

CARLETON UNIVERSITY
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

CIVE 5104

Winter 2016

Earthquake Engineering and Analysis

Course Outline

1. Multi-degree-of-freedom (MDOF) Systems:
 - Reviews (optional): equations of motion; eigenvalue problem, frequencies, mode shapes; mode superposition method; etc.
 - Eigenvalue problem: influence of axial forces.
 - Mode superposition: static correction; mode acceleration.
 - Extended Ritz (Lanczos) coordinates
2. Analysis of Structural Response to Earthquake:
 - Deterministic analysis of earthquake response, excitation by rigid-base translation or rotation.
 - Direct time-step integration method
 - Multiple support excitation
 - Earthquake forces in building codes
 - Response spectra: elastic and inelastic response spectra.
3. Response Analysis via Frequency Domain
4. Concepts and Practices of Earthquake Resistant Analysis and Design for Buildings and Bridges
5. System identification techniques for structural evaluation

Reference Texts

1. Clough, Penzien, "Dynamic of Structures", McGraw-Hill, 1993.
2. Humar, "Dynamics of Structures", Prentice Hall, 2001.
3. Chopra, "Dynamics of Structures", Prentice Hall, 2001.
4. Cheng, "Matrix Analysis of Structural Dynamics", 2001.
5. Newmark, Rosenblueth, "Fundamentals of Earthquake Engineering", Prentice Hall.
6. Berg, Glen V., "Elements of Structural Dynamics", Prentice Hall.

Grades:	Assignments/Research paper	50%
	Final exam	50%

Course Instructor: D.T. Lau, Room 3436 ME