Biomedical Ultrasound Imaging  
ECE 472  
Spring 2016  
10:00-10:50 MWF, room ECEB 3020

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Website: [http://courses.ece.uiuc.edu/EC472/index.htm](http://courses.ece.uiuc.edu/EC472/index.htm)

The overall objective of this course is to familiarize the students with most of the theoretical and engineering foundations of biomedical ultrasonic imaging. Conventional, Doppler and advanced ultrasonic imaging techniques will be described. Students will be introduced to important applications of the different ultrasonic imaging techniques. Engineering problems related to image production, quality and system design will be examined.

Course Grading: 30% - Homework; 45% - Mini-Exams I, II, III; 25% - Final Exam

Reference Material: Lecture Notes, Select literature, Recommended: Fundamentals of Biomedical Ultrasound by Richard Cobbold

Pre-Requisites: ECE 329 or consent of instructor

Syllabus: (topics covered- corresponding chapters in textbook)  
Acoustic wave propagation – Chapter 1: 1.1-1.5  
Attenuation in ultrasound – Chapter 1: 1.8  
Ultrasonic Sources – Chapter 6: 6.1; 6.10  
Fields – Chapters 2 and 3: 2.2-2.3; 3.1-3.8  
Anatomical Imaging:  
Conventional ultrasonic imaging – Chapter 8: 8.1-8.3  
Arrays – Chapter 7: 7.1-7.3  
Ultrasound Contrast Agents – Chapter 8: 8.6  
Harmonic Imaging – Chapter 8: 8.6  
Functional Imaging:  
Doppler (theory) – Chapter 9: 9.1-9.3  
Continuous wave Doppler – Chapter 9: 9.4-9.7  
Pulsed wave Doppler – Chapter 10: 10.1-10.5  
Color Flow Imaging – Chapter 10: 10.7-10.8; 10.10  
Doppler with ultrasound contrast agents  
Advanced ultrasonic imaging:  
Coded excitation – Chapter 8: 8.4  
Elastography – Chapter 8: 8.9  
Plane Wave Imaging  
Quantitative ultrasound imaging – Chapter 5: 5.1-5.2  
3D Ultrasound imaging  
Ultrasound computed tomography – Chapter 8: 8.7  
Ultrasound biomicroscopy – Chapter 8: 8.9-8.10  
Photoacoustics