

**RARITAN VALLEY COMMUNITY COLLEGE  
ACADEMIC COURSE OUTLINE**

**OPTH 120 PRINCIPLES OF OPTICS**

**I. Basic Course Information**

A. Course Number and Title: OPTH 120 PRINCIPLES OF OPTICS

B. Modified Course

C. Date of Proposal: Semester: Fall      Year: 2025

D. **Effective Term: Fall 2026**

E. Sponsoring Department: Health Science Education

F. Semester Credit Hours: 3

G. Weekly Contact Hours: 3      Lecture:3

Lab: 0

Out of class student work per week: 6

H.  Prerequisite (s): grade of C or higher in OPTH 100 Ophthalmic Materials I and OPTH-101 Ophthalmic Materials II Lecture

Corequisite (s): OPTH- 111 Ophthalmic Dispensing I – Lecture

H. Additional Fees: No

**II. Catalog Description**

Prerequisites: grade of C or higher in OPTH 100 Ophthalmic Materials I and OPTH 101 Ophthalmic Materials II Lecture

Co-requisites: OPTH 111 Ophthalmic Dispensing I – Lecture

This course includes the study of the concepts of geometric optics, and the principles and nature of light. These principles are applied in the study of how

light behaves in practical optical systems including lenses, spherical and plane mirrors, Galilean and astronomical telescopes, prisms and the human eye.

### **III. Statement of Course Need:**

- A. This is a required course for the Ophthalmic Science-AAS degree, and Ophthalmic Science (Opticianry) Certificate- Apprenticeship Option.
- B. This course is not designed for transfer.

### **IV. Place of Course in College Curriculum**

- A. Free elective.
- B. This course will serve as a required course for the Ophthalmic Science-AAS degree, and Ophthalmic Science (Opticianry) Certificate-Apprenticeship Option. It is suggested that the course be taken in the student's third semester.

### **V. Outline of Course Content**

- A. Nature of light, wave theory vs. corpuscular theory, history, terminology, velocity, frequency, period, wavelength, constructive and destructive interference, refraction, index of refraction, critical angle of refraction, dispersion, total internal reflection.
- B. Plane mirrors, law of reflection, image formation, electromagnetic spectrum, ultra-violet radiation and ocular damage, absorptive lenses, CPF lenses.
- C. Shadows, penumbra, umbra, types of light sources, illumination, foot candles, lumens, luminous flux, spherical mirrors – concave and convex, case studies, image formation, magnification and minification, field of view, calculations, cylindrical mirrors, parabolic mirrors.
- D. Dispersion, nu valves, specific gravity, axial chromatism, fraunhofer lines, achromatic doublets, prism, angular deviation, linear displacement, strabismus.
- E. Thin lenses, case studies, image formation, concave and convex lenses, magnification and minification, calculations, focal length, focal plane, focal point optical center, optical axis, vergence, surface power, thin lenses in contact.
- F. Combinations of thin lenses, intermediate image method calculation, sign conventions, final image formation, magnification and minification, telescopes, applications, and calculations.

- G. Lens aberrations – chromatic, coma spherical, curvature of field, distortion, marginal astigmatism, lensmaker equation, afocal lenses, iseikonic lenses, aniseikonia, antimetropia, anisometropia, back vertex power, astigmatic lenses, retinal image size.

## **VI. A. Course Learning Outcomes**

**At the completion of the course, students will be able to:**

1. Analyze the image formation in lenses and lens systems (GE-2).
2. Analyze the image formation in plane and spherical mirrors (GE-2).
3. Demonstrate an understanding of the history, principles and characteristics of light propagation and its interaction with objects.
4. Explain the concepts of illumination and shadow formation and their application to ophthalmic prescriptions.
5. Calculate the image formation of various basic optical systems including, but not limited to thin lenses, spherical mirrors and prisms.
6. Calculate the image formation of more advanced optical systems including but not limited to afocal lenses, thin lens systems, telescopes, astigmatic lenses and retinal image size.
7. Explain the cause and concept of Abbe values and their impact on the fitting of ophthalmic lenses.
8. Explain the nature, cause, and treatment of ophthalmic lens aberrations.
9. Establish competency for the geometric and physiological optics portion of the New Jersey Ophthalmic Dispensing State Board Exam.

## **B. Assessment Instruments**

1. research paper
2. written examinations

## **VII. Grade Determinants**

- A. research paper
- B. written examinations

Given the goals and outcomes described above, LIST the primary formats, modes, and methods for teaching and learning that may be used in the course:

- A. Lecture/discussion
- B. Small group work
- C. Computer assisted instruction

### **VIII. Texts and Materials**

- A. course supplement which includes topical information, diagrams and exercises
- B. film and video
- C. web sources
- D. power point presentations

(Please Note: The course outline is intended only as a guide to course content and resources. Do not purchase textbooks based on this outline. The RVCC Bookstore is the sole resource for the most up-to-date information about textbooks.)

### **IX. Resources**

- A. Computer access
- B. Canvas Course
- C. RVCC library

**X. Check One:**  Honors Course  N/A