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, and nominal lens formula. Explains lens makers' equation, boxing system, spherical lens design, fundamental aspects of cylindrical lenses, sphero-cylinder lens design, and flat and toric transposition. Prerequisite or Co-requisite: MTH 126. 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 Objectives:
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. Utilize the metric system and formulas to calculate lens powers.
d. Demonstrate knowledge of lens characteristics, forms, and shapes, and the refractive errors they correct.
e. Calculate lens power in primary meridians of a lens using the optical cross.
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

Effective Date of Course Content Summary: September 1, 2013