FLORIDA POLYTECHNIC UNIVERSITY

Syllabus: CEG 3101- Foundation Analysis and Design

Course Information

- **Course Number and Title**: CEG 3101 – Foundation Analysis and Design
- **Credit Hours:** 3
- **Academic Term:** Spring 2026
- **Class Meeting Time**: T Th 11:00 – 12:15 pm at WEB 1007

Instructor Information

- **Instructor:** Dr. Sanjeeta N. Ghimire
- **Office Location:** WEB 1023
- **Office Hours**: W, Th, and F 1:00 - 2:00 pm, or by appointment
- **Email address**: sghimire@floridapoly.edu

Course Delivery and Course Description

- **Delivery Mode**: In-Person.
- **Course Website**: https://catalog.floridapoly.edu/preview_program.php?catoid=35&poid=1595
- **Official Catalog Course Description**:
  Introduction to shear strength-based design of foundations and structures in geotechnical engineering. Topics covered include bearing capacity and settlement of shallow foundations, deep foundations, earth retaining structures and slope stability, and testing and analysis of soil for shear strength.

- **Course Pre-Requisites**: CEG 3011C Soil Mechanics
- **Course Co-Requisite**: None
- Communication/Computation Skills Requirement (6A-10.030): None

- **Required Texts and Materials:**
  Principles of Foundation Engineering, 10th ed., by Braja M. Das, Cengage, 2024. ISBN: 978-0-357684672
- **Recommended Text:**
  Foundation Design: Principles and Practices, 3rd ed., by D.P. Coduto, Prentice Hall, 2016. ISBN-13:978-0133411898.

Course Objectives and Outcomes

- **Course Objectives**:
  The objective of this course is to develop students' ability to analyze and design geotechnical foundations and earth-supporting systems. Building on prior knowledge from Soil Mechanics, the course emphasizes the evaluation of subsurface evaluation, soil improvement, and ground modification techniques to enhance foundation performance. Students will also learn methods to analyze bearing capacity and settlement of shallow and deep foundations, design of piles and drilled shafts, and understand lateral earth pressures and earth retaining structures. Numerical modeling software program for geotechnical applications (e.g., GeoStudio) is incorporated to enhance conceptual and practical understanding of the course.

- **Course Learning Outcomes**:
  Students will be able to demonstrate the ability to do the following:

  1. Understand geotechnical soil properties and subsurface exploration methods used in foundation engineering.
  2. Assess the applicability of soil improvement and ground modification techniques for foundation analysis.
  3. Analyze the bearing capacity and settlement of shallow and deep foundations under various loading conditions and design piles and drilled shafts.
  4. Apply principles of lateral earth pressure to analyze earth retaining structures and evaluate the slope stability.
  5. Communicate foundational analyses and design solutions effectively through careful, organized, and well-annotated work (demonstrate in-class performance, homework, quizzes, projects, presentations, and exams with practical engineering and technical explanations).

- Alignment with Program Outcomes:

Student Outcomes
Upon completion of the Civil Engineering Degree, students will possess:
1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Academic Support Resources

- **Library**: Students can access the Florida Polytechnic University Library through the University website and Canvas, on and off campus. Students may direct questions to library@floridapoly.edu.
- **Tutoring and Learning Center:** The Tutoring and Learning Center (The TLC) provides tutoring to all Florida Poly students who may need additional academic support. The TLC is staffed by students who have excelled in the courses they tutor. They offer support by reviewing concepts and materials from class, clarifying points of confusion and providing assistance with learning strategies. While the focus of TLC is to provide support to students in freshman-level courses, upper-level courses are also tutored at the Center. The TLC is located in the IST Commons (second floor).
    - **Knack Tutoring:** Students looking for additional assistance outside of the classroom are advised to consider working with a peer tutor through Knack. Florida Polytechnic University has partnered with Knack to provide students with access to verified peer tutors who have previously aced this course. To view available tutors, visit floridapoly.joinknack.com and sign in with your student account.
- **Academic Success Coaches**: All students at Florida Poly are assigned an Academic Success Coach. Your Academic Success Coach can assist you with academic success strategies. Please visit the Student Success Center on the second floor of the IST building to meet with an Academic Success Coach.
- **Writing Center**: Located on the second floor of the IST (2059/2061), the Writing Center helps students to develop their writing and presentation skills. Consultations are available in person and virtually. For more detail, visit https://floridapoly.edu/writingcenter.

Civility and Collegiality (optional statement)

Faculty and students come to the university for the same reason, which is to participate in a highly professional educational environment. To that end, both students and faculty are expected to treat each other with mutual regard and civility. Communication, written, oral and behavioral, between faculty and students must remain respectful. Within and outside of the classroom, students must refrain from derogatory comments toward the faculty member and their fellow students, and faculty as well must refrain from derogatory comments toward their students. Faculty and students should address each other with respect, in accordance with the wishes of the faculty and the students: for example, no one should be addressed by their last name alone.

