



# **INSTRUCTIONAL PACKAGE**

DMS 120  
Sonographic Instrumentation II

202230

Summer 2023

# INSTRUCTIONAL PACKAGE

## Part I: Course Information

Effective Term: 202230

COURSE PREFIX: DMS 120

COURSE TITLE: Sonographic Instrumentation II

CONTACT HOURS: 3

CREDIT HOURS: 3

### **RATIONALE FOR THE COURSE:**

This course is an advanced study of ultrasound physical principles. Topics include Doppler and Doppler instrumentation, spectral analysis, two dimensional and real time imaging, image processing, displays, harmonics, hemodynamics and Bioeffects. Upon completion, students should be able to demonstrate knowledge of all the above-named topics and be prepared to pass the physics portion of their national registry examination.

### **COURSE DESCRIPTION:**

This course is an advanced study of machine instrumentation, including display modes, components of an ultrasound system, quality control, an introduction to Doppler, the biological effects of ultrasound, artifacts, and future trends.

**PREREQUISITES/CO-REQUISITES:** DMS 101

\***Online/Hybrid** courses require students to complete the DLI Online Student Orientation prior to completing an online course. The DLI Online Student Orientation can be found in WaveNet, under the My Student tab.

### **REQUIRED MATERIALS:**

Please visit the [BOOKSTORE](#) online site for most current textbook information. Use the direct link below to find textbooks.

Enter the semester, course prefix, number and section when prompted and you will be linked to the correct textbook.

### **TECHNICAL REQUIREMENTS:**

Access to Desire2Learn (D2L), HGTC's learning management system (LMS) used for course materials.  
Access to myHGTC portal for student self-services.  
College email access – this is the college's primary official form of communication.

## **STUDENT IDENTIFICATION VERIFICATION:**

Students enrolled in online courses will be required to participate in a minimum of one (1) proctored assignment and/or one (1) virtual event to support student identification verification. Please refer to your Instructor Information Sheet for information regarding this requirement.

## **CLASSROOM ETIQUETTE:**

As a matter of courtesy to other students and your professor, please turn off cell phones and other communication/entertainment devices before class begins. If you are monitoring for an emergency, please notify your professor prior to class and switch cell phone ringers to vibrate.

**NETIQUETTE:** is the term commonly used to refer to conventions adopted by Internet users on the web, mailing lists, public forums, and in live chat focused on online communications etiquette. For more information regarding Netiquette expectations for distance learning courses, please visit [Online Netiquette](#).

## **Part II: Student Learning Outcomes**

Upon completion of this course the student should be able to:

- 1.** Explain the Doppler Effect, Doppler shift displays and power Doppler displays.
- 2.** Demonstrate the proper Doppler angle, Doppler equation, and spectral displays.
- 3.** Define and list the components of the ultrasound unit and transducers.
- 4.** Discuss safety measures and regulatory activities.
- 5.** Define ALARA and the proper use of unit output.
- 6.** Select the appropriate technique for examinations.
- 7.** Produce accurate measurements from data.
- 8.** Summarize: acoustic physics, sound propagation, interaction of sound and matter, instrument options and transducer selection, modes of operation, control options, techniques for recording and acoustical artifacts.

## **COURSE LEARNING OUTCOMES and ASSESSMENTS\*:**

### **Module # 1: Two-Dimensional Imaging**

**Materials Covered:** Chapter 12

**\*Assessment(s):** Class activity  
Unit Test

**Learning Outcomes:**

1. Explain the mechanical transducer.
2. Define each array transducer.
3. Describe the various number of elements, shape, steering and focusing of each array transducer.
4. Discuss how steering and focusing occurs in array transducers.
5. Define slice thickness and how it affects resolution.
6. Explain side lobes and grating lobes and their effect on image quality.

### **Module #2: Real Time Imaging**

**Materials Covered:** Chapters 13

**\*Assessment(s):** Class activity.  
Unit Test

**Learning Outcomes:**

1. Explanation of real time imaging and how it is created.
2. Discuss static scanning.
3. Describe factors that determine and pertain to temporal resolution.
4. Outline all factors relating to imaging depth.
5. Discuss how the number of pulses per Image affect temporal resolution.

### **Module # 3: Pulsed Echo Instrumentation**

**Materials Covered:** Chapter 14

**\*Assessment(s):** Class activity  
Unit Test

**Learning Outcomes:**

1. Describe the functions of the Pulser and the electrical signals it creates.
2. Explain how the receiver transforms the electrical signals.
3. Define amplification.
4. Discuss compensation.
5. Explain compression and how it affects the grayscale image.
6. Describe the two-part process that is involved in demodulation.
7. Explain reject, threshold, suppression, and how it affects the image with different level signals.

