

**Course Prefix/Number/Title:** DMS-212 Ultrasound Physics and Instrumentation II

**Number of Credits:** 2

**Course Description:** This course is the continued study of the principles of ultrasound physics and instrumentation. Emphasis will be placed on characteristics of sound waves, interaction of sound in soft tissue, transducers, artifacts, safety and quality assurance. Students will also become familiar with metric units, sound beam profiles, Doppler techniques, optimization of images, bioeffects and ultrasound system components.

**Pre-requisites:** DMS-211

**Corequisites:**

**Course Objectives:** This course will focus on the knowledge, skills and techniques required of the sonographer in order to safely operate sonographic equipment and produce high quality diagnostic images while providing safe patient care.

**Instructor:** Amy Hofmann

**Office:** Suite 302 5<sup>th</sup> Ave Building, Trinity Health

**Office Hours:** 9 AM to 2 PM Tu, Th and by appointment

**Phone:** 857-5620

**Email:** [amy.hofmann@trinityhealth.org](mailto:amy.hofmann@trinityhealth.org)

**Lecture Schedule:** 12:30 – 3:30 pm Tu June 6 to July 29 in Suite 301

**Lab Schedule:** None

**Textbook:** Understanding Ultrasound Physics, Edelman, 4<sup>th</sup> Edition

**Lab Manual:** Trinity Health Clinical Education Handbook

**Course Requirements:**

Grading is based on completion of assignments, quizzes and test.

Assignments 15%

Quizzes 15%

Test 70%

Consistent with class attendance policy, the student is responsible for attending every class and for the material presented. If a student will not be attending a class, he/she must notify the Program Director prior to absence to plan for makeup time and activities.

**Grading Criteria**

A = 94-100% of the total points

B = 87 - 93% of the total points

C = 80 - 86% of the total points

F = <79% of the total points

**Tentative Lecture Outline:**

<u>WEEK</u>	<u>TOPIC</u>	<u>READING</u>
6/6	Pulse echo instrumentation	Chpt 14
6/14	Displays and image processing	Chpt 15
6/21	Dynamic ranging system components	Chpt 16
	Harmonics and contrast agents	Chpt 17
6/28	Hemodynamics	Chpt 18

7/5	Doppler and spectral analysis	Chpt 19
	Optimizing Doppler	Chpt 20
7/11	Image artifacts	Chpt 21
7/18	Quality assurance	Chpt 22
7/25	Sonographers in the clinical setting	Chpt 23
	Bioeffects of clinical diagnostic ultrasound review & testing	Chpt 24

### **General Education Competency/Learning Outcomes**

1. Describe pulsed echo instrumentation to include the pulser, beam former and receiver.
2. Describe the features of image display monitors and post processing option.
3. Discuss the purpose of fundamental harmonics in imaging accuracy.
4. Discuss fluid hemodynamics and how ultrasound imaging techniques evaluate flow.
5. Distinguish between continuous wave and pulsed wave Doppler and clinical application techniques.
6. Describe methods of quality assurance in ultrasound imaging.
7. Discuss bioeffects of ultrasound, clinical safety and prudent use in imaging.

### **Relationship to Campus Theme:**

This course addresses a DMS Program theme by developing the knowledge and cultural competency skill sets necessary to provide safe, high quality patient care for the neonate, pediatric, adult and geriatric patient utilizing the protocols and techniques that are currently used in sonographic imaging.

### **Classroom Policies**

1. Cell phones and related devices are prohibited in the classroom at all times. It is recommended that you do not bring your cell phone or other electronic devices into the classroom or, at the very least, turn it off.
2. Food and beverages are permitted in accordance with classroom policy.
3. Be respectful of other students, instructors, and guests.

### **Student Email Policy**

Dakota College at Bottineau is increasingly dependent upon email as an official form of communication. A student's campus-assigned email address will be the only one recognized by the Campus for official mailings. The liability for missing or not acting upon important information conveyed via campus email rests with the student.

### **Academic Integrity**

According to the DCB Student Handbook, students are responsible for submitting their own work. Students who cooperate on oral or written examinations or work without authorization share the responsibility for violation of academic principles, and the students are subject to disciplinary action even when one of the students is not enrolled in the course where the violation occurred. The Code detailed in the Academic Honesty/Dishonesty section of the Student Handbook will serve as the guideline for cases where cheating, plagiarism or other academic improprieties have occurred.

### **Disabilities and Special Needs**

Students with disabilities or special needs (academic or otherwise) are encouraged to contact the instructor and Disability Support Services within the first two weeks of the semester to line up accommodations.

### **Title IX:**

Dakota College at Bottineau (DCB) faculty are committed to helping create a safe learning environment for all students and for the College as a whole. Please be aware that all DCB employees (other than those designated as confidential resources such as advocates, counselors, clergy and healthcare providers) are required to report information about such discrimination and harassment to the College Title IX Coordinator. This means that if a student tells a faculty member about a situation of sexual harassment or sexual violence, or other related misconduct, the faculty member must share that information with the College's Title IX Coordinator. Students wishing to speak to a confidential employee who does not have this reporting responsibility can find a list of resources on the DCB Title IX Webpage.