ME 51300
ENGINEERING ACOUSTICS

Course Objectives
1. Introduce the fundamental concepts of acoustical analysis to engineers with an emphasis on the wave approach.
2. Study wave propagation, sound radiation, absorption and transmission.
3. Apply fundamental concepts to noise control practice.

Fundamentals of Vibrations
1. Simple oscillator – free and forced vibration
2. Resonance
3. Impedance

The Vibrating String
1. Development of wave equation
2. Solution of wave equation
3. Boundary conditions
4. Forced vibration
5. Normal modes of vibration

The Acoustic Wave Equation and Simple Solutions
1. Linearized wave equation
2. Speed of sound
3. One-dimensional solutions – plane and spherical waves
4. Impedance
5. Intensity

Sound Transmission and Reflection
1. Normal incidence transmission and reflection at fluid interface
2. Oblique incidence reflection and transmission
3. Transmission through a limp panel
4. Reflection from absorbing media

Radiation of Sound
1. Radiation from monopoles and dipoles
2. Line sources
3. Radiation from a piston
4. Directivity
5. Radiation impedance

Pipes, Cavities and Wave Guides
1. Boundary conditions
2. Forced oscillations and standing waves
3. Rectangular ducts
4. Circular ducts

Room Acoustics
1. Sound in enclosures
2. Growth of sound in a room
3. Concept of reverberation time
4. Sound absorption materials
5. Acoustic factors in architectural design

Revision Date: 2/13/13
1. COURSE NUMBER AND NAME: ME 51300 Engineering Acoustics

2. CREDITS AND CONTACT HOURS: 3 credits
   a. Lecture – 3 days per week at 50 minutes for 16 weeks

3. COURSE COORDINATOR OR INSTRUCTOR:
   K.M. Li and J.S. Bolton

4. TEXTBOOK:

5. SPECIFIC COURSE DESCRIPTION:

   b. Prerequisites:
      First Semester Senior Standing

   c. Status: Elective

6. SPECIFIC GOALS FOR THE COURSE:
   a. Course Outcomes:
      1. Introduce the fundamental concepts of *acoustical analysis* to engineers with an emphasis on the *wave approach*.
      2. Study *wave propagation*, *sound radiation*, *absorption* and *transmission*.
      3. Apply fundamental concepts to *noise control* practice.

   b. Related ME Program Outcomes:
      A1. Engineering Fundamentals; B3. Prof/Ethical Responsibility;
      A3. Experimental Skills; B5. Life-Long Learning;
      A4. Modern Engr Tools; C1. Leadership,
      A5. Design Skills; C2. Global Engineering Skills;
      A6. Impact of Engr Solns; C3. Innovation;
      B1. Communication Skills; C4. Entrepreneurship
      B2. Teamwork Skills

7. LIST OF TOPICS: See following page.

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REVISION DATE: February 12, 2013