### **Module # 4: Image Processing**

**Materials Covered:** Chapter 15, 16 and 17

**\*Assessment(s):** Class activity  
Unit Test

**Learning Outcomes:**

1. Describe the various displays.
2. Explain the differences in analog and digital numbers.
3. Discuss the various scan converters.
4. Explain the pre and post processing and how it affects the spatial resolution.
5. Define types of storage media.
6. Describe how dynamic range is represented.
7. Explain compression's effect on US image.
8. Describe the tissue harmonics in fundamental imaging.
9. Discuss the contrast agents used in imaging.
10. Describe the contrast agents used with harmonic imaging and how it is used and affects the image.

**Module # 5: Hemodynamics****Materials Covered:** Chapter 18**\*Assessment(s):** Class activity  
Unit Test**Learning Outcomes:**

1. Define Hemodynamics.
2. Discuss the patterns of laminar flow found in normal physiologic states.
3. Explain the characteristics of turbulent flow and its' causes.
4. Detail energy flow and energy gradient.
5. Explain the various forms and causes of energy.
6. Discuss Ohm's Law.
7. Detail hydrostatic pressure with venous and arterial Hemodynamics.
8. Explain the effects of respiration on blood flow.

**Module # 6: Doppler****Materials Covered:** Chapter 19 and 20**\*Assessment(s):** Class activity  
Unit Test**Learning Outcomes:**

1. Discuss pulsed wave and continuous wave transducers and their different components.
2. Explain color flow and discuss its' advantages and disadvantages.
3. Describe Doppler artifacts and the most accurate ways to avoid them.
4. Describe spectral analysis and its' importance in scanning.
5. Explain the various assumptions of color flow imaging.
6. Describe normal incidence.
7. Discuss the characteristics aliasing and wall filter.

**Module # 7: Quality and Safety**

**Materials Covered:** Chapter 22, 23 and 24

**\*Assessment(s):** Complete journal review

**Learning Outcomes:**

1. Define what quality assurance is and why it is important.
2. Describe how performance is measured and what devices are used.
3. Define the goals of quality control.
4. Identify various phantoms as test objects.
5. The principles of Bioethics
6. Components of Medical Ethics
7. Explanation and understanding of Informed Consent.
8. Understanding and implementation of Ergonomics
9. Define bioeffects.
10. Discuss output and the correct ways to measure output.
11. Detail the study techniques used in bioeffects and each approach used.
12. Discuss heat.
13. Explain Cavitation and varying types.
14. Detail the AIUM standards and statements.
15. Define epidemiology and clinical studies.

**Module # 8: SPI registry review**

**Materials Covered:** Chapters 1-23

**\*Assessment(s):** Mock Board Exams

**Learning Outcomes:**

1. Understanding and implementation of all Ultrasound Physics concepts previously covered in each of the courses.

***\*Students – please refer to the Instructor’s Course Information sheet for specific information on assessments and due dates.***

## **Part III: Grading and Assessment**

### **EVALUATION OF REQUIRED COURSE MEASURES/ARTIFACTS\*:**

Students’ performance will be assessed and the weight associated with the various measures/artifacts are listed below.

### **EVALUATION\***

2023-2024

Tests	50%
Assignments	5%
Mock Board Exams	30%
Final Exam	<u>15%</u>
	100%

***\*Students, for the specific number and type of evaluations, please refer to the Instructor’s Course Information Sheet.***

**GRADING SYSTEM:**

92 – 100	A
83 – 91	B
74 – 82	C
65 – 73	D
64 and below	F

**This is a major area course and requires a grade of “C” or better for graduation.**

Grades earned in courses impact academic progression and financial aid status. Before withdrawing from a course, be sure to talk with your instructor and financial aid counselor about the implications of that course of action. Ds, Fs, Ws, WFs and Is also negatively impact academic progression and financial aid status.

The Add/Drop Period is the first 5 days of the semester for **full term** classes. Add/Drop periods are shorter for accelerated format courses. Please refer to the [academic calendar](#) for deadlines for add/drop. You must attend at least one meeting of all of your classes during that period. If you do not, you will be dropped from the course(s) and your Financial Aid will be reduced accordingly.



## Part IV: Attendance

Horry-Georgetown Technical College maintains a general attendance policy requiring students to be present for a minimum of 80 percent (80%) of their classes in order to receive credit for any course. Due to the varied nature of courses taught at the college, some faculty may require up to 90 percent (90%) attendance. Pursuant to 34 Code of Federal Regulations 228.22 - Return to Title IV Funds, once a student has missed over 20% of the course or has missed two (2) consecutive weeks, the faculty is obligated to withdraw the student and a student may not be permitted to reenroll. **Instructors define absentee limits for their class at the beginning of each term; please refer to the Instructor Course Information Sheet.**

**For online and hybrid courses**, check your Instructor's Course Information Sheet for any required on-site meeting times. Please note, instructors may require tests to be taken at approved testing sites, and if you use a testing center other than those provided by HGTC, the center may charge a fee for its services.

## Part V: Student Resources



### THE STUDENT SUCCESS AND TUTORING CENTER (SSTC):

The SSTC offers to all students the following **free** resources:

1. **Academic tutors** for most subject areas, **Writing Center support**, and **college success skills**.
2. Online **tutoring** and academic support resources.
3. Professional and interpersonal communication **coaching** in the EPIC Labs.

