1. *Course number and name*

**ENGR 837: Geotechnical Earthquake Engineering**

1. *Credits and contact hours*

3 credit hours; one 2-hr-45-minute lecture/week

1. *Instructor’s or course coordinator’s name*

Instructor: Timothy B. D’Orazio, Professor of Civil Engineering

Course coordinator: Timothy B. D’Orazio, Professor of Civil Engineering

1. *Text book, title, author, and year*

Kramer, Steven L., Geotechnical Earthquake Engineering, First edition, Prentice-Hall, 1996.

1. *Specific course information*
2. *brief description of the content of the course (catalog description)*

Vibration analysis of discrete and continuous systems. Earthquake engineering. Dynamic soil properties. Deterministic and probabilistic ground response analysis. Evaluation and mitigation of liquefaction hazards.

1. *prerequisites or co-requisites*

Restricted to graduate Civil Engineering students or permission of the instructor.

1. *indicate whether a required, elective, or selected elective course in the program*

Elective Course for Civil Engineering.

1. *Specific goals for the course*
2. *Specific outcomes of instruction.*

* Student can perform fundamental vibration analyses.
* Student can interpret the causes and effects of earthquakes.
* Student can perform ground response analyses.
* Study can identify ways damping can be modeled.
* Student can evaluate and remediate liquefaction hazards.

1. *explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.*

ABET Student Outcome(s): 1, 2, 3, 5, 7

1. *Brief list of topics to be covered*

* Analyzing single degree of freedom mass-spring-dashpot systems.
* Analyzing multiple degree of freedom mass-spring-dashpot systems.
* Using the wave equation in homogeneous soil.
* Calculating response spectra.
* Calculating Fourier spectra.
* Estimating ground motion parameters using empirical equations.
* Stiffness, damping and hysteresis in soils.
* Field measurements of dynamic soil properties.
* Lab measurements of dynamic soil properties.
* Evaluating liquefaction potential.
* The basic axioms of probability and an introduction to their use in geotechnical earthquake engineering.