Special Senses

- Sight
- Hearing
- Equilibrium
- Smell
- Taste

Sensory Receptors

- Photoreceptors
  - Seeing
- Mechanoreceptors
  - Hearing & equilibrium
- Chemoreceptors
  - Smell and taste
- Nociceptors
  - Pain
- Thermoreceptors
  - Temperature

Human Eye Anatomy

- retina
- choroid
- sclera
- retinal blood vessels
- optic nerve
- blind spot
- fovea centralis
- posterior cavity (vitreous humor)
- ciliary body
- lens
- iris
- pupil
- cornea
- anterior cavity (aqueous humor)
Anatomy of the Eye

External and Accessory Structures
- Eye lids
  - Eyelashes
  - Ciliary glands
- Conjunctiva
- Lacrimal apparatus
  - Lacrimal glands

Anatomy of the Eye

Internal Structures: The Eyeball
- Tunics
  - Covering of the eye walls
- Humors
  - Fluid filled interior

Tunics of the Eyeball
- Sclera
- Cornea
- Choroid
  - Ciliary body
  - Suspensory ligament
- Lens
- Iris and Pupil
- Retina
  - Rods and cones
Eye Disorders

- Cataracts
  - Lens becomes hard and opaque
- Glaucoma
  - Drainage of aqueous humor blocked, pressure increases
- Color blindness
  - Lacking one or more cone receptors

Cavities of the Eye

- Anterior cavity
  - Aqueous humor
- Posterior cavity
  - Vitreous humor

Retina Placement

- Retina
- Optic nerve
Retina Anatomy

- Rod and cone layer
- Bipolar cell layer
- Ganglionic cell layer
- Fovea centralis and macula lutea
- Optic disc - Blind spot
- Optic nerve
Visual Pathways to the Brain

- Binocular vision
- Optic nerves
- Optic chiasma
- Optic tracts
- Thalamus
- Visual cortex in occipital lobes
Focusing—General

- Light rays from A converge to B after passing through the eye.
- Inverted image is formed.

Focusing—Far and Near

- Ciliary muscle relaxed:
  - Lens flattened
  - Suspensory ligament taut
  - Focusing on distant object

- Ciliary muscle contracted:
  - Lens rounded
  - Suspensory ligament relaxed
  - Focusing on near object

Nearsightedness

- Long eyeball: rays focus in front of retina when viewing distant object.
- Concave lens allows subject to see distant objects.
Farsightedness

Short eyeball; rays focus behind retina when viewing close objects.
Convex lens allows subject to see close objects.

Two Types of Astigmatism

Uneven cornea; rays do not focus evenly.
Uneven lens allows subject to see objects clearly.

Uneven lens; rays do not focus evenly.
Uneven lens allows subject to see objects clearly.

Anatomy of Ear

ossicles
stapes
incus
malleus
oval window
cochlear nerve
tympanic membrane
cochlea
round window
Anatomy of the Ear

- Outer (external) Ear
  - Pinna
- External auditory canal
- Tympanic membrane
- Middle ear
  - Ossicles - malleus, incus, and stapes
- Eustachian tube
- Inner Ear
  - Cochlea
  - Semicircular canals
  - Vestibule

Inner Ear Anatomy

- Cochlea
  - Organ of Corti
- Vestibule
  - Utricle
  - Saccule
- Semicircular canals
  - Ampullae
  - Vestibulocochlear nerve
Mechanisms of Hearing

- Cochlea
  - Organ of Corti
    - Hair cells
    - Basilar membrane
    - Tectorial membrane
    - Cochlear nerve
    - Round window
    - Oval window
Mechanisms of Equilibrium

- Static Equilibrium
  - Position of the head with respect to gravity
  - Vestibule
- Dynamic Equilibrium
  - Angular or rotational body movements
  - Semicircular canals
Hearing and Equilibrium Deficits

- Deafness
  - Hearing loss of any degree
- Conduction deafness
  - Interference with conduction of sound waves to inner ear
- Sensorineural deafness
  - Damage to receptor cells in Organ of Corti, cochlear nerve, or neurons of auditory cortex
- Equilibrium problems
  - Nausea, dizziness, vertigo

Taste and Smell

- Chemoreceptors
- Olfactory receptor cells
  - Olfactory nerve
- Taste buds
  - Papillae
    - Gustatory cells
    - Gustatory hairs
  - Facial, glossopharyngeal and vagus nerves
Basic Taste Sensations

- Salty
- Sweet
- Sour
- Bitter

Taste Bud Locations on Tongue
The End