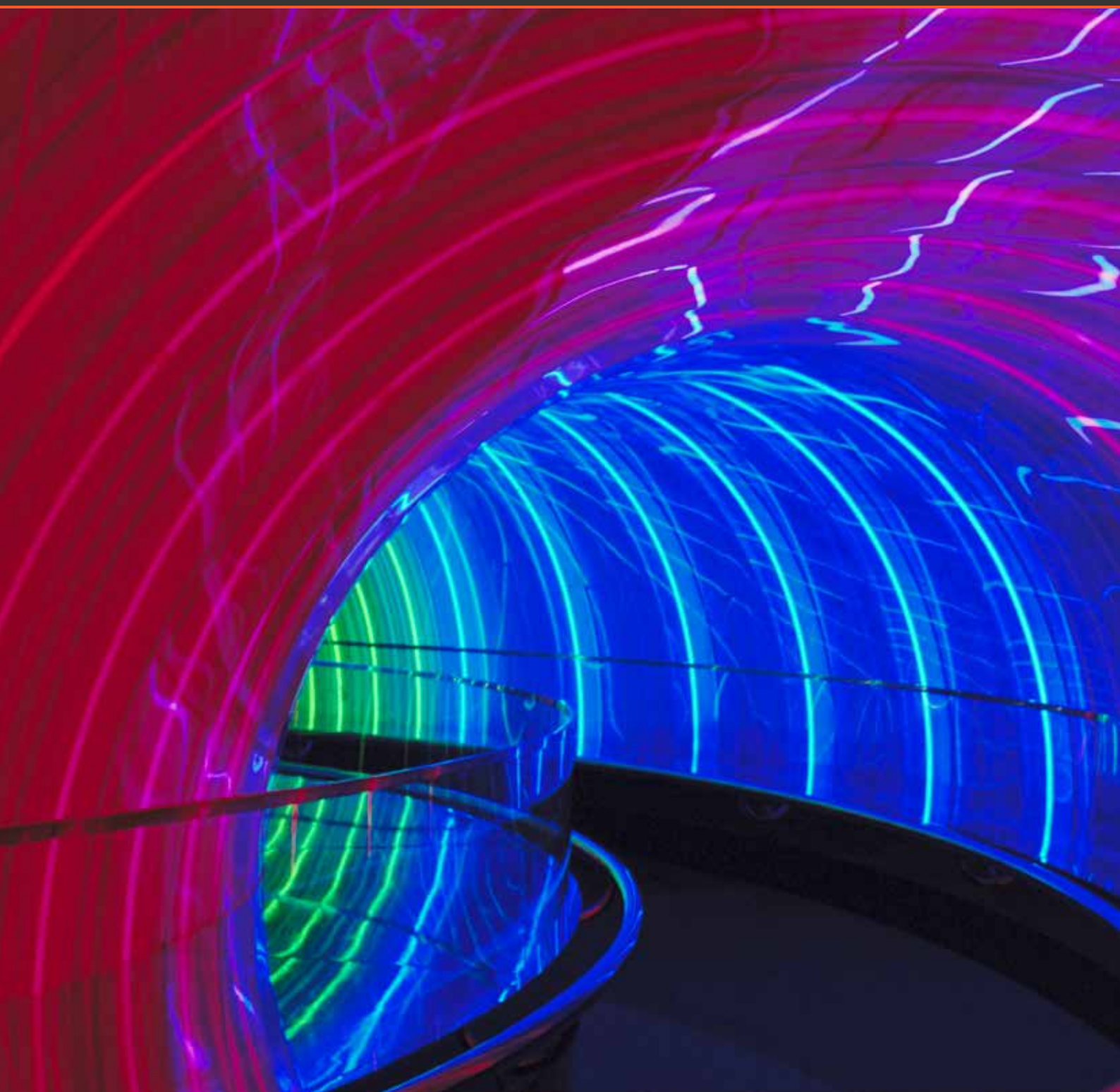
Brien Holden® VISION INSTITUTE ACADEMY

Global Optometry Resources

Geometric and Physical Optics



GEOMETRIC AND PHYSICAL OPTICS

STUDENT MANUAL

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COURSE OUTLINE

COURSE AIM

The aim of this module is to provide the student with a background in the properties and behaviour of light within optical systems that underlie concepts and principles encountered in clinical optometric and visual science modules.

COURSE OBJECTIVES

By the end of this module, the student should be able to:

- explain the principles of focal power and relate them to optical systems of the eye
- describe image formation in thin and thick lens systems
- perform calculations of ray tracing in the optics of thin, thick lenses and lens systems
- describe the behaviour of light in terms of wave theory, interference, diffraction and polarization
- describe aberrations of lens systems and methods for their reduction

COURSE CONTENT

The topics covered in this course include:

INTRODUCTION

1. Nature of light

GEOMETRIC OPTICS

2. Vergence
3. Refraction
4. Thin Lenses I
5. Thin Lenses II
6. Reflection

PHYSICAL OPTICS

7. Interference
8. Photometry
9. Optical Instruments
10. Diffraction and polarisation

COURSE DELIVERY

This module is designed to be delivered over one semester. Total delivery time for Geometric and Physical Optics is 24 hours of lectures.

Learning and Teaching Methods & Resources

The suggested teaching methods for this course include: PowerPoint presentations, tutorials, question and answer sessions, and self-directed study.

Suggested equipment for teaching includes:

- Computer & projector
- White board
- Handouts

RECOMMENDED ASSESSMENT

- Written examination
- Laboratory assignments

TEXT BOOKS

Prescribed texts

- Brien Holden Vision Institute. Global Optometric Resource Modules, Brien Holden Vision Institute; 2014.
- Freeman MH & C Hull, Optics. Butterworth-Heinemann.; 2004.
- Hecht, E. Optics. Addison-Wesley; 2002.
- Tunnacliffe AH and Hirst JG. Optics. 2nd edition. The Association of British Dispensing Opticians. 1996.

Recommended texts

- Keating: Geometric, Physical and Visual Optics. Butterworth-Heinemann; 2002.
- Longhurst RS, Geometrical & Physical Optics. Longman Press 1973.
- Loschin D. The Geometric Optics workbook. Butterworth-Heinemann. 2001.
- Mouroulis P., Macdonald J. Geometrical Optics & Optical Design. Oxford University Press 1/e 1997.
- Pedrotti LS and Pedrotti F. Optics and vision. Prentice Hall. 1998.
- Pritchard DC. Lighting 3/e Longman. 1985.
- Saxby G. The Science of Imaging, an Introduction. Institute of Physics. 1/e, 2002.
- Tilley R. Color and the Optical Properties of Materials, Wiley. 1/e 2002.

USEFUL WEB LINKS

- Physclips, UNSW: http://www.animations.physics.unsw.edu.au/light/
- Ray Tracing app: iPad: https://itunes.apple.com/au/app/ray-tracing-trace-your-rays/id665737348?mt=8
- Dr Bill's Optics Notes (Geometric, Physical, Ophthalmic optics): http://www.drdrbill.com/optics.html

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Tutorial questions also included for all chapters

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