

ME 419: Mechanical Vibrations
Fall or Spring Semester Elective

Type (check one): Required: _____ Elective: ✓

2005-2006 Catalog Data: Fundamentals of vibration theory applied to mechanical systems. Undamped and damped, single and multiple degree of freedom, vibrating systems. Steady state analysis of free and forced vibrations; critical speeds and balancing, vibration isolation, instrumentation. *One semester; three credits*

Prerequisites: ME 202, MATH 231

Co-Requisites: None

Textbook: Engineering Vibration, 2nd Ed, Daniel J. Inman, Prentice-Hall

Other Required Materials: None

Other References: None

Instructor: Dr. Ray W. Brown, Professor of Mechanical Engineering

Course Objectives:

1. Introduction to the nature of vibrating systems
2. Develop understanding of how vibrations may be measured and reduced in engineering practice

Prerequisites by Topics:

1. Differential and integral calculus
2. Solutions of linear differential equations
3. Particle and rigid body dynamics
4. Matrix algebra
5. Strength of materials

Topics:

1. Introduction
2. Elements of vibrating systems
3. Free vibrations of one-degree-of-freedom systems
4. Harmonic excitation of one-degree-of-freedom systems
5. Transient vibrations of one-degree-of-freedom systems
6. Vibration control
7. Multi-degree-of-freedom-system derivation of governing equations
8. Multi-degree-of-freedom systems
9. Vibrations of continuous systems

Class Schedule: Two 75-minute sessions per week

Prepared by: Dr. Ray W. Brown

Date: 23-Aug-05

**Professional Component:
ME 419 – Mechanical Vibrations**

Category (check one)	<input type="checkbox"/> Math/Basic Science <input checked="" type="checkbox"/> Engineering <input type="checkbox"/> General Education <input type="checkbox"/> Other
Design (check one)	<input checked="" type="checkbox"/> Significant <input type="checkbox"/> Some <input type="checkbox"/> None
Realistic Constraints (check all that apply)	<input checked="" type="checkbox"/> Economic <input checked="" type="checkbox"/> Environmental <input type="checkbox"/> Sustainability <input checked="" type="checkbox"/> Manufacturability <input type="checkbox"/> Ethical <input checked="" type="checkbox"/> Health & Safety <input checked="" type="checkbox"/> Social <input type="checkbox"/> Political

Relationship to Program Outcomes:

Check all that apply:

- (a) an ability to apply knowledge of mathematics, science, and engineering
- (b) an ability to design and conduct experiments, as well as to analyze and interpret data
- (c) an ability to design a system, component, or process to meet desired needs
- (d) an ability to function on multi-disciplinary teams
- (e) an ability to identify, formulate, and solve engineering problems
- (f) an understanding of professional and ethical responsibility
- (g) an ability to communicate effectively
- (h) the broad education necessary to understand the impact of engineering solutions in a global and societal context
- (i) a recognition of the need for and an ability to engage in life-long learning
- (j) a knowledge of contemporary issues
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice