

## Geometrical Optics

1051-303

Winter 2005/06

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**OVERVIEW:** This course introduces the description of optical imaging systems based on the ray model of light. Topics include refraction, reflection, prisms, imaging with lenses, stops and pupils, and optical system design using computer software.

**REQUIRED TEXT:** *The Geometrical Optics Workbook*, by D. Loshin (Butterworth-Heinemann)

Also helpful: *Geometrical, Physical, and Visual Optics* by Keating (Butterworth-Heinemann)

### COURSE OUTLINE & TENTATIVE SCHEDULE

#### Topics:

Week 1	Wave and ray representation of light; definitions & conventions
Week 2	Laws of reflection & refraction
Weeks 3, 4	Prisms
Weeks 4, 5	Curved refracting surfaces
Weeks 6, 7	Thin lenses
Weeks 7, 8	Thick lenses & thin lens combinations
Week 9	Plane and curved mirrors; aberrations
Week 10	Stops and pupils; introduction to the MTF

#### Laboratory Experiments:

Week 1	Pinhole camera: geometry and blur
Week 2	Snell's law, dispersion, and prisms
Weeks 4, 5	Methods of measuring lens power (two-part lab)
Week 6	Thin-lens combinations & telescopes
Week 7	Measurement of aberrations
Week 8	Introduction to lens design using OSLO
Weeks 9-11	FINAL PROJECT: Optical systems: simulated vs. real (using OSLO)

#### **Final grade composition**

30% Homework (quasi-weekly assignments)

25% Lab reports

30% Exams (weeks 5 and 10)

15% Final Project