

NOVA COLLEGE-WIDE COURSE CONTENT SUMMARY
DMS – 208 ULTRASOUND PHYSICS AND INSTRUMENTATION I (2 CR.)

Course Description

Discusses and solves mathematical problems associated with human tissue, basic instrumentation and scanning technology. Focuses on the use of pulse-echo principles as applied to diagnostic sonography. Presents the physics of sound-tissue interactions and explores ultrasound instrumentation controls and functions. Lecture 2 hours per week.

General Course Purpose

The purpose of this course is to introduce students to the fundamental principles of acoustical physics.

Course Prerequisites/Corequisites

Prerequisite: Admission to the Diagnostic Imaging program.

Corequisite: DMS 190, DMS 206, DMS 207, DMS 217, DMS 218.

Course Objectives

Upon completing the course, the student will be able to:

- a) Identify the characteristics of sound.
- b) Identify the wave properties of sound.
- c) Describe sound waves, propagation of ultrasound through tissue, reflection, refraction, and scattering.
- d) Explain transducer technology, and discuss the advantages and limitations of the various types.
- e) Discuss the basic features of medical sonographic equipment, including operator controls and image processing.
- f) Describe the role of advanced scanning features, including harmonics, coded excitation, and compounding.
- g) Explain how pulsed Doppler, color flow imaging, and amplitude imaging is achieved.
- h) Recognize and describe image artifacts and techniques to minimize or eliminate them.
- i) Describe the importance of performance, safety, and output measurements and standards.
- j) Discuss the basic features of medical sonographic equipment, including operator controls and image processing.

Major Topics to be Included

- a) Basic math for physics applications
- b) Soundwaves and propagation
- c) Soundwave strength parameters
- d) Attenuation
- e) Reflection
- f) Refraction
- g) Pulsed wave operation
- h) Piezoelectric effect
- i) Ultrasound transducers
- j) Resolution
- k) Real-time imaging
- l) Instrumentation components