Sonographic Instrumentation

DMS206

Spring 2021

Number of Credits: 4

Days Class Meets: Online

Meeting Times: None required

Location/Venue: Online

Instructor: Lindsay Mercer, BS, RDCS and Bradley Geiersbach, RVT, VT

Contact Phone: 517-745-1248 (Lindsay Mercer)

Contact Email: lmercer@jccmi.edu GeiersbBradleyJ@jccmi.edu

Online Office Hours: Tuesday and Wednesday 10 – 2 pm, Monday and Friday by appointment

---

Course Description

Students explore the mechanics of A-mode, B-mode, M-mode, Doppler, and real time equipment. Accessory equipment such as cameras, transducers, phased, annular and linear arrays, and all types of hard copy documentation instruments are investigated. Multiple methods of preventative maintenance and quality control are presented. Laboratory reinforces learning activities.

Prerequisite(s)

MTH 131, DMS 104

Course Goals

This is the second of two applied ultrasonic physics courses that prepare students entering the field of diagnostic medical sonography to understand wave energy and how interacts with matter to produce diagnostic images. Students will learn through lecture and lab assignments.

Course Objectives

1. Students who successfully complete the Sonographic Instrumentation course will demonstrate competencies in all aspects of ultrasound instrumentation.

2. Students who successfully complete the Sonographic Instrumentation course will demonstrate competencies in all aspects of applied ultrasound physics.

3. Students who successfully complete the Sonographic Instrumentation course will demonstrate competencies in all modes of ultrasound such as: M-mode, C-mode, B-mode and Doppler.

4. Students who successfully complete the Sonographic Instrumentation course will demonstrate competencies in understanding all aspects of ultrasound induced bioeffects.

5. Students who successfully complete the Sonographic Instrumentation course demonstrate competencies in understanding all aspects of signal production and processing.

Units/topics of Instruction

1. Elementary Principles

2. Propagation of Ultrasound through Tissue

3. Ultrasound Transducers

4. Pulse Echo Instruments

5. Principles of Pulse Echo Imaging

6. Images, Storage, and Display

7. Doppler

8. Image Features and Artifacts

9. Quality Assurance of Ultrasound Instruments

10. Bioeffects and Safety

11. Physiology & Fluid Dynamics

12. Venous Hemodynamics

13. Vascular Physical Principles

Textbook (chose appropriate options below)

- ***TEXTBOOK****:* Miele, F. Ultrasound Physics & Instrumentation, Fifth Edition, Pegasus Lectures, Inc., Texas 2013.ISBN: 978-0-9885825-0- *No digital copy is available by the publisher.*

- ***SUGGESTED ADDITIONAL TEXT*****:** Edelman, S.K., Understanding Ultrasound Physics , fourth Edition, ESP, Inc., Canada 2012. *No digital copy is available by the publisher.*

Textbook Zero Sample language to paste after textbook:

- **Text Book Zero.** This text is available in a digital format. Please see the links posted on our class Jet Net site. This text is available to rent or purchase in digital format through the JC Bookstore.
- **Open Educational Resources (OERs)** are strongly encouraged. If no textbooks are *required,* a disclaimer to the effect that students will not have to purchase books for the course:
- **This course uses OER!** *Optional* resources are available in electronic format as a direct download from the publisher and/or the JetNet shell.

Follett Access

- Please review the cost of your required materials to determine the best option for you to purchase your materials.
- For more information on the Follett ACCESS Program, you can view the view the frequently asked questions.

If after reviewing the costs, you choose to opt out, you may do so here: www.jccmi.edu/optout. Please note your opt out selection is for your entire semester schedule. You cannot opt out and opt in to individual courses. And you must opt out by the due date for your first class.

Class Starts On:	Opt Out Date:
May 10, 2021	May 13, 2021

If you have questions about materials, please contact the Jackson College Follett bookstore at jackson@bkstr.com. For account billing questions, please contact the Jackson College Cashier at jccashier@jccmi.edu.

Exam Process- Respondus

To protect the fairness and integrity of the exams, students will be required to take exams using Respondus Lockdown Browser and Monitor. This is an online test proctoring software that requires a download to your computer. Training and practice of Respondus technology will be provided in advance of the first exam. A Mac or PC that has a webcam and microphone is required to use Respondus. If you do not have this technology, please contact your instructor right away. Students are expected to complete the Respondus Practice quiz on time. This is to give our IT department time to help troubleshoot issues

before exam 1 begins. Failure to complete the Respondus quiz on time may result in instructor-initiated drop.

