow and deep foundation systems to resist vertical and horizontal loads coming from various superstructures including buildings, bridges, power plants, etc. Most engineers with responsibility for design and construction of foundation and structure systems need a working understanding of basic concepts to gain confidence in dealing with a variety foundation and geotechnical related problems that they encounter on engineering projects. This course is designed so that participants can better understand foundation engineering and learn from experts in geotechnical engineering on how to design a safe and sustainable foundation system in various site and loading conditions. All key concepts and guidelines will be explained and emphasis will be placed on the practical application of the information provided.

### **Who should attend?**

This course would be beneficial to all civil engineering practitioners and especially to those involved in the design, approval and maintenance of foundation engineering projects and any other structural and construction systems, such as: civil, municipal, environmental and construction engineers, consulting engineers, plans review personnel in municipalities, public works professionals, plant engineers, who are involved with building and construction works, technicians and specialists, geologists and earth scientists, civil engineers who want to understand foundations or any other load carrying soil-structure systems. The course will be of value both for those who are new to foundation engineering as well as to those who have experience with foundations.

### **Registration**

Click here for online registration <https://payments.carleton.ca/cee/a-short-course-advanced-foundation-design/> . If you would like to register with a cheque or bank draft, please complete the registration form shown on the last page.

### Advanced Foundation Design – Short Course Program

Day 1	Thursday April 2, 2020
08:00 – 08:30	<b>Welcome and Course Introduction</b>
08:30 – 10:00	<b>Review of soil mechanics and site investigation</b> Basic soil mechanics concepts used in foundation design, shear strength, subsurface exploration, geophysical approaches, geotechnical drilling, sampling and field tests
10:00 – 10:30	<b>Break and Discussion</b>
10:30 – 12:00	<b>Shallow foundations – bearing capacity</b> Shallow vs deep foundations, bearing capacity analysis, limit state design, LRFD design
12:00 – 13:00	<b>Lunch</b>
13:00 – 14:30	<b>Shallow foundations – settlement</b> Immediate vs long-term settlement, methods to estimate immediate settlement, elastic modulus of soil, stress increase in soil, estimating consolidation settlement
14:30 – 15:00	<b>Break and Discussion</b>
15:00 – 16:30	<b>Design of shallow foundations</b> Design considerations for shallow foundations, raft (mat) foundations
Day 2	Friday April 3, 2020
08:30 – 10:00	<b>Deep foundations</b> Types of deep (pile) foundations, selecting appropriate foundation system for a specific site, load transfer of pile foundations, pile setup, pile-load tests
10:00 – 10:30	<b>Break and Discussion</b>
10:30 – 12:00	<b>Pile foundations under axial loads – Load transfer</b> Bearing capacity of single pile and pile groups under axial loads, pull out capacity
12:00 – 13:00	<b>Lunch</b>
13:00 – 14:30	<b>Pile foundations settlement</b> Estimating settlement of single pile and pile groups under axial loads, design procedures for piles
14:30 – 15:00	<b>Break and Discussion</b>
15:00 – 16:30	<b>Lateral capacity and deflection of pile foundations, Design considerations</b> Lateral capacity and deflection analysis of single pile and pile groups under lateral loads, p-y curves, LPILE model, Down drag, Foundations in expansive soils, PDA
16:30 – 17:00	<b>Adjournment</b>



## After participating in this course you will be able to:

- understand the principles of foundation design, and identify issues and challenges associated with the design of foundations and other load carrying soil-structure systems.
- determine appropriate site exploration and laboratory characterization programs suitable for foundation projects.
- prescribe design requirements that are consistent with the foundation engineering provisions in the national and provincial standards.
- apply your comprehensive understanding of many of the basic concepts of foundation design to increase your effectiveness on your projects, and demonstrate your newly acquired skills in geotechnical engineering practice.

## Course Instructors

Dr. **M.T. Rayhani** is an Associate Professor of Geotechnical Engineering and the director of Geo-engineering Research Group in the Department of Civil and Environmental Engineering at Carleton University. His research areas include innovative foundation design, soil and foundation improvement solutions for seismic resistant design, foundation design in permafrost, and geotechnical aspects of landfill design. He holds a Ph.D. degree in Geotechnical Engineering from the University of Western Ontario and he is the author of over 50 publications in different areas of geo-engineering. Dr. Rayhani is a member of CGS, OGG, ASCE, ISMFE, and a Registered Professional Engineer in the Province of Ontario. He has been involved in many engineering projects around the world and has experience in foundation investigation and design, landfill barrier systems, embankment dams and slope stability.

## Special Feature

You will receive a copy of the course notes that you will find very useful on your projects.



**Carleton**  
UNIVERSITY

Canada's Capital University

**A Short Course – Advanced Foundation Design**  
**Carleton University, April 2-3, 2020**  
**Course Registration Form**

Name: \_\_\_\_\_ Title: \_\_\_\_\_

Organization: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ Province/State \_\_\_\_\_ Postal code: \_\_\_\_\_

Phone: (\_\_\_\_) \_\_\_\_\_ Fax: (\_\_\_\_) \_\_\_\_\_ Email: \_\_\_\_\_

**Regular registration fee before Mar. 20, 2020:** \$890.00 + tax

**Late registration fee after Mar. 20, 2020:** \$950.00 + tax

**Student registration fee:** \$790.00 + tax

**Parking for two days (optional):** 2 days x \$10:00/day \$20.00

**Total payment:** \$ -----

Fee covers two days of instruction, course notes, break refreshments, breakfasts and lunches.

**Registration:** Please go to (<https://payments.carleton.ca/cee/a-short-course-advanced-foundation-design/>) for online registration, or fill out this form and mail it to the address below along with a cheque or bank draft payable to **Carleton University**.

**Contact:** Advanced Foundation Design Short Course  
Department of Civil and Environmental Engineering  
3432 Mackenzie Building, Carleton University  
1125 Colonel By Drive, Ottawa, Ontario, K1S 5B6

**Tel:** (613) 520 2600 (1228)

**Fax:** (613) 520 3951

**Email:** [CEEINFO@cunet.carleton.ca](mailto:CEEINFO@cunet.carleton.ca)

**Accommodation:** Participants are responsible for making their own arrangements. For a list of hotels in the Ottawa area please go to [www.ottawahotels.com](http://www.ottawahotels.com), or visit <http://housing.carleton.ca/>.

**Directions:** For a campus map please go to <https://carleton.ca/campus/map/>. For directions on how to get to Carleton University please go to: <https://carleton.ca/campus/directions/>.