OPTI 423/523
Optomechanical Engineering Laboratory

Spring 2009
Tuesday and Thursday 1:00- 1:50 in Meinel 701

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This 2 credit course provides practical experience with involving design, analysis, hardware development, testing, and evaluation. Class meets weekly for assignment, planning, and review of the projects. Beyond the class time, the students will schedule time in the Optomechanics Laboratory where they have access to necessary equipment and instruction. Students will be required to present their work to the class, to provide written documentation, and to participate in class discussions beyond their own projects. This class is taught for students that have a good command of the principles of optomechanical engineering as taught in 421/521 and 421L/521L.

Text and notes

The text and notes for OPTI 421/521 will be used as primary resources. Additional notes and resources will be provided. The primary resources will be:

Yoder, Paul R., Jr., *Opto-Mechanical Systems Design, 3rd Ed.*, (CRC Press, 2006)

Vukobratovich, D. and S. *Introduction to Opto-Mechanical Design*

Burge, J. H., *OPTI420/521 course notes*

WWW

Class notes and information will be posted at www.optics.arizona.edu/optomech

The grade for the class is assigned based on the following:

1. Initial Project Review (20%)
2. Design Review (25%)
3. Final Project Review (35%)
4. Class participation (20%)

This class is available for graduate or undergraduate credit. Graduate students are expected to work independently. Undergraduate students will work as part of a team.

Goals for the class

1. Experience with hardware such that each student should demonstrate proficiency with common procedures and equipment.
2. Demonstrate professional skills for planning, executing, and reporting hardware-intensive tasks.
3. Expertise in one particular area. Each student will become an expert at the particular area of their choosing.
4. Exposure to a wide variety of disciplines, both from their peers and from ongoing activities at UA.

Logistics

Each student must maintain a bound laboratory notebook that they use for this class. All activities must be recorded in this notebook.

Class will be coordinated using the class website. Also, all presentation materials and reports will be published to the optomech web site.

In the first 2 weeks of class, the student projects must be defined. While this is underway, students will work in groups to get experience with some common procedures and equipment. Over the course of the semester, each person should get first-hand experience and become proficient with the following:

- Seating lenses into a barrel.
- Mounting a flat mirror and measuring distortion with an interferometer
- Seating a vacuum window
- Operating CMM, laser tracker, alignment telescope, autocollimator.
- Drilling, tapping, and de-burring a hole
- Connectorizing a SM optical fiber and measuring the transmission losses
- Connecting a Picomotor to a computer and driving the motor via commands

By the third week, each person should have their hardware intensive project (423L students work in pairs). The main goals for the projects are:

- Learn and hone professional skills necessary for hardware development
- Learn practical hardware skills in one particular area
- Understand issues with real data/ hardware
- Publish results. (Many of these projects could be published as SPIE Conference Proceedings.)

We will spend class time reviewing and discussing the progress and issues with these projects. Class participation is important. One of the main goals in the class is for all students to get exposure to the wide variety of hardware projects underway.

The stages for the projects are defined by semi-formal reviews:

1. Initial Project Review

In weeks 4 and 5, students will present an initial project review. This should include the following:

- Statement of problem and requirements
- Literature/background search
- Plan of approach
- Open issues and a plan for deciding them
- Preliminary bill of materials

2. Design Review

In weeks 6-9 (depending on the type of project) students present a design review, which includes the following:

- Detailed plans for hardware assembly
- Supporting analysis
- Results from any preliminary measurements
- Preliminary plan for executing measurements and for developing conclusions

3. Final Review

In weeks 14-15 students present a Final Review. The presentation and written report complete the project. Some expectations for the Final Review are

- Background
- System design/construction details
- Performance data
- Evaluation
- Lessons learned

Class attendance for peer reviews is mandatory. Interaction at these reviews is expected.