Acoustic and Noise Control

MECHANICAL ENGINEERING

Type of Course	:	New
Course Snapshot	:	Elective / PG
	:	Applies to all
Pre-requisites	:	First level course in Vibration (Desirable) Exposure to Fourier Analysis Interest in Mathematical Modeling
Course Duration	:	30 hours / 12 weeks
Industry Support	:	Ashok Leyland, TVS Motors, Mahindra & Mahindra, Tata Motors, Eaton, NPOL, NSTL, etc.

COURSE OUTLINE:

With increased awareness about the ill-effects of noise pollution, there is an increased demand to design quieter industrial products. Designing quiet products requires an appreciation of basic principles of acoustics and noise control. In this course, the students will be introduced to the foundations and concepts of acoustic wave propagation. Also, human factors influencing the perception of sound will be emphasized.

INSTRUCTOR:

Prof. Abijith Sarkar
Department of Mechanical Engineering
IIT Madras

ABOUT INSTRUCTOR:

Prof. Abhijit Sarkar did his Ph.D on structual acoustics from IISc Bangalore in 2009. Since 2010 he is a faculty at IIT Madras. He also has two years industrial experience. He is an active researcher in the field of vibration and acoustics. He is especially interested in applying analytical methods to problems in noise and vibration. He has taught courses in mechanics, mechanisms, vibration and acoustics at IIT Madras.

COURSE PLAN:

Week 1 : Introduction to Sound, Acoustics, Noise Pollution

Week 2 : Steady state / Harmonic Analysis / Phasors / Complex exponentials. Harmonic Plane waves, characteristic impedance, plane waves in duct. Traveling waves, standing waves, cut-on models induct, dispersion.

Week 3 : DB Arithmatic. Octave band frequency analysis, Intermittent Noise, Noise Rating

Week 4 : Acoustic Measurements. Duct Acoustics, Transmission Loss, Insetion Loss

Week 5 : Transfer Matrix method for expansion chamber muffler. Electro-Mechanical Analogy for lumped elements Electro-Mechanical analogy for lumped elements

Week 6 : Lumped acoustic Elements, Helmholtz Resonator. Acoustic Analysis of an automotive exhaust system, sourse impedence, radiation impedance.

Week 7 : Electro-acoustic analogy for duct acoustic systems Concentric hole cavity resonator. Spherical wave equation, pulsating sphere, spherical wave impedance, limiting case of plane waves

Week 8 : Monopole & Dipole. Inhomogeneous wave equation, Greens function

Week 9 : Kirchoff-Helmholtz integral equation , BEM. Rayleigh Integral. Oscillating piston on a baffle

Week 10 : Sound radiation from infinite plate / beam Sound radiation from a baffled plate, conclusion