ECE 592-101
Laser Diodes and Photonic Integrated Circuits

Instructor(s): Prof. Jonathan Wierer, jjwierer@ncsu.edu

Objective or Description: The fundamentals of semiconductor lasers and photonic integrated circuits with an engineering perspective. Students will learn the basics of semiconductor lasers and gain an understanding of the physical details of their operation. Topics include — basic phenomenological equations to solve problems on real laser diodes; mirrors and resonators for edge-emitting and vertical-cavity surface-emitting lasers; optical gain and spontaneous emission; dynamic effects; coupled mode theory, dielectric waveguides, and photonic integrated circuits.

Prerequisites: ECE 303 and 404. Programing and plotting using a software package such as Matlab, Python, or Excel is required.

Textbook: Larry Colden, Scott Corzine, and Milan Masanovic, Diode Lasers and Photonic Integrated Circuits, Second Edition, (2012).

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Grading: The course will consist of weekly homework assignments (6 sets, 30%), a midterm exam (~2hr, 30%), and a final exam (~2.5hr, 40%).

Lectures will also include new topical areas not included in the textbook, especially in wide bandgap semiconductors such as III-nitrides.