

Winter 2009

EECS 429 Semiconductor Optoelectronic Devices

Instructor: P. C. Ku (2417G EECS; peicheng@umich.edu)

Lectures: MW 1:30-3 at 2305 GG Brown

Lab: M 6-7 at 1303 EECS (Attendance to the Lab session is required to receive the credit.)

Office hours: MW 3-5 at 2417G EECS or by appointment

Textbooks:

P. Bhattacharya, *Semiconductor Optoelectronic Devices*, 2nd edition, Prentice Hall.
Supplemental lecture notes will be provided when necessary.

References (available on the Reserves Shelves in the Engineering Library):

Mitsuo Fukuda, *Optical Semiconductor Devices*, John Wiley (1999).

E. Fred Schubert, *Light Emitting Diodes*, 2nd edition, Cambridge Press (2006).

Homework: 5 homework (20%).

Exam: Two take-home mid-term exams (30% each) and one final exam (in class and open book, 20%).
The final exam will be held according to the official schedule published by the Office of Registrar.

Credit Units: 4

Pre-requisite: EECS 320 or graduate standing

Optoelectronic devices play a crucial role in various technologies including internet, data storage, display, image sensors, lighting and solar cells. In EECS 429, we will introduce the fundamentals underlying modern optoelectronic devices including lasers, light emitting diodes, photodetectors, solar cells, optical modulators, and displays. After a quick review of EECS 320 materials, we will introduce the physics, materials engineering, device structures, fabrication and circuit integration of the optoelectronic devices. ***We will put special emphasis on the concept and design of the device as well as the technology.*** We will focus on the conceptual parts of the textbook and **minimize** advanced materials such as quantum mechanics. Mathematics will be introduced in a way to facilitate the design and optimization of the device, rather than to sharpen your calculation skills. The key to the success is to truly understand the concept, i.e. physics underlying these optoelectronic devices. At the end of the course, you will be able to explain to your friends what enabled your day-to-day internet experience, why the downtown Ann Arbor is replacing all its street light with light emitting diodes and what are the challenges of making a solar cell technology truly viable.