

**BERGEN COMMUNITY COLLEGE
DIVISION OF HEALTH PROFESSIONS
DIAGNOSTIC MEDICAL SONOGRAPHY PROGRAM**

DMS 101

1 lec., 3 lab., 2 credits

Co-requisites: DMS-102, DMS-113, DMS-115

COURSE DESCRIPTION: Ultrasound Physics and Instrumentation I will provide the student with the relevant fundamental physical properties as the basic instrumentation used in diagnostic ultrasound. Modes of operation, imaging and display techniques that relate to high frequency sound production will be stressed.

GENERAL COURSE OBJECTIVES: At the conclusion of this course, the student will be able to:

- ✓ Discuss how ultrasound can produce images of the human body.
- ✓ Define the parameters of a sound wave as well as the parameters of pulsed ultrasound.
- ✓ Define all terms related to ultrasound physics.
- ✓ Demonstrate how to use equipment related to ultrasound.
- ✓ Select the proper transducer for any ultrasound procedure.
- ✓ Explain the role of each component of an ultrasound instrument.
- ✓ Adjust ultrasound machine controls to obtain a diagnostic image.

REQUIRED TEXTBOOK: Kremkau, Frederick W. DIAGNOSTIC ULTRASOUND: PRINCIPLES AND INSTRUMENTS. Eighth edition. W.B.Saunders Company. Philadelphia. 2011.

COURSE POLICIES:

1. In addition to scheduled tests, a quiz on the previous week's material will be administered prior to each lecture.
2. Missed quizzes (due to absenteeism or tardiness) cannot be made up. The lowest quiz grade will be dropped.
3. A physicians note must be submitted for any absence on a scheduled test day. The missed test must be made up in the Testing Center before the next class meeting.
4. If recording devises are encouraged and must be used in a manner that is not disruptive to the class. A voice activated unit is recommended.
5. Cell phone use in the classroom is prohibited.

ASSESSMENT: Knowledge of course objectives will be assessed by verbal questions prior to, and at the end of each class, quizzes, tests, and lab worksheets.

NUMERICAL GRADE CALCULATION

Lab assignments	10%
Quiz average	25%
Test average	30%
Final exam	35%

FINAL GRADE CALCULATION

92 to 100	A
88 to 91.9	B+
83 to 87.9	B
79 to 82.9	C+
75 to 78.9	C
0 to 74.9	F

All grades are "absolute" and will not be rounded off.

COURSE OF STUDY (Subject to change)

Week 1	History of ultrasound Echo production Differences between ultrasound and x-rays Sound wave theory
Week 2	Sound wave theory Transducer (crystal element) Piezoelectricity
Week 3	Parameters of a sound wave Velocity of a sound wave Pulsed ultrasound
Week 4	Power, amplitude, and intensity Decibels
Week 5	TEST #1
Week 6	Attenuation – definition and computation Attenuation – causes Reflections – specular and non-specular
Week 7	Impedance Perpendicular incidence
Week 8	Intensity Reflection Coefficient Intensity Transmission Coefficient Oblique Incidence and Refraction Snell's Law
Week 9	TEST #2
Week 10	Pulse-echo range equation Scanning modes Transducers: construction, crystals, backing, and matching layer
Week 11	Bandwidth Multi-hertz transducers Quality factor Characteristics of a sound beam
Week 12	Detail resolution; Axial and Lateral Instrumentation: Pulser, Transducer, Receiver
Week 13	TEST #3
Week 14	Instrumentation: Image Processors, Memory, and Display Review for final
Week 15	FINAL EXAMINATION (CUMULATIVE)