ME/AE 4760 Engineering Acoustics and Noise Control (Elective)

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


Topics Covered:

1. Introduction, scope of acoustics
2. Fundamentals of acoustics
3. Criteria, hearing, and hearing conservations
4. Sound generation and propagation
5. Noise control
6. Instrumentation

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 1-D and 3-D solutions to the wave equation.
   1.3 Students will demonstrate the 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 the 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 Student Outcomes:

<table>
<thead>
<tr>
<th>ME 4760</th>
<th>Mechanical Engineering Student Outcomes</th>
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<tbody>
<tr>
<td>Course Outcomes</td>
<td>a  b  c  d  e  f  g  h  i  j  k</td>
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<tr>
<td>Course Outcome 1.1</td>
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<td>Course Outcome 4.1</td>
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GWW School of Mechanical Engineering Student Outcomes:

(a) an ability to apply knowledge of mathematics, science and engineering  
(b) an ability to design and conduct experiments, as well as to analyze and interpret data  
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability  
(d) an ability to function on multidisciplinary teams  
(e) an ability to identify, formulate, and solve engineering problems  
(f) an understanding of professional and ethical responsibility  
(g) an ability to communicate effectively  
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context  
(i) a recognition of the need for, and an ability to engage in life-long learning  
(j) a knowledge of contemporary issues  
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

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