LABETTE COMMUNITY COLLEGE BRIEF SYLLABUS

SPECIAL NOTE:
This brief syllabus is not intended to be a legal contract. A full syllabus will be distributed to students at the first class session.

TEXT AND SUPPLEMENTARY MATERIALS USED IN THE COURSE (if any):

Please check with the LCC bookstore http://www.labette.edu/bookstore for the required texts for this class.

COURSE NUMBER: DMS 211

COURSE TITLE: SONOGRAPHY PHYSICS & INSTRUMENTATION

SEMESTER CREDIT HOURS: 3

DEPARTMENT: Diagnostic Medical Sonography

DIVISION: Health Science

PREREQUISITES: Acceptance into the Sonography program

COURSE DESCRIPTION:
This course will provide a detailed study of principles of the production and propagation of sound waves as applied to diagnostic medical Sonography. Included will be acoustic physics and Doppler ultrasound principles. Ultrasound instrumentation and image optimization will be foundational objective. This course will prepare competent entry-level general sonographers.

COURSE OUTCOMES AND COMPETENCIES:
Students who successfully complete this course will be able to:

1. Comprehend the basic principles of sound waves.
    - Explain the fundamentals of sound waves.
    - Describe the 2 basic types of waves. Pulsed wave and continuous wave.
    - List the properties of waves.
    - Identify the comparison of attenuation and decibels.
    - Distinguish between constructive and destructive interference.
    - Apply the AIUM standards for QA.
    - Explain the safety of Bioeffects set by the ALARA principle.

2. Describe the interactions of ultrasound and tissue.
    - Describe acoustic impedance.
    - Identify refraction and reflection.
    - Differentiate between scattering and diffraction.
    - Recognize absorption, attenuation, and scatter.
    - Describe the properties of acoustic waves.

3. Recognize general ultrasound instrumentation.
    - Discuss ultrasound frequencies.
    - Describe piezoelectric properties.
    - Label transducer construction including element, backing material, and dampening.
    - Identify bandwidth and its role in ultrasound.
    - Discuss the ultrasound as an important imaging modality.

4. Evaluate the different imaging mode principles.
    - Label A-mode images.
    - Describe B-mode imaging principles.
    - Critique M-mode imaging principles.
    - Recognize early imaging modes.
    - Identify the correct transducer for the structure being imaged.
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5. Analyze real-time ultrasound imaging principles and instrumentation.
    - Produce real-time ultrasound imaging principles and instrumentation.
    - Give example of mechanical instrumentation.
    - Describe electronic instrumentation.
    - Evaluate the difference between mechanical and electronic focusing/steering.
    - Identify electronic phased array instrumentation.
    - Explain the use of internal and external focusing techniques.

6. Use Doppler physics and instrumentation in the clinical setting.
    - Explain the Doppler Effect including positive and negative shifts.
    - Describe continuous wave Doppler vs. pulsed wave Doppler and their roles in the diagnostic field.
    - Discuss and manipulate color flow Doppler including power Doppler.
    - Modify spectral analysis.
    - Critique volume flow measurements including plethysmography and other volume measuring techniques.