OPTI 423/523- Optomechanical Design and Analysis

Course Description:
Principles that were taught in OPTI 421/521(Introductory Opto-Mechanical Engineering) will be applied to develop designs and perform detailed analysis of optomechanical systems. Prerequisite: OPTI421 or OPTI521

Textbooks:
- Vukobratovich, D. and S. Introduction to Opto-Mechanical Design.
- Burge, J. H. OPTI 421/521 Course Notes.

Grading Policy:
Final grades are based on approximately ten major reports. Each report is evaluated using the following scale:
- 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)

Students will always have the ability to correct and re-submit assignments. Excellence is expected. 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.

Undergraduate students will have similar design projects as those for the graduate students, but the scope of the undergraduate projects will be reduced. The independent projects will provide each student with the opportunity to develop a systems engineering plan and to make reports and presentations.

This is a design class. You will prepare requirements, preliminary designs, and final designs that will be submitted and graded. Most of class time will be spent discussing your designs and their issues. Students will be called on at random to present their work, and so must be prepared. If the student is absent (without excuse) or unprepared, the grade will suffer. Class participation is critical!

Outline
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 within SolidWorks
• 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