

**OPH 141
OPTICAL THEORY I**

COURSE DESCRIPTION:

Prerequisites: Enrollment in Opticianry or Optical Apprentice Certificate programs, MAT 070 or satisfactory score on placement test or OPH 101

Corequisites: MAT 121

This course introduces the principles of optics and ophthalmic lens design. Topics include basic theory and basic optical formulas. Upon completion, students should be able to use the metric system, define basic optical terms, and perform basic optical calculations. Course Hours Per Week: Class, 3. Semester Hours Credit, 3.

COURSE OBJECTIVES:

Upon completion of the course, the student will be able to:

- a. Use the metric system.
- b. Describe refraction at an interface.
- c. Define ophthalmic terms.
- d. Perform basic optical calculations.
- e. Discuss spherical and astigmatic refractive errors of the eye.
- f. Identify information contained in a written prescription for eyeglasses.
- g. Discuss basic cylinder optics.
- h. Use the optical cross.
- i. Use prism formulas.

OUTLINE OF INSTRUCTION:

- I. Theories of light
 - A. History
 - B. Definition of light
- II. Refractive Errors
 - A. Major parts of the eye
 - B. Emmetropia
 - C. Ametropia
 - 1.) Hyperopia
 - 2.) Myopia
 - 3.) Astigmatism
 - 4.) Presbyopia
- III. Lens measurements and terminology
 - A. Standard abbreviations and optical terms
 - B. Metric system
 - C. Dioptric definitions.

- IV. Single vision lens design
 - A. Flat and bent designs
 - B. Compound lens designs
 - C. Characteristics of single vision lenses
 - D. Optical cross

- V. Refraction at an interface
 - A. Definition.
 - B. Index of refraction
 - C. Snell's law.

- VI. Basic optical formulas
 - A. Focal length and power
 - B. Nominal power
 - C. Oblique meridian
 - D. Flat transposition
 - E. Lensmakers formula
 - F. Prentice's rule
 - G. Vertex distance compensation
 - H. Front and back vertex power

- VII. Prisms
 - A. Definitions & formulas
 - B. Characteristics of prisms
 - C. Use of prisms
 - D. Monocular and binocular effects of prisms
 - E. Fresnel prisms and lenses
 - F. ANSI standards for prism

REQUIRED TEXTBOOK AND MATERIALS:

Brooks and Borish. System for Ophthalmic Dispensing. 2nd ed. Butterworth-Heineman, 1996.

Stoner & Perkins. Optical Formulas Tutorial. Butterworth-Heinemann, 1997.

SUGGESTED REFERENCES:

Fannin and Grosvenor. Clinical Optics. Butterworth, 1997.

Brooks. Understanding Lens Surfacing. Butterworth-Heinemann, 1992.

STATEMENT FOR STUDENTS WITH DISABILITIES:

Students who require academic accommodations due to any physical, psychological, or learning disability are encouraged to request assistance from a disability services counselor within the first two weeks of class. Likewise, students who potentially require emergency medical attention due to any chronic health condition are encouraged to disclose this information to a disability services counselor within the first two weeks of class. Counselors can be contacted by calling 919-536-7207, ext. 1413 or by visiting the Student Development Office in the Phail Wynn Jr. Student Services Center, room 1209.