**CIVL 7116/8116**

**STRUCTURAL DYNAMICS**

**Spring 2023**

**THE UNIVERSITY OF MEMPHIS**

Instructor's Name: Dr. Shahram Pezeshk; Office ES104A; Phone: 678-4727

Email: spezeshk@memphis.edu

Date: January 17, 2022

Hours Credit: 3 Semester Hours

Office Hour: Open door policy, 2-4 PM MW

Course Meetings: 8:00-9:25 AM, MW; Room ES116

Textbook: Dynamics of Structures; Theory and Applications to Earthquake Engineering, by Anil Chopra, Prentice Hall, 5th Edition.

Recommended Textbooks:

* Structural Dynamics; Theory and Computation by Mario Paz, Van Nostrand Reinhold
* Dynamics of Structures, by Ray W. Clough and Joseph Penzien, McGraw Hill.
* Structural Dynamics, Theory and Application, J.W. Tedesco, W.G. McDougal, and C.A. Ross, Addison Wesley.
* Dynamics of Structures, by J.L. Humar, Prentice Hall.

**COURSE DESCRIPTION**

Dynamic analysis of single-degree-of-freedom structures, response to general dynamic loading, modal analysis of multistory shear buildings, introduction to nonlinear and random vibration.

**GRADING**

The final grades for the course will be based on the following percentages:

Homework 30%

Exams 40%

Final Exam 30%

---

100%

**ATTENDANCE**

Regular attendance is necessary to maintain pace with the lectures and the progress of the class. If you must be absent, please make sure you know the assignment for the following class meeting and turn in any work due that day.

**MAKE-UP WORK**

Generally, if a student misses an exam or a homework assignment a score of zero will be awarded. However, the student may be allowed to make-up an exam or turn in his/her homework late if a valid reason for the absence is presented to the instructor at the next class meeting. If the student must miss an exam because of a conflict in his/her schedule the student must notify the instructor in writing at least two days prior to the absence. Late homework problems will receive only a maximum of 50% of the grade.

**COURSE OUTLINE**

1. Introduction to the course

2. Single-Degree-of-Freedom (SDOF) Systems

* Equations of Motion: Basic SDOF System
* Free Vibration Response
* Response to Harmonic Excitation
* Response to Periodic Excitation
* Response to Impulsive Force
* Response to Arbitrary Dynamic Force
  + Linear Systems
  + Nonlinear Systems
* Fourier Analysis and Response in the Frequency Domain
* Generalized Coordinates and Rayleigh's Method
* Response to Earthquake Ground Motion & Earthquake Response Spectrum
  + Linear Systems
  + Nonlinear Systems

3. Multiple-Degree-of-Freedom (MDOF) Systems (Lumped Parameter)

* Equations of Motion
* Free Vibration Response
* Computation of Natural Frequencies and Modes of Vibration
* Modal Analysis of Dynamic Response
* Damped Motion of Shear Buildings
* Time History Response of MDOF Systems
* Dynamic Analysis of Systems with Distributed Properties
* Random Vibration

**Tentative Exam Times**

First Day of Classes: **January 17, 2023 / Tuesday**

February 21, 2023, Exam 1

**March 6-12, 2023 / Monday-Sunday** Spring Break

April 11, 2023 Exam 2

**April 16-20, 2023 No Class – I will be out of town**

**April 26, 2023 / Wednesday** Last Day of Classes:

**April 27, 2023 / Thursday** Study Day

May 2, 8:00 - 10:00a Final Exam