

# ME 408 – Intermediate Vibrations, Fall 2008

- Instructor:** Thomas J. Royston, Professor, Mechanical & Industrial Engineering, troyston@uic.edu
- Time & Place:** MW 9:30 – 10:45 PM, 3290 SEL
- Textbook:** A. A. Shabana, Vibration of Discrete and Continuous Systems, 1997, Springer-Verlag, New York (2<sup>nd</sup> ed.)
- Other references:** T. J. Royston, ME 408 Course Notes, – PDF email attachments and handouts  
Some supplementary material will be available on website at <http://acoustics.mie.uic.edu/website/teaching/me408.html>
- Call #:** 28666 U.G. 3 hours, 28667 Grad. 4 hours
- Prerequisites:** ME 308 or Graduate Standing in ME Program
- Prerequisite for:** ME 508, Engineering Acoustics; ME 535, Advanced Vibrations

## Topics Covered:

- 1. Introduction – Review of SDOF Theory:** Free vibration of single degree of freedom systems, damped vibration of single degree of freedom systems, forced vibrations, transfer functions
- 2. Deriving the Equations of Motion:** Generalized coordinates, virtual work, D'Alembert's principle, Lagrange's equation, kinetic energy, strain energy, energy vs. vector methods
- 3. Discrete (Lumped Parameter) Systems - Multi-degree of Freedom Theory:** Equations of motion, applications, undamped free vibration, orthogonality of the mode shapes, rigid-body modes, conservation of energy, forced vibration of the undamped systems, viscously damped systems
- 4. Continuous (Distributed) Systems:** Longitudinal vibrations, torsional vibrations, transverse vibrations of strings and beams, orthogonality of the eigenfunctions
- 5. Experimental Methods:** Fourier Analysis and signal processing issues, transducers, modal analysis, etc. Some hands-on experience in the lab with state-of-the-art vibration instrumentation.

## Grading:

Homework - <i>assigned in class - due week later beginning of class</i>	25 %
Exam #1 - Week 7, <i>Wednesday, October 8</i> - on material covered through Week 6	20 %
Exam #2 - Week 13, <i>Wednesday, November 19</i> - on material covered through Week 12	20 %
Final Exam – Cumulative	35 %

## Fall Semester 2008

August 25, M	Instruction begins.
September 1, M	Labor Day holiday. No classes.
September 5, F	Last day to complete late registration; last day to add a course(s) or make section changes; last day to drop individual courses without receiving W (withdrawn) grade on academic record via <i>Student Self Service</i> .
October 3, F	Last day for undergraduate students to use optional late drop in college office and receive grade of W on academic record.
November 27–28, Th–F	Thanksgiving holiday. No classes.
December 5, F	Instruction ends.
December 8–12, M–F	Final examinations.