PURDUE UNIVERSITY FORT WAYNE | Department of Civil and Mechanical Engineering

Course	ME 56300 – Mechanical Vibrations
Type of Course	Required for MSE-ME concentration
Catalog Description	Review of systems with one degree of freedom. Lagrange's equations of motion for multiple degree of freedom systems. Introduction to matrix methods. Transfer functions for harmonic response, impulse response, and step response. Convolution integrals for response to arbitrary inputs. Principle frequencies and modes. Applications to critical speeds, measuring instruments, isolation, torsional systems. Introduction to nonlinear problems.
Credits	3
Contact Hours	3
Prerequisite Courses	ME25100, Graduate Standing
Corequisite Courses	None
Prerequisites by Topics	Dynamics, Calculus, Differential Equations, Linear Algebra
Textbook	L. Meirovitch, *Fundamentals of Vibrations*, McGraw-Hill, current edition.
Course Objectives	To introduce intermediate vibration theory, its applications, and analysis techniques.

Course Outcomes

Students who successfully complete this course will be able to:

1. identify vibration problems of a mechanical system, **(1, 7)**
2. construct a mathematical model and find analytical/numerical solutions, **(1, 7)**
3. implement the solutions to improve the design and performance of the system. **(1, 7)**

Lecture Topics

1. Review of systems with one degree of freedom
2. Lagrange's equations of motion for multiple degree of freedom systems
3. Principle frequencies and modes
4. Transfer functions for harmonic response, impulse response, and step response analysis
5. Convolution integrals for response to arbitrary inputs

6. Distributed parameter systems
7. Approximation techniques
8. Introduction to nonlinear problems

Computer Usage   Low

Laboratory Experience   None

Design Experience   Low

Coordinator   Bongsu Kang, Ph.D.

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