Faculty from the outset of a course can and should specify what constitutes activities and behavior that take away from, that diminish, the educational environment. An individual student's distracting behavior impedes the education of fellow students, which itself is a form of disrespect. Civility and collegiality also include respecting each other's time: for example, neither students nor faculty should arrive late to class (unless unforeseen, pressing circumstances prevail); faculty should be present at the posted office hours; and students and faculty should be punctual when meeting times are scheduled. In more general terms, collegiality means respecting the right of both faculty and students to participate fully and fairly in the educational enterprise.

Course Policies

Attendance

- Students in face-to-face (this includes labs and C-courses) courses are expected "to attend all of their scheduled University classes and to satisfy all academic objectives as defined by the instructor" (University Policy, FPU-5.0010AP).
- *A+ Attendance* will be used to track attendance or traditional roll call per the preference of the instructor.
- Students are expected to regularly attend class and are responsible for notes, homework assignments, projects, laboratories, and any exams/quizzes missed if absent. Medical or family emergencies need to be communicated to the instructor as soon as possible, preferably before assignments or exams are due.
- Note: Falsifying attendance for yourself or for another student is an act of academic dishonesty and is considered a violation of the university's academic integrity policy.

Participation

Students are expected to participate in the classroom experience. The use of cellphones, earbuds/headphones during class is specifically not allowed, and students who engage in this behavior may be asked to leave the class for the day (noting exceptions for authorized accommodations). In addition, students who routinely do not bring materials to class that are required for participation will not be given credit for class attendance, and if this becomes a pattern of behavior, they may be asked to leave the class for the day. Persistent problems with participation may result in a code of conduct referral.

Late Work/Make-up work

- Homework that is turned in a day late results in a 10% deduction and an additional 10% thereafter for each day, up to (3) days. For example, a homework assignment that is due on Sunday and turned in the following Wednesday will have a maximum grade of 70%. Late homework will not be accepted beyond that.
- ALL HOMEWORK AND PROJECT DELIVERABLES MUST BE TURNED IN AND POSTED IN CANVAS ASSIGNMENTS TO EARN CREDIT AND RECEIVE A GRADE. IF THE ASSIGNMENT IS NOT POSTED IN CANVAS, A ZERO WILL BE RECORDED FOR THAT ASSIGNMENT.
- Should you have extenuating circumstances, CONTACT YOUR INSTRUCTOR. Your instructor will work with you and others, as needed, in the university community to make the appropriate adjustments. They may, at their discretion, accept a 'past due' assignment, however, YOU must email your instructor and ask them to open the Canvas assignment for you. The instructor retains the right to ask for documentation of your 'extenuating circumstance' before they reopen the assignment. The Canvas Assignment will remain open for 24 hours, after the request has been accepted with a confirmation email from the instructor to the student.

Grading Scale

- Grades will be posted to Canvas for reference only, and students should make sure they are recorded correctly. However, there is no guarantee that the percentages or projected grades provided are correct. The instructor will calculate final percentages and will determine final grades regardless of Canvas calculations.

A	≥93%	B+	≥87%	C+	≥77%	C-	≥70%
A-	≥90%	B	≥83%	C	≥73%	D	≥60%
		B-	≥80%			F	< 60%

Assignment/Evaluation Methods

Activity	Percentage
Attendance and In-Class Participation	5%
Homework	25%
Quizzes	10%
Midterm Exam	15%
Final Project	20%
Final Exam *(Comprehensive)*	25%
Total	100%

- All assignments should be turned in by the due date. Homework will be assigned after every class and is due on Canvas per the specified due date. Usually, you will have one week to complete homework assignments. Be sure to check your Assignments in Canvas, and set your reminders as necessary, for the dates and times that correspond to your class period. Homework will usually be submitted electronically as a Word/PDF file on Canvas.
- It is the student's responsibility to plan their schedules accordingly and ensure sufficient time to complete the weekly tasks. All deliverables, other than those deemed as a team assignment, will be individual, where everyone must **submit their own work**.

University Policies

Reasonable Accommodations

The University is committed to ensuring equal access to all educational opportunities. The University, through the Office of Disability Services (ODS), facilitates reasonable accommodations for students with disabilities and documented eligibility. It is the student's responsibility to self-identify as a student with disabilities and register with ODS to request accommodations.

If you have already registered with ODS, please ensure that you have requested an accommodation letter for this course through the ODS student portal and communicate with your instructor about your approved accommodations as soon as possible. Arrangements for testing accommodations must be made in advance. Accommodations are not retroactive.
If you are not registered with ODS but believe you have a temporary health condition or permanent disability requiring an accommodation, please contact ODS as soon as possible.

The Office of Disability Services (ODS):
DisabilityServices@floridapoly.edu
(863) 874-8770
The Access Point
ODS website: www.floridapoly.edy/disability

Accommodations for Religious Observances, Practices, and Beliefs

The University will reasonably accommodate the religious observances, practices, and beliefs of individuals in regard to admissions, class attendance, and the scheduling of examinations and work assignments. (See University Policy.)

