Advanced Lens Design
OPTI 696A

Prof. Jose Sasian

Syllabus
Syllabus OPTI 696A

Instructor:
• Jose Sasian
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• OSC Room 305
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Course goals:
• To learn advanced lens design methods.

Schedule:
• T-Th 2 PM to 3:15 PM

Grade
• Based on HW and on watching all lectures.
• Must watch all lectures.
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References:
• Class notes in the course Web site
• Introduction to aberrations in optical imaging systems, J Sasian, Cambridge University Press
• Introduction to Lens Design, J Sasian, Cambridge University Press
• http://fp.optics.arizona.edu/sasian/opti696A/

Office hours
• By email appointment
Learning Outcomes

• Explain optical specifications and the compliance matrix
• Explain and design apochromatic objectives
• Explain lens athermalization
• Produce ghost image analysis
• Explain and produce uniform illumination using LEDs and Gaussian beams
• Explain and apply the method of confocal mirror design
• Explain and design lenses without ghost images
• Produce stray light analysis
• Explain aberrations in non-axially symmetric systems
• Explain the irradiance function
• Explain and design zoom lenses
• Desensitize a lens for tolerances
• Explain optical drawings
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Topics

• Design of apochromats and super-achromats
• Lens athermalization; opto-thermal coefficient
• Optical drawings; lens specifications
• Ghost image analysis
• Radiometry of a lens system
• Gaussian to flat-top lenses
• Uniform illumination LED lenses
• Aberrations of non-axially symmetric systems
• Method of confocal mirror design
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Topics

• Designing with off-the-shelf lenses
• Miniature lenses: mobile phone lenses, microscope objectives, endoscope lenses
• Tolerancing and lens de-sensitization
• Zoom lenses
• Mirror systems
• Catadioptric systems
• Lenses for micro-lithography
• Polarization aberrations
• Guest lecturers
Books about design

Accessibility and Accommodations

At the University of Arizona, we strive to make learning experiences as accessible as possible. If you anticipate or experience barriers based on disability or pregnancy, please contact the Disability Resource Center (520-621-3268, [https://drc.arizona.edu/](https://drc.arizona.edu/)) to establish reasonable accommodations.
Academic Integrity

- **Academic Integrity**
  According to the Arizona Code of Academic Integrity (http://dos.web.arizona.edu/uapolicies/cai2.html), “Integrity is expected of every student in all academic work. The guiding principle of academic integrity is that a student’s submitted work must be the student’s own.” Unless otherwise noted by the instructor, work for all assignments in this course must be conducted independently by each student. **CO-AUTHORED WORK OF ANY KIND IS UNACCEPTABLE.** Misappropriation of exams before or after they are given will be considered academics misconduct.

  Misconduct of any kind will be prosecuted and may result in any or all of the following:
  * Reduction of grade
  * Failing grade
  * Referral to the Dean of Students for consideration of additional penalty, i.e. notation on a student’s transcript re. academic integrity violation, etc.

**Students with a Learning Disability**
If a student is registered with the Disability Resource Center, he/she must submit appropriate documentation to the instructor if he/she is requesting reasonable accommodations. (http://drc.arizona.edu/instructor/syllabus-statement.shtml).