

**Optics
Fall 2011**

Text: Optics, Hecht (4th Ed)

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Assignments for week of 8/29/11

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.

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

Assignment for week of 9/5/11

Monday: no class

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 9/12/11

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

Wed: 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 9/12/11

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

Wed: Laboratory: Experimental investigation of Fresnel's equations.

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

Assignment for week of 9/19/11

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

Wed: 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 9/26/11

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

Wed: 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 10/3/11

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

Wed: Stops and Mirrors 5.3-5.4

Wed: 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 10/10/11

Monday: no class

Wed: Matrix methods of geometrical optics. Notes will be supplied. Repeat 5.7,5.8,5.10 using matrix methods. Examples of matrix solutions.

Wed: 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 10/17/11

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

Wed: 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 10/24/11

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

Wed: 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 10/31/11

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,

Wed: 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 11/7/11

Monday: Exam 2

Wed: Read 10.2.3-10.2.5

Wed: 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 11/14/11

Monday: 10.2.4-10.2.5

Wed: Read 10.2.8 Do 10.33,10.34, 10.38

Wed: Laboratory: Diffraction grating,

Fri: Read 10.3-10.3.4 Do 10.39,10.41,

Assignment for day of 11/21/11

Monday: Read 10.3.5-10.3.6 Do 10.43,10.46

Assignment for week of 11/28/11

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

Wed: Laboratory: Zone plates with microwaves and light.

Turn in laboratory experiments, Laser stability

Friday: Topics to be assigned if time permits

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.

Course Objectives:

- **Students should be able to understand the theoretical developments of optics and the interaction of radiation with matter.**
- **Students should be able to demonstrate a knowledge of proper optical laboratory techniques.**
- **Students should be able to solve problems in optics at the appropriate mathematical level.**

“Students who wish to request accommodations in this class for a disability should contact Mr. Joe Kempfer, Assistant Director of Learning Services for Disability Support, 1307 Main Street (extension 1510). Accommodations cannot be provided until authorization is received from the office of Learning Services.”