

BOSTON UNIVERSITY
Department of Electrical & Computer Engineering

ENG EC591

Photonics Laboratory

Fall 2022

Catalog Description: Introduction to optical measurements. Basic theories of light. Principles of laser operation. Laser safety issues. Laboratory experiments: introduction to laser light and basic optical components; interference; Fabry-Perot resonators; beam optics; diffraction and Fourier optics; optical spectroscopy; polarization components; fiber optics. Optical simulation techniques. Waveguide design and modeling for integrated optics. Nanophotonics simulations based on the finite difference time domain (FDTD) method.

Prerequisites: Modern Physics (PY313 or equivalent)

Recommended corequisite: Engineering Optics (EC562)

Credits: 4

Lecture:	T 9-10:45 (all students)	EPC 203
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Labs:	R 9-10:45 (section B1)	PHO 701
	W 10:10-11:55 (section B2)	PHO 701

Instructor:	Roberto Paiella	Office:	PHO 529
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		Office hours:	R 1-3 or by appointment

Lab Assistant:	Mete Aslan	email:	maslan@bu.edu
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Reference textbook: B. E. A. Saleh & M. C. Teich, "Fundamentals of Photonics" (Wiley, NY, 2019), volume 1 of 2-volume set

Web Page: available on Blackboard Learn (<https://learn.bu.edu>)

Requirements:	Homework (lab reports and simulation projects)	90%
	Quiz	10%

NOTE: Lab experiments will be carried out in groups, but individual reports will be expected.

Course Calendar (tentative)

Wk	Date	Lectures	Labs
1	T-9/6	Course Introduction	
2	T-9/13	Ray Optics	
3	T-9/20	Lab 1: Introduction to Laser Light and Basic Optical Components	W-9/21 (section B2) R-9/22 (section B1)
4	T-9/27	Lab 2: Optical Interference	W-9/28 (section B2) R-9/29 (section B1)
5	T-10/4	Lab 3: Fabry-Perot Resonators	W-10/5 (section B2) R-10/6 (section B1)
6	T-10/11	No class (substitute Indigenous People's Day schedule)	
7	T-10/18	Lab 4: Beam Optics	W-10/19 (section B2) R-10/20 (section B1)
8	T-10/25	Lab 5: Diffraction and Fourier Optics	W-10/26 (section B2) R-10/27 (section B1)
9	T-11/1	Lab 6: Optical Spectroscopy	W-10/2 (section B2) R-10/3 (section B1)
10	T-11/8	Lab 7: Polarization Components	W-11/9 (section B2) R-11/10 (section B1)
11	T-11/15	Lab 8: Waveguide Design (Beam Propagation Method)	W-11/16 (section B2) R-11/17 (section B1)
12	T-11/22	Quiz	
13	T-11/29	Lab 9: Fiber Optics	W-11/30 (section B2) R-12/1 (section B1)
14	T-12/6	Lab 10: Finite-Difference-Time-Domain Simulations	W-12/7 (section B2) R-12/8 (section B1)

Course Objectives

The objective of this course is to provide the students with hands-on experience with modern optical components and experimental techniques. Laser safety issues and computer-aided optical design will also be emphasized.