

Diagnostic ultrasound imaging has advanced substantially over the past 25 years and this has been accelerated by the progressive move toward digital systems. Modern ultrasound systems rely heavily on multi-element array transducers, image reconstruction, and signal processing to produce the clinical images seen today. In addition, there has been a significant effort to make ultrasound more portable and less expensive while trying to maintain image quality and performance. Those involved in the operation and evaluation of ultrasound systems need to understand the technology and approaches being used in ultrasound imaging today.

This lecture will provide the background understanding of ultrasound physics and its application in imaging systems and the evolution of imaging toward the modern digital devices being used today.

**Learning objectives:**

1. Understand fundamental physics and operation of b-mode and Doppler.
2. Understand recent advances in signal processing including harmonic imaging, coded excitation, automated optimization methods, compound imaging and speckle reduction.
3. Understand the methods for image improvements by the processing methods used in ultrasound imaging.