PONTIFICIA UNIVERSIDAD CATÓLICA DE CHILE
SCHOOL OF ENGINEERING
DEPARTMENT OF STRUCTURAL AND GEOTECHNICAL ENGINEERING
ABET COURSE SYLLABI

ICE2703 EARTHQUAKE ENGINEERING

Credits and contact hours:	10 UC credits / 10 hours (3h. Lecture; 3h. Assistantship; 4h. Independent learning experiences)
Instructor's name:	Diego Lopez-García
Course coordinator's name	Diego Lopez-García
Textbook:	Chopra AK (2011): Dynamics of structures. 4th edition, Pearson Prentice-Hall, New Jersey, USA.
Course Catalog Description:	The course addresses the problem of formulating and solving the equations of movement of a second order dynamic system using the basic principles of analytical mechanics and the traditional formulation based on the dynamic equilibrium equations. The emphasis is on applications where the stress corresponds to seismic action. Simple systems with one degree of freedom and several degrees of freedom with practical applications to structural systems are considered.
Prerequisite Courses:	ICE2114 Structural analysis I
Co-requisite Courses:	None
Status in the Curriculum:	Required
Course Learning Outcomes:	1. Formulate the dynamic equations of mechanical and structural systems. 2. Understanding the dynamic response of one and several degrees of freedom structures. 3. Knowing the main aspects of the seismic response of structures. 4. Knowing the techniques to integrate in time the dynamic response of discrete systems.
Relation of Course to ABET Criteria:	a. Knowledge of mathematics, science and engineering b. Design and conduct experiments: analyze and interpret data c. Design a system, component, or process e. Identify, formulate, and solve engineering problems k. Techniques, skills, and modern tools for engineering practice.

Topics covered:

1. Fundamentals of Newtonian and analytical mechanics.
   1.1. Newtonian mechanics.
   1.2. Virtual Work Principle and D'Alembert.
   1.3. Hamilton Principle and Lagrange equations.
2. One degree of freedom systems.
   2.1. Description of the problem and solving methods.
   2.2. Free vibration.
   2.3. Response to harmonic excitation.
   2.4. Response to pulses.
   2.5. Numerical evaluation of the dynamic response.
   2.6. Seismic response of linear systems.
3. Several degrees of freedom systems.
   3.1. Description of the problem and solving methods.
   3.2. Free vibration.
   3.3. Damping in structures.
   3.4. Dynamic analysis and response of linear systems.
   3.5. Seismic analysis of linear systems.
   3.6. Response of structures with non-classical damping.
   3.7. Degrees of freedom reduction.
   3.8. Finite elements in dynamics.