

**Physics 408**  
**<< Optics >>**

Spring 2023

Instructor: Dr. Y. H. Shih

Office: PHYS 310

Telephone: 2558 (o), 1933 (Lab.)

Lectures: Mo We Fr 3:00PM-3:50PM

Room: Physics 201

Text: My Lecture Notes

References: Eugene Hecht <<Optics>> (Fourth Edition)

Robert Guenther << Modern Optics >>

Yanhua Shih <<An Introduction to Quantum Optics>>

Prerequisites: Student should have had a standard undergraduate course in intermediate Electromagnetic Theory, Optics and Optics Lab (PHYS 330L or equivalent) and a standard undergraduate course in Mathematical Physics or Engineering Mathematics. In particular, it will be assumed that the students understand the basic theory of ordinary differential equation, basic material about Fourier transform and vector analysis.

Homework: Homework due day will be determined in class. You are encouraged to discuss the problems together; however, each person should work out their assignment *independently*. Assignments are to be written up professionally with computer graphics where appropriate. The computer worksheets should be readable by anyone. This requires explanations of what you have done.

Grading Method: Homework 20%, Midterm 30%, Final 50%.

Office Hours: W 12:00-3:00pm. I am usually in my Lab. (Rooms 010, 011) and happy to speak with you any time. Call me before your visit.

Topic Outline:

- I. Maxwell's Equations and EM Wave Theory
- II. Einstein's Picture of Light: Quantized EM Wavepacket
- III. Measurement of Light
- IV. Interference and Coherence Theory
- V. Propagation and Diffraction of Light
- VI. Imaging and Fourier Optics
- VII. Polarization of Light
- VIII. Modern Optics (Laser Physics and Nonlinear Optics)
- IX. Quantum Optics (depending on the progress)

***Spring 2022 Safety Protocols and Compliance Statement:***

*UMBC has set clear expectations for masking while on campus that include the requirement that you must wear a KN95 face mask or equivalent that covers your nose and mouth in all classrooms regardless of your vaccination status. For information on masks equivalent to KN95s please click the following link:*

*<https://covid19.umbc.edu/masks/>*

*This is to protect your health and safety as well as the health and safety of your classmates, instructor, and the university community. Anyone attending class without a KN95 mask or wearing one improperly will be asked by the instructor to put on a KN95 mask or fix their mask in the appropriate position. Any student that refuses to comply with this directive will be asked to leave the classroom immediately and failure to do so may result in the instructor requesting the assistance of the University Police. Students who refuse to wear KN95 masks may be referred to Student Conduct and Community Standards and may face disciplinary action for violations of the Code of Student Conduct, specifically, Rule 2: Behavior Which Jeopardizes the Health or Safety of Self or Others and Rule 16: Failure to Comply with the Request of a University Official.*

*UMBC's on-campus safety protocols, including masking requirements, are subject to change in response to the evolving situation with Covid-19.*