JOHN A. REIF, JR. DEPARTMENT OF
CIVIL AND ENVIRONMENTAL ENGINEERING

NJIT New Jersey Institute of Technology

CE 742 – 101 - Geotechniques of Earthquake Engineering Fall 2025

Course Description: Explains the fundamentals of propagation of the earthquakes through soils to supporting structures and the use of computer programs for the solution of boundary value problems in soils. The first half is devoted to synthesis of earthquakes, mathematical formulation of the problem, measurement of applicable soil parameters, and use of computer programs to solve 1-D wave propagation problems in soils with structures. The second half is devoted to soil liquefaction, soil-structure interaction, and design of machine foundations.

Co-requisite or Pre-requisite: CE 341 within last five years

Instructor: **Jay N. Meegoda**
Office: Colton 221
Office Hours: W 4-6PM
Email: Meegoda@njit.edu

Suggested Text: Geotechnical Earthquake Engineering by Steven L. Kramer, ISBN # 0133749436, Prentice-Hall, Englewood Cliffs, NJ

Course Sections: 101

Meeting	Dates	Topic/*Assignment*
1	9/4/25	Introduction to Earthquakes
2	9/11/25	1D Vibration
3	9/18/25	1D Vibration
4	9/25/25	Response Spectra
5	10/2/25	Site specific Response Spectra & Ground Motion
6	10/9/25	SHAKE
7	10/16/25	Site-specific Analysis
8	10/23/25	Midterm
9	10/30/25	Soil Liquefaction
10	11/6/25	Soil Liquefaction and Site-specific Analysis
11	11/13/25	Design of Machine Foundations
12	11/20/25	Design of Slopes subjected to earthquakes
13	12/4/25	Design of Retaining Walls subjected to earthquakes
14	12/11/25	Soil Improvement or term project presentation
15	12/20/25	Final Exam

Grading Policy: 25% Homework, 25% Design Project 25% Mid-term, 25% Final

Grading Scale:

A: 100-90
B+: 89-85
B: 84-80
C+: 79-75
C: 74-70
D: 69-60
F: Below 60

Attendance Policy: Attendance to each class is mandatory.

Withdrawals: In order to ensure consistency and fairness in application of the NJIT policy on withdrawals, student requests for withdrawals after the deadline will not be permitted unless extenuating circumstances (e.g., major family emergency or substantial medical difficulty) are documented. The course Professors and the Dean of Students are the principal points of contact for students considering withdrawals.

NJIT Honor Code: ***Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf.***

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. ***Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university.*** *If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu*

Assignment Policy: There will be weekly assignments.

Syllabus Information: The dates and topics of the syllabus are subject to change; however, students will be consulted with and must agree to any modifications or deviations from the syllabus throughout the course of the semester.

Email Policy: All correspondence will be via email.

Items Required for this Course: Attendance, Weekly homework, midterm, final and term paper.

Dress Policy: As per NJIT requirements

AI Usage: Students are not permitted to use AI tools in this course.

Outcomes Course Matrix –

Strategies and Actions and Assignments	ABET Student Outcomes (1-7)	Program Educational Objectives	Assessment Measures
Student Learning Outcome 1:			
Students will learn and apply seismic concepts in site specific designs	1,2,6,7	1,2	Homework, exams and term paper
Student Learning Outcome 2:			
Students will learn and apply soil liquefaction concepts in site specific designs	1,2,6,7	1,2	Homework, exams and term paper
Student Learning Outcome 3:			
Students will learn and apply slope and retaining wall failure and machine foundation design concepts in site specific designs	1,2,6,7	1,2	Homework and exams.

CEE Mission, Program Educational Objectives and Student Outcomes

The mission of the Department of Civil and Environmental Engineering is:

- to educate a diverse student body to be employed in the engineering profession
- to encourage research and scholarships among our faculty and students
- to promote service to the engineering profession and society

Program Educational Objectives

Our **Program Educational Objectives** are reflected in the achievements of our recent alumni:

1. **Engineering Practice:** Alumni will successfully engage in the ethical practice of civil engineering within industry, government, and private practice, working towards safe, practical, resilient and sustainable solutions in a wide array of technical specialties including construction, environmental, geotechnical, structural, transportation, and water resources.

2. **Professional Growth:** Alumni will advance their technical and interpersonal skills through professional growth and development activities such as graduate study in engineering, research and development, professional registration and continuing education; some graduates will transition into other professional fields such as academia, business, and law through further education.

3. **Service:** Alumni will perform service to society and the engineering profession through membership and participation in professional societies, government, educational institutions, civic organizations, charitable giving and other humanitarian endeavors.

Student Outcomes

Our **Student Outcomes** are what students are expected to know and be able to do by the time of their graduation:

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 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 conclusion

7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Updated 8/2025