



Introduction to Sonographic Instrumentation

DMS104

Spring 2021

Number of Credits: 3

Days Class Meets: Online

Meeting Times: None required

Location/Venue: Online

Instructor: Stephen Geiersbach MS, RT(R), RDMS

Contact Phone: 517 917-4815

Contact Email: geiersbstephenm@jccmi.edu

Online Office Hours: Online

Course Description

In this course students will learn the history and basic principles of static and real-time ultrasound machines. The instrumentation of A-mode and its conversion into the real time B-mode scanners will be explored. Laboratory assignments reinforce learning activities. Prerequisites: ENG 085* and MTH 131* or higher, plus signed DMS fact sheet (EQV-DMSFS)

Prerequisite(s)

MTH 131* or higher

Course Goals

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

Course Objectives

1. Students who successfully complete the introduction to Sonographic Instrumentation course will demonstrate competencies in basic aspects of ultrasound physics.

2. Students who successfully complete the introduction to Sonographic Instrumentation course will demonstrate competencies in basic mathematical computation as it applies to ultrasound physics.

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

Units/topics of Instruction

1. Elementary Principles
2. Propagation of Ultrasound through Tissue
3. Pulse Echo Instruments
4. Principles of Pulse Echo Imaging
5. Doppler

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.
- List required textbook by title and ISBN.

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.

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.

Grading Procedure

Assessment	Points	Percentages
4 TESTS 70 PTS EACH	280	45%
8 LAB ASSIGNMENTS/5pts	40	7%
1 MIDTERM	100	16%
1 FINAL EXAM	200	32%
TOTAL	620	100%

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

Requirements beyond scheduled classes or laboratories, e.g., clinicals, extra credit assignments, TBA sessions, field placement, special project instructions, contract learning conditions, study hours required outside class, unscheduled class meetings, attendance at concerts or other required events.

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.

Caveat

A statement that advises students that some revisions may be necessary during the course. School closing policies, instructor illness and other procedural improbabilities are described for students.

Calendar

A partial or complete list of dates or class periods for the course. 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. Add or remove columns as necessary to suit your course.

**Also include a statement that calendar timelines and assignments are an approximation and could be changed.*

SCHEDULE OF ASSIGNMENTS

Unless you belong to the self-paced group, YOU HAVE 2 DUE DATES ON LAB WEEKS. ALL LAB DISCUSSION POSTS ARE DUE ON SUNDAY PRIOR TO LAB SUBMISSION DEADLINE AT 10 PM ET. ALL LAB ASSIGNMENT SUBMISSIONS ARE DUE WEDNESDAYS AT 10 PM ET. TESTS MUST BE COMPLETED BY DEADLINE OR A ZERO GRADE WILL RESULT (NO EXCEPTIONS). ONLY LABS 1-4 ARE TO BE SUBMITTED FOR GRADING. All other exercises are for your benefit. Additional items can be found in the Helpful Websites resource.

Week 1 Mathematics and Metrics

Orientation (conversion, formula sheet, etc.)

Read Pages: p.1-6, 497-524

Post intro discussion

Review all items under Important Course Items & Help Forums and Resources

Course orientation (time will be posted in the course)

LECTURE: Mathematics

LECTURE: Metrics

LAB 1

Notes: Mathematics

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, 11.11, 12.3, 15.3

Online Extras (see code on page vi): Appendix A Supplemental Exercises Set 1, 3, 5, & 6

TEST 1 COVERS ALL MATERIAL TO DATE

Week 2 Waves

LECTURE: Chapter 2 Level 1

LECTURE: Chapter 2 Level 2

LAB 2: Echo-ranging and Acoustic Propagation

Notes

Read Pages: 7-42

Exercises: 10, 13.7, 14.3

Online Extras (see code on page vi): Chapter 2 Supplemental Set 1, 2, 3 & 4

Conceptual Questions: 4, 7

TEST 2 COVERS MATERIAL THROUGH CHAPTER 2 LEVEL 2

Week 3 Attenuation

LECTURE: Chapter 3 Level 1

LECTURE: Chapter 3 Level 2

Notes

Read Pages: 43-73

Exercises: 11

Online Extras (see code on page vi): Chapter 3 Supplemental Set 1 & 2

Conceptual Questions: 5

Week 4 Midterm

MIDTERM EXAM (not proctored, but timed - 50 minutes) COVERS ALL MATERIAL THROUGH CHAPTER 3 LEVEL 2

Week 5 Pulsed Wave

LECTURE: Chapter 4 Level 1

LECTURE: Chapter 4 Level 2

LAB 3: pulsing characteristics

Notes

Read Pages: 75-98

Exercises 13

Online Extras (see code on page vi): Chapter 4 Supplemental Set 1 & 2
Conceptual Questions: 16

TEST 3 COVERS ALL MATERIAL THROUGH CHAPTER 4 LEVEL 2

Week 6 Transducers & Doppler

LECTURE: Chapter 5

LECTURE: Chapter 7.1

LAB 4: pulsing characteristics & frame rate

Notes

Read Pages: 99-116 & 223-234

Chapter 5 Exercises: 10

Online Extras (see code on page vi): Chapter 5 Supplemental Set 1 & 2

Chapter 7 Exercises: 1.8

Online Extras (see code on page vi): Chapter 7 Supplemental Set 1

Conceptual Questions: 5

TEST 4 COVERS ALL MATERIAL THROUGH CHAPTER 7

Week 7 Review & Final Exam

Final Exam **Respondus LockDown Browser**

FINAL EXAM WILL COVER ALL MATERIAL (not proctored but timed - 100 minutes)

Spring 2021 Academic Calendar

Event	Dates	Notes
COURSE DATES		
REGISTRATION BEGINS FOR ALL STUDENTS <i>New students must contact Admissions at 517.796.8425 prior to registering for classes.</i>	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