



22 Spring Semester

Sonographic Instrumentation

DMS206

Number of Credits: 4

Days Class Meets: Online

Meeting Times: None required

Location/Venue: Online

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

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Online Office Hours: Monday 10-3 pm

Wednesday 10-3 pm

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 it 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, delete what does not apply)

- **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.

[Learn about the new textbook program at JC](#)

For account billing questions, please contact the Jackson College Cashier at jccashier@jccmi.edu

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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](#).

Support

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.

Oasis Center

During a student's college experience, one might encounter situations that impact their learning environment. When these situations occur, support from the Oasis Center is available to provide short-term assistance. If the situation requires ongoing support, the Oasis Center staff can provide that level of support or will assist the individual in securing an outside agency to provide it.

For more information visit the Jackson College Oasis Center webpage <https://www.jccmi.edu/the-oasis-center/>

Health Clinic

Jackson College has partnered with Henry Ford Allegiance Health to offer healthcare to Jackson College students and employees. The Jackson College Health Clinic (JCHC) is located on Central Campus in the Justin Whiting Hall, Room 111. The caring and professional staff at the JCHC provides quality healthcare, including annual exams (physicals, program physicals and sports physicals), acute and chronic illness care and preventative health care (It's Your Life).

For more information visit the Jackson College Health Clinic webpage <https://www.jccmi.edu/health-clinic/>

Dental Clinic

Community members may utilize Jackson College Dental Hygiene Clinic, which offers dental hygiene services while helping students gain experience. Students work under the supervision of license dental hygiene instructor and dentist as they offer preventative services.

For more information visit the Jackson College Dental Clinic webpage <https://www.jccmi.edu/dental-hygiene/dental-hygiene-dental-clinic/>

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

Student success navigators serve not only as academic advisors but as a student's academic, financial, and total resource advocate or coach.

Students will have an assigned navigator to meet with for advising and any questions they may have. Navigators will serve as the "go-to" person to help students throughout the college experience.

It is important to know your Student Success Navigator. You may find your Navigator by visiting this website <https://www.jccmi.edu/academics/academic-advising/> and click on your pathway. You should also receive an email from your Navigator at the beginning of the semester.

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

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 every week 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

Please note: The format and timing of this course may need to change due to unforeseen circumstances. In particular: school closings, instructor illness, weather, or other situations that may arise.

If you are taking an in-person class, you will be required to complete a Reintegration Video Training course in JetNet prior to being admitted to campus.

All COVID safety protocols in place are based on current guidelines and will be enforced while students are on campus.

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

WEEK	DATE	TOPIC	HOMEWORK
1		Lesson: Mathematics Chapter 1 Level 1 Chapter 1 Level 2	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
2		Take Test 1 Lesson: Waves Chapter 2 Level 1 Chapter 2 Level 2	Reading Assignment: read pages 7-42 Do Exercises: 10, 13.7, 14.3 Conceptual Questions: 4, 7, 9, 10
3		Take Test 2 Lesson: Attenuation Chapter 3 Level 1 Chapter 3 Level 2	Reading Assignment: read pages: 43-73 Do Exercises: 11, 12 Complete Lab Assignment 1
4		Take Test 3 Lesson: Pulsed Wave Operation Chapter 4 Level 1 Chapter 4 Level 2	Reading Assignment: read pages: 75-98 Do Exercises: 13
5		Take Test 4 Lesson: Transducers Chapter 5 Level 1 Chapter 5 Level 2	Reading Assignment: read pages: 99-145 Do Exercises: 11, 28 Complete Lab Assignment 2
6		Take Test 5 Lesson: System Operation Chapter 6 Level 1 Chapter 6 Level 2	Reading Assignment: read pages: 147-222 Do Exercises: 7, 26 Complete Lab Assignment 3

7		Take Test 6 Lesson: Doppler Chapter 7 Level 1 Chapter 7 Level 2	Reading Assignment: read pages: 223-274 Do Exercises: 1.8 Conceptual Questions: 5, 33 Complete Lab Assignment 4
8		Take Test 7 Lesson: Artifacts Chapter 8	Reading Assignment: read pages: 275-300 Conceptual Questions: 8 Complete Lab Assignment 5
9		Take Test 8 Lesson: Bioeffects Chapter 9	Reading Assignment: read pages: 301-324 Do Exercises: 7 Conceptual Questions: 14 Complete Lab Assignment 6
10		Take Test 9 Lesson: Contrast and Harmonics Chapter 10 Lesson: Quality Assurance Chapter 11	Reading Assignment: read pages: 325-347, 349-376 Do Exercises: 12 Complete Lab Assignment 7 Complete Lab Assignment 8
11		Take Test 10 Take Test 11 Lesson: Physiology & Fluid Dynamics	Reading Assignment: read pages: 377-401: Conceptual Questions: Complete Lab Assignment 9
12		Take Test 12 Lesson: Venous Hemodynamics	Reading Assignment: read pages: 403-434 Complete Lab Assignment 10
13		Lesson: Vascular Physical Principles	Reading Assignment: read pages: 403-434
14		Take Test 14 Review for Final	
15		<u>FINAL EXAM</u>	

Important Dates:

MONDAY 03/07/2022- FRIDAY 03/11/2022	MID-SEMESTER BREAK-NO CLASSES
SUNDAY 04/30/2022	END OF FALL SEMESTER