

**The University of Texas at El Paso**  
**College of**  
**Department of**  
**Syllabus**

**Course Prefix and Number:** AERO 4335

**Course Title:** Structural Dynamics

**Credit Hours:** 3

**Prerequisite Courses:** MECH 2340 and MECH 2342 both with C or better.

**Course Description:** This course is designed to introduce the students to aerospace structural dynamics. Many aerospace structures are subjected to time-varying loadings, including impact and cyclic excitations. Dynamic response to these loadings can have a character very different from static response. This dynamic behavior must be anticipated in the design of the structure if its performance is to be satisfactory.

**Learning Outcomes:**

1. Students will develop models of physical systems and represent them using standard lumped parameter components-free body diagrams.
2. Students will develop and solve the governing systems of differential equations of motion.
3. Students will calculate natural frequency and damping ratio of a single-degree-of-freedom (1-DOF) physical system.
4. Students will predict forced vibration response of a 1-DOF system.
5. Students will calculate the natural frequencies (eigenvalues) and mode shapes (eigenvectors) of a multi-degree-of-freedom physical system
6. Students will predict forced vibration response of a multi-degree-DOF systems.
7. Students will compute natural frequencies and modes of beams and plates.

**Required Materials:** Fundamentals of Vibrations by Leonard Meirovitch, Waveland Press, Inc., 2010, ISBN 1577666917.

**Course Schedule:**

1. Introduction, review of dynamics.
2. Free vibration of single-degree-of-freedom (SDOF) systems.
3. SDOF response to harmonic and periodic excitations.
4. SDOF response to nonperiodic excitations.
5. Two-degree-of-freedom (2DOF) systems.
6. Analytical dynamics, multi-degree-of-freedom (MDOF) systems.
7. Distributed-parameter (continuous) systems.