

# Quantum Electronics

Fall 2005 Monday 2-4 pm at the Graduate Center

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This course is intended for graduate students or undergraduate seniors, who are interested in exploring research in optics. The emphasis is placed on the fundamental principles and their applications, which serve as the bridge between theory and practice. Physical concepts and analytical treatments for simplified models will be presented. In order to cover as much ground as possible, problems of lengthy derivations are assigned as homework. The starting point is the wave equation for electromagnetic waves. The semi-classical approach will be used throughout the course.

Pre-requisites: Intermediate electromagnetic theory, atomic and nuclear physics or modern physics.

Textbooks:

“Fundamental of Photonics”, by Bahaa E.A. Saleh and M. Teich, Wiley Interscience.

Supplemental reading:

“Quantum Electronics”, Amnon Yariv, Wiley.

Research papers and books for individual subjects

Topics:	Number of lectures
Waves and beam optics	1
Waves in dielectric media	1
Waveguides and coupled waveguides	1
Fourier optics and holography	2
Optical resonators	1
Laser amplifiers and lasers	2
Semiconductor lasers	2
Nonlinear optics	3
(Harmonics generation, phase conjugation, parametric and Raman)	
Noises in lasers and detection	1

Grading

Homework	50%
One Midterm	20%
Final Exam	30%