ECE 4300, Fall Semester 2016
Lasers and Optoelectronics
Course Information

Instructors:
Prof. Debdeep Jena (djena@cornell.edu), ECE and MSE, Cornell University
Prof. Clif Pollock, ECE, Cornell University.

Course Website:
https://djena.engineering.cornell.edu/2016_ece4300.htm
Homework assignments and postings will appear on this website. Please bookmark it.

Class Hours:
MWF 10:10 - 11:00 am.
Location: Bard Hall 140.
Office hours: TBD.

Prerequisites:
ECE 3030 or permission of instructor.

Course contents:
Introduction to the operation, physics, and application of lasers. The course covers diffraction-limited optics, Gaussian beams, optical resonators, the interaction of radiation with matter, stimulated emission, rate equations, and laser design. Examples of coherent radiation to nonlinear optics, communication, and leading-edge research are frequently used. Course concludes with a lab where students design and then build a laser.

Textbook:
The following text is required for the course:
Laser Electronics by Joseph T. Verdeyen, 3rd Edition.

Outcomes:

- Be able to analytically design and physically construct a functional laser with simple optics.
- Understand the general operating principles of laser systems, and be knowledgeable of specific systems (e.g. tunable, ultrafast, high power, fiber and semiconductor lasers).
- Understand how to design and the physics behind continuous wave operation, mode locking, Q-switching, and harmonic generation.
- Be able to design a laser optic system using mirrors, lenses and gain media based on Gaussian beam analysis. [Contd...]

Homeworks:

- Homework assignments are an integral part of learning in this course. Approximately one problem set will be assigned every two weeks.
- You are allowed to work with other students in the class on your homeworks. The name(s) of the student(s) you worked with must be included in your homework. But what you turn in must be in your *own* writing, and have your *own* plots and figures. Turning in plots/figures/text that are exact replicas of others *is considered cheating* (see below).
- Assignments must be turned in before class on the due date. The time the assignment is turned in should be written. There will be a 10% penalty each day of delay, and assignments will not be accepted beyond 3 days after the due date. There will be no exceptions to this rule.
- Present your solutions *neatly*. Do not turn in rough unreadable worksheets - learn to **take pride in your presentation**. Show the relevant steps, so that partial points can be awarded. BOX your final answers where applicable. Draw figures wherever necessary. Please print out the question sheet(s) and staple to the top of your homework. Write your name, email address, and date/time the assignment is turned in on the cover.
- Grading of the ECE 4300 assignments will be done by a course grader, with support from the instructors.

Cheating Policy:
Collaboration in homework assignments is allowed, but you must adhere to the requirements described in the homeworks section above. Collaboration in exams is considered cheating. Please read Cornell's policy on cheating here: `http://cuinfo.cornell.edu/aic.cfm`. Now there is no escaping the fact that lasers are *just plain cool*. So let's not spoil that by cheating! No matter how familiar we are with lasers, or how deeply we understand them, they remain an endless source of wonder and amazement - that such a thing actually exists. So let's approach the course in that spirit & enjoy discovering the secrets of this beautiful device!

Exams and Grades:
Other than the assignments, there will be two written prelim exams, and a written final exam. Here is the approximate breakup of scores that will go towards your final grade:

35% Assignments
15% Prelim 1 [Friday September 30th, 2016]
20% Prelim 2 [Monday, October 31st, 2016]
30% Final [TBD]

Demonstrations and Laboratories:
A few demonstrations will be performed in the course. In one of the assignments students will design and build a laser.