Mechanical Engineering Dept. Department

Syllabus
ME 484: Acoustics (3-0-3)

Course Catalog Description:

Fundamentals of vibration; Plane and spherical acoustic waves; Radiation, transmission and filters; Loudspeakers and microphones; Speech, hearing, noise and intelligibility; Architectural acoustics; Acoustic measurements and demonstration of measurement apparatus; and Case studies

Course Pre-requisites:

- MATH 302: Engineering Mathematics
- ME 201: Dynamics

Course Objectives:

1. This course is intended to teach students the basic principles of acoustics including the theory underlying different acoustic measurements and introductory exposure to noise control.
2. Students shall be provided with techniques for analyzing industrial noise and make them aware of the human and regulatory issues related to noise exposure

Course Learning Outcomes:

CLO1. fundamental of the wave equation.

CLO2. knowledge of how noise is being generated in an industrial environment

CLO3. ability to represent acoustic parameters in terms of decibel levels for pressure, power, intensity, impedance, equivalent level descriptors, and statistical level descriptors.

CLO4. ability to select or design simple barrier and enclosure type noise control treatments given performance criteria

Learning Resources:

- Fundamentals of Acoustics, L. Kinsler, A. Fery, A. Coopens, & J. Sanders John Wiley, 4th Edition, 2000

Lecture Assessment Plan:

Assessment Task	Week Due	Weight
Midterm Exam	10	25.0%

Assessment Task	Week Due	Weight
Term Project	14	15.0%
HW Assignment	6	15.0%
Quizzes	None	10.0%
Final Exam	None	35.0%

Lecture Weekly Schedule:

Week#	Topics
1	Fundamentals of vibration
2	Fundamentals of vibration (Continue)
	Vibrating strings and bars; Wave propagation
3	Vibrating strings and bars; Wave propagation (Continue)
4	Vibrating strings and bars; Wave propagation (Continue)
	Acoustic plane waves. Velocity of sound in fluids. Energy density and Acoustic intensity; Specific acoustic intensity; Decibels
5	Acoustic plane waves. Velocity of sound in fluids. Energy density and Acoustic intensity; Specific acoustic intensity; Decibels (Continue)
6	Acoustic plane waves. Velocity of sound in fluids. Energy density and Acoustic intensity; Specific acoustic intensity; Decibels (Continue)
	Spherical waves; General wave equation. Harmonic spherical waves; Spherical radiation and radiation impedance
7	Spherical waves; General wave equation. Harmonic spherical waves; Spherical radiation and radiation impedance (Continue)
8	Spherical waves; General wave equation. Harmonic spherical waves; Spherical radiation and radiation impedance (Continue)
	Noise levels and noise criteria
9	Noise levels and noise criteria (Continue)
	Sound reflection; Resonators and filters and wave-guides; Absorption of sound waves; and acoustic attenuation
10	Sound reflection; Resonators and filters and wave-guides; Absorption of sound waves; and acoustic attenuation (Continue)
	Loudspeakers and microphones; Direct-radiator speakers; Horn loud-speakers; Microphones and sound-level meters
11	Loudspeakers and microphones; Direct-radiator speakers; Horn loud-speakers; Microphones and sound-level meters (Continue)
12	Loudspeakers and microphones; Direct-radiator speakers; Horn loud-speakers; Microphones and sound-level meters (Continue)
	Architectural acoustics; Growth and decay of sound in a room; Reverberation time; Sound absorption materials

Week#	Topics
13	Architectural acoustics; Growth and decay of sound in a room; Reverberation time; Sound absorption materials (Continue)
	Case studies in industrial noise
14	Case studies in industrial noise (Continue)
15	Case studies in industrial noise (Continue)