CEG 5115: Foundation Design

Class Periods: M, W, F | Period 7 (1:55 PM - 2:45 PM)
Location: NEB 201
Academic Term: Fall 2024

Instructor:
Dr. Khiem Tran
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Office: Weil Hall 265 N
Phone Number: (352) 294-3369
Office Hours: Monday and Wednesday: 3:30-4:30 PM

Teaching Assistant/Peer Mentor/Supervised Teaching Student:
None

Course Description
The purpose of this course is to instruct students in the successful steps in the analysis, design and construction of shallow and deep foundations. For analysis and design this includes: 1) identifying and accounting for future influences; and 2) optimum selection of foundations based on a) stresses under service and extreme conditions (combined loading), b) deformations and c) constructability. Examples of deformations are immediate and consolidation settlements for shallow foundations; constructability issues are monitored stresses and estimated capacities of driven piles in the field.

Course Pre-Requisites / Co-Requisites
Soil Mechanics

Course Objectives
The student is expected to demonstrate proficiency in the analysis and design of shallow and deep foundation systems. This includes, but is not limited to, demonstrating the following geotechnical and structural engineering skills.

1. Estimate immediate, consolidation and secondary settlements of shallow foundations
2. Determine the bearing capacity of shallow foundations
3. Size shallow foundations based on the shear and flexure stresses according to ACI guidelines
4. Estimate axial capacities of driven, bored and cast-insitu piles and drilled shafts
5. Estimate lateral resistance of any deep foundation
6. Determine axial and lateral deformations of single pile/shafts

Upon successful completion of this course, the student will be able to design shallow and deep foundation systems using the relevant building codes and design specifications. The student will understand how those members act collectively within the framework of larger structural systems such as buildings. Competent use of codes and specifications requires that the student understand and be able to apply mathematical, material science, and engineering principles to practical design situations.

Materials and Supply Fees
Will be provided

Required Textbooks and Software
FB-DEEP and FB-MultiPier (licenses provided)
Handouts will be provided

Recommended Materials

- Foundation Design- Principles and Practices, Third Edition

- By Donald P. Coduto, William A. Kitch, and Man-chu Ronald Yeung

Required Computer

UF student computing requirement: *https://news.it.ufl.edu/education/student-computing-requirements-for-uf/*
<Note to instructor: the above requires a student to have a computer but allows for a Windows or a Mac. Add any particular or additional department or course specific requirements.>

Course schedule

Week day	Month	Day	Topics	Reading
F	Aug	23	Introduction to foundations	1.1, Handout
M	Aug	26	Load types and ASD	5.1-5.1
W	Aug	28	LRFD and performance requirements	5.1-5.1
F	Aug	30	In-situ stress	Handout
M	Sep	2	**Holiday, no class**	
W	Sep	4	Induced stresses	Handout
F	Sep	6	Elastic settlement	Handout
M	Sep	9	Consolidation test	Handout
W	Sep	11	Consolidation settlement	Handout
F	Sep	13	Site Investigation	4.1, Handout
M	Sep	16	SPT	4.3, Handout
W	Sep	18	CPT	4.3, Handout
F	Sep	20	Settlement by SPT	Handout
M	Sep	23	Settlement by CPT	Handout
W	Sep	25	Layered settlement	Handout
F	Sep	27	**Exam I**	
M	Sep	30	Time rate settlement	8.5
W	Oct	2	Creep settlement	Handout
F	Oct	4	Soil shear strength	Handout
M	Oct	7	Bearing pressure	6.3
W	Oct	9	Bearing capacity (Terzaghi)	7.1-7.5
F	Oct	11	Bearing capacity (Vesic)	7.1-7.5, handout
M	Oct	14	Bearing capacity (Vesic)	7.1-7.5, handout
W	Oct	16	Shear design of foundation element	10.1-10.7
F	Oct	18	***Homecoming, no class***	
M	Oct	21	Flexure design of foundation element	10.1-10.7
W	Oct	23	Deep foundation types	12.1-12.4
F	Oct	25	Pile Driving Equipment and Stresses	handout
M	Oct	28	Drilled Shaft Construction	handout

W	Oct	30	Static Load test and data reduction	14.1-14.5
F	Nov	1	**Exam II**	
M	Nov	4	Driven pile capacity by static analysis	15.1-15.2
W	Nov	6	Driven pile capacity by static analysis	15.1-15.2
F	Nov	8	Shaft capacity by static analysis	16.1-16.2
M	Nov	1	***Holiday, no class***	
W	Nov	13	Pile capacity by SPT	Handout
F	Nov	15	Lateral capacity for short pile	Handout
M	Nov	18	Lateral capacity for long pile	Handout
W	Nov	20	Lateral Pile-Shaft Group Interaction	Handout
F	Nov	22	FB-MultiPier software	Handout
M	Nov	25	***Holiday, no class***	
W	Nov	27	***Holiday, no class***	
F	Nov	29	***Holiday, no class***	
M	Dec	2	FB-MultiPier software	Handout
W	Dec	4	Exam review and wrap up	
Final Exam 12/12/2024 @ 3:00 PM - 5:00 PM				

Attendance Policy, Class Expectations, and Make-Up Policy
Class attendance: not mandatory
Make-up Exams: Medical Excuse or Prior Approval

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies. Click here to read the university attendance policies:
https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Homework (10)	20 each	20%
Exam I	100	25%
Exam II	100	25%
Final Exam	100	30%
		100%

Grading Policy

Percent	Grade	Grade Points
93.0 - 100	A	4.00
90.0 - 92.9	A-	3.67
87.0 - 89.9	B+	3.33
84.0 - 86.9	B	3.00
80.0 - 83.9	B-	2.67
77.0 - 79.9	C+	2.33
74.0 - 76.9	C	2.00

70.0 - 73.9	C-	1.67
67.0 - 69.9	D+	1.33
64.0 - 66.9	D	1.00
60.0 - 63.9	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy may be found at:
UF Graduate Catalog
Grades and Grading Policies

Students Requiring Accommodations
Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting https://disability.ufl.edu/students/get-started/. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Course Evaluation
Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

In-Class Recording
Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

University Honesty Policy
UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code.

On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (https://sccr.dso.ufl.edu/process/student-conduct-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Commitment to a Safe and Inclusive Learning Environment

The Herbert Wertheim College of Engineering values varied perspectives and lived experiences within our community and is committed to supporting the University's core values, including the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information, and veteran status.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Your academic advisor or Graduate Coordinator
- HWCOE Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
- Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, pld@ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: https://registrar.ufl.edu/ferpa.html

Campus Resources:

Health and Wellness

U Matter, We Care:

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: https://counseling.ufl.edu, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Discrimination, Harassment, Assault, or Violence

If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or http://www.police.ufl.edu/.

Academic Resources

E-learning technical suppor*t*, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://elearning.ufl.edu/.

Career Connections Center, Reitz Union, 392-1601. Career assistance and counseling; https://career.ufl.edu.

Library Support, http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. https://teachingcenter.ufl.edu/.

Writing Studio, 302 Tigert Hall*,* 846-1138. Help brainstorming, formatting, and writing papers. https://writing.ufl.edu/writing-studio/.

Student Complaints Campus*:* https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/;https://care.dso.ufl.edu.

On-Line Students Complaints*: https://distance.ufl.edu/getting-help/; https://distance.ufl.edu/state-authorization-status/#student-complaint.*