THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Introduction to Ultrasonics - With Applications

WELDENG 5038

Credit Hours:
3.00 - 3.00

Course Levels:
Undergraduate (1000-5000 level)
Graduate (5000-8000 level)

Course Components:
Lecture

Course Description:
The fundamental principles of ultrasonics will be covered, followed by the interaction of ultrasound with materials, and concluding with investigations of the major industrial applications.

Prerequisites and Co-requisites:
Prereq: Math 2177, 2255, or 2415, and MechEng 2040; or permission of instructor.

Course Goals / Objectives:
- Understand fundamental nature of ultrasonic waves in materials
- Understand behavior of piezoelectric materials and their use in ultrasonic transducers
- Be able to model vibration behavior of simple transducer configurations
- Gain appreciation for the breadth of the field of ultrasonics, both high frequency and high power
- Understand key physical effects of ultrasound in fluid and solid media
- Understand unique features of high power ultrasonic systems
- Gain in-depth understanding of at least two high power applications
- Understand the elements of chemical and biological processing applications

Course Topics:

- Introduction and elements of vibrations and waves
- Wave types in solids/fluids; reflection, transmission, diffraction of waves.
- Ultrasonic transducers
- Physical Acoustics; attenuation, streaming and cavitation.
- Applications of low intensity ultrasonics.
- Applications of low intensity ultrasonics - major sectors.
- High power ultrasonic transducers, resonators and horns.
- Physical effects of intense ultrasound.
- Applications to metal and polymer material processes and in manufacturing.
- Applications in chemical processing and emerging applications.

Designation:

Elective