DMSO 1302 Basic Physics

CREDIT
3 Semester Credit Hours (3 hours lecture)

MODE OF INSTRUCTION
Face to Face

LAMAR INSTITUTE OF TECHNOLOGY

COURSE DESCRIPTION
Foundations of acoustical physics and acoustical waves in human tissue. Emphasis on ultrasound transmission in soft tissues, attenuation of sound energy, parameters affecting sound transmission, and resolution of sound beams.

COURSE OBJECTIVES
- Upon completion of this course, the student will be able to
  - Describe the interaction of sound in soft tissues
  - Explain sound production and propagation
  - Summarize the basic principles and techniques of ultrasound

INSTRUCTOR CONTACT INFORMATION

Instructor:	Tracy Ryals, RDMS, RVT
Email:	taryals@lit.eu
Office Phone:	409-247-5130
Office Location:	Gateway #115
Office Hours:	Please see Starfish to schedule an appointment

REQUIRED TEXTBOOK AND MATERIALS
1. Understanding Ultrasound Physics by Sidney K. Edelman, Ph.D 4th edition
   ISBN#0-9626444-5-5
   www.esp-inc.com
2. Computer with webcam

ATTENDANCE POLICY
- Attendance is **mandatory**. Absences are only permitted for serious illness (with a doctor's note) or immediate family emergencies.
- **Three (3) absences** will result in a one-letter grade reduction.
- **Excused vs. unexcused:** There is no distinction—all absences count equally toward the semester total, regardless of reason.
- Tardiness of more than 10 minutes or being late for two consecutive classes will count as one absence.
- The sign-in sheet will be removed **15 minutes** after class begins. If you arrive after this time, you will be marked absent.

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- Leaving class for more than 15 minutes will also result in being marked absent.
- If you are absent, **you must contact the instructor** to report the absence and are fully responsible for obtaining any missed assignments or information.

COURSE CALENDAR

****This schedule is subject to change at the discretion of the instructor at any time.***

DATE	TOPIC	READINGS (Due on this Date)	ASSIGNMENTS (Due on this Date)
06 – 02	Syllabus Ch 1 The Basics Lecture	Chapter 1 & PP	
06 – 04	Ch 2 Sound Lecture Ch 3 Describing Sound Waves	Chapter 2 & 3 PP	
06 – 09	Ch 1-3 Worksheets/Review		
06 – 11	***Unit #1 Test***		***Test #1***
06 – 16	Review Test #1 Ch 4 Describing Pulsed Waves Lecture	Chapter 4 & PP	
06 – 18	Ch 5 Intensities Lecture	Chapter 5 & PP	
06 – 23	Ch 4 & 5 Worksheets/Review		
06 – 25	***Unit # 2 Test***		***Test #2***
06 – 30	Review Test #2 Ch 6 Interaction of Sound & Media Ch 7 Range Equation Lecture	Chapter 6 & 7 PP	
07 – 02	Ch 6-7 Worksheets/Review		
07 – 07	***Unit # 3 Test***		***Test #3***
07 – 09	Review Test #3 Ch 8 Transducers Lecture/Worksheets	Chapter 8 & PP	
07 – 14	Ch 9 Sound Beams Lecture/Worksheets	Chapter 9 & PP	
07 – 16	Ch 8 & 9 Review		***Transducer/Sound Beam Project Due***
07 – 21	***Unit #4 Test***		***Test #4***
07 – 23	Review Test # 4 Ch 10 & 11 Lecture	Chapter's 10, 11 & PP	
07 – 28	Ch 10 & 11 Worksheets/Review		
07 – 30	***Unit #5 Test***		***Test #5***
08 – 04	Review Test #5 Review for Final		
08 – 06	Review for Final		
08 – 11	***Final Exam***		***FINAL***

DROP POLICY
If you wish to drop a course, you are responsible for initiating and completing the drop process. If you stop coming to class and fail to drop the course, you will earn an "F" in the course.

COURSE EVALUATION
Final grades will be calculated according to the following criteria:

- **Unit Exams 75%**
- **Course Assignments 5%**
- **Final Exam 20%**

GRADE SCALE

- 93-100 A
- 85-92 B
- 77-84 C
- 69-76 D
- 0-68 F

Course Outline

A. LIT
    a. Policies
    b. Academic calendar
    c. Classroom policies
B. The Basics
    a. Metric system
    b. Graphs
C. Sound
    a. Sound waves
    b. Acoustic parameters
        i. Acoustic variables
D. Describing Sound Waves
    a. Period
    b. Frequency
    c. Strength
        i. Intensity
        ii. Power
        iii. amplitude
    d. Wavelength
    e. Propagation speed
E. Describing Pulsed Waves
    a. Pulsed Ultrasound
    b. Pulse Duration
    c. Spatial Pulse Length
    d. Pulse Repetition Period
    e. Duty Factor
F. Interaction of Sound and Media
    a. Decibels
    b. Attenuation
    c. Attenuation Coefficient
    d. Reflection and Transmission
    e. Impedance

G. Range Equation
    a. Range equation
        i. Time of flight
        ii. Go return time
        iii. 13 microsecond rule
H. Axial Resolution
I. Transducers
    a. Basic transducer construction
        i. Types of transducers
    b. Transducer frequencies
    c. Sound beams
        i. Anatomy of a sound beam
        ii. Focused
        iii. Unfocused
J. Sound beams
        i. Focal depth
        ii. Divergence
    b. Huygens' principle
        i. Spherical waves

TECHNICAL REQUIREMENTS
The latest technical requirements, including hardware, compatible browsers, operating systems, etc. can be online at https://lit.edu/online-learning/online-learning-minimum-computer-requirements. A functional broadband internet connection, such as DSL, cable, or WiFi is necessary to maximize the use of online technology and resources.

