

ECE/BIOM 403: Intro to Optical Techniques in Biomedical Engineering

IN

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Basic physics of light interaction with matter

Pre-requisites

- CHEM111; PH142 with a minimum grade of C

Concepts:

- Optical contrast mechanisms: Absorption, Refraction, Diffraction, Interference, Scattering, Nonlinear Interactions.
- Optical imaging and microscope system models.
- Fluorescence, fluorescent lifetime, vibrational spectroscopy.

Applications:

- Advanced microscopes for new types of histology and histopathology.
- Optical tweezers, gene sequencing, pulse oximetry, interventional microscopy, methods for detecting cancer and other diseases.

- Describe sources of optical imaging in biomedical systems

- Identify the physical principles of optical imaging for histopathology, cell biology, molecular biology, and other applications

- Explain optical techniques for technologies such as gene sequencing, pathogen detection, investigation of diseases such as cancer

- Identify the latest advances in sensitive molecular detection and super resolution microscopy