Visit the [Student Success & Tutoring Center](#) website for more information. To schedule tutoring, contact the SSTC at [ssc@hgtc.edu](mailto:ssc@hgtc.edu) or self-schedule in the Penji iOS/Android app or at [www.penjiapp.com](http://www.penjiapp.com). Email [ssc@hgtc.edu](mailto:ssc@hgtc.edu) or call SSTC Conway, 349-7872; SSTC Grand Strand, 477-2113; and SSTC Georgetown, 520-1455, or go to the [Online Resource Center](#) to access on-demand resources.



### STUDENT INFORMATION CENTER: TECH Central

TECH Central offers to all students the following **free** resources:

1. **Getting around HGTC**: General information and guidance for enrollment, financial aid, registration, and payment plan support!

2. Use the [Online Resource Center \(ORC\)](#) including Office 365 support, password resets, and username information.
3. **In-person workshops, online tutorials and more services** are available in Desire2Learn, Student Portal, Degree Works, and Office 365.
4. **Chat with our staff on TECH Talk**, our live chat service. TECH Talk can be accessed on the student portal and on TECH Central's website, or by texting questions to (843) 375-8552.

Visit the [Tech Central](#) website for more information. Live Chat and Center locations are posted on the website. Or please call (843) 349 – TECH (8324), Option #1.



## HGTC LIBRARY:

Each campus location has a library where HGTC students, faculty, and staff may check out materials with their HGTC ID. All three HGTC campus libraries are equipped with computers to support academic research and related school work; printing is available as well. Visit the [Library](#) website for more information or call (843) 349-5268.

## STUDENT TESTING:

Testing in an **online/hybrid** course and in **make-up exam** situations may be accomplished in a variety of ways:

- Test administered within D2L
- Test administered in writing on paper
- Test administered through Publisher Platforms (which may have a fee associated with the usage)

Furthermore, tests may have time limits and/or require a proctor.

Proctoring can be accomplished either face-to-face at an approved site or online through our online proctoring service. To find out more about proctoring services, please visit the [Online Testing](#) section of the HGTC's Testing Center webpage.

The **Instructor Information Sheet** will have more details on test requirements for your course.

## DISABILITY SERVICES:

HGTC is committed to providing an accessible environment for students with disabilities. Inquiries may be directed to HGTC's [Accessibility and Disability Service webpage](#). The Accessibility and Disability staff will review documentation of the student's disability and, in a confidential setting with the student, develop an educational accommodation plan.

Note: It is the student's responsibility to self-identify as needing accommodations and to provide acceptable documentation. After a student has self-identified and submitted documentation of a disability, accommodations may be determined, accepted, and provided.

### **STATEMENT OF EQUAL OPPORTUNITY/NON-DISCRIMINATION STATEMENT:**

Horry-Georgetown Technical College prohibits discrimination and harassment, including sexual harassment and abuse, on the basis of race, color, sex, national or ethnic origin, age, religion, disability, marital or family status, veteran status, political ideas, sexual orientation, gender identity, or pregnancy, childbirth, or related medical conditions, including, but not limited to, lactation in educational programs and/or activities.

### **TITLE IX REQUIREMENTS:**

All students (as well as other persons) at Horry-Georgetown Technical College are protected by Title IX—regardless of their sex, sexual orientation, gender identity, part- or full-time status, disability, race, or national origin—in all aspects of educational programs and activities. Any student, or other member of the college community, who believes that he/she is or has been a victim of sexual harassment or sexual violence may file a report with the college's Chief Student Services Officer, campus law enforcement, or with the college's Title IX Coordinator, or designee.

\*Faculty and Staff are required to report incidents to the Title IX Coordinators when involving students. The only HGTC employees exempt from mandatory reporting are licensed mental health professionals (only as part of their job description such as counseling services).

### **INQUIRIES REGARDING THE NON-DISCRIMINATION/TITLE IX POLICIES:**

**Student and prospective student** inquiries concerning Section 504, Title II, Title VII, and Title IX and their application to the College or any student decision may be directed to the Vice President for Student Affairs.

**Dr. Melissa Batten, VP Student Affairs**

*Title IX, Section 504, and Title II Coordinator*

Building 1100, Room 107A, Conway Campus

PO Box 261966, Conway, SC 29528-6066

843-349-5228

[Melissa.Batten@hgtc.edu](mailto:Melissa.Batten@hgtc.edu)

**Employee and applicant** inquiries concerning Section 504, Title II, and Title IX and their application to the College may be directed to the Vice President for Human Resources.

**Jacquelyne Snyder, VP Human Resources**

*Affirmative Action/Equal Opportunity Officer and Title IX Coordinator*

Building 200, Room 205B, Conway Campus

PO Box 261966, Conway, SC 29528-6066

843-349-5212

[Jacquelyne.Snyder@hgtc.edu](mailto:Jacquelyne.Snyder@hgtc.edu)