CE 518 EARTHQUAKE ENGINEERING
Spring 2025-2026

Instructor: *Dr. Cemalettin Dönmez*
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Classes: Wednesday 9:45-12:30

Recommended
Texts: - Earthquakes, Bruce A. BOLT, Freeman
- Seismic Design of Reinforced Concrete Buildings, Jack MOEHLE, McGraw Hill, 2014
- The Seismic Design Handbook, Farzad NAEIM, Kluwer Academic Publishers
- Basic Earthquake Engineering, Haluk SUCUOĞLU, Sinan AKKAR, Springer, 2014
- Geotechnical Earthquake Engineering, Steven L. KRAMER, Prentice Hall
- Earthquake Engineering From Engineering Seismology to Performance Based Design,
  Yousef BOZORGNIA, Vitelmo V. BERTERO, CRC Press
- Dynamics of Structures, Anil K. CHOPRA

Tentative Course Outline:
1. **Introduction**
2. **Causes and Results of Earthquakes on Earth Crust**
   Structure of the Earth, Tectonic Plates, Faults and its types, Seismic Waves, Effects of EQ
3. **Response of SDOF Systems to EQ Excitation**
4. **Earthquake Response and Design Spectra**
5. **Response of MDOF Systems to EQ**
   Vibration Modes, Orthogonality, Modal Expansion of Displacements, Solution of Equation of Motion under EQ excitation, Modal Superposition
6. **Analysis Procedures and Seismic Design of Building Structures**
   Dynamic Degrees of Freedom, Dynamic Parameters of a Building, Equivalent Static Lateral Load Procedure, Modal Response Spectrum Analysis, Nonlinear Static Analysis (Pushover), Structural Irregularities, Drift and Base Shear
7. **Seismic Design of Reinforced Concrete Structures**
   Basis of Design, Seismic Demand, Ductile and Brittle Response, Capacity Design, Performance Requirements

Grading:

Assignments	(7x9)	63%
Final		40%
Total		103%

NOTES: Students will be required to read a sizable amount of literature. These documents are mostly provided by the instructor. You are assumed to be familiar with the basic principles of structural dynamics, spreadsheet software, basic programming, and structural analysis tools both in static and dynamic modes. There will be a limited application with a nonlinear analysis tool OPENSEES. Several related areas of study will be connected in the course context, and you will gain the ability to analyze and design structural systems for ground motions.