Electrical and Computer Engineering
MSE Track in Photonics and Optoelectronics

Introduction
The MSE track in photonics and optoelectronics offers students extended expertise and
opportunities in areas such as experimental and theoretical work in optical imaging, integrated optical
circuits, optical communications, bio-photonics, ultrafast optics, nonlinear optics, lasers, solar powers,
semiconductor devices and sensors. The ECE department has various optical laboratories, among these
being the Bio-Photonics Laboratory, Nonlinear and Quantum Optics Laboratory, Nanoenergy and
Optoelectronics Laboratory, Ultrafast and Nonlinear Photonics Laboratory, and Integrated Photonics
Laboratory for assembly and testing of various optical imaging systems, measurement of complex linear
and nonlinear optical properties of materials, testing of optical communication and microwave signal
processing subsystems, and conducting ultrafast time-resolved measurements, as well as a machine shop
and an electronic shop.

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.

ECE Courses Relevant to the Track
Courses in the ECE Department (not all courses are offered every year):

EN.520.603 Introduction to Optical Instrumentation
EN.520.613 Adv. Topics in Optical Medical Imaging
EN.520.624 Integrated Photonics
EN.520.627 Photovoltaics and Energy Devices
EN.520.678 Biomedical Photonics
EN.520.682 Introduction to Lasers
EN.520.683 Bio-photonics Laboratory
EN.520.685 Adv. Semiconductor Devices
EN.520.691 Optoelectronic Microsystems
EN.520.773 Adv Topics in Microsystem Fabrication

Relevant Courses in Other Departments

Mathematics
AS.110.417 Partial Differential Equations for Applications
AS.110.443 Fourier Analysis

Physics and Astronomy
AS.171.621 Condensed Matter Physics
AS.171.755 Fourier Optics and Interferometry in Astronomy

Computer Science
EN.600.618 Operating Systems
EN.600.644 Network Security

Material Science and Engineering
EN.510.615 Physical Properties of Materials
EN.510.616 Physical Behavior of Metamaterials

Courses in the Johns Hopkins Engineering for Professionals (EP) Program

Electrical and Computer Engineering (EP)
525.613 Fourier Techniques in Optics
525.625 Laser Fundamentals
525.636 Optics and Photonics Laboratory
525.691 Fundamentals of Photonics
525.753 Laser Systems and Applications
525.756 Optical Propagation, Sensing, and Backgrounds
525.772 Fiber-Optic Communication Systems
525.796 Introduction to High-Speed Electronics and Optoelectronics
525.797 Advanced Optics and Photonics Laboratory

Applied Physics (EP)
615.751 Modern Optics
615.758 Modern Topics in Applied Optics
615.778 Computer Optical Design
615.780 Optical Detectors and Applications
615.781 Quantum Information Processing
615.782 Optics and MATLAB

ECE Activity in Photonics and Optoelectronics

Core Faculty
- Andreas Andreou
- Amy Foster
- Mark Foster
- Jin Kang
- Jacob Khurgin
- T.E. (Ed) Schlesinger
- Susanna Thon
Research Activity

- Bio-Photonics
- Fiber Optics
- Integrated Photonics
- Lasers and other Optical Sources
- Micro/Nano-Photonics
- Microwave Photonics
- Mid-Infrared Technologies
- Optical Communications
- Optical Imaging
- Optical Signal Processing
- Plasmonics
- Quantum Optics
- Semiconductor Physics
- Silicon Photonics
- Solar Energy Devices
- Ultrafast and Nonlinear Optics

Contact Information
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