DISABILITIES STATEMENT
The Americans with Disabilities Act of 1990 and Section 504 of the Rehabilitation Act of 1973 are federal anti-discrimination statutes that provide comprehensive civil rights for persons with disabilities. LIT provides reasonable accommodations as defined in the Rehabilitation Act of 1973, Section 504 and the Americans with Disabilities Act of 1990, to students with a diagnosed disability. The Special Populations Office is in the Eagles' Nest Room 129 and helps foster a supportive and inclusive educational environment by maintaining partnerships with faculty and staff, as well as promoting awareness among all members of the Lamar Institute of Technology community. If you believe you have a disability requiring an accommodation, please contact the Special Populations Coordinator at (409)-951-5708 or email specialpopulations@lit.edu. You may also visit the online resource at Special Populations - Lamar Institute of Technology (lit.edu).

STUDENT CODE OF CONDUCT STATEMENT
It is the responsibility of all registered Lamar Institute of Technology students to access, read, understand and abide by all published policies, regulations, and procedures listed in the *LIT Catalog and Student Handbook*. The *LIT Catalog and Student Handbook* may be accessed at www.lit.edu. Please note that the online version of the *LIT Catalog and Student Handbook* supersedes all other versions of the same document.

STARFISH
LIT utilizes an early alert system called Starfish. Throughout the semester, you may receive emails from Starfish regarding your course grades, attendance, or academic performance. Faculty members record student attendance, raise flags and kudos to express concern or give praise, and you can make an appointment with faculty and staff all through the Starfish

home page. You can also login to Blackboard or MyLIT and click on the Starfish link to view academic alerts and detailed information. It is the responsibility of the student to pay attention to these emails and information in Starfish and consider taking the recommended actions. Starfish is used to help you be a successful student at LIT.

ADDITIONAL COURSE POLICIES/INFORMATION

- No food, drinks, or tobacco products are allowed in class.
- Cell phones and all electronic devices must be turned off during class.
- Children are not permitted in class at any time.
- Assignments are due at the beginning of class or by the date listed in the syllabus.
    - **Late work will not be accepted and will receive a grade of zero.**

Exam Policy – In-Person

- All in-person exams will be given on the dates listed unless changed by the instructor.
- If you miss an exam:
    - You will lose 10 points from your test grade.
    - An additional 10 points will be deducted for each class day missed afterward.
- If you attend any sonography class on the test day, you must take the test that day or receive a zero.
- Make-up exams must be taken on the first-class day you return.

Exam Policy – Online

- Online exams will be given on scheduled dates unless changed by the instructor.
- If you miss the deadline:
    - 10 points will be deducted every hour the exam is late, starting from the posted due time.
        - *Example: If the exam is due at 7:00 PM and submitted at 7:01 PM, 10 points will be deducted; at 8:00 PM, 20 points, etc.*
    - After midnight, the exam receives a zero.
- All online exams will be administered through Blackboard using LockDown Browser with Webcam and Screen Monitoring.

LockDown Browser Instructions

- Disable all computer notifications before testing.
- Open the “LockDown Browser” from your desktop (or Applications folder on Mac).
- Close all blocked programs when prompted.
- Log in to Blackboard and begin the exam.
- Complete the Startup Sequence, including the webcam check and environment scan.

Online Exam Violations – Point Deductions

20-Point Deductions:

- Poor lighting in the testing environment.
- Face is not visible always.
- Background noise (TV, music, talking, etc.).
- Reading questions aloud.
- Wearing sunglasses, hats, hoodies, earbuds, or headphones (ears must remain fully visible).

Repeat of any above violation on another exam = 50-point deduction.

Major Violations – 50-Point Deduction or Zero

- Not in a private location (if another person is seen or heard).
- Use or visibility of phones, notes, books, or papers during the exam.
- Leaving the room for any reason during the exam.
- Suspicious activity that appears to be cheating.

These violations may result in a zero or 50-point deduction at the instructor's discretion.

Academic Integrity Policy

- It is considered cheating to use or possess the following items during any exam (unless approved for use):
    - Cell phones, smart watches, laptop, tablet, earphones, or any communication device.
- Cheating on any lecture or lab exam will result in:
    - Immediate dismissal from the program.
    - A final course grade of F.

Testing Tips (Online Exams)

1. Use Google Chrome as your browser.
2. You must have a webcam and microphone connected.
3. Be prepared to scan your testing area. If you can't move your computer, use a mirror to show your surroundings.

Important Notes

- You are responsible for following all testing requirements.
- Completing the verified signature portion of the exam confirms your agreement to follow all rules.
- No extra credit is given in this course.
- You are allowed ONE test reset per semester. No exceptions.