ME 4760 Engineering Acoustics and Noise Control (Elective)

Catalog Description: ME 4760 Engineering Acoustics and Noise Control (3-0-3)
Prerequisites: Math 2403 Differential Equations
Study of acoustics related to noise and its control; acoustic terminology, wave propagation, wave propagation solutions, instrumentation, data processing, room acoustics, noise control, hearing, noise legislation. Crosslisted with AE 4760.

Textbook: Colin Hansen, *Noise Control, from Concept to Applications*, Taylor and Francis, 2005

Reference: Lawrence E. Kinsler, Austin R. Frey, Alan B. Coppens, and James V. Sanders, *Fundamentals of Acoustics*, John Wiley & Sons, 1982.

Topics Covered:

1. Nature of sound
2. The wave equation
3. Plane waves and spherical waves
4. Impedance, power, intensity, directivity
5. Microphones, sound level meters, sound intensity probes, spectrum analyzers
6. Data processing: analog to digital conversion, FFT, windowing, sampling
7. Sound transmission and control
8. Human response to noise (OSHA standards)
9. Environmental noise

Course Outcomes:

Outcome 1: To teach students the basic principles of acoustics

1.1 Students will demonstrate knowledge of the fundamental assumptions related to the derivation of the wave equation.
1.2 Students will demonstrate knowledge of the 1-D and 3-D solutions to the wave equation.
1.3 Students will demonstrate ability to represent acoustic parameters in terms of decibel levels for pressure, power, intensity, impedance, equivalent level descriptors, and statistical level descriptors.

Outcome 2: To teach the students the use and application of acoustic analysis instruments

2.1 Students will demonstrate knowledge of the basic instruments used to experimentally characterize acoustics fields.
2.2 Students will demonstrate knowledge of digital signal processing and related issues.

Outcome 3: To provide students an introductory exposure to noise control

3.1 Students will demonstrate the ability to characterize treatment effectiveness in terms of insertion loss.
3.2 Students will demonstrate knowledge of rating systems and representations for noise control treatments.
3.3 Students will demonstrate ability to select or design simple barrier and enclosure type noise control treatments given performance criteria.

Outcome 4: To make students aware of the human and regulatory issues related to noise exposure

4.1 Students will demonstrate knowledge of the mechanism of human hearing, and of noise-induced hearing damage.

4.2 Students will demonstrate the ability to assess the legality of a noise exposure history under OSHA regulations.
4.3 Students will demonstrate the ability to assess the suitability of a given noise environment to accepted usage practices.

Correlation between Course Outcomes and Program Educational Outcomes:

ME 4760												
	Mechanical Engineering Program Educational Outcomes											
Course Outcomes	a	b	c	d	e	f	g	h	i	j	k	l
Course Outcome 1.1	X		X		X							X
Course Outcome 1.2	X				X							X
Course Outcome 1.3	X										X	
Course Outcome 2.1	X	X							X		X	
Course Outcome 2.2	X									X	X	X
Course Outcome 3.1	X		X		X						X	X
Course Outcome 3.2	X								X		X	
Course Outcome 3.3	X		X		X			X	X	X	X	
Course Outcome 4.1	X							X	X	X	X	
Course Outcome 4.2	X					X		X	X	X	X	
Course Outcome 4.3	X				X	X		X	X	X	X	

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