

ECE 532 Compound Semiconductors and Diode Lasers Fall 2023

Instructor: Kent Choquette
choquett@illinois.edu

Description: Compound semiconductor materials and their optical properties. Diode lasers including quantum well heterostructure lasers, strained layer lasers, quantum dot lasers, edge-emitting and vertical cavity lasers. Current topics in diode laser development.

Prerequisites: ECE340 and PHYS486 or equivalent.

Wiki: <https://wiki.illinois.edu/wiki/display/ECE532FA23>
See "Lectures and Notes" for slides, reading assignments, and homework.

Supplementary: L. Coldren, S. Corzine, and M. Masanovic, *Diode Lasers and Photonic Integrated Circuits*, 2nd Ed., Wiley (2012).
G. Agrawal and N. Dutta, *Semiconductor Lasers*, 2nd Ed. Wiley (1993).

Grading:	Homework	20%	Due one week after assigned
	Exam #1	20%	Sept. 22
	Exam #2	20%	Oct. 25
	Presentation	20%	
	Comprehensive Final	20%	Dec. 12 from 1:30-4:30pm

Topical Outline:

1. Bonds, bands, and carriers
2. Recombination, gain, and threshold
Exam 1
3. Heterojunctions, active regions, and waveguides
4. Strained layer and quantum dot gain
5. Laser diode modulation
Exam 2
6. In-plane laser diodes
7. Vertical cavity surface emitting lasers
8. Student presentations/Nanolasers
Cumulative final exam

Presentation Guidelines

Recent *IEEE J. Selected Topics Quantum Electronics* technical paper assigned for review.

Presentation content should contain introductory and motivating material suitable for general audience followed by details suitable for experts. Quality graphics in .ppt, .pptx, or .pdf format.

Presentation must include discussion and references to other research in addition to assigned paper

15 minute timed presentation