Grading Procedure

Item	Each Worth	Points Available
14 Tests	20 points	280 points
10 Lab Assignments	10 points	100 points
1 Final Exam	200 points	200 points
Totals		580 points

Grading Scale

GPA	GRADE RANGE
4.0	95-100%
3.5	90-94%
3.0	85-89%
2.5	80-84%
2.0	75-79%
1.5	70-74%
1.0	65-69%
0.5	60-64%
0.0	0-59%

Failure

Any circumstances under which a student could be dismissed from or failed in the course that is not covered in other college publications. In pass/fail courses, a listing of minimal competencies.

Academic Honesty Policy

Academic Honesty is defined as ethical behavior that includes student production of their own work and not representing others' work as their own, by cheating or by helping others to do so.

Plagiarism

Plagiarism is defined as the failure to give credit for the use of material from outside sources. Plagiarism includes but is not limited to:

- Submitting other's work as your own
- Using data, illustrations, pictures, quotations, or paraphrases from other sources without adequate documentation
- Reusing significant, identical or nearly identical portions of one's own prior work without acknowledging that one is doing so or without citing this original work (self-plagiarism)

Cheating

Cheating is defined as obtaining answers/material from an outside source without authorization. Cheating includes, but is not limited to:

- Plagiarizing in any form
- Using notes/books/electronic material without authorization
- Copying
- Submitting others' work as your own or submitting your work for others
- Altering graded work
- Falsifying data
- Exhibiting other behaviors generally considered unethical
- Allowing your work to be submitted by others

Accessibility

Jackson College understands that cultivating a broadly diverse community is crucial to our educational mission and to our foundational commitment to leadership and service. Jackson College is fully committed to ensuring our courses are accessible to everyone including those with disabilities. We are currently working to increase accessibility and usability of our course materials in order to meet or exceed the requirements of Section 508 of the Rehabilitation Act of 1973, the Americans with Disabilities Act of 1991 and Web Content Accessibility Guidelines (WCAG) 2.0. For more information about Jackson College's efforts to ensure accessibility please visit the Jackson College accessibility web page.

If you have an accessibility need in any of our classes please e-mail the Center for Student Success at JCCSS@jccmi.edu or visit the Center for Student Success web page.

At the Center for Student Success (CSS), we are committed to providing all students the opportunity to achieve academic success by providing a variety of support services free of charge to Jackson College

students. This includes, but is not limited to, peer and faculty tutoring, mental health referral, temporary assistance with transportation, various workshops/seminars, and the TRIO program.

In addition, the CSS staff is committed to adapting the College's general services to meet the individual needs of otherwise qualified students with disabilities, for the purpose of providing equal access to all programs and facilities.

Course Management

Ways that students can manage their enrollment in a course for special circumstances. Includes withdrawal, and audit and incomplete grading procedures.

Makeup Policy

It is the students responsibility to make certain they have a secure connection and that all tests are completed by the due date. All tests are open at the start of the semester and students can take them at any time prior to the due date. If a student chooses to wait until the last minute to take the test, they will do so at their own risk if they should experience technical difficulties. Each student will be allowed 1 test reset. If a student should miss a test deadline after that, they will receive a zero for that test.

Help

Available learning services or opportunities for students seeking help with their course work. May include information about tutors, learning centers, reserved library materials, counseling services.

Academic Advising

It is important to contact a Center for Student Success professional prior to the start of the semester in order to receive accommodations in a timely manner. While we will make every effort to coordinate accommodations in a timely manner, failure to self-identify prior to the start of the semester may delay notification to instructors and timeliness of acquiring accommodations. Accommodations do not automatically carry over to the next semester. Please e-mail JCCSS@jccmi.edu or visit the Accommodations for Students with Disabilities web page

Student Responsibilities

Students are expected to cover the necessary topics and to demonstrate their ability to meet performance objectives. It is expected by the instructor that all assignments and readings will be completed on time. The very nature of this course makes it very difficult for one to catch up once they are behind.

Attendance- Participation Policy

For online sections

Just as in a traditional classroom course, regular class participation and keeping up on the reading and assignments is strongly correlated with survival in college. It is my recommendation that you plan to do your assignments and take your exams BEFORE the last day they are due. If problems occur, there is time to fix them before the deadline.

In compliance with Federal Title IV funding requirements, as well as college initiatives, I will be monitoring student participation on a regular basis and officially reporting student activity throughout the term to assure compliance with college policy and federal regulations. It is imperative that you log in to the course and actively participate *within the first couple of days of the term* to validate your enrollment in the course. After that, not actively participating in class may result in you being withdrawn from the course. Being withdrawn from a course can have an impact on financial aid, billing, athletic eligibility, and housing status. As a college student you are responsible for how your participation impacts your academic progress; the accountability lies with you.

