OPTI 423/523

Optomechanical Design and Analysis

Spring 2009
MWF at 11:00- 11:50 in Meinel 307

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Prof. Bob Parks
Prof. Rob Stone

Office hours: TBD

This course applies the principles of optomechanical engineering to design and analysis of numerous systems and components. The format of the class will be quite informal. The class will meet regularly where problem statements, methods, and solutions will be discussed. Class participation will be essential. This class is taught for students that have a good command of the principles of optomechanical engineering as taught in 421/521.

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., *OPTI421/521 course notes*

WWW

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

Class plan for Spring 2009

Class meets M, W, F at 11:00 generally, but due to the independent nature of this class, we may not meet every class period. What the calendar on the web site. Once the design projects are underway, we will use class time for

Reviewing students work
Problem solving
Discussing issues

Class participation is important!
Much of your work will not be collected, but you must be prepared to discuss it when called upon in class. Students will be called on at random. If the student is absent (without excuse) or unprepared, the grade will suffer.

Covered in this class

- Fundamentals of optomechanical design
  - Fundamentals of optomechanical engineering – fill in the gaps
  - Systems Engineering as applied to optomechanics
  - Layout for optical systems
  - Technique of design for fabrication
- Design of mounts for common optics
  - Lens barrels
  - Fold mirror
  - Window
- Precision mechanics design and analysis
  - Coarse and fine adjustments
  - Motion control
  - Use of flexures
- Software tools for optomechanical design and analysis
  - Modeling of 3-D objects using Solid Works
  - Developing mechanical drawings from SolidWorks models
  - Finite Element modeling using CosmosWorks
  - Using Matlab to post-process finite element results
- Independent Design Project. Each student will pursue an independent project, which must include the following:
  - Define requirements
  - Preliminary design and analysis
  - Detailed design
  - Fabrication and test plan

  The independent projects will provide each student with the opportunity to develop a systems engineering plan and to make reports and presentations.

Each person will be expected to actively review their colleagues' work. In this way, each student will learn about particulars from a variety of projects.

Grading:
The grading for this class follows the rules below:

For each major report (There should be a total of 8)

15 points for excellent
10 points for adequate
5 points for incomplete
0 points if no submission

-5 Any time a student is called upon in class and is not prepared or is absent (without excuse).

Grades are assigned accordingly:

A : >89, B : 80-89, …

Special issues for DL students:

1. Participation

Local students will not submit interim work, but must be prepared to discuss it in class. Distance learning students are required to submit interim work. The expectations will be defined in class and documented on the class web site. Submissions should be made to optomech.optics.arizona.edu. In some cases, there is no written assignment *per se*, but rather something like "Review properties of optical glass." For these, distance learning students should take what action seems appropriate, then simply send a brief note to Optomech with information about the action taken. The goal is not to add a reporting requirement, but simply to help keep all students on track.

The interim work does NOT need to be polished. If it is not complete, then the student needs to explain the difficulty.

We assume that the DL students may lag the regular class by up to 1 week, so the interim reports can be submitted up to 1 week after the date in the class calendar.

2. Software

We can help you to purchase the software that we use on campus, but we cannot provide it. You should feel free to choose other software. We will use Solid Works and Matlab in this class.

3. Projects

You will choose you own project. You should make it relevant to your work. For the class, you will be required to make presentations to your peers. You should schedule these yourselves with the appropriate group of peers. They will grade you according to a supplied rubric. You will also be required to submit your presentations and reports for grading. I will post these things on our web site.