Lens Design OPTI 517
Syllabus

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http://wp.optics.arizona.edu/jsasian/courses/opti-517/

Course Goal
To learn the skill of lens design. For this there will be a significant amount of practical lens design homework.

Schedule
M-W-F 9:30 AM to 10:45 AM

Office hours
By email appointment

Homework
There are nine homework sets. Each homework set must be organized, clear, and neatly presented as if it were intended for a customer or your supervisor.
There will be one week of grace period to turn in the HW's. After that there will be a 20%, HW grade, penalty for each week that the HW is late starting from the due date. All materials, including the class summary must be turned in by the last day of classes, sharp at 5:00 PM. No exceptions here. The grace period will not apply for any HW for those asking for an incomplete.

Exams
There will be only a midterm exam.

Final grade
Will be based on the sum of all the homework points, the midterm exam, and the course summary
Homework 55%
Midterm exam 45% (around October/November)

Software
Codev, Radiant-Zemax/optics studio, Oslo, Synopsys, Optalix
Must get on board asap!

OPTI517 Lectures

- Imaging
- Review of first-order optics
- Aberration theory I
- Aberration theory II
- Higher order aberrations
- Control of spherical aberration
- Ray tracing
- Chromatic aberrations I
- Chromatic aberrations II
- Control of coma
- Control of astigmatism, field curvature and distortion
- The Brownie camera
- Image evaluation
- Periscope lens
- The Petzval portrait lens
- Diffractive lenses
- Lens optimization
- Cooke triplet
- Double Gauss
- Pupil effects
- Tolerancing I
- Tolerancing II
- A periscope lens design
- Lens manufacturing

OPTI517 Demos

- How a lens design program works
- Oslo
- Code v
- Zemax- optimization
- Lens for laser diode collimating
- Critical air-space doublet
- Dall and Offner null correctors
- Monochromatic quartet achromatization
- Shupman medial telescope
- Maksutov, Houghton, and Schmidt cameras
- Landscape lens, Chevalier, periscope lens
- Petzval portrait lens and field flattener
- Phase, hologram, and Sweatt models
- Rapid rectilinear, meniscus and landscape lens
- Protar and optimization hints
- New-achromat and Schroeder lens
- Cooke triplet and as telecentric lens
- Double Gauss and derivatives
- Tessar lens
- Tolerancing
- A periscope design
- Lenses for microlitography

OPTICS 517

- the field
- developing a skill
- the theory
- the program
- the experience

References

R. R. Shannon, ‘The art and Science of Optical Design,
’ Cambridge University Press 1997.
Kingslake-Johnson, ‘Lens Design Fundamentals,’ Elsevier.
M. J. Kidger, “Fundamental Optical Design,” SPIE Press, 2002.
M. J. Kidger, “Intermediate Optical Design,” SPIE Press, 2002.

Other references

Welford, Aberrations of optical systems
Laikin, Lens Design
Smith, Modern Lens Design
Malacara and Malacara, Handbook of lens design
Korsch, Reflective optics
Kingslake, Optical system design
Kingslake, History of the photographic lens
Cox, A system of optical design
Slyusarev, Aberration and optical design theory
MIL-HDBK 141, Optical design
SPIE, Critical Review 41, Lens Design
International Lens Design Conference Proceedings
Schott: Optical Glass Catalogue

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 c onducted 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).