MECHANICAL ENGINEERING

Instructor Name : NACHIKETA TIWARI (IIT Kanpur **-** Mechanical Engineering **)**

COURSE DURATION : Jan-Apr 2017   **CORE / ELECTIVE :** Elective   **UG / PG:** Both

PRE-REQUISITES : Must be enrolled into a B. Tech. program or equivalent and should have completed at least second year of his 4-year program.

INTENDED AUDIENCE : UGs, PGs, professionals in industry who want to learn about basics of sound and acoustics

INDUSTRIES APPLICABLE TO : Automotive, NVH, Acoustics, Railways, Power Generation and all industry that has to address issues related to noise.

COURSE OUTLINE : This course is intended for all those who want to conduct experiments in area of NVH. Thus, the course is open to students of engineering and science, and also to all those who from the industry and research organizations – who are working in area of sound, NVH and acoustics. Each lecture will be followed by a quiz, which will help student the concepts better, and gain deeper insights to measurement process. The course is fairly generic so that there is no need for a particular background. Rather, what is needed is openness, and ability to learn and check out new ideas with comfort.

ABOUT INSTRUCTOR : Dr. Nachiketa TIwari is an Associate Professor of Mechanical Engineering at IIT Kanpur. He has extensive experience in area of acoustics and noise. Earlier, he worked for over 13 years at the R&D Headquarters Bose Corporation in Massachussetts.   Dr. Tiwari has developed several courses on noise, acoustics, and NVH. He has been engaged in several noise and vibration related projects to fulfill the needs of India's industry as well as research organizations. He has established Dhwani, an Acoustics Lab at IITK, which is one of the best in the country.

COURSE PLAN

 Week 1**:**Introduction,Introduction,Introduction,Decibels,Terminology,Adding Decibels

 Week 2**:**Concept Review,Concept Review,Concept Review,Concept Review,Concept Review,Concept Review

 Week 3**:**Wave Equation,Momentum Equation,Continuity Equation,Gas Equation,1-D Wave Equation,1-D Wave Equation

 Week 4**:**Solution for 1-D Wave Equation,Sol. for 1-D Wave Eqn.,TL Equations,TL Equations,TL Equations,1-D Waves in Tubes

 Week 5**:**1-D Waves in Tubes,1-D Waves in Tubes,1-D Waves in Tubes,Imperfect terminations,Kundt's Tube,Kundt's Tube

 Week 6**:**Power Flow,Power Flow,Power Flow,Spherical waves,Spherical waves,Spherical waves

 Week 7**:**Spherical waves,Spherical waves,Spherical waves,Interference,Interference,Interference

 Week 8**:**Directivity,Directivity,Directivity,Muffler,Muffler,Muffler

 Week 9**:**Muffler,Sound in rooms,Sound in rooms,Sound in rooms,Sound in rooms,Absorption coefficient

 Week 10**:**Absorption coefficient,Reverberation time,Reverberation time,FFT,FFT,FFT

 Week 11**:**FFT Weighting,Weighting,Weighting,Loudness,Loudness

 Week 12**:**Microphones,Microphones ,Noise Dosage,STC & NRC STC & NRC,Closure