1. *Course number and name*

**ENGR 833: Principle of 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: Cheng Chen, Professor of Civil Engineering

Course coordinator: Cheng Chen, Professor of Civil Engineering

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

Chopra, A.K., Dynamics of Structures: Theory and Applications to Earthquake Engineering, 6th Edition, Pearson Prentice Hall, NJ, 2023.

*Recommended Resources:*

Lindeburg, Michael R., and Kurt M. McMullin. Seismic Design of Building Structures. 9th ed. Professional Publications, Inc. Belmont, CA, 2008

Recommended Lateral Force Requirements and Commentary by Structural Engineers Association of California, Seventh Edition, 1999

Hart, G. C. & Wong, K., Structural Dynamics for Structural Engineers, Wiley & Sons, Inc., 1999

Farzad Naeim, The Seismic Design Handbook, Second Edition, Kluwer Academic Publishers, 2001

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

Structural dynamics of single and multi-degree of freedom systems. Applications to earthquake analysis, response, and design of structures. Introduction to characterization of earthquake ground motions, development of response spectra, and effects of local site conditions on spectra. Introduction to seismic damage to buildings.

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 analyze SDOF and MDOF systems and derive their equations of motion.
* Student can solve for the responses of SDOF and MDOF systems for a variety of excitations using analytical and numerical solutions.
* Student can establish and utilize the response spectra to determine the peak responses of SDOF and MDOF systems.
* Study can identify ways damping can be modeled.
* Student can conduct dynamic analysis and calculate responses of systems to earthquake motions.
* Student can determine responses of structures deforming into their inelastic range (SDOF).
* Student can apply the response spectrum method to estimate responses of MDOF structures

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, 6, 7

1. *Brief list of topics to be covered*

* Earthquakes and consequences for engineers
* Mitigation of Seismic Hazards
* Principle of Structural Dynamics
* Ground Motions and Their Effects
* Dynamic Properties of Earthquakes
* Seismic Response of Buildings and Sites.