



**The Hashemite University**  
**Faculty of Allied Health Sciences**  
**Department of Medical Imaging**  
**Course Syllabus**

<b>Course information</b>	
<b>Course Title</b>	Diagnostic Ultrasound
<b>Course Code</b>	110508354
<b>Prerequisites</b>	110102161
<b>Credit Hours</b>	3 (2theory+3Lab) Hours

<b>Course Description</b>
This course introduce the student to comprehensive coverage of the physical principles of Diagnostic Ultrasound (US) and its clinical applications, the theoretical foundations necessary for the clinical practice of US scanning and understanding of 3D anatomical images as they related

<b>Course Objectives</b>
By the end of this course, student is expected to:
<ol style="list-style-type: none"> <li>1. Define Acoustic impedance</li> <li>2. Explain Piezoelectric effect</li> <li>3. Calculate the end of the near field transducer</li> <li>4. Compare between Linear- and curvilinear-array transducers</li> <li>5. Discuss Factors affecting the real time imaging:</li> <li>6. Describe Doppler shifts in medical ultrasound and Pulse-Wave Doppler Circuit</li> <li>7. Discuss Intravascular contrast agents</li> </ol>

<b>Recommended Textbook</b>	
<b>Title</b>	Diagnostic Ultrasound
<b>Author</b>	P.Hoskins, K. Martin and A. Thrush
<b>Publisher</b>	CAMBRIDGE - UK
<b>Year</b>	2010
<b>Edition</b>	2 <sup>nd</sup> Ed
<b>Book website</b>	

<b>Other References</b>	
<b>Title</b>	Diagnostic Ultrasound
<b>Author</b>	Stewart C. Bushong
<b>Publisher</b>	
<b>Year</b>	1999
<b>Edition</b>	1 <sup>st</sup> Ed
<b>Title</b>	Ultrasound Physics and Instrumental
<b>Author</b>	W. R. Hedrick, D. L. Hykes, and D. E. Starchman
<b>Publisher</b>	Lippincott Williams and Wilkins
<b>Year</b>	1995
<b>Edition</b>	3 <sup>rd</sup> Ed

**websites**

**Course Contents****Chapter 1: Physics of Ultrasound****Introduction to Ultrasound**

- Fundamental of waves
- Nature of sound
- Medical applications
- *Piezoelectric effect*

**Chapter 2: Interaction of ultrasound with tissues**

- Reflection
- Refraction
- Diffraction
- Wave interference
- Attenuation
- Wave Motion
- Acoustic impedance

**Chapter 3: Transducers and beam-forming**

- Common features of all transducers and transducer elements
- 
- Linear- and curvilinear-array transducers (beam-stepping arrays)
- 
- Phased-array transducers (beam-steering arrays)
- 
- Hybrid beam-stepping/beam-steering transducers
- 
- 3D/4D transducers
- 
- Mechanically scanned transducers

**Chapter 4: Modes of display in ultrasonography**

- Static imaging modes:
  - 1-A mode.
  - 2-B mode.
- Dynamic imaging modes:
  - 3-M mode.
  - 4-Real time B mode
- Image processing and display

**Chapter 5: Properties of B-mode images**

- Imaging system performance
- Artifacts
- Measurement systems
- Sources of errors in ultrasound systems
- Interpretation of measurements

**Chapter 6: Principles of Doppler ultrasound**

- Doppler ultrasound systems
- The ultrasound signal received by the transducer
- The CW Doppler signal processor
- Origin and processing of the Doppler signal for PW systems
- Time-domain systems

**Chapter 7: Quality assurance**

- Clinical and technical assessment
- Relative performance measures
- Absolute performance measures
- Recent developments

- Doppler testing

**Chapter 8: Assignment for Contrast agents**

- Contrast micro bubbles
- Commercially available ultrasound contrast agents
- Interaction of micro bubbles and ultrasound
- Contrast-specific c imaging techniques
- Performing a contrast scan
- Artifacts in contrast imaging

**Chapter 9: Patient Preparation**

- Liver US
- Renal US
- Pelvis US
- Bladder US
- Aorta US

<b>Assessment</b>	
<b>First Exam</b>	25
<b>Second Exam</b>	25
<b>Final Exam</b>	40
<b>Lab + In course assessment</b>	10