PME 3320 Mechanical Vibrations

Instructor:

Ming-Huang Li

Objectives:

This course is aimed to deliver the basic concept of dynamic vibration analysis to the undergraduate students, including some advanced topics such as multi-degree-of-freedom systems and vibration of bars and beams. The topic covers the mathematical description on the one- and multi-degree-of-freedom systems, free and forced vibration systems, and continuous vibration system.

Language:

This course is offered in English, but some important concepts will be repeated in Taiwan Mandarin.

Prerequisites (Suggested):

Dynamics, Mechanics of Materials, Engineering Mathematics

Grading:

Assignments and Quiz **(30%)** [including computer-aided homework]

Exams (Mid-term & Final Exams) **(55%)**

Hands-on Experiments and Term Projects **(15%)**

Textbook:

Singiresu S. Rao, *Mechanical Vibrations, 6th Edition (SI Units)*, Pearson. (ISBN 9781292178608)

Course Outline:

This is a *tentative outline* of the course. The progress and content of the course will be adjusted based on student's feedback.

Introduction and review	1. Introduction 2. Fundamentals of vibration 3. Review of basic math skills
Vibration of 1DOF Systems	1. Free vibration of One DOF systems 2. Harmonically excited vibration 3. Vibration under general forcing conditions 4. Impact vibration of one DOF systems
Vibration of Multi-DOF Systems	1. Two DOF Systems 2. Introduction to multi-DOF systems 3. Free vibration of multi-DOF systems 4. Forced vibration of multi-DOF systems 5. Determination of natural frequencies and modes shapes
Vibration of Continuous Systems	1. Introduction to continuous system 2. String vibration 3. Torsional and longitudinal vibrations of beams 4. Transverse vibration of beams