Mechanical Engineering Dept. Department

Syllabus
ME 482: Mechanical Vibrations (3-0-3)

Course Catalog Description:

Free and forced vibrations. Applications to systems with one, two, and multi-degree of freedom. Viscous, hysteretic, and Coulomb damping. Response to general periodic excitations. Transient vibration and the phase method. Principal and coupled coordinates. Dynamic vibration absorbers. Energy methods and Rayleigh's principle

Course Objectives:

1. Teach students the fundamental concepts and modeling methodologies for vibrating mechanical systems.
2. Teach students methods for analyzing vibration responses in time domain and frequency domain.

Course Learning Outcomes:

CLO1. Students shall gain understanding of the fundamental concepts in vibrations

CLO2. Demonstrate ability to derive mathematical models in vibration.

CLO3. Demonstrate ability to identify dynamic characteristics – e.g. natural frequency, period, damping, resonance, beating.

CLO4. Demonstrate ability to identify free response, forced response, transient, and steady state response.

Learning Resources:

- 1) (MATLAB Tutorial sessions delivered to students + handout) ===> for solving problems

Lecture Assessment Plan:

Assessment Task	Week Due	Weight
HW	bi-weekly	7.0%
Quizzes	bi-weekly	8.0%
Final Exam	Registrar (TBA)	30.0%
Exam (II)	week (11 or 12)	25.0%

Assessment Task	Week Due	Weight
Term Project	week 15	10.0%
Exam (I)	week (7 or 8)	20.0%

Lecture Weekly Schedule:

Week#	Topics
1	Introduction to vibration
2	Free vibration of single degree of freedom (SDOF) systems (Undamped, Damped)
3	Free vibration of single degree of freedom (SDOF) systems (Undamped, Damped) (Continue)
4	Harmonic excitation of SDOF systems (Frequency and Time Domain)
5	Harmonic excitation of SDOF systems (Frequency and Time Domain) (Continue)
6	Harmonic excitation of SDOF systems (Frequency and Time Domain) (Continue)
7	Harmonic excitation of SDOF systems (Frequency and Time Domain) (Continue)
8	Transient vibrations of SDOF systems (Time Domain)
9	Transient vibrations of SDOF systems (Time Domain) (Continue)
10	Transient vibrations of SDOF systems (Time Domain) (Continue)
	Free vibration of multi degree of freedom (MDOF) Systems
11	Free vibration of multi degree of freedom (MDOF) Systems (Continue)
12	Free vibration of multi degree of freedom (MDOF) Systems (Continue)
13	Free vibration of multi degree of freedom (MDOF) Systems (Continue)
14	Forced vibrations of MDOF Systems
15	Forced vibrations of MDOF Systems (Continue)
	Applications