The Hashemite University
Faculty of Allied Health Sciences
Department of Medical Imaging

Course Syllabus

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

Course Description
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

Course Objectives
By the end of this course, student is expected to:
1. Define Acoustic impedance 2. Explain Piezoelectric effect 3. Calculate the end of the near field transducer 4. Compare between Linear- and curvilinear-array transducers 5. Discuss Factors affecting the real time imaging: 6. Describe Doppler shifts in medical ultrasound and Pulse-Wave Doppler Circuit 7. Discuss Intravascular contrast agents

Recommended Textbook	
Title	Diagnostic Ultrasound
Author	P.Hoskins, K. Martin and A. Thrush
Publisher	CAMBRIDGE - UK
Year	2010
Edition	2nd Ed
Book website	
Other References	
Title	Diagnostic Ultrasound
Author	Stewart C. Bushong
Publisher	
Year	1999
Edition	1st Ed
Title	Ultrasound Physics and Instrumentional
Author	W. R. Hedrick, D. L. Hykes, and D. E. Starchman
Publisher	Lippincott Williams and Wilkins
Year	1995
Edition	3rd Ed
websites	

Website	

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**

Assessment	
First Exam	25
Second Exam	25
Final Exam	40
Lab + In course assessment	10