

**Optics**  
**Spring 2006**

**Text: Optics, Hecht (4<sup>th</sup> Ed)**

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**Assignments for week of 1/16/06**

**Monday:** After class, read chapter 1 and chapter 2.1 to 2.4. Problem 1 of set 1 should be done by Wed.

**Wed:** Read sections 2.5 to 2.7. Work on other problems in set 1.

**Laboratory:** Experiments on E & M radiation. Microwaves and sound wavelength determination. Lecher Wire experiment. Reflection in coaxial cable (open and closed end)

**Friday:** Study 2.8 to 2.10. Turn in problems in set 1.

**Assignment for week of 1/23/06**

**Monday:** Continue above

**Wed:** read 3.1-3.3.2. Do problems 3.2,3.5,3.6

**Wed: Laboratory:** Doppler effect with ultrasonic waves. Intensity variation for spherical and cylindrical waves.

**Friday:** Read 3.3.3-3.4.3. Do problems 3.23, 3.31, 3.32, 3.29

**Assignment for week of 1/30/06**

**Monday:** Read 3.4.4 - 3.7. Do 3.38,3.40,3.36,3.57

**Wed:** Read 4.1-4.4.1. Do 4.2,4.3,4.4,4.7,4.15

**Laboratory:** Experiments on ray optics.

**Friday:** Read 4.4.2-4.5 Do 4.24,4.26(error in answer),4.32,4.35

**Assignment for week of 2/6/04**

**Monday:** Read 4.6.1-4.6.2. Do 4.37,4.39,4.40

**Wed:** Read 4.6.3. Do 4.41,4.45,4.46,4.50, 4.66

**Laboratory:** Experimental investigation of Fresnel's equations. Rainbows, Haloes and Mirages (lab, thanks to Gerencher)

**Friday:** Read 4.7-4.8 Do 4.41,4.52,4.57,4.60

**Assignment for week of 2/13/06**

**Monday:** Read 4.7-4.8 Do 4.61,4.77,4.78

**Wed:** Read 4.9-4.11. Do 4.52,4.68,4.69

**Laboratory:** Speed of light with pulsing laser. Evanescent wave with microwaves.

**Friday:** Read 5.1- 5.2.2. Do 5.1,5.7,5.8

**Assignment for week of 2/20/06**

**Monday:** Continue 5.2.2 and problems.

Exam 1 Chapters 2 to 4. In class and take-home next Monday.

**Wed:** Read 5.2.3 Do 5.10, 5.20, 5.22, 5.43

**Laboratory:** Geometrical Optics, beam expander, Gaussian profile

**Friday:** Read 5.3-5.4 Do 5.44,5.47,5.68,5.76

**Assignment for week of 2/27/06**

**Monday:** Exam 1 Chapters 2 to 4. In class and takehome

**Wed:** Stops and Mirrors 5.3-5.4

**Laboratory:** Continue previous experiments and do experiments with prisms, the spectrometer.

**Friday:** Read 5.5 Do 5.71,5.79,5.86

**Assignment for week of 3/6/06**

**Monday:** Matrix methods of geometrical optics. Notes will be supplied.  
Repeat 5.7,5.8,5.10 using matrix methods.

**Wed:** Solution to problems and Exam 1  
Examples of matrix solutions.

**Laboratory:** Aberrations, Coma and Astigmatism. See p.253-263. Start lab on polarization

**Friday:** Read 7.1-7.2 Do 7.3,7.4,7.6,7.11,7.22,7.29

**Assignment for week of 3/13/06**

**Monday:** Go over material of 8.1-8.6 do 8.3,8.10,8.13,8.16

**Wed:** read 8.7-8.9 Do 8.18,8.20,8.21,8.25

**Laboratory:** Elliptical polarization of microwaves, half and quarter wave retarders..

**Friday:** Jones vectors and Jones matrices. Do handout problems on Jones matrices. Also 8.60, 8.69, 8.70, 8.72

**Assignment for week of 3/20/06**

**Monday:** Stokes vectors and Mueller matrices. Do 8.57, 8.58, 8.59, 8.61

**Wed:** Read 9.1-9.3 Do 9.2, 9.3, 9.4, 9.8, 9.10

**Laboratory:** Continue polarization experiments. Interference: Young's double slit, Michelson interferometer

**Friday:** Read 9.4-9.5. Do 9.12, 9.24, 9.25, 9.27

**Assignment for week of 3/27/06**

**Monday:** Read 9.6. Do 9.34, 9.35, 9.37, 9.40

**Wed:** Read 9.7-9.8 : 9.41, 9.46, 9.31,

**Laboratory:**, Interference: single slit, double and multiple slits. Fabry Perot interferometers (scanning Fabry Perot with laser beam)

**Fri:** Read 10.1-10.2.2 Do 10.2, 10.3, 10.6, 10.7

**Assignment for week of 4/3/06**

**Monday:** Exam 2

**Wed:** Read 10.2.3-10.2.5

**Laboratory:** Babinet compensator, Scanning interferometer, single slit intensity distribution.

**Fri:** continue 10.2.-10.2.3 Do 10.9, 10.10, 10.12

**Assignment for week of 4/10/06**

**Monday:** 10.2.4-10.2.5

**Wed:** Read 10.2.8 Do 10.33, 10.34, 10.38

**Laboratory:** Diffraction grating,

**Fri:** Read 10.3-10.3.4 Do 10.39, 10.41,

**Assignment for week of 4/17/06**

**Monday:** No class

**Wed:**

**Laboratory:** Zone plates with microwaves and light.

**Friday:** Read 10.3.5-10.3.6 Do 10.43, 10.46,

**Assignment for week of 4/24/06**

Monday: Read 10.3.7-10.3.8 Do 10.45 (use the web. ) 10.47,10.49

Wed: Read 10.3.8-10.3.10 Do 48,10.52

Laboratory: **Turn in laboratory experiments**, Laser stability

Friday: Course evaluation and review for final.

**Syllabus will be continued week by week**

Grades will be determined by 25% problem solutions, 25% exams, 25% laboratory and 25% final exam.

Problem solutions are to be your own work and cooperation with other students is not permitted and will be considered cheating. Help with problems is only available from the instructor.

Attendance of lectures is important since new material, problem solutions, different approaches from that of the text and computer instructions will be presented during this time.

Students work at their own pace in the laboratory and must complete all experiments. Laboratory attendance is required since explanations and procedures will be presented at the beginning of the laboratory period and can not be repeated.