Calendar

Within the calendar on specific days are:Assignments, readings, homework, exercised, performances, quizzes, topics, subject matter, skills, chapter titles, discussion topics, tests, comprehensive exams, due dates for major papers or performances.

***Syllabus is subject to modification as needed throughout the course. See JetNet for assignment instructions and due dates. Reading assignments and/or assessments may be added to enhance learning.*

WEEK	DATE	TOPIC	HOMEWORK
May 10 1		Lesson: Mathematics Chapter 1 Level 1 Chapter 1 Level 2 ***Take Test 1***	**Read Pages: p.1-6, 497-524** **Exercises: 2.1, 3.1, 6.1, 7.2, 8.1, 8.3, 9.3, 9.6, 9.8, 9.11, 9.12, 10.4, 11.1,12.3, 15.3**
May 17 2		Lesson: Waves Chapter 2 Level 1 Chapter 2 Level 2 ***Take Test 2***	Reading Assignment: read pages **7-42** Do Exercises: **10, 13.7, 14.3** Conceptual Questions: **4, 7, 9, 10**
May 24 3		Lesson: Attenuation Chapter 3 Level 1 Chapter 3 Level 2 ***Take Test 3***	Reading Assignment: read pages: 43-73 Do Exercises: 11, 12 ***Complete Lab Assignment 1*** ***Due Sunday, June 13th***
May 31 4		Lesson: Pulsed Wave Operation Chapter 4 Level 1 Chapter 4 Level 2 ***Take Test 4***	Reading Assignment: read pages: 75-98 Do Exercises: 13

June 7 5		Lesson: Transducers Chapter 5 Level 1 Chapter 5 Level 2 ***Take Test 5***	Reading Assignment: read pages: 99-145 Do Exercises: 11, 28 ***Complete Lab Assignment 2*** ***Due Sunday, June 13th***
June 14 6		Lesson: System Operation Chapter 6 Level 1 Chapter 6 Level 2 ***Take Test 6***	Reading Assignment: read pages: 147-222 Do Exercises: 7, 26 ***Complete Lab Assignment 3*** ***Due Sunday, June 13th***
June 21 7		Lesson: Doppler Chapter 7 Level 1 Chapter 7 Level 2 ***Take Test 7***	Reading Assignment: read pages: 223-274 Do Exercises: 1.8 Conceptual Questions: 5, 33 ***Complete Lab Assignment 4*** ***Due Sunday, June 13th***
June 28 8		Lesson: Artifacts Chapter 8 ***Take Test 8***	Reading Assignment: read pages: 275-300 Conceptual Questions: 8 ***Complete Lab Assignment 5*** ***Due Sunday, June 13th***
July 5 9		Lesson: Bioeffects Chapter 9 ***Take Test 9***	Reading Assignment: read pages: 301-324 Do Exercises: 7 Conceptual Questions: 14 ***Complete Lab Assignment 6*** ***Due Sunday, August 1st***
July 12 10		Lesson: Contrast and Harmonics Chapter 10 Lesson: Quality Assurance Chapter 11 ***Take Test 10 and 11***	Reading Assignment: read pages: 325-347, 349-376 Do Exercises: 12 ***Complete Lab Assignment 7*** ***Complete Lab Assignment 8*** ***Due Sunday, August 1st***

July 19 11		Lesson: Physiology & Fluid Dynamics Lesson: Venous Hemodynamics ***Take Test 12 and 13***	Reading Assignment: read pages: 377-401: Conceptual Questions: Reading Assignment: read pages: 403-434 ***Complete Lab Assignment 9*** ***Complete Lab Assignment 10*** ***Due Sunday, August 1st***
July 26 12		Lesson: Vascular Physical Principles ***Take Test 14***	Reading Assignment: read pages: 403-434 Review for Final
Aug 2 13		**FINAL EXAM**	***Due Sunday, August 8th***

Important Dates:

Event	Start Date	Notes
Spring 2021 Academic Calendar		
COURSE DATES		
REGISTRATION BEGINS FOR ALL STUDENTS *New students must contact Admissions at 517.796.8425 prior to registering for classes.*	Feb 24, 2021	
Semester Dates	May 10 – Aug 9, 2021	
OTHER DATES		
Memorial Day Holiday	May 29 – 31, 2021	No classes
Independence Day Holiday	July 3 – 5, 2021	No classes