

ULTRASOUND COURSE OFFERING FOR SPRING QUARTER 2024



BIOEN 449/549 *Ultrasound Imaging*

Mondays & Wednesdays 9:30-11:20 pm, BNS 115

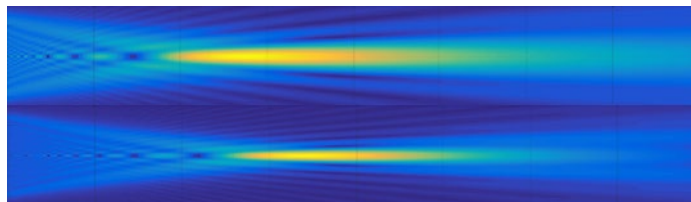
Instructor: Mike Averkiou PhD, Professor, Bioengineering

The department of Bioengineering is offering **BIOEN 449/549 Ultrasound Imaging**. The course provides undergraduate and graduate level engineering and science students with fundamentals of acoustics and ultrasound relevant for ultrasound imaging.

Ultrasound imaging continues to gain popularity in clinical imaging and imaging research. Seattle is an ultrasound hub with many ultrasound imaging companies present in the area.

The course is ideal for students interested in a career in ultrasound imaging. It covers the physical aspects, imaging modes, and clinical utility of diagnostic ultrasound, and also includes hands on lab demonstrations and computational exercises with the use of state-of-the-art ultrasound scanners. An introductory level knowledge on ultrasound is preferred but not necessary.

For further information and course descriptions, contact **Mike Averkiou** (maverk@uw.edu) or **Kalei Combs**, Academic Counselor, Graduate Programs, Bioengineering, 206-221-5448, kaleic@uw.edu, or **Eric Wang**, Academic Services Specialist, 206-685-3494, ew1@uw.edu.



Topics Covered:

1. Intro and basic ultrasound physics
2. Sound beams and signals
3. Transducers and arrays
4. Diffraction and array beamforming
5. Ultrasound interaction with tissue and real-time imaging
6. Doppler processing and color-flow imaging
7. Tissue harmonic imaging
8. Ultrasound contrast agents and their imaging techniques
9. Advanced Applications (elastography, molecular imaging, photoacoustics)

Target audience: Engineering or physical science students. Students interested in working in medical ultrasound industry in the Seattle area or elsewhere or currently performing research that could utilize ultrasound during their graduate studies.

Prerequisites/Recommended Background:

Basic math and physics typically covered in the first years of engineering and science majors. Some basic signal processing knowledge is nice to have but not a requirement. Basic mathematical programming tools such as Matlab will be used, although other languages/tools are acceptable and not a requirement

Specific outcomes:

By the end of the course, students will demonstrate the ability to:

1. Identify and explain the basic principles and fundamentals of ultrasound necessary for diagnostic ultrasound imaging
2. Explain the main aspects of focused sound beams and the acoustic field produced by them
3. Identify different types of ultrasound transducers, arrays, and explain array beamforming
4. Use basic mathematical models and tools to describe ultrasound imaging
5. Use basic ultrasound equipment to take acoustic measurements in the lab
6. Identify the main imaging modalities in diagnostic ultrasound (B-mode, Doppler, Color Flow, Harmonic Imaging, Contrast Imaging)
7. Use diagnostic ultrasound devices to image various parts of the body and measure blood flow