Ultrasonic Nondestructive Testing

WELDENG 4303

Credit Hours:
3.00 - 3.00

Course Levels:
Undergraduate (1000-5000 level)

Course Components:
Lecture

Course Description:
Principles of ultrasonic wave generation, interaction of ultrasonic waves with material structures with emphasis on characterization of material properties, and quantitative ultrasonic evaluation of material discontinuities.

Prerequisites and Co-requisites:
Prereq: 4103, and enrollment as WeldEng-BS major; or permission of instructor.

Course Goals / Objectives:
- Achieve basic understanding of main concepts and aims of ultrasonic NDT
- Learn theoretical principles of ultrasonic methods and their capabilities and limitations
- Learn ultrasonic wave interaction with interfaces between materials and ultrasonic spectroscopic methods
- Learn applications of ultrasonics for material characterization
- Obtain some basic laboratory experience with ultrasonic testing
Course Topics:
- Introduction to course.
- Vibrations and ultrasonic waves.
- Physical principles and interaction with interface between materials.
- Oblique incidence of ultrasonic wave on liquid solid interface.
- Ultrasonic transducers. Radiation field of ultrasonic transducer.
- Measurements of velocity and attenuation. Ultrasonic laboratory.
- Ultrasonic spectroscopy. Spectroscopic evaluation of adhesive joints laboratory.
- Ultrasonic evaluation of joints.
- Homework siposia presentations and practical examples.
- Modeling of ultrasonic systems as a linear system.
- Ultrasonic scattering. Ultrasonic laboratory.
- Ultrasonic scattering in polycrystalline materials.
- Reflection from defects.
- Ultrasonic NDT and damage tolerance concept.

Designation:
Elective