

**J. Sargeant Reynolds Community College
Course Content Summary**

Course Prefix and Number: OPT 121

Credits: 3

Course Title: Optical Theory 1

Course Description: Introduces theory and application of ophthalmic lenses. Presents history, basic manufacturing, and quality standards of ophthalmic lenses, propagation of light, refraction, and dioptric measurements, true power, surface power, nominal lens formula. Explains lens makers' equation, boxing system, spherical lens design, fundamental aspects of cylindrical lenses, spherocylinder lens design, and flat and toric transposition. Lecture 3 hours per week.

General Course Purpose: This course is designed to provide Opticianry students with knowledge of optical theory principles to function as effective opticians.

Course Prerequisites and Co-requisites:
None

Student Learning Outcomes:

Upon completing the course, the Opticianry student will be able to

- a. Use basic algebraic and trigonometric procedures to calculate direction and vergence of light rays;
- b. Explain the theories and laws of light, including refraction, reflection, and absorption;
- c. Use Snell's Law to calculate the angle of refraction and reflection of light rays;
- d. Calculate the focal length of a lens using the lens maker's equation and the thin lens equation;
- e. Calculate lens power in primary meridians of a lens using the optical cross; and
- f. Compensate for changes in vertex distance.

Major Topics to Be Included:

- a. The Big Picture – The Three O's
- b. Basic math review
- c. Theories of Light
- d. Absorption, refraction and reflection
- e. Snell's Law, Focal Length and Power
- f. Refraction through a lens/lens characteristics
- g. Basic optical formulas
- h. Transposition and compound lenses, prescription notation, spherical equivalent
- i. Vertex compensation
- j. True and marked power

Date Created/Updated (Month, Day, and Year): December 6, 2019