



Brien Holden®  
VISION INSTITUTE

ACADEMY

Global Optometry Resources

## **Ocular Motility and Binocular Vision**



# OCULAR MOTILITY AND BINOCULAR VISION

## STUDENT MANUAL

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# COURSE OUTLINE

## COURSE AIM

This module aims to enable students to gain an understanding of the actions and functions of intraocular and extraocular muscles and their role in binocular vision.

## COURSE OBJECTIVES

On successful completion of this course, the student should be able to understand the neurophysiological basis of eye movements, assess them clinically and manage related anomalies.

By the end of the course the student should be able to:

- Describe the neurophysiological basis of ocular movement
- Explain the relationships of extraocular muscles in eye movement and laws of ocular movement
- Describe the basic principles of binocular vision tests
- Describe eye movement dysfunctions
- Explain the management of eye movement dysfunction.

## COURSE CONTENT

The topics covered in this course include:

### **Basis of ocular movement**

Models of oculomotor control  
Accommodation  
Introduction to eye movements  
EOM dysfunction  
Fixation  
Saccades  
Pursuits  
Vestibulo-ocular reflexes and Optokinetic nystagmus  
Nystagmus  
Reading eye movements  
Evaluation of eye movements

### **Relationships of extraocular muscles in eye movement**

Visual direction  
Motor fusion  
Combined vergences, sensory fusion, horopter  
Empirical horopter  
Hering's laws

**Aspects of binocular vision**

Fixation Disparity  
Binocular summation  
Ocular dominance  
Depth Perception  
Stereopsis  
Rivalry and suppression  
Aniseikonia

**Management of eye movement dysfunction**

Neurophysiology of binocular vision  
Normal development of binocular vision  
Deprivation and binocular anomalies

## COURSE DELIVERY

This module is designed to be delivered over 6 months (1 semester). The total delivery time is 56 hours.

**Learning and Teaching Methods & Resources**

The suggested teaching methods for this course include: PowerPoint presentations, discussions, case studies, demonstrations and clinical placements.

Course resources available at the Brien Holden Vision Institute site: [education.brienholdenvision.org](http://education.brienholdenvision.org).

- Student manual: 37 chapters (listed on p4)
- PowerPoint Presentations corresponding to each of the 37 chapters
  - Chapters 1 - 13 include ocular motility content
  - Chapters 14 – 37 include binocular vision content

Suggested equipment includes

- Computer & projector
- White board

## RECOMMENDED ASSESSMENT

- Written examination
- Lab assignments

## TEXT BOOKS

**Prescribed texts**

- Brien Holden Vision Institute Global Optometric Curriculum Modules, Brien Holden Vision Institute, 2010
- Griffin JF and Grisham JD. Binocular Anomalies: diagnosis and vision therapy. 4th Edition. Boston: Butterworth-Heinemann. 2002.
- Ciuffreda KJ and Tannen B. Eye movement basics for the clinician. St Louis: Mosby. 1995.
- Adler's Physiology of the Eye, 11th Ed. Mosby, St. Louis, 2010.
- Steinman, et al. Foundations of Binocular Vision. New York: McGraw-Hill. 2000.
- Regan D. Vision and Visual Dysfunction: Volume 9 - Binocular Vision. 1991.

- Reading RW. Binocular Vision. Woburn: Butterworth Publishers. 1983.
- Schwartz SH. Visual Perception. A Clinical Orientation. 4th Edition. Connecticut: Appleton & Lange. 2010.
- Kandel ER. Essentials of Neural Science and Behavior, Connecticut: Appleton & Lange. 1995.
- Scheiman M and Wick B. Clinical Management of Binocular Vision: Heterophoric, accommodative, and eye movement disorders. 3rd Edition. Philadelphia: Lippincott Williams & Wilkins. 2009.
- Evans BJ. Pickwell's Binocular Vision Anomalies. 5th Edition. Philadelphia: Butterworth-Heinemann/Elsevier. 2007.

### **Recommended readings**

- Schor CM & Ciuffreda KJ. Vergence eye movements: basic & clinical aspects. London: Butterworths. 1983.
- Goss D. Ocular accommodation, convergence and fixation disparity. A manual of clinical analysis. Butterworth Heinemann. 1995.



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37. Miscellaneous topics



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