

# BROWARD COLLEGE COURSE OUTLINE

**LAST REVIEW: 2009-2010**

**NEXT REVIEW: 2014-2015**

**STATUS: A**

**COURSE TITLE:** ANATOMY AND PHYSIOLOGY OF THE EYE

**COMMON COURSE NUMBER:** OPT 1210

**CREDIT HOURS: 3**

**CONTACT HOUR BREAKDOWN**

**CLOCK HOURS:**

Lecture: **48**

Lab:

Clinic:

Other:

**PREREQUISITE(S):**

**COREQUISITE(S):**

**PRE/COREQUISITE(S):** OPT 1330, OPT 1110 and OPT 1110L

## **COURSE DESCRIPTION:**

This course provides a review of the structure and function of the systems of the human body emphasizing the anatomy and physiology of the human eye. Visual recognition of common eye disorders and refractive disorders are also discussed.

## **UNIT TITLES**

- 1 INTRODUCTION TO HUMAN ANATOMY
- 2 MAJOR HUMAN SYSTEMS
- 3 EYEBALL ANATOMY AND PHYSIOLOGY
- 4 ANATOMY OF THE SKULL AND ORBIT
- 5 BLOOD SUPPLY
- 6 PHOTOCHEMISTRY OF VISION
- 7 NERVOUS SYSTEM
- 8 SENSORY VISUAL PATHWAY
- 9 CENTRAL NERVOUS SYSTEM
- 10 SUPRANUCLEAR MECHANISMS
- 11 PERIPHERAL NERVOUS SYSTEM
- 12 AUTONOMIC NERVOUS SYSTEM
- 13 REFRACTIVE ERRORS

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## OPT 1210

### **Unit 1: INTRODUCTION TO HUMAN ANATOMY**

#### **General Outcome:**

**1.0 The student shall:** be able to list the major body systems, their function, and demonstrate knowledge of the external and internal body structures. be able to list the major body systems, their function, and demonstrate knowledge of the external and internal body structures.

#### **Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 1.1 Define the terms associated with this course.
- 1.2 List and define five directional terms that refer to relative locations of parts of the body.
- 1.3 List and define three planes that divide the body into slices for study
- 1.4 Explain the use of anatomical directions and be able to place any major organ in relation to any other organ.
- 1.5 Be able to label a diagram showing the major organs of the human body.
- 1.6 Be able to describe the functions of the major organs.

### **Unit 2: MAJOR HUMAN SYSTEMS**

#### **General Outcome:**

**2.0 The student shall:** be able to list the major systems of the human body, explain how they interrelate, and list some of the major pathology that can affect them.

#### **Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 2.1 List the functions of the Circulatory system and describe some of the pathology that may be associated with it.
- 2.2 List the functions of the Nervous system and describe some of the pathology that may be associated with it.
- 2.3 List the functions of the Respiratory system and describe some of the pathology that may be associated with it.
- 2.4 List the functions of the Reproductive system and describe some of the pathology that may be associated with it.
- 2.5 List the functions of the Digestive system and describe some of the pathology that may be associated with it.

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### **Unit 3: EYEBALL ANATOMY AND PHYSIOLOGY**

#### **General Outcome:**

**3.0 The student shall:** be able to describe the gross anatomy of the human eye, label a diagram of the structures, and discuss each structures function in the visual process.

#### **Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 3.1 List the three coats of the eye.
- 3.2 List the three spaces found within the eye.
- 3.3 List the three layers of the tear film from anterior to posterior.
- 3.4 List the five layers of the cornea.
- 3.5 Describe the flow of aqueous from its formation to its outflow from the eye.
- 3.6 List the structures found in the anterior segment of the eye.
- 3.7 List the structures found in the posterior segment of the eye.
- 3.8 List the ten layers of the retina.

### **Unit 4: ANATOMY OF THE SKULL AND ORBIT**

#### **General Outcome:**

**4.0 The student shall:** be able to list the major parts of the skull and orbit and be able to label a diagram with the seven bones of the orbit.

#### **Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 4.1 Describe the floor of the cranial vault, including the three fossae
- 4.2 Identify the seven bones of the orbit
- 4.3 Identify the three openings into the orbit from the cranial vault
- 4.4 List those vessels and nerves that course through each of the three openings
- 4.5 List those structures that travel through the muscle cone
- 4.6 List and locate the four sinuses that surround the orbit
- 4.7 Describe the nerve fibers that flow through the ciliary ganglion

### **Unit 5: BLOOD SUPPLY**

#### **General Outcome:**

**5.0 The student shall:** be able to list the major parts of and discuss the importance of the cerebral vasculature and blood supply to the eye and orbital contents.

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### **Unit 5:** BLOOD SUPPLY continued

#### **Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 5.1 Trace the blood supply to the brain from the heart.
- 5.2 Explain the relationship between the vertebrobasilar artery system and the internal carotid artery system.
- 5.3 Explain the importance of the circle of Willis.
- 5.4 Identify the various portions of the circle of Willis.
- 5.5 Trace the blood supply to the eye and orbit from the internal carotid artery in the cavernous sinus.
- 5.6 Traces the venous drainage from the eye and its orbit back to the heart.

### **Unit 6:** PHOTOCHEMISTRY OF VISION

#### **General Outcome:**

- 6.0 The student shall:** able to list and discuss the major concepts of photosensitive pigments, nerves, and color vision.

