**OPTI 421L/521L - Introductory Optomechanical Engineering Laboratory**

**Course Description:**

The course provides hands on experience to complement the lecture material in the OPTI 421/521: Introductory Optomechanical Engineering.

**Textbooks:**

Special Materials: Lab Notebook

**Grading Policy:**

- 421L Undergraduates: 100% from lab notebooks
- 521L Graduate Students: 75% from lab notebooks, 25% from project/report

The lab notebook is the most important part of the lab. You need to keep your notebook up to date, and write in it as you do the lab. You must use a bound notebook that has numbered pages that cannot come out.

Your notebooks must contain everything needed to reproduce the experiment:

- Date, time, lab partner(s)
- Objective of the experiment
- Diagrams of any set-ups
- All observations and comments
- Required calculations with equations
- Answers to the questions from the handouts

The notebook must be neat enough that somebody else reading your notebook could understand what you did. All markings in the lab notebook should be made in pen. It is a good idea to cut out and tape relevant material into your notebook where appropriate. Use digital images where appropriate. It is also useful to keep a table of contents for your notebook.

The grade for this course is based on your lab notebook and a final paper for 521L students. The notebooks will be graded on the basis of completeness of the lab write-up and answering the questions. Each lab will be graded for the following:

- Preparation: Before starting the lab, the objective should already be entered into the notebook, along with a summary of the preparation that was completed.
- Diagrams of lab setups, should be concise, yet include important parameters
- Any data, presented in a neat form, including labels
- Observations, should be concise and neat
- Answers to questions
At the end of the term, 521L students must submit a 3-5 page paper covering a topic of your choice from this course. The paper, which should be written as an informal technical memo, will be worth 25% of your grade. The paper should present a summary of one of your labs in a complete and concise way.

It should include the following:

- Introduction
- Description of the equipment and setup
- Presentation of the data, including uncertainties
- Discussion, including interesting observations
- Lessons learned from this lab, and suggestions for improving it.

The paper is due at the end of the term with your lab notebook, but it can be turned in any time in the semester before that.

**Outline**

Subject to modification by professor

- First order optics, image motion
- Basic alignment technique
- Singlet lens centering
- Introduction to precision metrology
- Total station and CMM (coordinate measuring machine)
- Inspection of optical components
- Kinematics and constraints
- Machining, Fabrication, & Shop Tricks
- Adhesive and fasteners
- Material properties
- Vibration
- Linear, rotary stages and motion control