Title IX

Florida Polytechnic University is committed to ensuring a safe, productive learning environment on our campus that prohibits sex discrimination and sexual misconduct, including sexual harassment, sexual assault, dating violence, domestic violence and stalking. Resources are available if you or someone you know needs assistance. You may speak to your professor, but your professors have an obligation to report the incident to the Title IX Coordinator. Please know, however, that your information will be kept private to the greatest extent possible. You will not be required to share your experience. If you want to speak to someone who is permitted to keep your disclosure confidential, please seek assistance from the Florida Polytechnic University Ombuds Office, BayCare's Student Assistance Program, 1-800-878-5470 and locally within the community at Peace River Center, 863-413-2707 (24-hour hotline) or 863-413-2708 to schedule an appointment. The Title IX Coordinator is available for any questions to discussion resources and options available.

Academic Integrity

The faculty and administration take academic integrity very seriously. Violations of academic integrity regulation include actions such as cheating, plagiarism, use of unauthorized resources (including but not limited to use of Artificial Intelligence tools), illegal use of intellectual property, and inappropriately aiding other students. Such actions undermine the central mission of the university and negatively impact the value of your Florida Poly degree. Suspected violations will be fully investigated, possibly resulting in an academic integrity hearing and sanctions against the accused student if found in violation. Sanctions range from receiving a zero on the exam or assignment to expulsion from the university. Repeat offenders are subject to more severe sanctions and penalties.

Recording Lectures

Students may, without prior notice, record video or audio of a class lecture for a class in which the student is enrolled for their own personal educational use. Recordings may not be used as a substitute for class participation or class attendance. Recordings may not be published or shared in any way, either intentionally or accidentally, without the written consent of the faculty member. Failure to adhere to these requirements is a violation of state law (subject to civil penalty) and the student code of conduct (subject to disciplinary action).
Recording class activities other than class lectures, including but not limited to lab sessions, student presentations (whether individually or part of a group), class discussion (except when incidental to and incorporated within a class lecture), and invited guest speakers is ***prohibited****.*

Course Schedule

Schedule of Topics by Week

Spring 2026 – Foundation Analysis and Design Schedule: *Subject to change per course policies.*

Week	Class #	Date	Days	Topic	Assignments
1	**1**	Jan 13	Tuesday	Syllabus and Course Overview	
	2	Jan 15	Thursday	Introduction to Foundation Engineering and Geotechnical Properties of Soil	HW 01
2	**3**	Jan 20	Tuesday	Geotechnical Properties of Soil	HW 02
	4	Jan 22	Thursday	Natural Soil Deposits and Subsoil Exploration	
3	**5**	Jan 27	Tuesday	Natural Soil Deposits and Subsoil Exploration	HW 03
	6	Jan 29	Thursday	Soil Improvement and Ground Modification	
4	**7**	Feb 3	Tuesday	Soil Improvement and Ground Modification	HW 04
	8	Feb 5	Thursday	Quiz 01	Quiz 01
5	**9**	Feb 10	Tuesday	Career Day - No Classes	
	10	Feb 12	Thursday	Shallow Foundations: Ultimate Bearing Capacity	HW 05 (GeoStudio)
6	**11**	Feb 17	Tuesday	Ultimate Bearing Capacity of Shallow Foundations: Special Cases	HW 06 (GeoStudio - GSLOPE)
	12	Feb 19	Thursday	Vertical Stress Increase in Soil	
7	**13**	Feb 24	Tuesday	Settlement of Shallow Foundations	HW 07 (GeoStudio – GSLOPE/QUAKE/W)
	14	Feb 26	Thursday	Settlement of Shallow Foundations	
8	**15**	Mar 3	Tuesday	Midterm Exam Review	
	16	Mar 5	Thursday	Midterm Exam	Midterm Exam
		Mar 9	Monday	-----	Midterm Grades Due
9	**17**	Mar 10	Tuesday	Mat Foundations	HW 08
	18	Mar 12	Thursday	Mat Foundations	
10		Mar 16 - 20	Mon - Fri	Spring Break – No Classes	
11	**19**	Mar 24	Tuesday	Pile Foundations	HW 09
	20	Mar 26	Thursday	Pile Foundations	
12	**21**	Mar 31	Tuesday	Quiz 02	Quiz 02
	22	Apr 2	Thursday	Final Project Introduction	
13	**23**	Apr 7	Tuesday	Drilled-Shaft foundations	HW 10
	24	Apr 9	Thursday	Lateral Earth Pressure	HW 11 (GeoStudio – GSLOPE/SIGMA/W)
14	**25**	Apr 14	Tuesday	Retaining Walls	HW 12 (GeoStudio – GSLOPE/SIGMA/W)
	26	Apr 16	Thursday	Retaining Walls	Final Project Submission Due
15	**27**	Apr 21	Tuesday	Final Project Presentation	Final Project Presentation in Class

	28	Apr 23	Thursday	Final Project Presentation	Final Project Presentation in Class
16	**29**	Apr 28	Tuesday	Last Day of Classes	Final Project Report Submission Due
		Apr 29 – May 1	Wed - Fri	Reading Days – No Classes	
		May 4-8		**Final Exams**	**Exam Day and Time to be Notified**

For University's Important Dates: https://floridapoly.edu/academics/academic-calendar/index.php