

**Jordan University of Science and Technology**  
**Faculty of Applied Medical Sciences**  
**Department of Allied Medical Sciences**  
**Course Syllabus**

<b>Course Information</b>	
<b>Course Title</b>	Ultrasound
<b>Course Number</b>	RA 380
<b>Prerequisites</b>	RA 210, RA 353
<b>Course Website</b>	NA
<b>Instructor</b>	
<b>Office Location</b>	Part timer
<b>Office Phone</b>	
<b>Office Hours</b>	TBA
<b>E-mail</b>	NA
<b>Teaching Assistant</b>	NA
<b>Course Description</b>	
<p>This course teaches the concepts and phenomena involved in ultrasound beam characteristic and behavior. A good conceptual understanding of the behavior of sounds waves in various media, the ultrasound beam, and the transducer are essential to discern image characteristics and avoid artifact. Ultrasound of various body systems will be briefly outlined.</p>	

<b>Text Book</b>	
<b>Title</b>	Ultrasound Scanning: Principles and Protocols.
<b>Author(s)</b>	Tempkin, B.
<b>Publisher</b>	Saunders
<b>Year</b>	1999
<b>Edition</b>	Second
<b>Book Website</b>	NA
<b>References</b>	Buging, S. (2001). Diagnostic ultrasound: Essential for Medical imaging series. Mosby: St. Louis.

<b>Assessment Policy</b>		
<b>Assessment Type</b>	<b>Expected Due Date</b>	<b>Percentage</b>
<b>First Exam</b>	TBA	30%
<b>Second Exam</b>	TBA	30%
<b>Final Exam</b>	TBA	40%
<b>Assignments</b>	NA	NA

<b>Course Objectives</b>	<b>Percentage</b>
1. Identify, contrast, and compare the various types of mechanical waves and the sound spectrum.	10%
2. Calculate frequency, wavelength, intensity, and identify relative sizes of objects.	10%
3. Anticipate and evaluate reflection characteristics based on acoustic impedance calculation	10%
4. Discuss and note the differences between specular, diffuse, and rayleigh scatters.	10%

5. Calculate levels of attenuation in tissues	10%
6. Describe and discuss the operational characteristics of an ultrasound transducer	15%
7. Describe, discuss, contrast, compare the concepts of an array of elements and beam formation	15%
8. Apply the concepts of resolution and focusing to obtain the optimum image; evaluate the image for quality	20%
9. Calculate the range in a pulse-echo event.	
10. Describe, discuss, contrast, compare, identify the Doppler effect in a spectral display	
11. Identify and evaluate image artifacts and explain them using reasonable physical principles	
12. Develop an appreciation for the importance of physics in understanding and using ultrasound techniques.	

### Teaching & Learning Methods

Lectures, visual demonstrations, group work, and personal contact

### Learning Outcomes: Upon successful completion of this course, students will be able to

Related Objective(s)		Reference(s)
1-12	Demonstrate an understanding of the principles of ultrasound image formation	
1-12	Identify and analyze the main clinical application	
1-12	Recognize the situations in which ultrasound imaging is likely to be of value	
1-12	Critically describe the role of ultrasound relative to other imaging modalities	
1-12	Describe and appreciate novel methods of ultrasound imaging and carry out an appraisal of their likely clinical benefit	

### Useful Resources

World Wide Web and University Library.

### Course Content

Week	Topics	Chapter in Text (handouts)
1	Elementary principles	
2	Properties of ultrasound Units and mathematics	
3	Propagation of ultrasound through tissues	
4		
5	Ultrasound transducers	
6	Construction and characteristics Beam formation and focusing	

	Axial and lateral resolution	
7	Range equation and pulse characteristics	
8		
9	Doppler effect	
10		
11	Physical explanations of artifacts	
12		
13	Review	
14	Final exams period	

<b>Additional Notes</b>	
<b>Assignments</b>	Exams
<b>Exams</b>	MCQs, fill in blank, link and/or essay
<b>Cheating</b>	The university regulations are applied in the case of cheating
<b>Attendance</b>	The university regulations are applied
<b>Workload</b>	3 hours per week
<b>Graded Exams</b>	First, second and final exams
<b>Cheating</b>	The student will be penalized regarding to JUST regulations. If the student has been suspended as a cheater during a course exam, the student will receive a zero at that exam and will receive a Notice from the chair of the department.

