Investigate the interrelationship between the structures and functions of the main body systems.
Four Types of Tissues

- Tissues are collections of cells and cell products that perform specific, limited functions

- Types of tissue
  - Epithelial tissue
    - Covers exposed surfaces
    - Lines internal passageways
    - Forms glands

CLE 3251.1.2 Investigate the interrelationship between the structures and functions of the main body systems
Four Types of Tissues

- **Types of Tissue (cont’d)**
  - **Connective tissue**
    - Fills internal spaces
    - Supports other tissues
    - Transports materials
    - Stores energy
  - **Muscle tissue**
    - Specialized for contraction
    - Skeletal muscle, heart muscle, and walls of hollow organs
  - **Neural tissue**
    - Carries electrical signals from one part of the body to another

CLE 3251.1.2 Investigate the interrelationship between the structures and functions of the main body systems
Epithelial Tissues

- **Epithelia**
  - Layers of cells covering internal or external surfaces

- **Glands**
  - Structures that produce secretions

CLE 3251.1.2 Investigate the interrelationship between the structures and functions of the main body systems
Epithelial Tissues

- Characteristics of Epithelia
  - Cellularity (cell junctions)
  - Polarity (apical and basal surfaces)
  - Attachment (basal lamina)
  - Avascularity
  - Regeneration

CLE 3251.1.2 Investigate the interrelationship between the structures and functions of the main body systems
Functions of Epithelial Tissue

- Provide physical protection
- Control permeability
- Provide sensation
- Produce specialized secretions (glandular epithelium)
Epithelial Tissues

- Specializations of Epithelial Cells
  - Move fluids over the epithelium (protection)
  - Move fluids through the epithelium (permeability)
  - Produce secretions (protection and messengers)

- Free Surface and Attached Surface
  - Polarity
    - Apical surfaces:
      - microvilli increase absorption or secretion
      - cilia (ciliated epithelium) move fluid
    - Basolateral surfaces

CLE 3251.1.2 Investigate the interrelationship between the structures and functions of the main body systems
Epithelial Tissues

- Maintaining the Integrity of Epithelia
  - Intercellular connections
  - Attachment to basal lamina
  - Epithelial maintenance and repair

CLE 3251.1.2 Investigate the interrelationship between the structures and functions of the main body systems
Epithelial Tissues

- Attachment to the Basal Lamina

  - **Clear layer** (Lamina lucida)
    - Thin layer
    - Secreted by epithelia
    - Barrier to proteins

  - **Dense layer** (Lamina densa)
    - Thick fibers
    - Produced by connective tissue
    - Strength and filtration

CLE 3251.1.2 Investigate the interrelationship between the structures and functions of the main body systems
Epithelial Tissues

- Epithelial Maintenance and Repair
  - Epithelia are replaced by division of germinative cells (stem cells)
  - Near basal lamina

CLE 3251.1.2 Investigate the interrelationship between the structures and functions of the main body systems
Classification of Epithelia

- Singular epithelium; plural epithelia

Classes of Epithelia

- **Based on shape**
  - Squamous epithelia: thin and flat
  - Cuboidal epithelia: square shaped
  - Columnar epithelia: tall, slender rectangles

- **Based on layers**
  - Simple epithelium: single layer of cells
  - Stratified epithelium: several layers of cells

CLE 3251.1.2 Investigate the interrelationship between the structures and functions of the main body systems
Classification of Epithelia

- **Squamous Epithelia**
  - **Simple squamous epithelium**
    - Absorption and diffusion
  - **Mesothelium**
    - Lines body cavities
  - **Endothelium**
    - Lines heart and blood vessels

CLE 3251.1.2 Investigate the interrelationship between the structures and functions of the main body systems
Classification of Epithelia

- Squamous Epithelia
  - Stratified squamous epithelium
    - Protects against attacks
    - Keratin protein adds strength and water resistance
Classification of Epithelia

- Cuboidal Epithelia
  - Simple cuboidal epithelium
    - Secretion and absorption
  - Stratified cuboidal epithelia
    - Sweat ducts and mammary ducts
Classification of Epithelia

- **Transitional Epithelium**
  - Tolerates repeated cycles of stretching and recoiling and returns to its previous shape without damage
  - Appearance changes as stretching occurs
  - Situated in regions of the urinary system (e.g., urinary bladder)

CLE 3251.1.2 Investigate the interrelationship between the structures and functions of the main body systems
Classification of Epithelia

- Columnar Epithelia
  - Simple columnar epithelium
    - Absorption and secretion
  - Pseudostratified columnar epithelium
    - Cilia movement
  - Stratified columnar epithelium
    - Protection

CLE 3251.1.2 Investigate the interrelationship between the structures and functions of the main body systems
Classification of Epithelia

- Glandular Epithelia
  - Endocrine glands
    - Release hormones:
      - into interstitial fluid
      - no ducts
  - Exocrine glands
    - Produce secretions:
      - onto epithelial surfaces
      - through ducts
Classification of Epithelia

- Glandular Epithelia
  - Types of secretions
    - Serous glands:
      - watery secretions
    - Mucous glands:
      - secrete mucins
    - Mixed exocrine glands:
      - both serous and mucous

CLE 3251.1.2 Investigate the interrelationship between the structures and functions of the main body systems
Classification of Epithelia

- Glandular Epithelia
  - Gland structure
    - **Unicellular** glands
      - **Mucous (goblet) cells** are the only unicellular exocrine glands:
        » scattered among epithelia
        » for example, in intestinal lining

CLE 3251.1.2 Investigate the interrelationship between the structures and functions of the main body systems