



## CE 456 – Geotechnical Earthquake Engineering

**Code and Name:** CE 456 – Geotechnical earthquake engineering

**Credit Hours:** 3 (Lecture: 3, Tutorial: 1)

**Textbook:**

- Principles of Soil Dynamics: Das, B.M., & Ramana, G.V., 2nd Edition, Cengage Learning, 2010

**Other References:**

- Towhata, I. *Geotechnical Earthquake Engineering*, Springer, 2008.

- Look, B. J., *Handbook of Geotechnical Investigation & Design Tables*, Taylor & Francis, 2007.

**Course Description:**

Introduction to earthquake engineering, Basic earth features and earthquake principles, Common earthquake effects/damages, Site investigation for geotechnical earthquake engineering, Liquefaction, bearing capacity of foundations, Retaining wall and slope stability analysis, Seismic micro-zonation, Site improvement methods to mitigate earthquake effects.

**Pre-requisites:** CE451 Foundation Engineering

**Co-requisites:** None

**Course Learning Outcomes:**

With relation to ABET Student Outcomes (From Fall 2019-SOs: 1-7)

1. Analyze and interpret site investigations techniques for seismic hazard analysis (6)
2. Apply the principles of site improvement methods to mitigate earthquake effects (1)
3. Explain the importance of soil dynamic / earthquake engineering in geotechnical analysis and design (1)
4. Develop relationships between physical and mechanical characteristics of soils under dynamic loads (1)
5. Analyze and interpret dynamic response of various geosystems (6)
6. Apply modelling techniques commonly used in geotechnical earthquake engineering (2)

**Topics to be covered:**

- Introduction to earthquake engineering
- Site investigations for seismic hazard analysis
- cyclic response of soils, wave propagation through soil and local site effects
- Soil liquefaction
- Introduction to seismic analysis of bearing capacity of foundations
- Introduction to seismic analysis of retaining walls
- Introduction to seismic analysis of slope stability
- Site improvement methods to mitigate earthquake effects

**Grading Policy:**

The grading for the course is: 60% coursework and 40% Final Exam. The course work consists of two Midterm Exams, where each midterm exam is worth 20%. It also includes quizzes, and projects for the remaining 20% that is modified by the course instructor.

