Electrical and Computer Engineering
MSE Track in Image Processing

Introduction
This track involves topics surrounding image processing including image acquisition and reconstruction, image compression and coding, image analysis, and image understanding. Applications including optical and biomedical imaging are emphasized and core techniques such as digital signal processing, random signal analysis, and sparse signal processing are offered.

General Requirements
1. Satisfactory completion of eight one-semester graduate courses. All require advisor approval. These courses may not include primarily research/independent study courses (e.g. 520.700, 520.800, 520.801, etc.) Seminar courses (e.g. 520.601) and special studies courses may not be used.
   - Five courses must come from the full-time ECE department (520.XXX), and be 600 level or above.
   - Three Additional courses must be level 600 (WSE) / 400 (KSAS) or above.
2. Completion of either (Option 1) two additional graduate courses, or (Option 2) a master’s essay, or (Option 3) a special research project approved by an ECE faculty member.

List of ECE Courses Relevant to the Track

- 520.634 Modern Biomedical Imaging Instrumentation and Techniques
- 520.603 Introduction to Optical Instrumentation
- 520.613 Advanced Topics in Optical Medical Imaging
- 520.614 Image Processing & Analysis
- 520.615 Image Process & Analysis II
- 520.632 Medical Imaging Systems
- 520.623 Medical Image Analysis
- 520.635 Digital Signal Processing
- 520.646 Wavelets and Filter Banks
- 520.648 Compressed Sensing and Sparse Recovery
- 520.651 Random Signal Analysis
- 520.652 Filtering and Smoothing
- 520.673 Magnetic Resonance in Medicine

Relevant classes in other departments

Applied Mathematics & Statistics
553.693 Mathematical Image Analysis

Biomedical Engineering
580.483 Nuclear Medicine Imaging
580.673 Magnetic Resonance in Medicine
580.679 X-ray Imaging and Computed Tomography

Mechanical Engineering
530.473 Molecular Spectroscopy and Imaging
ECE Activity in Image Processing

Core Faculty
- John Goutsias
- Jerry Prince
- Trac Tran
- Paul Bottomley (Joint appointment in ECE)
- Eric Frey (Joint appointment in ECE)
- Donald Geman (Secondary appointment in ECE)
- Greg Hager (Secondary appointment in ECE)
- Xinde Li (Secondary appointment in ECE)
- Michael Miller (Secondary appointment in ECE)
- Dzung Pham (Adjunct appointment in ECE)
- Arman Rahmim (Joint appointment in ECE)
- J. Webster Stayman (Secondary appointment in ECE)
- Benjamin Tsui (Joint appointment in ECE)
- Rene Vidal (Secondary appointment in ECE)

ECE Research Activity in Image Processing
- Whole-body quantitative (parametric) PET/CT imaging
- Quantitative Imaging Methods for Targeted Radionuclide Therapy (TRT)
- Dual Isotope SPECT Imaging Technique
- Texture and shape analysis (radiomics), and radiogenomics, as applied to medical imaging (SPECT/PET)
- Optical and photoacoustic imaging through the intact brain for in vivo assessment of brain network activity
- Compressive Ultrahigh-speed Continuous Imaging
- Magnetic Resonance Tissue Contrast Synthesis
- Brain image segmentation in multiple sclerosis
- Retinal Layer Segmentation in Optical Coherence Tomography
- Motion Analysis of the Tongue During Speech using Magnetic Resonance Imaging

Contact Information
Belinda Blinkoff
Senior Academic Program Coordinator
Johns Hopkins University
Dept. of Electrical & Computer Engineering
3400 N. Charles St., Barton Hall 105
Baltimore, MD 21218
Phone: 410-516-4808
bblinkoff@jhu.edu