#### **Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 6.1 List and discuss the major concepts of photosensitive pigments, nerves, and color vision.
- 6.2 List four photosensitive pigments.
- 6.3 Compare differences between the rods and cones.
- 6.4 Explain the bleaching process of visual pigments in the retina.
- 6.5 Explain the reformation of visual pigments in the retina.
- 6.6 Discuss light and dark adaptation.
- 6.7 List the primary colors.
- 6.8 Explain hue, saturation, and intensity.
- 6.9 Discuss the various types of color vision deficiencies.
- 6.10 Know how to test for color vision deficiencies.

### **Unit 7:** NERVOUS SYSTEM

#### **General Outcome:**

- 7.0 The student shall:** be able to trace a nerve impulse and to relate this phenomena to the vision process.

#### **Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

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**Unit 7: NERVOUS SYSTEM** continued

- 7.1 Describe the three parts of a neuron.
- 7.2 Define a synapse.
- 7.3 List the sequence of events that occur when a nerve impulse is transmitted from one neuron to another.
- 7.4 Describe the organization of the nervous system.
- 7.5 differentiate sensory, motor, and central mechanisms.

**Unit 8: SENSORY VISUAL PATHWAY**

**General Outcome:**

- 8.0 The student shall:** be able to list and describe the function of the vision pathway from the retina to the visual cortex.

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 8.1 Describe the characteristic patterns of the three basic areas constituting the nerve fiber layer of the retina.
- 8.2 Describe the anatomy of the sensory visual pathway.
- 8.3 Differentiate the composition of the origin of nerve fibers in the prechiasmatal and postchiasmatal portions of the pathway.
- 8.4 Describe the relationship between areas of the visual field and the origin of nerve fibers that represent that area.
- 8.5 Locate nerve fibers in the calcarine fissure in relation to their location in the nerve fiber layer of the retina.

**Unit 9: CENTRAL NERVOUS SYSTEM**

**General Outcome:**

- 9.0 The student shall:** will be able to describe how ocular function is affected by the midbrain, pons , and CN nerves.

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 9.1 Locate and identify the lobes of the brain.
- 9.2 Locate and identify the structures on the undersurface of the brain.
- 9.3 Identify the structures viewed on a midsagittal view of the brain stem.
- 9.4 Relate the structure and function of the pons and midbrain to the eye and orbit.
- 9.5 Explain the relationship of specific areas of the brain to visual function.
- 9.6 Describe the formation and circulation of cerebrospinal fluid.

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**Unit 10: SUPRANUCLEAR MECHANISMS**

**General Outcome:**

**10.0 The student shall:** be able to list the major functions of the eye movement systems and how they relate to normal visual function.

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 10.1 Identify four supranuclear eye movement systems
- 10.2 Discuss difference in function of the four supranuclear eye movement systems
- 10.3 Identify and locate two cortical supranuclear pathways
- 10.4 Identify and locate two subcortical supranuclear pathways
- 10.5 Identify and locate three gaze centers
- 10.6 Discuss eye movement syndromes occurring in the brain stem resulting from damage

**Unit 11: PERIPHERAL NERVOUS SYSTEM**

**General Outcome:**

**11.0 The student shall:** be able to list and describe the function and ocular innervation of the seven cranial nerves that are directly involved with the eye.

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 11.1 Identify the cranial nerves by name and Roman numeral
- 11.2 Describe the location of the cranial nerves that sub serve the visual system
- 11.3 Compare the functions of the cranial nerves that sub serve the visual system
- 11.4 Describe the infra nuclear pathways of the cranial nerves that sub serve the visual system
- 11.5 Explain how the vestibular system interconnects with the ocular motor system

**Unit 12: AUTONOMIC NERVOUS SYSTEM**

**General Outcome:**

**12.0 The student shall:** be able to discuss how the autonomic nervous system controls internal organ function, and how certain classification of drugs affects it.

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

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### **Unit 12:** AUTONOMIC NERVOUS SYSTEM continued

- 12.1 Compare the differences between the sympathetic and parasympathetic divisions of the autonomic nervous system.
- 12.2 Compare the differences between the adrenergic and cholinergic chemical transmitters.
- 12.3 Explain the role of the autonomic nervous system in relation to eye function.
- 12.4 Name four mydriatic drugs.
- 12.5 Name four anticholinesterase drugs.
- 12.6 Name three cycloplegic drugs.
- 12.7 Name three direct adrenergic-agonist drugs.
- 12.8 Name three beta-blocker drugs.
- 12.9 Trace the sympathetic nerve fiber pathways to the eye.
- 12.10 Trace the parasympathetic nerve fiber pathways to the eye.

### **Unit 13:** REFRACTIVE ERRORS

#### **General Outcome:**

- 13.0 The student shall: be able to discuss the refractive conditions of the eye how and how they are classified.**

#### **Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 13.1 Understand and describe the three types of myopia.
- 13.2 Understand and describe the six types of hyperopia.
- 13.3 Understand and describe the ten types of astigmatism.
- 13.4 Understand how the eye's natural lens provides a variable optical power.
- 13.5 Explain the relationship between accommodation and any refractive error.
- 13.6 Explain the effects of age and refractive error on the near point of accommodation.
- 13.7 Compare and contrast simple refractive errors and pathological refractive errors.