

**16:332:591:01 – Index #36132
Optoelectronics I
Fall 2007**

Instructor: Prof. Wei Jiang

**T,Th 7th (6:40 pm – 8:00 pm)
SEC 212**

Prerequisites: 16:332:580 and 16:332:581 or 583.

Course Description: Waveguides and optical fibers, optical resonators, principles of laser action, light emitting diodes, semiconductor lasers, other lasers, optical amplifiers, optical modulators and switches, photodetectors, wavelength-division-multiplexing and related optical devices.

Homework: Homework and exams will be based on class notes, which will be available in power point version on the class web site. A list of reference books and research papers will be given throughout the lectures. Some of the research papers and reports will be given as "supplemental reading".

Week-by-Week Syllabus

Week 1: Introduction and Applications; Optical waveguides

Week 2: Optical waveguides & fibers;

Week 3: Basics of quantum mechanics

Week 4: Basics of semiconductor physics and materials

Week 5: Review 1; EXAM 1

Week 6: LEDs & Optical Amplifiers

Week 7: Optical Resonators and optical gain

Week 8: Lasers: Threshold conditions & fundamental device characteristics

Week 9: Lasers: various types

Week 10: Modulators: Internal modulation; external modulators (Mach-Zehnder etc)

Week 11: Electroabsorption modulators; optical switches; Review 2

Week 12: EXAM 2 (no class on Thur for Thanksgiving)

Week 13: Photo-detectors: basic physics, noise; Various types: (PIN, MSM, APD)

Week 14: Other devices for integrated optics; Wavelength-division-multiplexing devices

Week 15: Review for final exam

Textbooks:

. Amnon Yariv, Quantum Electronics, ISBN 0471609978, required

. B. E. A. Saleh & M. C. Teich, Fundamentals of Photonics, Wiley-Interscience, 2nd edition (2007), ISBN 0471358320 (optional).

. Pallab Bhattacharya, Semiconductor Optoelectronic Devices, Prentice Hall; 2nd edition (1996), ISBN 0134956567 (optional).

Amount of Homework Required or Suggested per Week: 3 hours