



Course Code CVEE-321	Course Title Structural Dynamics	ECTS Credits 6
Department Engineering	Semester Fall, Spring	Prerequisites MATH-280, CVEE-320
Type of Course Required	Field Civil & Environmental Engineering	Language of Instruction English
Level of Course 1 st Cycle	Year of Study 3 rd	Lecturer(s) Dr Panayiotis Polycarpou
Mode of Delivery Face-to-face	Work Placement N/A	Co-requisites None

Objectives of the Course:

The main objectives of the course are:

1. To develop an understanding regarding the response of structures under dynamic loading, emphasizing on seismic actions.
2. To provide the fundamental knowledge in the field of earthquake engineering
3. To introduce the methods for analytical and numerical formulation of typical structural dynamic problems

Learning Outcomes:

After completion of the course students are expected to:

- Identify the dynamic degrees of freedom of a structure and distinguish them from static degrees of freedom
- To know the meanings of free vibration, eigen-frequency, damping
- To be able to formulate the equation(s) of motion of a given dynamic system
- To be able to compute the dynamic properties for a given SDOF system and evaluate its dynamic response in both analytical and numerical manner
- To be able to compute the mass, stiffness and damping matrices of a MDOF system
- To know the basic methods of evaluating the dynamic response of MDOF systems
- To be able to perform response spectrum analysis for a given MDOF system

Course Contents:

Single degree of freedom (SDOF) systems: Dynamic loading, Inertia forces, Dynamic degrees of freedom, Equation of motion, Free vibration, Damping, Harmonic and periodic excitations of without and with damping, the various methods for the analytical and numerical evaluation of the dynamic response, seismic excitations, response spectrum

Multi degree of freedom (MDOF) systems: Equations of motion, Mass and stiffness matrices, the single-story building, Free vibration, Natural frequencies and mode shapes, Rayleigh damping matrix, Forced vibration, base excitations, evaluation of the response of MDOF systems: modal analysis, response spectrum analysis, direct integration methods.

Learning Activities and Teaching Methods:

Lectures, in-class examples and exercises, Homework assignments

Assessment Methods:

Homework assignments, mid-term exam(s), final exam.

Required Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
Anil K. Chopra	Dynamics of Structures, 4th Edition	Prentice Hall	2011	978-0132858038

Recommended Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
Ray W. Clough and Joseph Penzien	Dynamics of structures, 2nd edition	McGraw-Hill	1993	0-07-011394-7