Bossier Parish Community College
Master Syllabus

Course Prefix and Number: SONO 201 **Credit hours**: 1

Course Title: Physics and Instrumentation I

Course Prerequisites: Enrollment in the DMS program courses is limited to those students who have been selected and admitted to the professional phase of the program. Program courses are sequenced by semester and must be taken as a group each semester per program requirements and policies.

Textbook(s):
Required Textbooks: Understanding Ultrasound Physics: Sidney Edelman 4th edition

Course Description:

Comprehensive study and related laboratory exercises covering the areas of ultrasonic propagation principles, transducer parameters, interactive properties of ultrasound with human tissues, possible biologic effects, basic equipment types, instrumentation, and quality control procedures.

Learning Outcomes:

A. Demonstrate knowledge and understanding of basic ultrasound physics.

1) Sound waves

2) Acoustic Variables

3) Seven parameters of sound waves and their characteristics

4)Pulsed sound and the five parameters to describe its characteristics

B. Demonstrate knowledge and application of image production and optimization.

1) Sound production and propagation

2) Interaction of sound and matter

3) Instrument options and transducer selection

4) Principles of ultrasound instruments and modes of operation

5) Operator control options

To achieve the learning outcomes, the student will or will be able to:

- Describe sound wave characteristics using the seven parameters: period, frequency, amplitude, power, intensity, wavelength, and speed
- Describe pulsed sound using the parameters: pulse duration, pulse repetition frequency, duty factor, pulse repetition period, and spatial pulse length.
- Discuss the acoustic variables; pressure, density, and distance and their role in ultrasound
- Explain the pulse-echo principle used in sonographic imaging.
- Describe the image formats used in sonography.
- Explain the concept of frequency and its importance in sonography.
- Define ultrasound and describe its behavior.
- Compare continuous with pulsed ultrasound.
- Describe the weakening of ultrasound while it travels through tissue.
- Discuss the generation of echoes in tissue.
- Describe the construction of a transducer and the function of each part.
- Explain how a transducer generates ultrasound pulses.
- Explain how a transducer receives echoes.
- Describe a sound beam and list the factors that affect it.
- Discuss how sound beams are focused and automatically scanned through anatomy.
- Compare linear, convex, phased, and vector arrays.
- Define detail resolution.
- Differentiate among the three aspects of detail resolution.
- List the factors that determine detail resolution.
- Explain how sonographic instruments work.
- List the primary components of sonographic instruments.
- List the functions of each component.
- Describe how images are stored electronically.
- Compare preprocessing with postprocessing.
- Compare signal processing and image processing.
- Explain how displays work.
- List the common display modes.
- Define contrast resolution and list the factors that influence it.
- Define temporal resolution and list the factors that influence it.
- List the functions of the beam former.
- List the functions of the image former.
- Discuss the purposes of coded excitation, gain, compensation, detection, and compression.
- Explain how an operator of an ultrasound instrument can implement the ALARA principle by minimizing exposure of the patient to ultrasound during diagnostic scanning.

Course Requirements: **In order to pass the course, the student must earn 76% of the total possible points on the unit quizzes for the course and make a minimum score of 70% on the final exam. The student must achieve an overall course average of 76%. Grades will not be rounded. Failure to complete any of the course requirements listed below will result in an "F" for the course.**

The student will:

- Participate in/complete all classroom/laboratory experiences (such as discussion questions; quizzes; section test; case studies; concept mapping; DVD, video, web-site, or reading assignments).
- Be held responsible for the content of the entire course. The final exam is mandatory, will be cumulative, and worth 25% of the overall grade for the course.

Course Grading Scale:

93 –	100%=	A
85 –	92%=	B
76 –	84%=	C
68 –	75%=	D
0 –	67%=	F

Attendance Policy: The college attendance policy (for the classroom) is available at http://catalog.bpcc.edu/content.php?catoid=5&navoid=369#class-attendance

Course Fees: (if applicable)

Nondiscrimination Statement

Bossier Parish Community College does not discriminate on the basis of race, color, national origin, gender, age, religion, qualified disability, marital status, veteran's status, or sexual orientation in admission to its programs, services, or activities, in access to them, in treatment of individuals, or in any aspect of its operations. Bossier Parish Community College does not discriminate in its hiring or employment practices.

COORDINATOR FOR SECTION 504 AND ADA
Angie Cao, Student and Disability Services Specialist
Disability Services, F254, 6220 East Texas Street, Bossier City, LA 71111
318-678-6511
acao@bpcc.edu
Hours: 8:00 a.m.-4:30 p.m. Monday - Friday, excluding holidays and weekends.

Equity/Compliance Coordinator

Teri Bashara, Director of Human Resources
Human Resources Office, A-105
6220 East Texas Street
Bossier City, LA 71111
Phone: 318-678-6056
Hours: 8:00 a.m.-4:30 p.m. Monday - Friday, excluding holidays and weekends.