

Imaging

- *photoacoustic tomography*
- *thermoacoustic tomography*
- *phase-contrast x-ray imaging*
- *electrocardiographic imaging*
- *optical bioelectric imaging*
- *nanoparticle imaging agents*
- *diffuse optical tomography*
- *optical coherence computed tomography*
- *ultrasound-modulated optical tomography*
- *neural imaging*
- *multimodality imaging*

Imaging activities at Washington University are interdisciplinary, involving the Departments of Biomedical Engineering, Electrical and Systems Engineering, and Computer Science and Engineering in the School of Engineering and Applied Science. In addition, strong and long-standing collaborative interaction with departments in the School of Medicine give engineering students at Washington University ample opportunities to participate in biomedical and biological science projects that involve imaging.

Opportunities for educational experience to learn the principles and applications of imaging technologies are available through the Imaging Science and Engineering Graduate Certificate Program, which is a coordinated program of courses, seminars, and laboratory experiences jointly offered by the participating departments.

Imaging activities also have a wide span from the microscopic, such as the imaging of tissues and cells, to the macroscopic imaging of the whole body, and from basic research to clinical application. Research includes the study and development of technology for acquiring, processing, transmitting, and storing image data.

PROGRAM OF STUDY

Biomedical engineering students in this program follow a course of study in accordance with the general requirements of the BME Department. The following courses are available to students in this program:

BME 494 Medical Imaging
BME 502 Cardiovascular Magnetic Resonance Imaging
BME 504 Optical Bioelectric Imaging
BME 505 Advanced MRI and Molecular Imaging
BME 533 Biomedical Image Processing
BME 591 Biomedical Optics I: Principles
BME 592 Biomedical Optics II: Imaging
BME 5907 Advanced Concepts in Image Science
ESE 588 Quantitative Image Processing
ESE 524 Detection and Estimation Theory
ESE 578 Digital Representation of Signals
CSE 552A Advanced Computer Graphics
ESE 587 Ultrasonic Imaging
CSE 509A Digital Image Processing
ESE 523 Information Theory
CSE 546T Computational Geometry

PROGRAM FACULTY

Samuel Achilefu, Ph.D., *Molecular optical and multimodal imaging*

Mark Anastasio, Ph.D., *Image reconstruction, photoacoustic imaging, phase contrast x-ray imaging*

Dennis Barbour, M.D., Ph.D., *Neuronal imaging*

Joseph P. Culver, Ph.D., *Diffuse optical tomography, non-invasive optical imaging*

Igor R. Efimov, Ph.D., *Cardiac and optical imaging, optical coherence tomography*

Timothy E. Holy, Ph.D., *Optical methods for neural imaging*

H. Harold Li, Ph.D., *Dose imaging for radiation therapy*

Gregory Lanza, Ph.D., *Targeted contrast agents, molecular imaging*

James G. Miller, Ph.D., *Ultrasonic imaging*

Joseph A. O'Sullivan, Ph.D., *Tomographic imaging*

Paragh Parikh, M.D., *Technology development for radiation therapy, real-time tumor tracking*

Marcus E. Raichle, M.D., *Functional brain imaging*

Yoram Rudy, Ph.D., *Noninvasive imaging of cardiac activation*

Yuan-Chuan Tai, Ph.D., *High resolution PET and multimodal imaging, functional plant imaging*

David Van Essen, Ph.D., *Functional brain-mapping*

Lihong Wang, Ph.D., *Photoacoustic tomography, thermoacoustic tomography, optical imaging*

Michael J. Welch, Ph.D., *Radiopharmaceutical chemistry for imaging agents*

Samuel A. Wickline, M.D., *Cardiac magnetic resonance imaging, molecular imaging*

Pamela Woodard, M.D., *CT/MR cardiac imaging*