

OPTI 421/521

Introductory Opto-Mechanical Engineering

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This is an introductory course that covers the basic principles of opto-mechanical engineering. It is taught for students that are familiar with optical systems, yet may have little mechanical engineering experience. This class will meet three times per week for 50 minute lectures. The emphasis in this class is on practical engineering issues.

Grades

OPTI 421 (undergraduate)

Grades in this course will be derived half from exams (two mid-terms and a final) and half from regular homework, reports, and quizzes. The homework solutions will typically be submitted as complete informal technical reports. These will be graded on presentation as well as content.

OPTI 521 (graduate)

For graduate credit, graduate status and additional work will be required. Additional homework and exam problems may be required. Two additional reports will be assigned over the semester. These will require independent research or design. One class presentation will be required. The 521 grades will use the following weights: 40% homework, 20% midterms, 20% final, and 20% for the reports.

Textbooks:

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

Vukobratovich, D. and S. *Introduction to Opto-Mechanical Design* will be handed out on CD.

Notes

Class notes will be posted on the class web site www.optics.arizona.edu/optomech

Syllabus

The class is divided into three, roughly equal parts:

I Review of optics from a mechanical perspective

- Review of first order optics – emphasizing coupling of imaging relationships to mechanical motion
- Use of fold mirrors and prisms
- Metrics for performance of optical systems (covered more extensively in 415/515)
- Tolerancing of optical systems
- Specification of optical components (covered more extensively in 415/515)
- Introduction to mechanical modeling with SolidWorks
- Mechanical drawings
- Fabrication issues and limitations

II Introductory engineering mechanics

- Introductory engineering mechanics – statics
- Introductory engineering mechanics – deflections
- Introduction to finite element modeling
- Introductory engineering mechanics – thermal effects
- Vibration isolation
- Materials – Engineering properties

III Topics in optomechanical engineering

- Kinematic systems
- Precision adjustments and motion control
- Mounting of windows and prisms
- Mounting of lenses
- Mounting and interface for mirrors
- Optomechanical system design