Neuroscience Chapter 9 Objectives

1. Understand how wavelengths and frequency of light relate to vision. Understand the concepts of reflection, absorption, and refraction.

2. Be able to identify each of the following structures and understand their function in vision.
   a. Pupil
   b. Iris
   c. Cornea
   d. Fovea
   e. Optic disk
   f. Lens
   g. Aqueous humor
   h. Vitreous humor
   i. Ciliary muscle
   j. Zonule fibers
   k. Retina
   l. Optic nerve
   m. Sclera

3. Understand the basic optical properties that affect how an image in the visual field is projected onto the retina.

4. Understand the basic causes of near-sightedness and far-sightedness and know how they are corrected.

5. Be able to identify the laminae of the retina and know what types of cells and synapses would be found in each layer.

6. Know the basic structure of rods and cones.

7. Know the regional differences in retinal structure and be able to discuss how these differences affect vision, especially motion or lighting difference detection and color vision (partially covered in the textbook).

8. Be able to explain how convergence and spatial summation are related to visual acuity and motion or lighting difference detection (not covered in the textbook).

9. Be able to explain how light is transduced into neural signals. Make sure to understand the differences in photoreceptor activity in the dark and light.

10. How many photons are necessary to lead to transduction in a rod and why (not covered in the textbook)?

11. Be able to explain the Young-Helmholtz Trichromatic Theory and Hering’s Opponent-Process Theory (partially covered in the textbook).

12. Be able to explain receptive fields. Be able to identify the firing patterns of receptive field neurons according to where the light is falling on the receptive field.

13. Be able to explain lateral inhibition (not covered in the textbook).

14. Know the types of retinal ganglion cells.