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# ECE 4300, Fall Semester 2016

## Lasers and Optoelectronics

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### Assignment 1

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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.

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.

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*. These directions will not be repeated in subsequent assignments, you can refer back to this assignment in case you forget.

**Posted on: Wednesday, 8/31/2016. Due on: 9/14/2016, Wednesday**

**Problem 1.1 (A qualitative overview of a laser.)**

Describe succinctly (in  $\leq 1$  page!) in your own words & illustrations

- a) how is laser light different from light from an incandescent bulb, and
- b) what ingredients must be present to make a laser work.

**Problem 1.2 (Real-life problem you can solve as a Lasers expert!)**

Verdeyen Problem # 1.4. Make a sketch to illustrate the problem.

**Problem 1.3 (The Uncertainty Relations and Beam Spreading.)**

Verdeyen Problem # 1.8.

**Problem 1.4 (Brush up your EMag skills.)**

Verdeyen Problem # 1.3.

**Problem 1.5 (on Ray Tracing.)**

Verdeyen Problem # 2.4.

**Problem 1.6 (Stability criteria for a Ring-Laser cavity.)**

Verdeyen Problem # 2.7.