

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

Spring 2024

Instructor: Dr. Y. H. Shih

Office: PHYS 310

Telephone: 2558

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

Room: Physics 107

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. Measurement of Light
- III. Einstein's Picture of Light: Quantized EM Wavepacket
- 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)